with a man who was probably a murderer: that explained everything. The only thought that worried him was whether he was enough of an actor to keep Rixon in ignorance of his impending arrest. Perhaps a tell-tale look or a slip of the tongue might betray the truth, and if Rixon's suspicions were aroused he would be alone with a desperate man—and an armed one, too.

When he came to the place where they had been working, his train of thought was broken off just as a twig is snapped, for there in the distance was Rixon, already several hundred yards away, and pedalling for dear life on the track bicycle, which gathered speed every moment on the steep downward grade.

Uttering an exclamation, Rendell's first impulse was to start off in pursuit, but he soon realised the absurdity of chasing an armed man on a machine. So he came back to where the speeder had been, and here another discovery awaited him.

At the foot of the nearest telephone pole lay

the test set, one of the wires of which had been connected to the line above, while the other trailed away over the track in the direction of the stream, where it had evidently been earthed. In a flash Tom understood what had happened: Rixon had rigged up the test set as soon as he had started for Oak Flat and had overheard the whole of his conversation with the manager. And there were the climbing irons, just where he had thrown them after coming down the pole.

Without waiting a moment he snatched up the test set with the intention of ringing through to the manager, but on looking more closely at the instrument he found that Rixon had rendered it useless, doubtless by hurling it against the rocks after it had served his purpose.

He must get through to the manager, and quickly too. Rixon would probably cut the line, when he had got what he thought was a safe distance.

(Concluded on page 114.)

THE STORY OF COCKALOCKIE.

A FTER an exceptionally exhausting day, Cockalockie crowed his last good-night to the world at large and stumped heavily into the hen-house.

His tired legs begged him to fly up upon the roost, but the extreme dignity of his position prevented him indulging that inclination; such a proceeding would certainly be remarked upon by his household; also, they must on no account guess how tired he was.

Keeping his head high, therefore, he dragged his legs wearily up the steps of the small ladder leading to the roost, and took his place between his two favourite hens.

When his master was at home, Cockalockie and his hens had lacked nothing. Now their master had gone on holiday, leaving them in charge of a friend who knew nothing about them and cared less.

The last few days had proved exceptionally hard for poor Cockalockie. Food was scarce, and he had spent a strenuous time scraping for grubs and stray morsels for his hens.

'Times are changed,' he said to himself, as he preened his feathers for the night, 'but so long as I am able, I will search and scrape and search and scrape.' Then he closed his eyes and pretended to sleep.

Presently he became aware that his companion

on one side was restless. Then came a gentle peck at his neck and a whisper, 'Are you asleep, Cockalockie?'

He opened his eyes and discovered Buffie Brown wide awake.

'No, my dear, I'm not asleep. But why are you awake?'

'I can't sleep, I'm so hungry. Are you?'
'Not especially,' Cockalockie replied,
although he was ravenous. 'Wait until tomorrow,' he continued. 'Perhaps Farmer
Brown will plough that field then, and we'll
have a feed.'

'Oh, I do wish to-morrow would come!' said Buffie.

Just then Fluffie Facie woke up and nestled close to Cockalockie.

'You awake too, Fluffie? What's wrong with you?' said Cockalockie.

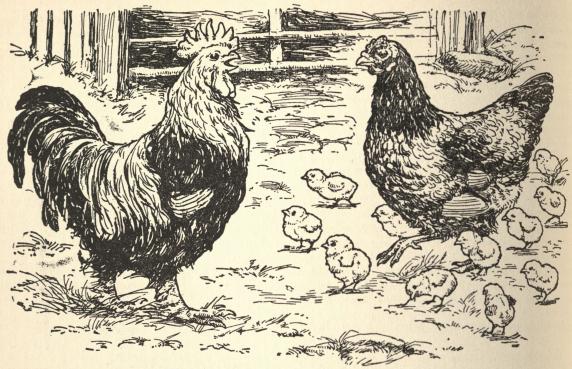
'I've had a most horrible dream about you, Cockalockie—a horrible dream.'

'Why, what was it, wifie?'

'I dreamt you were lying dead in the plantation, and——'

Cockalockie interrupted with a queer little laugh. 'Nonsense, nonsense,' he said, lightly. 'Dreams go by contraries. I'm here all right, Fluff, so don't you worry.'

Fluffie Facie nestled still closer to Cockalockie,



66 6 Why, Mrs. Cluck, this is indeed a delightful surprise."

and went to sleep with her head against his breast.

Next morning Cockalockie remained upon the roost until his household, having consumed the scanty meal, wandered off in twos and threes from the empty trough. Then only did he descend to pick up a stray fragment here and there. But life has compensations; for just outside the farm-yard Cockalockie encountered a sight which made his heavy heart glad: Mrs. Cluck came towards him clicking proudly, with a brood of eleven little fluffy yellow chicks.

'Why, Mrs. Cluck, this is indeed a delightful surprise, and such fine little fellows too,' said Cockalockie with evident pride. Mrs. Cluck clucked still louder and Cockalockie felt overcome with gratitude. The chicks, somewhat awed, pressed close to their mother; while Cockalockie, seeking some means by which to express his joy in the little ones, scraped for dainty morsels for them, calling on them as each grub appeared. He was succeeding very well with his advances. The chicks had quite overcome their primary shyness. They gathered round him, their bright eyes fixed in eager expectancy on the ground. But just then, Farmer Brown's wife came along with a large basket of clothes and scattered the happy family party.

(Concluded on page 111.)

'THIS LITTLE WORLD.'

SOME PORTRAITS OF GREAT BRITAIN. Drawn by J. A. SYMINGTON.

(Continued from page 70.)

MAIDSTONE (population 37,216), the capital of the county, has grown greatly in the last quarter of a century, and, while it still retains many fine old buildings (though it destroyed one of them—the Tithe Barn—a few years ago to ease its huge traffic), it has a

number of very active industries—paper-making, the manufacture of sweets and table delicacies, cement-making, motor-building, brewing, and agriculture generally, among others. It is the centre of the hop and fruit districts. In fact, the old proud proverb about

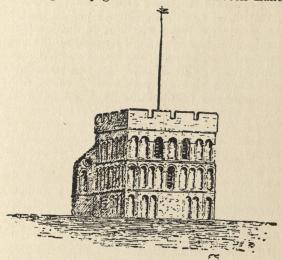
Kent, 'not in Kent, not in Christendom,' might be altered to 'what is not in Maidstone is not in Kent.'

The earliest known inhabitant of Maidstone and of Kent is a fossil iguanodon, who now sleeps in the British Museum. He never saw man, nor man him. The town existed in Roman times, had a Saxon castle, and is in Domesday Book. About 1395 the College (of priests) was founded, and many fine fragments of the buildings are still in use, beautifully situated on the banks of the river of Kent, the Medway. The parish church, All Saints, handsome and very large, was probably first built about the same time. The Archbishops of Canterbury had a palace close by; the present building, still used, was erected in 1560. In the town are many old houses of various dates, and the excellent County Museum has for dwelling a beautiful old half-timbered manor house of the Tudor period, carefully extended in the same style to house the growing and valuable collection of objects and the good library.

The assizes are held here and the County Jail is in the town, with all the County offices of various kinds. There is a cricket week every year on the picturesque ground in Mote Park, a little way out. Near the town is the traditional County meeting-place, Penenden Heath, where for centuries Men of Kent and

Kentish Men have assembled to declare their joy or anger over public events.

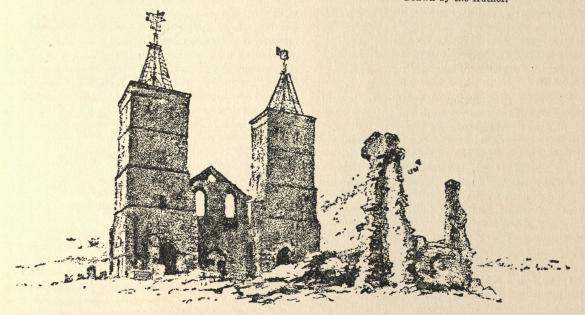
The chief events in Maidstone's public history were its association with the rebellions of John Ball, Wat Tyler, and Jack Cade, and the siege by Fairfax when the Kentish Royalists rose against the Parliament in 1648. He captured the town after very fierce fighting, which possibly gave its name to Havock Lane.



The old Church at Sandwich.

From Towers and Spires, by Canon Tyrrell Green.
(Wells Gardner, Darton & Co., Ltd.).

Drawn by the Author.



RECULVERS TOWERS.

Some smaller places near may be mentioned here. Cricket had a rebel at Sutton Valence (six miles off, population 1174) in John Willes (1777–1852). He revolutionised a great game, for, getting the idea from his sister, 'he was the first to introduce round-arm bowling into cricket.'

At Allington (population 97) there have been castles all through history, on the site of a British village and a Roman villa. Under the Conqueror there was one of wood, under Stephen one of stone. Most of the present building was set up by Sir Henry Wyatt, father of Sir Thomas Wyatt, the poet, and grandfather of the second Sir Thomas, who was beheaded in 1554 for leading a rebellion (with men gathered in Maidstone) against Queen Mary on her marriage with Philip of At AYLESFORD (population 3113) Spain. Roman relics have been found. The Stone Age cromlech, Kit's Coty House, is in the parish, and there was a battle here, somewhere about 455 A.D., between the Britons and Saxons, though some say it took place at Worm Lake, near Sutton Valence. The Mallings (East and West) are great homes of cricket. At West Malling is the old county cricket ground (a fine piece of turf still used for the game), on which Kent beat England in 1839. There is also a considerable portion of the noble priory founded in 1090. Leeds has a very fine old castle begun in the thirteenth century, and surrounded by a moat; it belonged at one time to the family of Fairfax. Battle Hall, close by, is said to date from the time of Edward I.: it still has massive flag-stones for its floor.

Margate (population 46,480) is a notably healthy seaside resort, which has gained nearly 20,000 new inhabitants in the last ten years. Its most famous event was the first appearance of bathing machines in the eighteenth century, when the place got its earliest reputation as a holiday centre. The Margate 'hoy,' on which Charles Lamb wrote a delightful essay, used to bring scores of Londoners down by river and sea, not always so comfortably as in to-day's steamers. W. P. Frith's lively picture of Margate Sands is well-known.

At Garlinge, close to Westgate, which is virtually one with Margate, is the Dandelion Gate—a fine brick building which is all that is left of the once great family of Daundelyon. The name probably comes from Dent-du-lion,

for this family bore three lions rampant on their coat-of-arms. Margate Church contains a brass in memory of its last member, who died in 1445.

The Nore Lightship (first stationed in 1731) is perhaps not in Kent, because it lies in the very middle of the Thames, and the border between Kent and Essex runs midway along the river: the lightship is three miles from either coast, on a sand-bank. The Nore is, so to speak, the geographical mouth of the Thames; the Girdler Lightship (see map) is outside the

Thames, in the North Sea proper.

This was the scene of a famous naval mutiny, in 1797—the Mutiny of the Nore. There had been many fleet mutinies about that time, partly owing to the new ideas just introduced by the French Revolution, but perhaps quite as much to the terrible conditions of an ordinary seaman's life.* The worst revolt was at Spithead, but after that had been put down and concessions made to the crews, the section of the fleet stationed at the Nore broke into mutiny independently. The rising created great alarm, for England was at war with France, and moreover, the mutineers stopped all merchant and food ships from going up river to London. They were, however, overcome, and Richard Parker, their leader, was hanged, with many of his associates; others were flogged 'round the fleet' (so many lashes on each ship), and still others imprisoned.

The North Foreland and South Foreland are famous landmarks in the English 'narrow seas.' Each bears a lighthouse: the North Foreland, so important for ships rounding into the Thames, first had one in 1636. The heights above sea level and range of the lighthouses are respectively, North, 188 feet and 20 miles; South, 374 feet and 26 miles. It was off the North Foreland that, in 1666, Blake and Prince Rupert defeated the Dutch fleet under De Ruyter, and Hubert de Burgh destroyed the French fleet in 1217.

The whole of the Kent coast line has to be guarded thus, for the Channel and Thames mouth abound in sand-banks, the most famous being the Goodwin Sands (see Tenterden), on which there are four lightships, the North, South, and East Goodwins, and the Gull. The farthest east in Kent is at the danger-point of Dungeness. The oldest is the Pharos in Dover

^{*} See Sea Life in Nelson's Time. By John Massfield (Methuen.)

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Castle (see Dover). There are about nine hundred such lights round the coast of Great Britain.

Penshurst (population 1531) has long been famous as the house of the illustrious family of Sidney, to whom Edward VI. gave Penshurst Place, a glorious mansion originally begun in the fourteenth century, but most of it over a century younger. The park, over which the public may wander at will, is one of the loveliest in England. The village itself is full of charm. The church contains many interesting monuments.

RAMSGATE (population 36,561), a 'limb' of Sandwich, is another of Kent's happy and healthy watering-places. It has no very exciting history in itself, but Ebbsfleet (see page 67) and Re-

culver (below) are near. The harbour was built in 1749-50. Pegwell Bay, close by, is noted for its fine sands and its shrimps. Dickens's 'Tuggses at Ramsgate' (in Sketches by Boz) tells us what the place was like eighty years ago.

THE RECULVERS is the name often given to the twin towers (sometimes called 'the Sisters'), which are all that is left of the twelfth century church of Reculver (population 631). They stand on the very edge of the sea, which has here eaten much land. Reculver (four hundred years ago 'scarce half a mile from the sea') was the Roman port of Regulbium, commanding the once deep channel of the Wantsum, between the Isle of Thanet and the mainland. King Ethelbert is said to have died and been buried here. (Continued on page 123.)

THE DIM RED DAWN.

By Mrs. HOBART HAMPDEN, Author of 'Louisa,' 'The Hidden City,' 'Princess Ooma,' &c.

Illustrated by E. S. Farmer.

(Continued from page 91.)

LULU!' Bobo was calling. 'Lulu, you have taken my tooth. Give it back to me immediately. Here is your loathsome fish.'

Lulu gasped, for once unequal to the situation. Not till Bobo had reached the river bank and was gaping at the dead and live mammoths, did she find her tongue.

'How did you know where to look for us?' she questioned. 'Churruk didn't see us. What did he say? Did he tell you about Brild? I didn't think he'd bother.'

'Brild? Churruk?' said Bobo, vaguely, absorbed in the sight before him. He had not even glanced as yet in his son's direction. 'What nonsense are you talking? What do I know about Churruk or Brild? I watched Zend's burial this morning. Then I sat apart, planning my picture, and I looked for the tooth I was carving last night, and I found I had picked up your disgusting fish in its place. You were not in the hut, so I guessed you had gone to the river to spear salmon. So I came. Ow, what a sight!' he ended, breathless; while Lulu slipped a hand into a pocket inside her tunic in which she kept oddments. Bobo was right; she had taken the tooth-by mistake. At the last moment overnight each must have caught up the wrong object. She remembered now; Bobo had laid down the tooth, and she the fish, just before they had gone into the hut. But what must she do? Would Bobo let the

three of them go unhindered? Already he was looking at Zan instead of at the mammoth.

'We are taking Zan away,' she began to explain, hurriedly, 'so that Churruk shan't kill him. I promised Zend. Awful things will happen if I don't keep my promise,' she added, to impress her uncle.

'Oh!' said Bobo. If not as much impressed as Lulu hoped, at least he did not seem inclined to interfere. He was mildly interested, that was all. But, as he looked again at the baby mammoth, his expression changed. 'But that—what are you going to do with that?' he questioned, pointing.

'Take it with us, if it will come,' Lulu answered.

'But I want to make a picture of it,' Bobo complained. 'How can I if you take it away? And where are you going? You will all perish,' he added, as an afterthought.

'We are going to my people's home,' Zip-Zip cut in, glad of a chance to help. 'It is safe there; very safe.'

Carried away, she began to boast a little. 'There are wonderful pictures there,' she said. 'Big, marvellous, coloured pictures. Better pictures than the pictures you make.'

'Coloured pictures?' Better pictures than mine?' said Bobo. 'I don't believe it.' He glared at Zip-Zip indignantly.

'I shall come with you and see for myself,'

he announced. 'I know they are not better.

But coloured—that is new.'

And, at that, Brild's voice was uplifted. He also had been awaiting his chance where he lay, a little to one side. Startled, Bobo glanced at him, aware for the first time of his presence.

'Father, I am hurt; I can only crawl,' Brild urged. 'Father, they are going to leave me behind to be killed and eaten. Don't let them.

Take me with you.'

'Why should we help him?' Lulu began to protest. But before she could get any further, Bobo waved his hand at her impatiently; and next he put his fingers in his ears. He did not want to be pestered with arguments; he would not be bothered. Nor did he want to be disturbed by Brild's clamour. He chose what seemed to him the easiest course.

'Be quiet, Lulu,' said Bobo, peevishly.
'Don't deafen me.' He strode across to Brild, picked him up, and flung him across his shoulder. The boy was no great weight; he

could carry him.

'Now lead the way,' Bobo told his niece.
'Don't stand there wrangling. And make that thing come with us if you can.'

CHAPTER XII. LULU, THE LEADER.

'THAT,' said Zip-Zip, waving a hand, 'is the

water that comes and goes.'

At the edge of the forest she stood. In front of her was a wide plain, across which the river ran to a blue line in the distance at which she was pointing. Behind her were Lulu and Zan, Bobo and Brild, and the baby mammoth, still following. It had attached itself to Lulu persistently. It had been restless unless she slept close to it at night. In the daytime it had often felt for her with its trunk, and grunted and squealed if it failed to find her immediately. Once it had seized her round the waist and lifted her right off her feet, but it had set her down again eventually. As, poised in the air, she had looked along its wide back, she had realised what a splendid seat that back would make. Perhaps the mammoth would become so tame that she, Zip-Zip, and Zan could ride on it? When it was a little older possibly Bobo might ride on it also. But not Brild, never Brild, who had already fared so much better than he deserved. Since Lulu could not get rid of him, she ignored him as far as possible.

Bobo had proved an unexpected source of strength. Eager to reach the caves, fully aware

and apprehensive of possible peril, he had been resourceful and far less lazy than usual. There had been no pursuit to guard against-Lulu had been right in supposing that Churruk's warnings would prove an efficient safeguard-but the hourly dangers of the forest had been lessened by Bobo's presence. He had helped to build bigger fires at night than would have been possible for Lulu, Zip-Zip, and Zan alone. He had cleared a way through undergrowth too thick for them to tackle where there seemed no opening. The baby mammoth in this respect had been of use, too; it trampled a path for itself recklessly, butting with its head at everything that opposed it. Sometimes, hurt, it would turn to Lulu plaintively for comfort, but always returned to the charge with undiminished vigour.

And Bobo had helped to provide food. The salmon, which might with care have been enough for three, was not enough for five. Bobo had stalked a deer—he said he liked to watch it feeding so that he could make a picture of it afterwards—and had driven it finally within reach of Lulu's spear. Bobo had snared small things with a snare that was new to his niece, the secret of which he had not troubled to show her hitherto. He had kept the longest watch at night, for he could do with less sleep than those younger, despite the fact that, during the day, he had to carry Brild, whose leg

was less swollen but not yet useable.

'I must see those coloured pictures,' he had given as a reason for conduct that probably amazed himself. 'If you have lied about them, Zip-Zip, you shall pay for it.'

'I have told the truth,' Zip-Zip always an-

swered gaily, however.

Each day, as the forest thinned, she grew lighter hearted. As she stood now between forest and plain, her eyes were dancing; she was obviously locating objects she remembered. She seemed to like the open country, though to her companions, accustomed always to closegrowing trees, it seemed bare and unfriendly. Zan, especially, regarded it with distrust; he was smaller than the others, and so the plain seemed to him larger. He was almost tempted to clutch at Lulu's hand, but restrained himself stubbornly. He had plodded through the forest doggedly; he had refused to he helped; he had refused to own that he was tired. He had learnt, every hour, something new which he had at once tried to put into practice.

(Continued on page 106.)



"The caves were empty!"

THE DIM RED DAWN.

By Mrs. HOBART HAMPDEN, Author of 'Louisa,' 'The Hidden City,' 'Princess Ooma,' &c.

Illustrated by E. S. Farmer.

(Continued from page 104.)

THIS way,' said Zip-Zip, suddenly; and began to run across the plain. 'Over there, where that tree is.'

She did not stop until she stood beneath a solitary tree on the very edge of the cliff. To the right, the river had cut a deep ravine that opened on to yellow sands, studded with rocks.

Between those rocks are the pools where the fish live,' Zip-Zip explained, and clambered down the side of the ravine until she came to a huge hole, the entrance to a cave. More slowly the others followed, the baby mammoth nosing after them. The country through which they had passed, since leaving the tribal boundaries, had been inhabited only by wild things. So far, it seemed that no new clan had taken possession of the hunting grounds left empty by the death of Zip-Zip's people, as Lulu had thought might possibly have happened. But it still remained to see if the caves themselves were empty. If they provided as secure a shelter as Zip-Zip insisted, surely something or some one would be entrenched therein? Lulu and Bobo hung back a little, therefore, Lulu with a hand on Zan's arm. There was no need to restrain Brild. Had he been able to walk, he would certainly have been the last of the line. As it was he was clutching at Bobo's shoulder, staring at the cavern opening with starting eyes. Already Zip-Zip was through it, and calling. He shrieked as her voice echoed back.

But her confidence was justified. The caves were empty! They were all, and more, than she had promised. From a big central cave smaller caves opened; there was plenty of room for the baby mammoth. Under foot was fine, dry white sand, and since the caves were roofed with rock a fire could be lit inside them at any time without risk. The deep ravine screened the entrance from storms, and down the back and side of the big cave ran a stream of water to join the river. Already Bobo was looking for the pictures. There was light enough for him to see there were strange daubings on the walls-splashes of red and yellow, blue and green. As Zip-Zip watched his face she smiled, pleased. Hitherto she had been only Zip-Zip, the small slave; Zip-Zip, the

despised. Now she could see that even Bobo was impressed with something her people had made.

'There are colours. It is true,' he was muttering. 'How did they do it? What did they use?' He let Brild slide, helter-skelter, to the cave floor, and began to scratch at the pictures on the walls with his finger nails, while Lulu looked around approvingly also. There was much she felt she must examine at her leisure, but what she had already noticed pleased her. She was sure she could adapt herself quickly to this new life; this unknown country had begun to seem familiar.

For, if Zip-Zip were glowing with a new sense of importance, Lulu also was uplifted. Had she not in fact become chief of a tribe, if but a tiny one? Who should dispute her leadership of her companions? Not Bobo. If left undisturbed to make pictures, probably he would not interfere with her. Not Brild. Brild should be kept strictly in his place. He should be taught that he must work as Zip-Zip had worked, and that if he wanted food he must earn it. Not Zip-Zip. Despite all that had happened Zip-Zip was still evidently content to follow; she was waiting now eagerly for orders. Not Zan-at least, as yet. Zan, still so small, must obey also. Lulu liked the prospect. She looked round the cave once more, and then at the distant blue line. There was something, she had to admit, beyond her control. Yet, where Zip-Zip and her people had failed, she, Lulu, might succeed, and find the thing that pulled the water and rule it too.

'How close does the water come?' she asked

Zip-Zip.

'There, where the dark line is,' Zip-Zip answered, pointing. A ridge of dry dark leaves and stalks belonging to some queer plant marked the boundary. 'It comes so far, and then it goes away,' Zip-Zip finished.

Lulu drew a long, contented breath. There was no hurry then in dealing with the water. It could wait until she had time to attend to it. She ran her hand up and down the trunk of the baby mammoth as it stood beside her. Her first real conquest, it seemed a proof of

her authority—a thoroughly convincing proof. 'Ah!' she sighed again, contentedly. 'This

is good. Very, very good.'

And she had kept her promise to Zend, she liked to feel it. Zan, sitting cross-legged at her feet, was safe. And was Zend's lonely spirit comforted thereby? She hoped it might be. She looked at Zend's spear, and touched the sling that hung at her waist. Already she had used both with good effect. And.

suddenly, Lulu felt irresistibly compelled to share her triumph with Zend.

'With your weapons I will conquer. Your weapons,' she whispered. Then she turned

briskly to her followers.

'In a little while it will be dark,' Lulu reminded them. 'We need wood for a fire. We must build a barricade across the cave mouth.'

(Continued on page 119.)

HYDRAULICS.

By P. M. BAKER, B.Sc., M.B.E., A.M.I.E.E., A.M.I.Mech.E.

Illustrated by BERNARD WAY.

WHEN we have obtained a supply of power from some source such as a heat engine or a water-power plant, such as has been described earlier in these pages, we have still to apply it to drive machines or perform other useful work for us.

There are, of course, many cases in which the engine or turbine, i.e., the source of power, can be coupled directly to the apparatus to be driven, and, generally speaking, the more direct the drive can be the better we like it. Thus in a ship the engine or turbine drives the propeller shaft direct, or in some cases by means of gearing; the pistons of the steam locomotive are connected directly to the crank shaft and so to the wheels by the piston rods and the connecting rods; and we might mention many other examples of direct connection between the engine and its load. But there are many cases in which this direct coupling is inconvenient, and when some method of transmitting power is required. There are various ways in which this can be done; each has its special sphere in which it acts better than the others. We can, for instance, couple the engine crank shaft to its load by gearing, by pulleys and belts, or by a chain much like that used on a bicycle, where it transmits the power supplied by the rider to the back wheel, and these are convenient methods of coupling the power generator to a load near to it: if the load was far removed from the source of power we might transmit energy electrically. But there is one method of transmitting power, viz., by water, which has special advantages in some cases, so we will see how it is done.

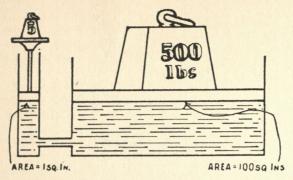
Do not confuse this use of water in the engineering world with that described in the article on Water Power. There we were utilising

Nature's supplies of ready-made power; here we are transmitting power, produced in some way or another, from the engine to its load, and it is this job that we are thinking of when we speak of hydraulic machinery.

General principles of Hydraulics.—Before we describe actual hydraulic appliances we must consider a few elementary principles, as unless we understand the *principles* on which any machine or device works we are not likely to appreciate a description of the machine itself.

We can regard all matter as being solid, liquid or gaseous, and if you think of a solid as having a definite shape and size of its own, of a liquid as taking the shape of the vessel in which it is contained, and of a gas as having no definite size or shape, for it fills the containing vessel whether large or small, you will not be far wrong. If you also remember that liquids and gases, because they can flow from one vessel to another, are called fluids, and that there must be many substances which are on the border-lines between solidity and fluidity, you will see that our general idea has to be used with a little common-sense. Practically all solids show traces of flowing under great pressure or when hot; very many fluids are very viscous (sticky) or become solid when very

Now one of the essential differences between a liquid and a gas is that while a gas can be compressed, liquids are practically incompressible. At one time we thought that liquids were absolutely incapable of being compressed, but we know now that under very great pressure slight compression takes place, so slight, however, that we can neglect it for our present purpose, when we are only dealing with liquids as a means of transmitting energy.



How Liquid Pressure distributes itself equally.

Liquids under Pressure.—If we put a liquid, or a gas for that matter, under pressure, it exerts the same pressure in all directions, upwards, downwards and sideways. There is just the same pressure on a square inch of the side or the upper surface of your bicycle tyre as on a square inch of the piece which touches the ground; just as much pressure on a square inch of the cylinder head of the steam engine or on the cylinder walls as on the piston. This is an important fact to remember.

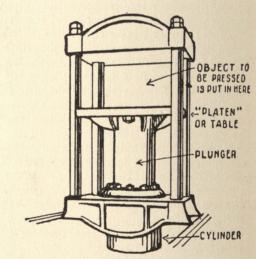
I have neglected the increased pressure at the bottom of a liquid due to its own weight (we could not neglect it if we had any great depth of liquid), but this does not affect the

general truth of the statement.

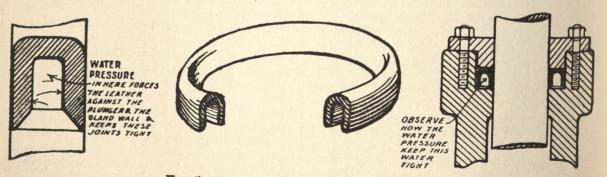
If we had an apparatus such as that represented in section above, consisting of two cylinders with a piston in each, communicating by means of the passage shown, and with the space below the pistons filled with water or some other liquid, then a small weight on the small piston would be able to balance a larger weight placed on the large piston.

If the small piston had an area of one square inch and the large piston 100 square inches (which would require it to have a diameter of

ten times that of the small piston), then a weight of five pounds on the small piston would just balance a weight of 500 pounds on the large piston. It will be quite clear that this is so if we remember that the five pounds on the small piston is exerting its pressure on one square inch of piston area and is, therefore, putting a pressure of five pounds per square inch on the water, while every one of the 100 square inches of the other piston is likewise receiving a pressure of five pounds, transmitted through the water, and the whole area will, therefore, carry five hundred pounds. This looks, at first sight, as though we are securing some work for nothing, but it is not really so, for if the five-pound weight on the small piston were to move down through one foot, doing five foot pounds of work, it is evident that the water which it would push into the other cylinder would only raise the larger piston up one hundredth of a foot, and, therefore, if there were no frictional losses the work done by the



A simple Baling Press.



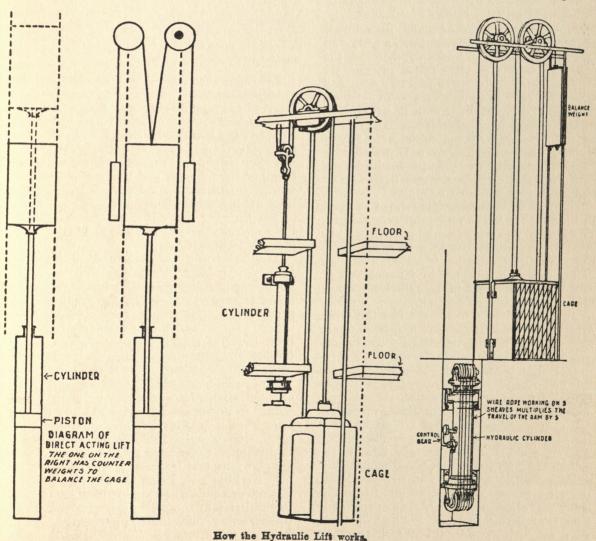
How the Plunger is kept water-tight by the U leather.

piston in the small cylinder would be exactly equal to that done in the large one.

Now because of the fact that we have just illustrated, hydraulic appliances are very useful and convenient in those operations which require the application of a big force exerted slowly, as, for instance, when we squeeze up cotton bales very tightly, for transport by sea, or in forging iron or steel, when a large mass of perhaps twenty to thirty tons of steel has to be squeezed into some desired shape, such as that of the stern-post of a ship; and this is one of the features of hydraulic work which you will be able to follow in most of the machines described in this chapter.

One respect in which hydraulic appliances differ from steam or air-driven ones is that pistons are not necessarily used, their place being generally taken by plungers.

In the steam engine or the gas engine we use a piston accurately fitting a nicely boredout cylinder, and the steam or gas, by pressing against it and driving it forward, gives up its energy; but as liquids are incompressible there is no need for the plunger to fill the barrel of the cylinder exactly and make a water-tight joint with it. It displaces its own volume of water at each stroke, as every cubic inch of plunger which enters the cylinder must push out a cubic inch of water; the only thing that



matters is that the 'gland' where the plunger enters the cylinder shall be water-tight. Our outline diagram on page 108 was intended to show how the pressure on the water is the same all through the system, and how we may therefore obtain a 'mechanical advantage' by an hydraulic apparatus. In practical work an hydraulic plant consists of two parts—(1) a pump driven by an engine or motor of some kind to supply the high-pressure water, and (2) a cylinder in which the pressure is applied, i.e., one apparatus to put water under high pressure and another to use the same.

Some Hydraulic Machines.—Now we will examine a few hydraulic machines and see how these elementary principles are applied.

A simple Baling Press.—Perhaps the simplest example from which you can learn a good deal about hydraulic appliances is that of the hydraulic baling press. These presses are used for the purpose of squeezing cotton and other such materials into a very small compass. The space occupied by cotton is a very important consideration when it has to be carried by rail or sea, for if the cotton were simply bundled loosely in bags, not only would it be liable to fire but, in addition, it would occupy much valuable cargo space and the shipping

company's charges would be high.

The drawing shows a simple form of machine by which the cotton can be tightly compressed. It has a plunger which works in an hydraulic cylinder and which carries a table on which the cotton in its wrapping is placed. The top of the press is held down by means of heavy steel rods which tie it to the cylinder. When high-pressure water from a pump is supplied to the cylinder, the plunger raises the table, squeezing the cotton between it and the top of the press with a great force. There are grooves in the table and in the top of the press so that steel bands can be placed around the bale and riveted up, while pressure is still on, in order to prevent the cotton resuming its original volume when the pressure is removed.

The plunger is made water-tight where it leaves the cylinder in a very ingenious manner. Around the inside of the top edge of the cylinder is turned a groove into which is fitted a leather collar which has been pressed into the form shown in the drawing, its section being that of an inverted U. It was originally a flat ring of leather, and it has been squeezed, when wet, between dies till it took the form

illustrated. A retaining ring, held down by nuts and bolts, keeps this leather in the position shown, as you will see in the diagram. When the water in the cylinder is under pressure, that which goes up the sides of the plunger into the inside of the U presses out its side walls against the cylinder wall and the plunger respectively, so that each makes a water-tight joint, and, as you will see, the greater the pressure the tighter this joint becomes.

Clean water, free from grit, is essential if the apparatus is to work satisfactorily, for, if gritty or dirty water is used the grit is fairly certain to scratch or score the plunger or to get between it and the leather, which it can easily scratch. As leakage readily takes place through such scratches, hydraulic engineers are very careful to use none but clean water. You will doubtless think of many uses to which such a press can be put.

The Hydraulic Lift.—Another example of the use of hydraulics is afforded by the hydraulic lift. In the simplest form of lift the cylinder is rather longer than the total travel of the lift, and the cage is carried directly on the head of the plunger—a simple and attractive idea, but really not as simple as it looks, for, in a modern building, the cylinder and the space it occupies would be enormous. An outline drawing of a lift of this kind is given on the left-hand side of the drawing on p. 109, in which, however, for simplicity, a piston instead of the usual plunger is shown.

The bad feature of this kind of lift, apart from the space it occupies, is that the heavy plunger is in water when the lift is down and in air when it is up, and so the whole moving arrangement, plunger, cage and load, appears to get heavier as the cage and plunger rise: thus the lift goes slower and slower as it reaches the top; indeed, the water pressure may not be sufficient to take it right to the top.

You will remember that Archimedes is credited with the discovery that an object which is immersed in water appears lighter than when it is in air. It seems to lose weight by an amount equal to the weight of the water it displaces. You have probably read this in your Physics text-books and done experiments on Archimedes' Principle in the school laboratory, and what you read there applies to the lift plunger. There are many methods of correcting this, including counterpoises or balance weights with heavy chains or wire

ropes which, travelling over pulleys at the top of the lift well, transfer their weight from the plunger to the counterpoise as the cage rises, and an arrangement of this kind is shown in the left-hand middle diagram.

A lift of this sort would be all right for a low-pressure water supply, but for the very high-pressure water which is used whenever possible, the plunger would be very thin—too thin to carry the weight of the load, and so we have generally to modify the arrangement and use that shown in the right-hand diagram.

It will be seen that the hydraulic cylinder is placed in some convenient position in the lift well, and, as the cage has to travel through a very considerable distance, the cage-rope is passed several times round a number of pulleys carried by the plunger head and the cylinder foot, thus multiplying the travel of the plunger. The valve, often a slide valve, which admits water to the cylinder to raise the lift, cuts it off to hold the lift fast or lets it escape to lower it, is usually controlled by a rope which passes through the cage, so that the attendant can control the water supply from the cage itself. The arrangement of the U leather packing between the cylinder and the plunger is identical with that seen in the diagrams of the baling press. The lift shown on the righthand side overcomes the Archimedes principle difficulty, but the cylinder and plunger are

usually arranged like that shown, where the multiplying sheaves or pulleys with the rope passing several times round them can be seen. There are direct acting lifts for carrying luggage from subways to platforms at many of the large railway stations, and many hotels and offices have lifts with the multiplying arrangement.

(Continued on page 124.)

THE FAIRIES' FRIEND.

WHERE do they come from—where do they go? I, myself, and the fairies know! Many a secret they share with me, Many a marvellous sight we see. We know the plot where the brownie delves-We know the steps of the dancing elves-The bend in the track through the tufted reeds. Where goblins ride on their goblin steeds— The place where the pixies pipe at night, When Will-o'-the-wisp turns up his light— The doors, in the trees, of the tiny homes Of the quaint little long-eared, grinning gnomes. Now and then-just once in a way-Late, perhaps, on Midsummer's Day-Fairies go scattering magic dew, That other children may see them too. (A drop on each eye from a fairy hand.) But the wonderful way to Fairyland, The secret door, and the hidden key, Are known to none but the elves and Me.

THE STORY OF COCKALOCKIE.

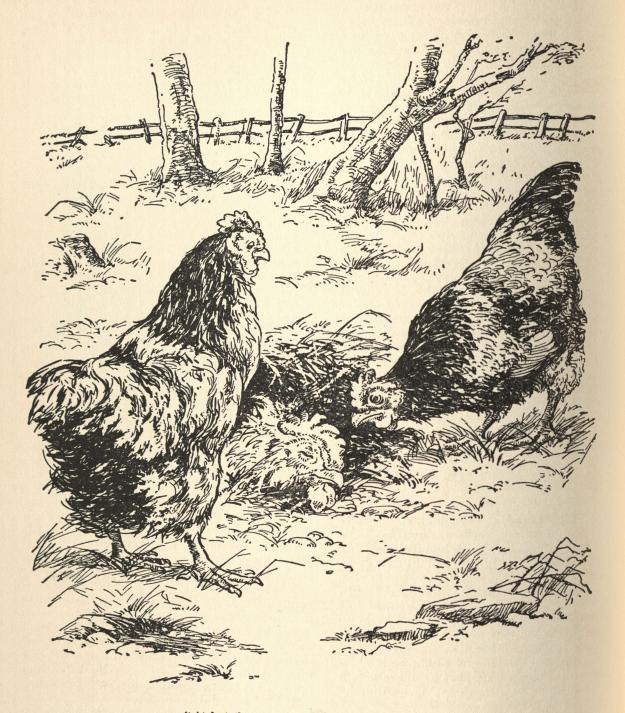
(Concluded from page 100.)

NEXT day passed, and the next, and the day after that Cockalockie was nowhere to be found. The hens remained huddled together in the yard. Buffie Brown and Fluffie Facie searched the fields, the hedgeways, the ditches—everywhere—for him in vain. At length they found him in the old plantation, almost hidden in a hole into which he had crept to die of starvation. There he was, but a shadow of his former self, his beautiful feathers ruffled, his eyes closed. Buffie and Fluffie called him by name and touched him, but he did not seem to see them or to hear them; if he did, he was too weak to answer.

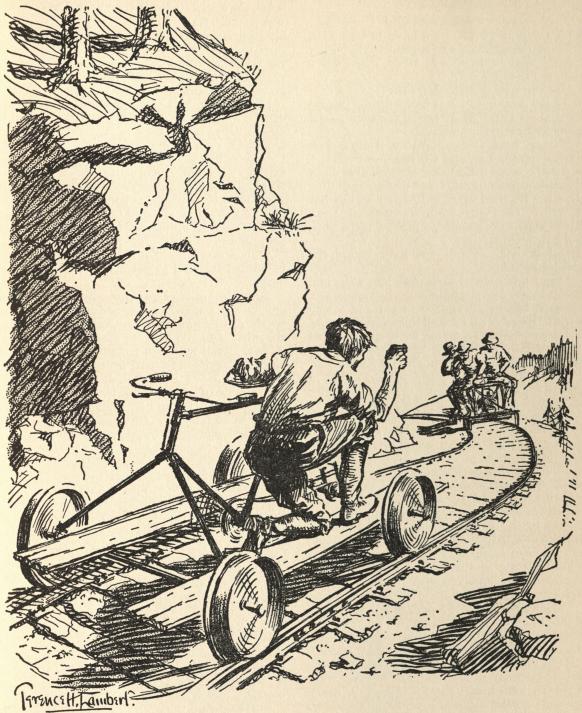
Fluffie Facie stayed with Cockalockie, while Buffie Brown ran as quickly as she could to tell the others that he was found. At the corner of the cart-shed she almost collided with Dolly Dorking and Winnie Wyndotte, who came running to find Buffie Brown and Fluffie Facie with the good news that their master had returned. So Buffie Brown, Dolly Dorking, and Winnie Wyndotte ran to tell the others that Cockalockie was found; then all ran together to where he lay. Their master, full of wonderment at this strange proceeding, followed to find out the cause.

All he saw at first was a moving mass of feathers pushing and shoving with outstretched necks. As he approached they made way for him, then he saw Cockalockie. He lifted him up, felt his heart, and took him to his house.

What happened to Cockalockie in his master's house no one knows: Cockalockie never told. Sufficient it is to say that he returned next day alive and well to his devoted household, and they all lived in happiness and plenty ever after.



"At last they found him, almost hidden in a hole."



"Rixon was seen pedalling at full speed."

'YOU NEVER KNOW'

(Concluded from page 99.)

BY the time Tom had got back to Oak Flat, speak. Was he in time? Good, there was a voice at the other end.

'He will pull the bicycle off the track further down the line, and hide it in the brush,' gasped Rendell. 'Then, when the motor's past, he'll go on and get right away.'

'Never mind, the afternoon train's just

starting up the line, and I'll tell-

Bing! Something seemed to have dealt Rendell a blow on his ear-drum, and then silence. He tried to ring through again, but in vain. Then the truth dawned on him: Rixon must have stopped, swarmed up a pole, and cut the line.

Hardly had Rendell got back before the

speeder arrived.

'Jump aboard, and we'll grab him yet,' said the detective, when he heard what had happened. 'Step on her, pal,' he added to old Jake, who was driving. 'We'll need all the speed she's got.'

Jake was always a terror on a speeder, and required little urging. With a roar from the engine he let in the clutch, and they were off.

The detective, who was unused to such a primitive mode of travel, sat in front and hung on to the handrail like grim death, especially when the car hit a sharp bend and was jerked to one side or the other, or when they rushed giddily across a canyon on a flimsy wooden bridge.

Now they shot across the clearing by the big water tank, gathering such speed that every man heaved a sigh of relief when they had passed the hairpin bend at the bottom; now they flashed by the old loaded landings that marked the site of a busy lumber camp of years gone by. At one moment they were roaring through a deep cutting in the solid rock, at the next they shot out upon an open stretch of fireblackened country.

At length they were below the timber line, where the track wound in and out amongst the foothills. Surely they would overtake their man before long? As the car swept round the curves, the detective crouched forward with his automatic ready in his hand, and all eyes were fixed on the track ahead, expecting every moment to catch sight of a figure on a speeder.

Time went on, and the men on the speeder were beginning to think that Rixon must have hidden his machine and made across country,

when they rounded a sharp curve, and there he was on the track bicycle, some eighty vards ahead. He was crouching on one side of the machine, and was ready for them. Two shots rang out in rapid succession. The detective replied, and the next moment a rocky bluff hid Rixon from view.

'Speed her up!' shouted the detective to Jake, but scarcely were the words out of his mouth, when the firing of the motor became

irregular, then ceased altogether.

'Looks like he's hit the motor,' said Jake, leaning over and peering into the mechanism. Suddenly he started back, for a strong smell of petrol heralded a burst of flame from the engine. and he was barely able to pull the car up and let the men jump off before the whole thing became a mass of leaping flames.

'Come on, boys!' shouted the detective, as he rushed forward to get a view round the next

curve.

Here the railroad ran for some distance up one side of a small valley, and after crossing a wooden bridge on an acute bend, returned on the other side. When the men came round the corner, Rixon was seen pedalling at full speed on the opposite side, and at no great distance from them.

A couple of shots from the detective made Rixon realise that to run the gauntlet was too risky, so he took a flying leap, and landing on all fours, managed to scramble behind some loose boulders that lay by the side of the track.

The detective and his men also took cover, and for a time a tense duel took place across that narrow ravine. The detective and Jake, who both had automatics, strained every nerve to get a sight of the fugitive as he lay behind the rocks, but an occasional answering shot told them that as yet their efforts were in vain.

This forced inactivity was hard to bear, and Tom's nerves seemed to be stretched to snapping point, when suddenly another shot rang out, the detective dropped his automatic, and with a low moan fell in a crumpled heap by Tom's side—dead.

Something would have to be done to end this stalemate, and Tom had a feeling that he was the one to do it. Luckily he had thought out a half-formed plan before the detective had been hit. Now his mind was made up.

Snatching up the Colt, he dashed across to where Jake and his mate lay, drawing Rixon's fire as he did so. Quickly he explained to them his plan, then, with Rixon's bullets

sputtering on the rocks as he ran, he dashed round the bend to where the charred remains of the speeder lay.

Here he rested a few moments in safety, then he cut up through the trees on the right of the track. Then, making a wide detour, he picked his way over the hillside, and crossed the ravine higher up above the bridge.

From here he struck upwards and away from the track, until he knew he was in line with the part of the cut where Rixon lay. Then, taking care not to make a noise, he stole downwards through the trees and finally came out on the open space that bordered the edge of the cutting.

It was now that his plan would be put to the test: would things go as he had hoped, or would Rixon try to sell his life at a price? Tom knew he was a dead shot; he had seen him shoot insulators from a telephone pole in the neatest possible manner. And he thought of the detective . . .

As he lay at full length, a bullet from the other side embedded itself in the bank a few feet below him with a splutter of loose earth. Then, with his finger on the trigger, he peered over the edge. Good! there was Rixon just below him, crouching gun in hand behind the rocks, and murderously intent.

Tom covered him with his gun, then taking up a tiny fragment of rock with his left hand, he tossed it down on the figure below.

With an exclamation Rixon looked up to see where it had come from, and a look of surprise mingled with hatred spread over his face.

'None of that!' said Tom, as Rixon made a move. 'Drop your gun and get out on the track. You've murdered one man already today.'

Scowling and muttering, Rixon did as he was ordered, and in a few moments Jake and his man, who had seen how things had gone, arrived on the scene, and trussed him up with a leather belt.

And so, when the 'Old Man' arrived soon after on the up-bound train, it was a strange little party that he found waiting by the side of the railroad.

'Well, young fellow,' he said to Tom, after Jake had told him what had happened. 'You're certainly made of the right kind of stuff. You can go to work in the morning in Rixon's place, and I'll send you up a helper.'

And that's how Tom Rendell got his start. You never know . . .

THE STARS.

THE late William Canton, author of several beautiful books for children, tells in one of them how he took his little girl out at night for the first time. He says he chose a night that was starlit, so that she would always associate the darkness with the light of the stars and a father's hand,

And how beautiful the stars make the night! It was worth while having darkness to see them shining so calm and clear. Had there been no night, we should never have seen them.

And how friendly they have been to man! The sailor knows the stars; they are his familiar friends and infallible guides, especially the pole-star, which, though not the most brilliant, is far and away the most useful of all the stars.

The stars have been the guides of men from history's dawn until now. The guide to Bethlehem was a star.

How far off they are, even the nearest of them! The distance of the farthest cannot be measured. Some are so far away that Sir Robert Ball said that if the news of the birth of Christ had been transmitted to a ray of light at the time, the news would not even yet have reached some of the stars, so distant they are. Light travels 186,000 miles a second. A nice little sum to count the number of seconds in 1925 years, then multiply by 186,000!

The number of the stars seems literally to have no end. With the naked eye a thousand or two are visible. But by means of great telescopes and sensitive photographic plates more than five hundred millions are known to exist, and the census is by no means complete.

Yet God telleth the number of them, and calls them all by name; and He who does that, He who created the heavens, is our keeper, our Father, which is surely the most wonderful thing of all.

MY CARPET.

F. C. HOGGARTH.

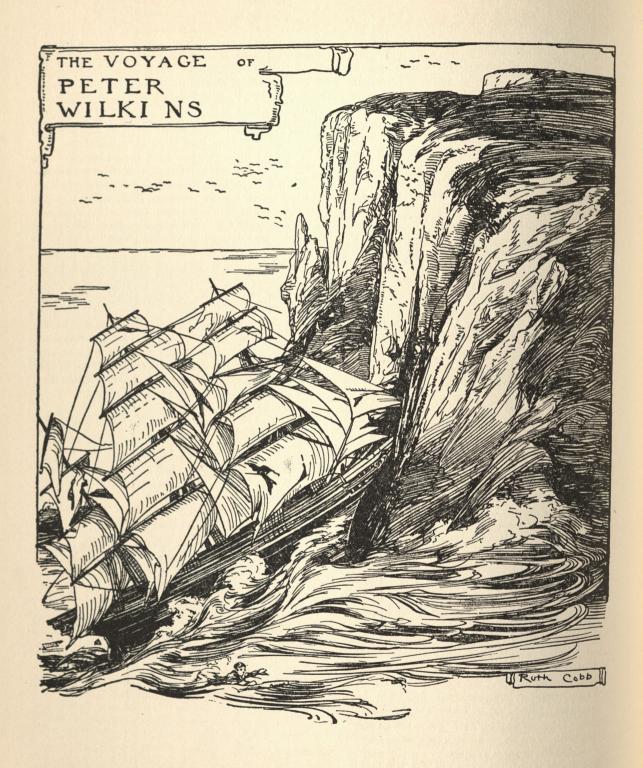
I KNOW a pretty carpet
That any one may tread;
It's made of grass and slender stems,
And many a flower head.

It has a coloured pattern
Of yellow, white and green,
For buttercups and daisies
On every side are seen.

And when the wind blows softly

The flowers bend and toss,
And little waves sway up and down,
And sweet scents blow across.

My carpet is a meadow
Beneath a sky of blue,
And every year in springtime
The pattern grows anew. M. G. RHODES.



THE ROMANCE OF PETER WILKINS.

SEVERAL great authors, among them Sir Walter Scott, Charles Lamb, and Leigh Hunt, were all fond of a book called The Life and Adventures of Peter Wilkins, a Cornishman. For many years it was not known by whom this amazing story, after the style of Gulliver's Travels and Robinson Crusoe, was written. There was no name on the book when it was first published in 1751, merely the initials 'R. P.' Nearly a hundred years later there was a sale of a number of old papers belonging to a printer. Among them was



A "Gawry," or Flying Woman, in flight.

discovered the original agreement of publication of this book, mentioning the author as one Robert Paltock of Clement's Inn. Practically nothing else except this fact is known about him, or of what kind of man he was. Apparently he lived a quiet, well-ordered existence. The working of the 'Wander Spirit' within him may have only been expressed in this romance and story of the man 'Peter Wilkins.'

The Introduction tells how a ship called the

Hector was on a voyage from the South Seas to England. One day a curious black cloud was noticed in the sky. It was no very great size, but it appeared to be following the ship and overtaking it. The Captain, fearing disaster to his vessel, fired upon it to disperse it. It fell with a cry and a plop into the sea. A ship's boat put off, and it was found that the cry came from an elderly man who was struggling in the water, his arms being attached to several long poles tied together in a very curious manner. He was rescued and taken on board. He gave his name as Peter Wilkins, and this was the story that he told.

When quite young he had sailed on a ship from Bristol to seek his fortune. At first he had various more or less ordinary adventures common to sailors of the time. He was captured by the French and wandered with a native through the region of the Congo. Then, after being taken prisoner by the Portuguese, he escaped to sea in a stolen ship. After a severe storm, he and one sailor only survived of all the crew. They endeavoured to control the



A "Gawry" alighting with wings furled.

ship themselves; suddenly they found that the ship was mysteriously being drawn southward, although no sails were set. At last the ship drove straight into a line of cliffs. Peter afterwards accounted for this strange experience by the iron-stone in the rock that composed the cliffs having the power to attract the ship, owing to its being loaded with iron.

In the crash Peter's companion perished in the sea and he was left alone. While exploring in a small boat he was carried along a subterranean channel and out into a beautiful land beyond. Here on the side of a lake he decided to make his home, converting a grotto into a dwelling. He managed to move a few things from the wreck of his ship, and he was singularly fortunate in finding everything else that he wanted to keep him in safety. He found good wood to build with, and large leaves suitable for roofing, and so could build his house. All the curious plants that he cooked turned out not only to be palatable but nourishing, and he was able to make good bread. Practically everything he found he was able to make use of. Even a strange monster that he caught from the lake was of use. From the skin he made a warm covering, and from the flesh, when cooked, came much oil that proved suitable for burning, and so he could have artificial light, a necessity in a land where the night lasted six months and the day for six months.

After a while, although he could discover no human beings in the land, Peter was conscious at times of voices in the air around him. There seemed nothing to account for these sounds, till later, hearing a thud on his roof, he discovered that a beautiful woman had fallen to the ground close to his dwelling. She belonged to a race from a not-far-distant country where the people were all able to fly, having wings of a silk-like substance attached to their bodies and fitting like a garment when not in use. This woman, who was named Youwarkee, and belonged to a race of people called Glumms, married Peter, and their children all had wings in different degrees.

When he was to visit Youwarkee's old home, Peter, being without these advantages, had to be carried through the air in a specially contrived machine. Like so many other heroes of this type of story, Peter becomes the adviser of the King, Youwarkee's father. He re-organized the government and the flying armies, devising tactics similar to those that have been in actual use in our own day. He abolished slavery and in-

vented a written language for the people, and in a comparatively short number of years developed an enlightened civilisation for the country.

Heartbroken after Youwarkee's death, his children being provided for, he longed to return to his native country. He set out, hoping to arrive there in his flying machine, but owing to its not having been in use for some time, it fell with him into the sea, and Peter Wilkins was

rescued by a passing ship.

Another author, a well-known novelist of Victorian days, Bulwer Lytton, was fascinated in the same way by a strange race who lived in an imaginary land and had the power of flying, a thing that is now an accomplished fact with ourselves. His hero comes to the unknown land in a novel way. All through the ages, romances on this theme have been concerned with the sea; this man arrives at his destination from the bottom of a coal-mine. The Vrilya, who inhabited it, lived in a subterranean country, in the centre of our earth. They knew of our world, their people being descendants of some who had fled into subterranean caverns when in distant ages there had been a flood upon the earth.

Their name meant 'The Civilised Nations,' and they believed themselves to have reached a superior state to those on the earth above. Every one flew, but unlike the Glumms, the people of Peter Wilkins's story, the wings of the Vrilya were mechanical contrivances worked by 'Vril,' or electricity, a force which they had early discovered. They had, in consequence, many kinds of marvellous engines and contriv-ances in their everyday life. The Vrilya were vegetarians on principle; they thought it wrong to kill animals for food. Their government was simple, with a single supreme magistrate at its head. There was no crime in the land as we know it, no courts of law, consequently no punishments. There were a few general laws which the people had to keep and wished to

Lytton's hero returns to the earth by the same means as he arrived. He had become unpopular with the Vrilya owing to his refusal to settle with them and marry one of their beautiful daughters. She aided his escape and he returned to his home with the idea that these people, with their more advanced civilisation, would one day issue forth upon the earth to be the coming race

of the future.

したおればれば

STORM-AND CALM.

THAT night when the rushes whistled,
And the goblins danced to the tune,
And a wrathful wind drove frightened clouds
Across a stormy moon;

When the oak tree groaned in anguish,
And the stream in fury rose;

When the night rode high in the darkening sky,

And the pools on the mountain froze;

I saw in a nest, unhurt by the storm,

A mother bird keeping her babies warm.

JOYCE BROWNING (aged 16).

A REMARKABLE FISH.

CERTAIN animals, birds, and reptiles are very long-lived, though nothing can be discovered in their formation to account for the circumstance. The stag, the elephant, the eagle, the crow, the parrot, and the viper are especially remarkable for the length of their life. In 1497 a carp of prodigious size was caught in a fish-pond in Suabia, with a ring of copper round it, on which were engraved these words in Latin: 'I am the first fish that was put into this pond by the hands of Frederick II., Governor of the world, 5th October, 1230.' It must, therefore, have lived at least 267 years. But these facts have been seriously doubted of late, though it is certain that carp have very long lives.

THE DIM RED DAWN.

By Mrs. HOBART HAMPDEN, Author of 'Louisa,' 'The Hidden City,' 'Princess Ooma,' &c.

Illustrated by E. S. Farmer.

(Continued from page 107.)

CHAPTER XIII.
THE LAMP.

THERE was certainly much to be done before night came, and brought with it unknown dangers. Not only was there wood for the fire to collect, sufficient to keep it burning until morning and scare night prowlers. Not only a barricade to build as a defence against anything that might be bold enough to try and force a way inside the cave. But there was food to be cooked, and one of the smaller caves to be selected as a stable for the baby mammoth —a cave at a little distance from the fire, for it did not like fires, though it was now more accustomed to them. But if a log, falling, sent up a shower of sparks it would still back, panic-stricken. In the forest its huge feet had only crushed the undergrowth. In the cave there was less space to spare; it might do more damage. It had already begun to nose around inquisitively until Bobo, who was still intent on the pictures, grew annoyed.

'Take it away,' he said, peevishly. 'It blocks

the light.'

'Come,' Lulu coaxed, and up to her the baby mammoth lumbered, to snuff reproachfully, however, at her outstretched but empty hand. She ran out of the cave, and collected an armful of the dry dark stalks that marked the boundary to give it. But, though it sniffed hopefully at her offering, it dropped it immediately and stamped it into the sand of the cave floor.

'That does not taste nice,' said Zip-Zip, watching. 'Once I tried to eat it when I was hungry. But if that thing is not full fed it will fidget all night, and keep us awake, very likely,' she suggested, and Lulu nodded. As the baby mammoth had followed through the forest it had never ceased to eat. Its restless trunk had snatched incessantly at leaves and branches. Neither were available now, but there was grass on the plain above, and it ate grass when it could get nothing better. But it could not be left to graze unattended, lest it should stray amidst its strange surroundings. Zan had better be put in charge of it, Lulu thought, since he could not carry as big a bundle of wood, nor build a barricade as efficiently, as Zip-Zip and herself.

'Take my mammoth to the top of the cliffs, and bring it back when I call,' she told him. And, delighted with his new importance, Zan departed in the baby mammoth's wake, singing loudly, while Lulu next turned her attention

to Brild

'And you shall cook,' she ordained. That, at least, Brild could do, if not available as yet

for harder tasks.

'You have been idle long enough,' Lulu reminded him sharply. But there was no need of a spur, since anything to do with food inevitably attracted him. Already he was limping to do her bidding. Crouched down beside the lump of venison that still remained, Brild began to hack and tear it into pieces of a convenient size against the time when the fire

should be built. There were still hot embers in the firepot that had been brought from the settlement for kindling. Day and night the firepot had been fed; the ashes that might have choked it shaken out through small holes pierced in the bottom. On the beach there was driftwood, and backwards and forwards Lulu and Zip-Zip went until they had made a pile in the centre of the cave that was big enough for their purpose. As they were about to set a selected portion alight, Bobo, still fretful, stalked out of a side cave he had been exploring.

'Make the fire in here,' he ordered.
'Already I can scarcely see, and there are pictures in this cave better than any pictures I have found. There is space too for more that I shall make.' He jerked his thumb over his shoulder and glowered at his niece as she

merely stared at him in answer.

'It is too late. There isn't time,' she protested, sulkily, exasperated at this latest whim. The wood had taken long enough to collect. There was still the barricade to build, which would mean more hard work, since the largest boulders she or Zip-Zip could handle must be used for it. Bobo had been indulged enough for one day, it seemed to Lulu. Squatting on her heels she rocked backwards and forwards, very loth to obey, until Zip-Zip, who had been watching anxiously, suddenly intervened as Bobo advanced threateningly.

'I remember. There was something,' Zip-Zip cried, her hands pressed hard against her forehead. 'Something that was better than a fire. Something by which we used to see at night.' Then:—'Wait. Wait,' she urged as Bobo stopped to gape at her. Across the cave she ran, reached up to a ledge, and from it took down a stone that had been chipped and pared until it was slightly hollowed. In the hollow lay a whitish lump. Carefully she placed the

stone on the top of the firepot.

'That lump is fat; it will melt,' she explained. And, next, she sped to the cave mouth, caught at a strand of a creeper that festooned it, broke off a small fibrous piece, frayed out the end, and floated the little wick she had thus made on the top of the now liquid grease. Finally she lit the wick from the glowing embers and handed the finished lamp to Bobo when it had cooled a little. Back to his pictures he hastened, and presently grunted with satisfaction.

'It is better than the firelight,' he proclaimed approvingly. 'Not so bright, but far steadier.'

'My Grandfather lit it every night,' Zip-Zip meanwhile was telling Lulu. 'I remembered in a hurry when Bobo meant to hit you. I shall remember more and more, I think.'

'Yes,' Lulu agreed, impressed by the production of the lamp. It was the first she had seen, or had need of. The thatched huts of the settlement had been used as shelters only, Tribal life in the main went on outside them: in the open the smallest breeze would have extinguished Zip-Zip's little wick. But in a cave, a lamp had certainly its uses. There was plenty of time now to finish the barricade, to summon Zan and the mammoth before it was finally closed. As the last stone was firmly wedged, Brild announced that the venison was ready, unable himself to wait any longer. If somewhat underdone, it still tasted good, There was enough for all, and, their hunger satisfied, Brild, Zan and Bobo soon fell asleep while Zip-Zip sat brooding by the fire, her thoughts questing in the past. Lulu, not drowsy as yet, leant against the barricade, looking through a peephole that had been left at the moonlit night outside. Fascinated, she stood watching. As yet she had not had time to give the salt water much attention, but now she could study it at her leisure.

It had moved as Zip-Zip had foretold. It had come right up to the dark line; dark itself, yet glistening at the edge. Restlessly, it clutched and sucked at the sand, swaying; and, all the time, it crooned to itself in a fashion Lulu found weirdly attractive. So long she watched, the water had begun to slide away ere she turned to find Zip-Zip behind her.

'I think I have remembered something more,' said Zip-Zip. 'I think I have remembered people came sometimes to see us, people not of our tribe. I do not know why. That I have forgotten.' She shivered as she spoke and yawned, and it seemed to Lulu she must have been dreaming. Zip-Zip was a great dreamer, and had often been beaten by Dilda for waking, screaming, from a nightmare.

'You saw them in your sleep?' Lulu

suggested in consequence.

'Perhaps I did,' Zip-Zip had to acknowledge.' But I am only shivering because it is cold here by the barricade so far from the fire,' she explained.

'Come back to the fire then,' Lulu told her,

almost asleep now herself.

(Continued on page 122.)



" Quick! Run!' Zip-Zip gasped."

THE DIM RED DAWN.

By Mrs. HOBART HAMPDEN, Author of 'Louisa,' The Hidden City,' Princess Ooma,' &c.

Illustrated by E. S. Farmer.

(Continued from page 120.)

CHAPTER XIV.

THE THING ON THE LEDGE.

THE day had scarcely begun when Lulu I woke next morning. Outside, the sky was greyish pink; inside the cave the only light was the faint glow of the smouldering, smothered-down fire. But the little mammoth, scenting the dawn which stood to it for feeding time again, had roused her by turning her over with its trunk. As she opened her eyes it charged the barricade, which crumbled instantly. Out into the ravine it swung while Lulu watched, interested. Here was a force, it seemed to her, that could surely be turned to account. If the mammoth could batter down an obstacle so easily, could it not build it as well? Its great strength, as well as its broad back, might be made useful. The trunk that curled round her body could curl round logs and boulders too. But it had much to learn first. To graze alone, for instance, since some one could not always be spared to herd it. She watched it pound towards the cliff top, fairly confident that it would return now that it knew the way to and from the cave well, for, since it had not deserted her in the familiar forest, it was the more probable it would cling to her in this country that was strange to it. When it was out of sight, she turned her attention to the day's needs.

'Zip-Zip and I will go fishing,' Lulu planned.
'And Zan must bring in all the wood he can.
He must bring it to the cave mouth and Brild can drag it inside.' It was irksome that nothing could be exacted from Bobo, but, after all, this she had anticipated. And, already, Bobo was examining the cliffs for the source of the colours he had admired overnight, and was

entirely oblivious of aught else.

'There is yellow clay over there,' he was muttering. 'Red, blue and green. I will dig them out. I will mix them up.' And, snatching up a sharp flint, he scrabbled with it at the cliff face while Brild, whining, began to protest his leg hurt him so much still he could not help with the wood. A glance at Lulu's face, however, quelled him, and, daunted, Brild crept to the entrance. Already Zan was on the shore below, waist high in the water,

hauling at a bit of wood as big as himself. He had flung off his skin tunic, and Zip-Zip picked

it up as she and Lulu passed.

'We can pin the edges together with splinters of shell, and carry the fish in it,' she explained. 'The pool fish are smaller than the river fish.' And, with a quick glance to right and left, she led the way towards a belt of rocks, broken by pool after pool; pools, Lulu found to her delight, all well stocked. If smaller than the river fish, the fish of the salt water were more varied. There were fish that swam, but also fish that jumped; fish that clung to the stones until they were prised away. From pool to pool Lulu skipped, entranced, while Zip-Zip watched and helped, proud again. If Bobo's approval pleased her, Lulu's meant more, far more. But her very pride made her yet prouder; she longed to show her country to the best possible advantage. Shielding her eyes with her hand, she looked around in search of further attractions, only, however, to clutch at Lulu in sudden alarm while she pointed to something in the distance. A low, round rock about the size of a hut roof, apparently with nothing remarkable about it. Yet Zip-Zip was panting as if in terror; already she was pulling at Lulu's arm.

'What?' Lulu questioned, puzzled. Then she too stared. The rock was moving gradually, she realised. Inch by inch, sluggishly, so slowly that the movement was hardly perceptible. Yet, already, it was nearer, distinctly nearer. And, as she watched, it turned a little, and jutting out from it was a huge and horny

head.

'Quick! Run!' Zip-Zip gasped, too scared to be ambitious any longer. And so infectious was her fear, Lulu instinctively obeyed. A hundred yards at least the two raced before they

turned to look again.

The thing had turned too, but at a right angle. It had been travelling in a straight line, parallel with the cliffs. Now it was edging towards a point where was a wide ledge a little way up. In the direction of this ledge

it began to struggle, outspread against the cliff's face. Seen thus, it was most weird and strange, uncanny, forbidding. Its legs were

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visible as well as its head; short bent legs with feet ending in great claws. And it had a beak, a horrible hooked beak. Digging its beak and claws into the clay and chalk it climbed. More

than once it slithered back, but still it persevered until it reached its goal. Then, turning sideways, it crouched down to sun itself.

(Continued on page 130.)

'THIS LITTLE WORLD.'

SOME PORTRAITS OF GREAT BRITAIN. Drawn by J. A. SYMINGTON.

(Continued from page 103.)

DICHBOROUGH (part of the parish of K Ash—population 2049) has an uncanny history. Here, in all probability, Julius Cæsar first landed in Britain, B.C. 55. When Britain was more firmly conquered, a century later, Richborough grew into an important Roman harbour, Rutupium, or Portus Rutupensis. A castle, the ruins of which still stand, was built in the time of the Emperor Severus (A.D. 146-211). Many Roman remains have been found in the place. As the sea ran away from the place, the port vanished, and nothing much happened at Richborough for sixteen hundred years: and then it held one of the big secrets of the Great War of 1914-1918. With incredible speed and skill it was turned once more into a great port, the base of a trainferry which bore load after load of supplies of all kinds to France without the need for transporting from rail to ship. So Richborough received the first invasion of England by Europe recorded in written history, and returned the invasion after nineteen and a half centuries.

Rochester (population 31,933 — see also CHATHAM), like Canterbury and Dover, is a history of England in little. Britons, Romans and Saxons lived here—the name, Hroffe's or Roffe's Cester, combines the two last: Roffe is a Saxon name (from which the Bishop's official signature, 'Roffen,' is taken), and cester or castrum is the Latin for camp or castle. Watling Street crosses the Medway here. Rochester and London are the twin oldest bishoprics of England (after the archiepiscopal see of Canterbury). The city has been besieged or sacked (or both) by Danes, by Ethelred, Rufus, John, de Montfort, Tyler, Cade, and Fairfax. Its present cathedral and castle (the splendid Norman keep of which still stands) date from A.D. 1077-1080, though the cathedral was added to in many later generations-and despoiled by King John in 1215; it had been founded in 604 A.D. Its Guildhall was built in 1687—the year before King James II. left

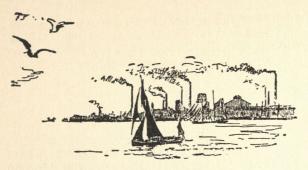
England for ever by way of Rochester, where his brother, Charles II., had rested in 1660 on his way to London for the Restoration. East-gate House, now a museum (the 'Nun's House' of Dickens's Edwin Drood), was built in 1590, and there are many other fine old buildings of all periods. Finally, Mr. Samuel Pickwick began his real adventures at the 'Bull' hotel. Dickens, the creator of Mr. Pickwick, lived and died (in 1870) at Gad's Hill. Rochester is full of the life of Dickens as well as of the life of all England.

Romney (New Romney—population 1604) and Romney Marsh are part of a famous old local saying: 'There are four quarters of the world—Europe, Asia, Africa, and Romney Marsh.' New Romney (in which, curiously, Old Romney, a few miles away inland, was once included—Old Romney having had a church in Saxon times) is one of the original Cinque Ports: but now the sea has retreated a mile or more. It has a fine partly Norman church, and is a pleasant place, perhaps quieter than its close modern neighbour, Littlestone, where golf-links run alongside the sea.

Most of the Marsh could still be flooded, and all was in readiness for such work during the Great War. A few sluices in Dymchurch sea wall would be opened, and in would come the sea to its old kingdom, rushing up the Hythe military canal and back over the Levels to meet and help its own waves. For all the Marsh, right up to the Isle of Oxney and Tenterden, Kenardington and Lympne, was once under water (see Tenterden), and has only been drained and reclaimed ('inned') from the sea in successive centuries from Saxon times onwards.

Sandgate (population 2768) is virtually one with Hythe, Folkestone, and Shorncliffe. The remains of the Castle (built in 1539) still stand.

Sandwich (population 3161) is one of the oldest places in Kent or England: its recorded



Woolwich from the River of London.

age goes back as far as A.D. 665. It is a Cinque Port. Canute and his Danes invaded and burnt it regularly. It still rings the Norman curfew at eight in the evening. St. Bartholomew's Hospital was instituted about 1244, and on St. Bartholomew's Day five hundred Sandwich children each receive a bun.

Sevenoaks (population 9060) is a beautiful little town, with fine views from its high hills all over the Weald, and a most famous mansion and park in Knowle: the house dates from various periods between 1400 and 1600. A Lord Mayor of London in 1418, Sir Walter Sennocke, was a foundling who took Sevenoaks or Sennocke for his surname, and founded a Grammar School and almshouse in the town.

SHEERNESS (population 18,673) guards the mouth of the Medway, and is famous as a port and naval base. It was captured by De Ruyter in 1667, and a hundred and thirty years later the mutiny of the Nore really began there.

(Concluded on page 135.)

HYDRAULICS.

By P. M. BAKER, B.Sc., M.B.E., A.M.I.E.E., A.M.I.Mech.E.

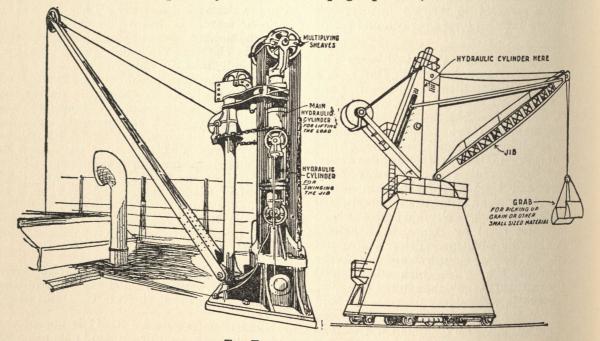
Illustrated by BERNARD WAY.

(Continued from page 111.)

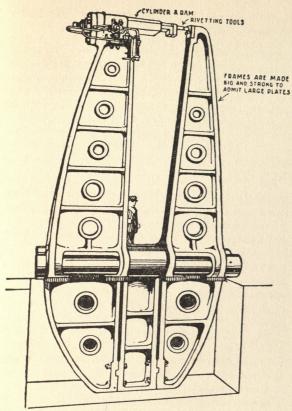
HYDRAULIC CRANES.—Another type of apparatus which is conveniently worked hydraulically is the crane. The left-hand picture below shows an hydraulic crane intended for use on board ship. Its job is to lift

cargo from the hold, swing it over the side, and lower it into a barge lying alongside or on to the wharf.

The hydraulic cylinder is fixed (often in an upright position) between two of the decks near



Two Types of Hydraulic Crane.



A LARGE HYDRAULIC RIVETTING MACHINE FOR BOILER RIVETTING WITH A FORCE OF 200 TONS

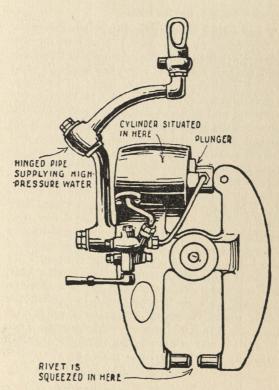
to a hatchway, and the rope, which runs on a pulley at the head of the 'jib,' passes three or four times round sheaves on the plunger head and on the cylinder, as you can see in the picture, so that for every foot travel of the plunger the load can be lifted four, six or eight feet according to the number of sheaves used.

There are often other, smaller cylinders with ropes or chains passing over the pulleys on their plungers, for the purpose of swinging the jib of the crane, and for pulling the jib itself up or letting it down, so that it can reach any part of the hatchway, and you can see one of these auxiliary cylinders in the drawing

The cylinders might have been laid down horizontally, but the vertical arrangement is best, because, when the water pressure is released the weight of the plunger causes it to return into the cylinder, which it would not do if it were horizontal. Such cranes as this are used in passenger ships, as, apart from other

advantages, they are almost silent in operation and permit the handling of cargo at night without keeping all the ship's company awake, as a steam crane or winch would do.

Another hydraulic crane, this time on wheels and arranged to run along the dock-side, is shown on the right-hand side of the drawing. It is almost identical in principle with that shown on the left-hand, but it has to have some form of flexible pipe to bring its supply of high-pressure water to it. You can see these on the wharves in many seaport towns.



A small portable Riveter.

Hydraulic Riveting and Punching Machines.— Another kind of job which can conveniently be worked hydraulically is that of punching holes in plates (we drill them when we can, as punching strains the metal round the hole, but there are jobs for which punched holes are satisfactory) or squeezing up rivets which hold boiler or bridge plates together.

These machines are really simple, although they are sometimes very large owing to the size of the work which they have to handle. The diagram on page 125 illustrates a big machine with very large jaws which enable rivets to be closed in large boiler shells. The partly finished boiler is hung on the crane so that the plates to be riveted are between the jaws (near where the man is seen standing in the diagram), and the cylinder, perched on top of the jaw, pushes forward its plunger, carrying a riveting tool to squeeze up the red-hot rivet against the fixed tool on the other jaw. The

diagram (page 125, on the right) shows a small portable riveter with a hinged pipe, and, in both drawings of riveting machines, you will see that there is a small pipe supplying water to the front end of the cylinder. This is for the purpose of pushing back the main plunger into its cylinder when its job is done. You will see the valve controlling the water supply and operating its handle in the drawing.

(Continued on page 140.)

BIRD CAMEOS.

I.-THE ROBINS.

T was a cold winter morning when the robin I first came to visit us. I saw him on the pear-tree just outside the window, putting his head on one side, and cheeping as much as to say, 'I want some breakfast too!' Of course, I gave him some, and after that he came every morning, and brought his little mate with him too. As the spring days came both the birds hopped about with an air of importance, and then the little cock-robin was seen giving his mate the best of the crumbs, and taking great care of her, and one morning I saw him carrying a leaf away and knew they were making a nest. For a long time I could not discover where they were building, but at last I found the nest carefully hidden just where the sun could warm it, and the soft wind could blow the scent of the lilies-of-the-valley. It was a beautifully made little home-smoothly lined with hair, and covered outside with dry leaves and moss. I knew well if I went near too often, the birds would be scared away, so I only once looked at the four brown-speckled eggs. Then I waited and watched the little cock-robin bringing food to his little mate, as she sat so

patiently on her eggs day after day, only leaving them for very short intervals and just going where he could easily call her back.

In three weeks time four little robins were hatched. How the father and mother bird worked! Backwards and forwards they flew, sometimes bringing a bright green caterpillar, sometimes a worm. Stronger and stronger the little ones grew, and I knew soon they would fly away and the nest would be empty.

So I thought one day, as the old birds were off food-hunting, I would take a closer peep. I parted the gooseberry bushes, stepped up to

the nest, and bent to look.

In a moment there was a terrible commotion! The two old birds came hurrying up, and flew on to my head, flapping their wings, and pecking and pulling at my hair. I jumped back and ran from the nest as hard as I could, till I reached the seat by the lilies-of-the-valley.

The father bird, his feathers still ruffled with his anger and energy, was sitting on an apple-bough near the nest; the mother bird was spreading her wings over the little ones, and presently nothing was to be seen but the tip of her beak, and the end of her tail. G. L. D.

GLITTERS, THE GOLDFISH.

CLITTERS, the Goldfish, lived all alone in

U a lily pond.

He was lonely, because he was the only fish in the pond, and he was bored because there was nothing for him to do all day long, except blow air-bubbles, or to swim round and round through the green waters. And he was dreadfully tired of doing both these things.

'I wish I could escape,' he yawned, opening his mouth very wide, and bumping his nose

against the bank.

It was not long before he got his chance.

One day there was a very bad storm, and the pond was flooded. Glitters jumped with delight and swam out with the waters of the flood, and was carried by them into a river. How the waters swirled, and bubbled and sang as they rushed along, and how delighted Glitters was as he was carried along by their force! By-and-by he saw a large speckled fish. Glitters swam up to him with a friendly air.

'Please can you tell me the way to the

lake?' he asked.

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'Ugh! you fat gold-grubber,' snarled the fish, who was a cross old Trout, and he flashed past with a flick of his tail. Poor Glitters was very disappointed, for he had looked forward to playing with other fish in the river.

'I'm not really fat—and I can't help the colour of my scales,' he murmured sadly to himself. But the River had heard his question.

'Lake? What do you want with a lake, you funny little fish?' it gurgled. 'I'm going to the sea. The sea, the sea, the deep, blue, rolling, world-wide sea. You come along with me.'

'Why, I've always wanted to see the world, so I will,' said Glitters, as he was borne along by the current. Indeed, he didn't have to swim at all, only to steer himself by gentle little wags of his tail to this side and that.

The little Goldfish had never heard tell of the sea in all his life; but long ago, when he was a baby, he had heard of places called lakes, where a fish could swim for miles without bumping his nose against the banks. But the sea—the world-wide sea. sounded even better than lakes. Who could tell—there might even be other goldfishes living there!

On and on swept the river, growing wider and wider, and rougher and rougher, as it drew nearer the sea. Glitters met several more Trout, but they all looked so crossly at him, that he did not speak to them.

'They don't seem to like me,' he thought. The truth was, the Trout were jealous of him, because they thought he must be very rich to wear such wonderful golden scales.

By-and-by the River began to sing: 'Here we come. Here we come. Here we come to

the world-wide sea.'

And it began to flow ever so much faster. Glitters was floated along faster with it, but as he went he began to notice a very curious taste in the water that seemed to burn his throat, and to make his gills smart. He just managed to gasp out: 'Is this the Sea?'

'Yes!' roared the River, swirling on at full-

speed. 'Yes, this is the Sea.'

'Oh, please! Why does it taste so funny?' gasped the little Goldfish, feeling very ill indeed.

'Funny? It doesn't taste funny—you silly. It tastes salt,' laughed the River, rushing on.

Then the little Goldfish opened and shut his mouth several times very quickly.

'By my shining scales,' he said firmly, and

repeated his words; 'by my shining scales I don't like the sea at all,' and with a whisk of his tail he turned round, and very, very slowly began to swim up the river again.

'Why, I believe you are a fresh-water fish after all,' laughed the River. 'You had better

go home to your lily pond.'

But Glitters didn't answer. He wasn't going back to the lily pond. He was going to find a lake. And if the sea was at this end of the river, perhaps a lake was at the other end. As it happens he was right. But Glitters never got so far as that to find

In fact he didn't get even as far as the lily pond, for the current of the flooded river was so strong that the little Goldfish could hardly swim against it. So as soon as he had left the horrid salty taste of the sea-water well behind, Glitters was very glad to be gently wafted into the back waters of a little creek. Here he was thankful to rest a little while in the clear waters of a pool, leaning his side against a bank of green water-weeds.

But not for long, for up swam a shoal of

merry little minnows.

'Hullo!' cried the leader, when he sighted the golden scales of Glitters. 'What have we here?'

All the little minnows goggled their already goggly eyes, opened their little mouths, and flicked their little tails with surprise. Then they made a circle in the water round Glitters.

'Who are you?' they asked all together. 'I'm Glitters the Goldfish, and I come from

the lily pond,' said Glitters.

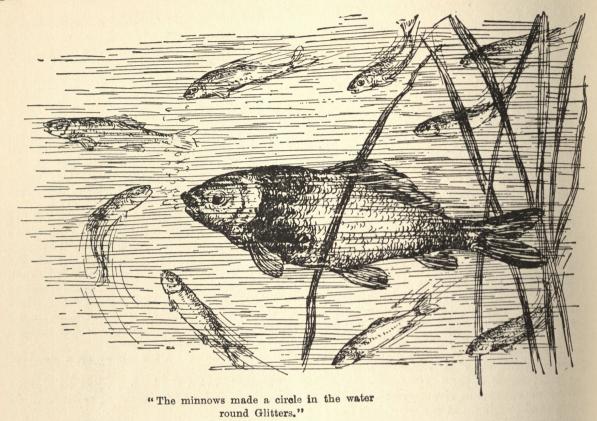
'O-o-o-h,' said all the Minnows, and they looked at their leader.

The Leader, like the Trout, thought that Glitters must be very rich and very wonderful to wear such shining scales, and to live in a lily pond. So he said: 'Please will you be our King?'

But Glitters was growing cautious. The Sea had turned out half as nice as he expected, and perhaps a King wouldn't either. So he asked: 'What does a King have to do?'

'Oh-' said the Leader of the Minnows, who didn't quite know, because they had never seen a King before. 'Oh-just lie in the shade of our water lily plant-and-erblow bubbles-and-er-do nothing all day long.'

'Then I'd rather not be King,' said Glitters firmly. He had had enough of blowing



bubbles and the rest of it while he lived in the lily pond. 'I'd rather just play with you; and please will you show me where to find

something to eat?'

'Rather!' cried all the Minnows together, swishing their tails to show their delight, and they swam off to show him where the most delicious water-weeds grew. And when they had eaten as much as they wanted, then they all played a game of catch-as-catch-can, in and out of the water-weeds, and through the crystal waters of the pool, until it was time to go to bed.

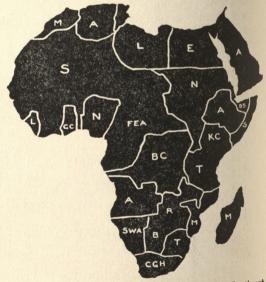
And Glitters was happier than he had ever

been in his life.

'I'll stay here,' he said to himself, and he did.

So keep a good look-out, and perhaps the next time you see a shoal of minnows playing in a crystal, clear pool—perhaps you will catch a glimpse of Glitters, the Goldfish who might have been King, swimming about in their midst.

JEAN GORDON.



Key to the "Jigsaw" Puzzle on p. 97—the Continent of Africa, with Madagascar.

(The white lines show the present territorial divisions, not the edge of the black fragments.)



"On the floor lay Zan, and on his chest Brild squatted."

THE DIM RED DAWN.

By Mrs. HOBART HAMPDEN, Author of 'Louisa,' The Hidden City,' Princess Ooma,' &c.

Illustrated by E. S. Farmer.

(Continued from page 123.)

AH!' Zip-Zip breathed. 'It I remember too.' She blinked, dazed, as under the sudden strain old things came flooding back once more. Her hands went up to her ears and she shuddered.

'Ah!' she said again. 'He screamed. Lulu,

he screamed.'

'Who screamed?' Lulu demanded. On the verge of panic herself by this time, she shook the cowering Zip-Zip. 'Quick, tell me!' she insisted sternly. And, in response, Zip-Zip

contrived to pull herself together.

'My father. Inside my head only,' she explained, ashamed. 'But once he did scream. We had been fishing, and we had gone very far, and the water was trying to catch us. We were running to get out of its way. When it is close there is a strong current that runs past that ledge—too strong for any swimmer. And my father tripped over a rock and broke his leg. Crack went the bone. It was not only bruised like Brild's.'

'Ah!' Lulu breathed, her eyes on the thing

on the ledge.

'We carried him a long way,' Zip-Zip went on, 'but the water came too fast; he was too heavy. And "Put me on the ledge," he said, "and come back later." And we did not know that that had made the ledge its home. And we left him, and it found him.'

'Yes?' Lulu prompted. But now she found that she preferred to look at Zip-Zip, and not at the subject of her tale. There was no dis-

puting it was a gruesome story.

'We put our fingers into our ears when we heard the shrieks,' Zip-Zip finished, sighing. 'And, when the water went, we crept to look. And on the ledge there was a heap of bones and that was all. But see, the water is coming.

We must not loiter too long.'

Subdued somewhat still, the two began to work their way cave-wards, fishing at intervals, for there was still room in the bag they had made of Zan's tunic, and the water was still sufficiently distant. Heavily laden, finally, they reached the foot of the ravine, and sat down to rest before the ascent. The ledge on which the great thing sat was now no longer

visible. It was hidden by a curve that jutted out and against which the salt water was by this time splashing, piling itself up when it

could get no further.

'The current is strongest round the curve,' said Zip-Zip, pointing. She was happier now with the piled water between her and the thing she feared, and eager to distract Lulu's attention from it—afraid that, after all, a cave life might not seem attractive. And Lulu, also, was very willing to forget. She had, indeed, expected to encounter new forces, but she saw no reason, if they were alarming, for dwelling on them needlessly.

'Come,' she said, and picked up the tunic again. Then abruptly she dropped it. Had something screamed, or had she just imagined it because of what had passed? A glance showed her Zip-Zip cowering once more with

greying cheeks and eyes dilated.

'Did you hear it?' Zip-Zip was whispering.
'Did you hear it?' And at the whisper, came

the scream again.

But Lulu did not wait to answer. Already she was half-way up the ravine. She knew now who had screamed; it must be Zan. Only one so young would scream so shrilly. But what fell thing had got within the cave? And why were Brild and Bobo silent? Why were they not defending Zan whom she had saved from Churruk—Zan on whom her future plans were based? Indignant, Lulu had not time to be afraid.

She was level with the cave entrance now, Zip-Zip a few yards behind her. A moment Lulu paused to get her breath ere she crept forward stealthily. Zan's opponent would be easier to deal with if surprised. Then, 'What are you doing, Brild?' Zip-Zip heard Lulu shout. 'Let him go, I say. Let him go.'

CHAPTER XV. BOBO INTERVENES.

WITH a spurt Zip-Zip pulled herself up until she could see into the cave over Lulu's shoulder. On the floor lay Zan, and on his chest Brild squatted. One hand was twisted in Zan's hair, in the other Brild held a stick aflame. He was staring, open-mouthed, at Lulu. Taken by

THE STATE OF THE S

surprise, he was too startled even to move before she challenged him again.

'Give me that stick,' said Lulu. 'Give it to me.'

And, as she spoke, she sprang into the cave, snatched the stick from Brild and sent him flying. Over he fell backwards, and on his chest she sat in turn, shouting to Zip-Zip.

chest she sat in turn, shouting to Zip-Zip.

'Light this stick again,' she shrieked. 'It's almost out. It's growing cool. I want it hot! Hot! Hot! And as Zip-Zip, stick in hand, rushed to the fire and Zan scrambled to his feet, Brild, desperate, began to yell, which brought Bobo out of his chosen cave in a rage that equalled Lulu's own. He glared at his niece, and she glared back at him.

'Am I to have no peace?' Bobo spluttered. 'How can I make my pictures with all this noise? Must you always be fighting, loathsome brats? Leave Brild alone, Lulu. Leave him alone at once, I say.'

'Yes, leave me alone,' Brild whimpered, dropping his voice. The meeker he appeared, the less noisy now his protest, the more likely it was his father would side with him, he was aware. 'Leave me alone,' he moaned faintly.

'No,' said Lulu, for she felt she was on sure

ground; the ground of mutual tribal law to which Bobo, as well as herself, owed obedience. If one of Zend's tribe injured another member, he must suffer the same injury himself.

'Brild was going to burn Zan's feet. I shall burn his,' she told Bobo grimly. 'You know it is the law.' And Bobo, at a loss for an argument, rubbed his nose dubiously.

'It is the law,' he was forced to admit, if reluctantly. But as Brild, desperate, screeched again, Bobo lunged, caught Lulu round the waist, and swung her off the ground despite her struggles. But she did not persist in those struggles long. Bobo was too strong to make struggling worth while, more than one tussle in the past had taught her. Though it was not just this thing that Bobo was doing, there seemed no remedy. Moreover, Zip-Zip was sidling to her rescue, and would inevitably be damaged also. Indeed, Bobo had already launched a kick in Zip-Zip's direction.

'Put me down,' Lulu bargained, therefore, and dropped the stick in token of submission. And Bobo set her on her feet again and made some amends by beginning to argue with her.

(Continued on page 142.)

MY DIARY.

Written and Illustrated by RUTH COBB.
V.—TRAVELLERS' DIARIES.

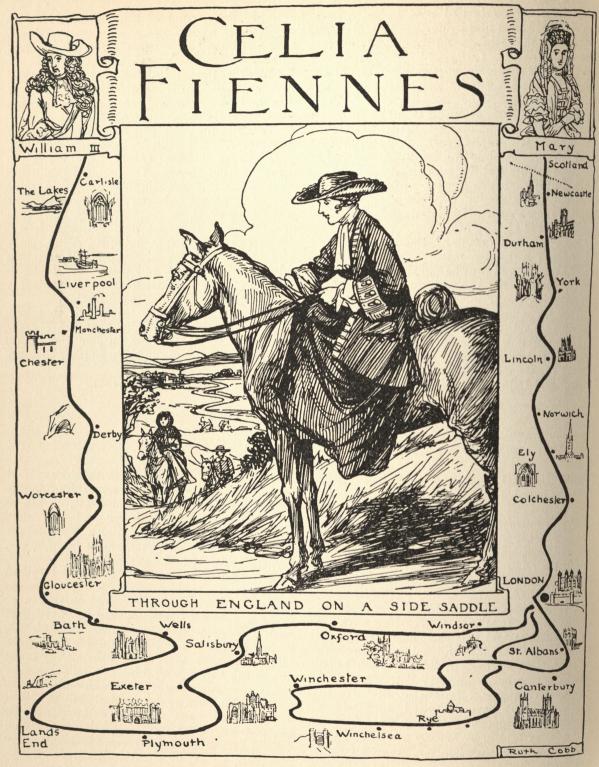
TRAVELLING about England for pleasure, especially by a woman, was somewhat unusual when Celia Fiennes* lived. We do not know very much about her personally, except that her father was a parliamentary officer in the civil war, and that she was grown up during the reign of William and Mary. She kept a journal of her Travels through England on a Side Saddle. This diary was obviously written from day to day, but the only dates mentioned are 1695 and 1697. She says in the beginning: 'As this was never designed, so not likely to fall into the hands of any but my near relations, there needs not much to be said to Excuse or recommend it. Something may be diverting and profitable, tho' not to Gentlemen, that have travelled more about England. My journeys, as they were begun to regain my health, by variety and change of aire and exercise, so whatever promoted that was pursued.'

One summer she made as much as 1551 miles, travelling up the east of England to Scotland, and down, on the west, as far as Bath. Sometimes her sister and her maid went with her, at other times her mother. Occasionally the party may have been larger, for she writes of 'all our company.'

We get to know a great deal about England at that time from her diary; of the towns and villages and country houses as they were then. She does not appear to have met with any exciting adventures, although she suffered from the bad state of the roads. 'Before I came to Asford, forceing my horse out of the hollow way, his feete failed, and he Could noe wayes recover himself, and so I was shott off his neck upon the Bank, but noe harm I bless God; and as soone as he could role himself up, stood stock still by me, which I looked on as a great mercey—indeed, mercey and truth all ways have attended me.'

Another time, near Ely, 'the raines now had

^{*} The name was and is pronounced 'Fines.'



The Journeys of Celia Fiennes.



MOONLIGHT.

fallen so, as in some places near ye City, ye caussey was covered, and a remarkable deliverance I had, for my horse Earnest to drinke, ran to get more depth of water, than ye Caussey had, was on ye brinke of one of these dikes, but by a special providence, which I desire never



William Cobbett as a young man.

to forget, and and all ways to be thankfull for, Escaped.'

She was a confirmed sightseer, and went over houses and into caves and mills and places she thought interesting. She enters the account of the various inns she stayed at, and the things she had to eat. At Pomfret (Pontefract), 'Provisions are very Easy here, we had 2 or 3 pound of Codffish for a small matter, and it was a large dish.' Bridges were few and far between in those days, and she disliked ferries; 'those ferry boats are soe wet, and then the sea, and wind, is allwayes Cold to be upon, that I never faile to Catch Cold in a ferry boate, as I did this day, having 2 more ferryes to Cross.'

She was not as happy as usual when in Scotland, and disapproved of the household arrangements.

'The houses look just like booths at a fair. I am sure I have been in some of them, that were tollerable dwellings to these, they have no chimneys, their smoke comes out all over the house. There is no Room in these houses, but is up to ye* thatch, in which are two or three beds.

* 'Ye' is only 'the.' It was not pronounced 'ye,' but it was written with a contraction for 'th,' which looked like 'y.' It is nonsense to talk nowadays of 'ye olde house.'

Notwithstanding ye Cleaning of their parlour for me, I was not able to bear the roome: the smell of the hay was a perfume, and what I Rather chose to stay, and see my horses Eate their provender in the stable, than to stand in that room, for I could not bring myself to sit down. My landlady offered me a good dish of flish, but I could have no stomach to Eate any of the flood they should order.'

Celia Fiennes visited many cathedral towns, and it is interesting to know how they and the large commercial towns looked in those days. She says of Salisbury Cathedral, 'It appeals to us below as sharpe as a Dagger. Yet the compass on the top as bigg as a cart wheele.'

The diary closes with an account of Windsor and of London, 'ye metropolis of England.' There are accounts of the Lord Mayor's show, and the coronation of William and Mary, and various sights of the town. Of the Tower of London she says, 'In another part is kept severall Lyons which are named by ye names of ye Kings, and it has been observed that when



"Just such a chap as I was at h's age."

a king has dyed, ye Lion of ye name has also dyed.

Why Celia Fiennes ceased to keep a diary, or what happened to her in later life, is not known. Her descendants kept the diary, but it was not published until 1888.

Another diary writer, who journeyed through

England, at a later time, was William Cobbett, a reformer, a member of parliament, and writer of beautiful English. He did not journey merely for pleasure, but to observe the country, and the state of the people who lived and worked on the land. On arriving at a Cathedral town, he often makes no mention of the cathedral, but describes the market and whether the people looked ragged or well clothed.

Cobbett, who was the son of a small farmer, was born in 1762. He was early put to work in the fields, keeping the birds away from the seeds. He says, 'When I first trudged a field, with my satchell swung over my shoulder, I was hardly able to climb the gates and styles, and at the close of the day, to reach home was

a task of infinite difficulty.'

He and his brother were taught by their father to read, and when eleven years old he became a gardener's boy. It was not until he was twenty that he left the country and became a lawyer's clerk in London. Soon after he enlisted as a soldier, and was sent with his regiment to Nova Scotia. After he left the army he settled in America, and he became a teacher of English and French, and also a bookseller. He began to write pamphlets on causes he had much at heart, and they sold largely, and attracted attention even in England, and when he returned home in 1800 he was immediately welcomed by the government as a good man for their side. He edited a political paper at first, afterwards entering Parliament. He was very outspoken, and began his opening speech by saying: 'It appears to me that since I have been sitting here I have heard a great deal of vain and unprofitable conversation.' His greatest interest was the agricultural labourer, the conditions of whose lives at that time were extremely hard. He began his Rural Rides on October 30th, 1821, and the last entry is in 1832.'

Mixed up with his daily entries of his journey are many invectives against statesmen, and the public doings that he disliked. He journeyed through most of the southern and midland counties, and as far north as the Tweed. He rode as much as forty miles a day, although he once or twice mentions travelling in a post chaise. He sometimes took his son Richard with him on his journeys. His arrival at a town often caused quite a sensation. He says on Saturday night, November 10th, 1821, Old Hall: 'One thing could not fail to please me, my friends were gay and my

enemies gloomy . . . I went into the market place amongst the farmers, with whom, in general, I was very much pleased. If I were to live in the county two months I should be acquainted with every man of them.'

Like other diarists, William Cobbett makes many entries about eatables, and how he enjoyed simple meals with the labourers: 'I asked the man whether he had any bread and cheese, and was not a little pleased to hear him say "Yes." Then I asked him to give me a bit. He answered in the affirmative at once, though I did not talk of payments. His wife brought out the cut loaf and a piece of Wiltshire cheese. I verily believe that all the pleasure of eating, enjoyed by all the feeders in London, does not equal that which we enjoyed in gnawing this bread and cheese as we rode over this cold down.'

Health interested him less, though he describes how, having tried every other remedy, he attempted to cure himself of whooping cough by getting wet through to the skin.

He loved the country sights and sounds as well as the people. There are many entries such as: 'Near Ipswich. A lark very near to me in a ploughed field rose from the ground and was saluting the sun with his delightful song'; or November 5th: 'A white frost this morning. The hills round about, beautiful at sunrise, the rooks making that noise, which they always make in winter mornings.'

He disliked towns, and deplored the growth of large cities. It is not difficult to imagine his feelings if he saw the state of England as it is to-day, with its population leaving the country, and the rapid spreading of towns. He was angry enough at the state of things in his own day, at the pretty girls 'ragged as colts and pale as ashes,' the miserable poverty, the dwellings 'little better than pig

beds.

On August 1st, 1823, he stopped at an inn, at Billingshurst in Sussex. 'The landlady sent her son to get me some cream, and he was just such a chap as I was at his age, and dressed in the same sort of way, his main ornament being a blue smock-frock faded from wear and mended with pieces of new stuff. The sight of this smock-frock brought to my recollection many things very dear to me. This boy will, I daresay, perform his part at Billingshurst, or

11111111

at some place not far from it. If accident had not taken me from a similar scene, how many villains, and fools, who have been teased and tormented, would have slept in peace at night, and have fearlessly swaggered

about by day!' So wrote William Cobbett, and by such entries, we get to know and admire the man himself, his infinite love for Nature and Mankind, his hatred of oppression and injustice.

UP A TREE.

THE letters had said, 'Will you all come to tea On Tuesday, the seventh, at quarter-past three'

-That was as plain as plain could be.

Now here were the acorns and berries and oats, The stand for umbrellas, the pegs for the coats, And the smart little page who'd delivered the notes.

And here was the hostess as grand as could be, With Billum and Bobbikins, one on each knee, But where were the guests she'd invited to tea?

'Let's fly to the party,' said venturesome Jack,
'Invite all the others to go and come back
With us in our 'plane.' But alas! and alack!

The 'plane was as rotten as rotten could be; Instead of arriving at quarter-past three, It landed and left all the guests 'up a tree.'

THAT'S HOW!

IF a hard lesson is to be learned, do not spend a moment fretting; do not lose a breath in saying 'I can't,' or 'I do not see how,' but go at it, and keep at it. That is the only way to conquer it.

If a fault is to be cured, or a bad habit broken off, it cannot be done by just being sorry, or only trying a little. You must keep fighting it, and not give up fighting until it is got rid of.

After a great snow-storm a little fellow began to shovel a path through a great snow-bank before his grandmother's door. He had nothing but a small shovel to work with.

'How do you expect to get through that drift?' asked a man passing along.

'By keeping at it,' said the boy cheerfully; 'that's how!'

And it is a great 'how.' It is the secret of mastering almost every difficulty under the sun. If a hard job is before you, stick to it. Do not keep thinking how hard or how large it is; but go at it, and little by little it will grow smaller and smaller until it is done.

'THIS LITTLE WORLD.'

SOME PORTRAITS OF GREAT BRITAIN.
Drawn by J. A. SYMINGTON.

I.—KENT.
(Concluded from page 124.)

THE ISLE OF SHEPPEY (total population 26,344) is made an island by the Swale. It contains the valuable port of Queenborough (population 3081), which has a history going back to Saxon times. Edward III. and Queen Philippa of Hainault stayed here. Sheppey means the isle of sheep. The famous 'giant' steamer (as giants went in those days) set out from here on her maiden voyage.

SITTINGBOURNE (population 9339) has no very notable history, but is a pleasant small town with a considerable manufacture of cement, bricks, and paper.

STAPLEHURST (population 1897) is a very typical Kentish village. It contains a monument to the Protestant martyrs of 1556. It is also notable for a terrible railway accident in June, 1865, in which Charles Dickens was involved. He worked desperately to help others who suffered in that catastrophe, and there is little doubt that his efforts injured his health and greatly tended to shorten his life.

Tenterden (population 3438) is a little known but beautiful and once important town which is practically the capital of the Weald of Kent, and has a curious history. But it is the geography of Tenterden which is important. Within the last twenty years barges could sail up the Rother to Smallhythe, the harbour of Tenterden, two miles away. A thousand years ago Tenterden was a port. It is a limb of Rye, a Cinque Port, and has all the rights and splendid insignia of a Cinque Port. It has the widest street in England.

Tenterden, with Kenardington and Lympne, was the real frontier of England when Romney Marsh was sea, not 'inned' land. The Danes sacked all these little places from the sea and not across any of the dangerous marshes: but the sea has been driven back. If you stand on 'the

Gibbet' (a hill near Tenterden) you can see spread out as rich pasture-land—all of which was under the sea when the Romans came to Kent. 'Invicta'—Kent has conquered even the sea.

William Caxton was probably born at Tenterden: his fireplace is still shown—but not to every one. Oliver Goldsmith acted here when he was pennilled: part of the theatre where he

played is still left.

THURNHAM (population 716) is on the old Pilgrim's Way from Winchester to Canterbury —and a very beautiful Way it is at that point. It contains the remains of a Norman Castle. But its fame to Kent folk lies in the fact that Alfred Mynn is buried there—perhaps the only cricketer fit to be compared, for 'records,' with W. G. Grace, Jack Hobbs, and Wilfrid Rhodes. He was born in 1807, and was possibly the finest 'all-rounder' of them all. In 1843 he took fifteen wickets in one match for the Gentlemen of Kent against the Gentlemen of England, and in the same year for Kent against England took eight wickets in one innings. He weighed eighteen to twenty stone, stood six foot one, and was noted for his hard driving and his fast round-arm bowling—as well as for his fine character. He deserved his title of 'The Lion of Kent.' Not far away, on Bearstead Green, Mr. P. F. Warner has brought many famous cricketers of to-day to play in those village matches which are the true strength of the great game.

Tonbridge (population 15,947), like most of the inland towns of Kent, has a natural importance from its geography. The ruins of the Norman Castle explain its position. The Medway here dwindles into a pretty little stream as it runs on past Penshurst to its rise on the edge of Ashdown Forest. Tonbridge is the highest commanding place in its course. Today it is also an important railway centre, lying midway between the high hills to the north and south-east.

There are a good many picturesque old houses in the busy town, notably the Chequers Inn. One of the famous Kent cricket 'weeks' is held here, and the cricket 'nursery,' or training place for young cricketers, is connected with the Angel ground.

Tunbridge Wells (population 35,551) is really the 'Wells' of Tonbridge: Lord North

discovered the famous chalybeate springs there in 1606, and ever since persons in search of health have flocked to the charming old promenade called the Pantiles to 'take the waters.' Most of the famous people of the next three centuries came here. It is the scene of a famous chapter in Thackeray's The Virginians. The country round is exceedingly picturesque, and the famous Nevill ground (where also a 'week' is held) is one of the prettiest of all the pretty Kent cricket-fields.

Westerham (population 3162) is a pleasant little town where James Wolfe was born and lived. He fell at the taking of Quebec in 1759. His house still stands and is preserved so far as possible in its original condition. Thackeray in *The Virginians* describes a visit to Wolfe there. Jane Austen also knew Westerham, much of which cannot have changed greatly since her day.

WHITSTABLE (population 9842) means oysters, such as are found nowhere else in the world. It is an old ancient town, but not otherwise remarkable.

Woolwich is famous for its Arsenal and its Dockyard, which have been established overfour centuries. The Royal Military Academy has also been established there for about two hundred years.

It seems strange to-day, when the grimy place is so full of people and traffic, to recall that Richard Lovelace, the ideal cavalier, was born here in 1618, and lived much of his adventurous life here; he wrote the famous poem

which ends

'I could not love thee, dear, so much, Loved I not honour more,' and that other which tells us that

> 'Stone walls do not a prison make, Nor iron bars a cage.'

Another famous cavalier, Prince Rupert, also dwelt at Woolwich. But nowadays bigger guns than that celebrated soldier ever saw are made in the Arsenal. One of the best known was the 'Woolwich Infant,' the first of the 110-ton guns which fell out of use for a time over thirty years ago, but came back for the Great War. The first 'Infant' cost over £20,000, and every discharge meant £35. Woolwich is the headquarters of the British artillery.

F. J. H. D.



"The glasses disclosed two black objects."

A MOORLAND ADVENTURE.

Y parents were in India, so I was spending M Y parents were in India, with my uncle—the summer holidays with my uncle— Captain Lushington-at Greywell Farm. He was a widower, and here, since retiring from the Navy, he had lived on the wildest part of the Yorkshire moors with his three children. May and Harold—the twins—were just my age, which was fifteen, whilst Bob was a couple

of years older.

The holidays were half over, when during one of our many fishing expeditions, we met one day for a picnic lunch, in a glorious gorge of the hills, with purple heather for a carpet, and grey, lichen-covered rocks for table and chairs. Each had a good basket of trout to show, for a heavy thunderstorm the day before had cleared the air, whilst the rain which accompanied it had changed the moorland streamlets from trickling threads into trout brooks. Cold chicken, hard-boiled eggs, and ginger beer had rapidly disappeared, when to our dismay, my uncle's best sheep-dog, Watch, suddenly staggered into our midst, with halfglazed eyes, and a minute later lay there dead, his rigid muscles and limbs at once suggesting

'The sheep-stealers!' exclaimed Bob. 'Our head shepherd is at the fair with the lambs today, and that lazy fellow, Donkins, is in charge. You may be sure they've caught him asleep or loafing at home, poisoned Watch, and are on the look-out for a sheep to stray to an out-ofthe-way glen to cut its throat. It's years since they've been to these parts, so people have grown careless, but I heard Father say they'd been on the prowl again lately, and killed sheep only twenty miles away. Now that we've been warned by poor old Watch, it's our own fault if his murderers get off

scot-free.'

'What a good thing my bringing my fieldglasses to look at the grouse with!' said May. 'Let's pack up, hide the baskets, and

The Scout spirit was strong in us, and by the time the baskets were hidden, our plans were

arranged.

Keeping as much under cover as possible, we at length reached some big rocks, high up and lying in the direction from which poor Watch had come.

Here we ensconced ourselves, but for some time May's quick eyes scanned the moors in Nothing but purple heather and mountain grass where the sheep fed, scattered in ones and twos, could be seen, with an occasional family of unusually energetic grouse just stirring from the midday rest, to seek some favourite feeding-ground.

'No good,' she said at last, handing the glasses to me, with a sigh. 'We must move

on to a fresh look-out.'

Hardly, however, had I got the glasses focussed, than they disclosed two black objects which wriggled out from behind some whin bushes. A long scrutiny satisfied me that they were the heads of two men working their way stealthily towards a low pass, where a sheep was feeding.

Not till sheep and men had disappeared did we venture to leave the sheltering rocks and

hastily follow in their wake.

At length we reached the pass, slithered over it on all fours, and after scouting ahead, stole warily through whin and heather till we gained the dense beech woods clothing the steep banks of the river which ran through the valley and cut our moorland in two.

On peering over the bank through an opening between the trees, intense was our indignation to see two white-bearded old men facing us in a shallow below, holding up a dead sheep, still bleeding from a cut in its throat, the great Lon its fleece telling us plainly enough to whom it belonged.

Whilst the men held the sheep to let it bleed in the water, and so leave no traces, in turn we scanned their faces with the glasses, but though their features seemed familiar to us, yet not one of us could put a name to their

owners.

Just then a horse neighed, and May whispered, 'There's a cart above the wood near the road; I see the horse's tail switching off the flies. They are going to carry away the sheep, and as I can run fastest, I will go to the nearest police station on the road they are going, for I can sneak up and see by the address on the cart where they live. I know all the short cuts, so if I start now, I shall get there first.'

Off through the woods she sped, but had hardly started when, to our consternation, we saw a hulking fellow with bushy black beard and eyebrows, who carried a spade, coming from

the cart towards her.

Well was it that we waited before rushing to the rescue, for providentially May saw the man first and turned aside in time to avoid him.

Though he had not seen, he had evidently heard her moving through the bushes, for he stopped to listen; but as this luckily caused a self-conscious rabbit harbouring there to dart out, after cursing it for giving him a scare he moved on, and May reached the cart unobserved.

(Continued on page 162.)

BIRD CAMEOS.

II.-THE BLACKBIRDS: A TRAGEDY.

IT was very foolish of the two blackbirds to build so high up! Why did they do it? Perhaps to escape the neighbours' cats! Well, they began by choosing their site-against the trunk of the pear-tree, where a friendly branch stretched out a shady arm, and certainly looked First the birds brought up and inviting. arranged long pieces of dry grass and stalks, then they searched for mossy roots and mud; and if the mud was too hard they would dip it into their drinking water before they carried it up to their embryo home. It made a good foundation for the inside when it hardened. When the nest was finally lined with softer blades of dry grass, the two workers surveyed it with satisfaction. No! not quite complete yet. I believe they thought it was too visible, for they searched around until they found two long dried fronds of fern, which they triumphantly carried up and stuck into the outside of the nest, hanging down in two long trails. They must have forgotten they were not building near the ground, for the fern made their home much more easily seen-down below it would have helped to hide it! In due course the eggs were laid and the birds hatched. I would not climb up and look into the nest, but I watched the mother sitting higher and higher in the nest, and often standing on the side popping food into the hungry mouths.

How untiring she and her yellow-billed mate were! I would see them hopping over the grass, and listening with their heads on one side for the grind of the worm they wanted to catch, or snatching a hasty bath in the water-dish. And I would whisper, 'Soon your work will be done, and you will be proud to show off your babies.' Alas! it was not to be. One day I heard an ugly 'Caw! Caw!' followed by frightened cries, and a moment later a huge crow flew out of the pear-tree, in its great beak a plump little fledgling. The two poor parent-birds screamed, and flapped after it—distracted

and helpless. Sorrowfully I neared the tree. The nest was all torn and ragged one side, and the fern fronds hanging limp and bedraggled from the bough.

Why weren't those foolish blackbirds content to build a little lower?

G. L. D.

IF I WERE A KING.

I'D choose for my kingdom a country patch; For palace, a cottage—with roof of thatch; From daylight to dusk my dominion should ring With the songs of my subjects—if I were a king!

If I were a monarch I'd choose, for throne, No canopied seat, but the mossy stone That's washed by the waters that ripple and flow By the banks where the splendid marsh-marigolds grow.

My sceptre—the symbol of state—should be An osier sweet from a willow tree; For crown, I would covet no costlier gem Than a shimmering buttercup diadem.

On guard at the entrance to my domain I'd have, as sentinel, heron or crane;
For my councillors, rooks on their elm tree perch,
Or the knowing old owl from the tower of the church.

If I were a monarch my realm should be A region of meadow and stream and tree; Marauders who pillaged my birds' nests I'd bring, Hey, presto! to justice—if I were a king!

THE NIGHTLIGHT.

SOMETIMES before I go to sleep
I nearly shut my eyes and peep
At the nightlight dimly burning.
Then shapes fantastic dazzle me,
And colours bright and strange I see
That go turning—turning—turning!

A thousand jewels, green and gold,
And scorching sparks and snowflakes cold
Round the yellow flame go twirling;
And twisted threads of light shoot out
Where flaming shuttles leap about,
And a million stars go whirling!

And silver ripples circle through
A sparkling sea of red and blue—
In the shadows madly sweeping;
Too soon they fade to solemn grey,
And, phantom-like, they slip away . . .
And the nightlight sees me sleeping!

H. L. G.

HYDRAULICS.

By P. M. BAKER, B.Sc., M.B.E., A.M.I.E.E., A.M.I.Mech.E.

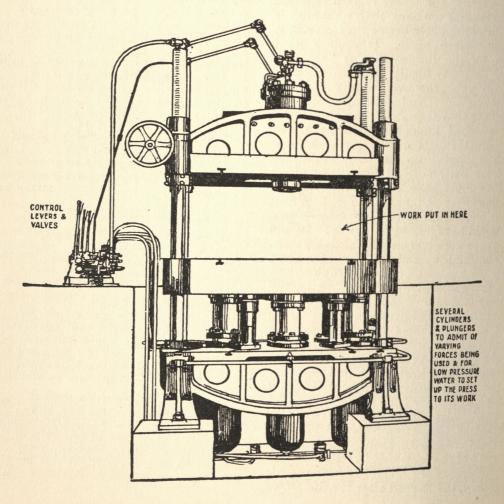
Illustrated by BERNARD WAY.

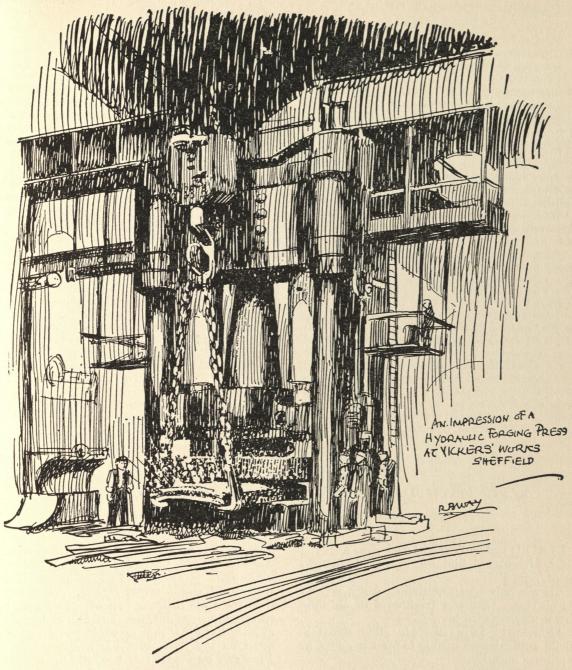
(Continued from page 126.)

A S final examples of hydraulic apparatus we show a picture of a large press with several cylinders intended to squeeze up steel plates into the form of shallow cups for boiler ends or similar work. The early parts of the job call for less force than when the final 'squeeze' is being given, so we use one cylinder to start with, filling the others with low-pressure water, and only using high pressure on all for the last effort. This saves unnecessary use of our high-pressure water. The other picture is intended to give you some idea of the size of the hydraulic presses used for squeezing up masses of steel into the forms required for

armour plates, for ships' frame parts, or other similar purposes.

In many steelworks large forgings are made by means of what is called a steam hydraulic press—a combination which enables tremendous force to be exerted on the object which is to be literally squeezed into shape. This press has fixed on to the top of its immensely heavy frames, an hydraulic cylinder whose plunger can press on the tools which are to be applied to the forging. Over this is a steam cylinder whose piston rod enters the top of the hydraulic cylinder through a U leather packing, just like any other plunger. Water at 700 to 1000





pounds per square inch is used to press the plunger, or rather the tools it carries, on to the hot steel, and then, to give the final squeeze, the water valves are closed and steam is turned on to push the piston rod down into the water, greatly increasing the pressure in the cylinder, and therefore the force of the squeeze. There are such presses in existence which can exert a pressure of over 3000 tons on a forging.

(Continued on page 156.)

FROM CHATTERBOX OF SIXTY YEARS AGO.

IV.-A SHOEBLACK'S STORY.

THE president of an American College was one morning, while sitting in his study, astonished by the entrance of a visitor. He was a lad of about seventeen years, rough and uncouth in his appearance, with thick clumsy shoes on his feet, and an old tattered hat on his head. The president, a kindly and venerable man, asked the boy what he wished.

'If you please, sir,' said the plough-boy, in a bashful, awkward way, 'I'd like to get some larnin'. I heard you had a college, sir, and I thought if I could work for you, you would help me to an

'Well, my young friend,' replied the president. 'I scarcely see any way in which you might be use-

ful to us.

'Why, I can bring water, cut wood, or black boots,' interrupted the lad, his eyes brightening with earnestness. 'I want to get an edication. I don't keer how hard I work, only so as to get an edication.'

'I am afraid, my young friend, I can do nothing for you,' said the president. 'I would like to help you, but I see no way in which you can be useful

to us at present.'

The plough-boy stood silent and mute, holding the handle of the door for a moment. His eyes were downcast, and his lip quivered. At last, he made a well-meant but awkward obeisance, and opening the door, turned sadly from the room.

His earnestness had, however, appealed strongly

to the president's feelings. He called him back. and in a few moments the plough-boy was hired as boot-black to the college.

Many years after, there might have been seen a new and magnificent building, rich with the beauties of architecture, and thronged by an immense crowd. who listened in death-like stillness to the burning eloquence of a great lecturer. The speaker is a man of middle age of striking appearance, piercing eyes, and with a keen, high intellectual forehead. Every eye is fixed on him, every lip hushed, and every ear drinks in the eloquent teaching of the orator. Who in all that throng would recognise in the famed, the learned, the eloquent president of the college, the humble boot-black of former days?

'BY BOOK POST.'

WE, who get so many parcels by post, can hardly realise that once upon a time the Parcel Post did not exist. There is a story told of an old woman who wanted to send a pair of trousers to her son, so she borrowed a Postal Guide and looked up the rules, then did up her parcel securely, stamped and posted it. When the boy received it he was asked to pay a large sum for excessive letter rate, and so returned the parcel to his mother unopened. She, in great indignation, went to the post-office, and showed the postmaster it was marked Book Post.' 'But it is not a book,' said he. 'Nay, nay,' answered the old woman, 'but it said in your Guide, anything left open at both ends could go Book rate, and surely trousers are open at both ends!'

THE DIM RED DAWN.

By Mrs. HOBART HAMPDEN, Author of 'Louisa,' 'The Hidden City,' 'Princess Ooma,' &c. Illustrated by E. S. FARMER. (Continued from page 131.)

BRILD had only frightened Zan, and you frightened him. That was his punishfrightened him. That was his punishment,' said Bobo.

'It was only a game,' Brild echoed, seizing on his clue. 'Zan was frightened of nothing.

I was playing with him.'
'Playing!' Lulu snorted. She stared at Brild until, though unable to meet her eyes, he

squirmed uneasily.

'Zip-Zip, tell him what happened to your father,' said Lulu. 'And remember, Brild, what has happened once can happen again. It would be very easy to break your leg. Why, I could do it.

Satisfied, she strolled out of the cave and

flung herself on the warm sand of the ravine to rest as befitted a leader. Behind her she could hear Brild gasping as Zip-Zip poured out a stream of blood-curdling details. Then out of the cave came Zan, clad in his tunic again to sit opposite. Silent, he squatted, and, looking at him, Lulu saw that he was frowning, drumming on the sand with his heels meanwhile. Presently he glanced at her, his brows downdrawn.

'Was it a game?' Zan questioned suddenly. 'No,' said Lulu. It was not difficult to guess the reason for his question; she knew enough of Zan by this time for that. He was ashamed that he had screamed at all. And since he

showed so much right feeling, Lulu felt inclined to be gracious, and did not improve the occasion as she was tempted to do. Screaming was, of course, practically inexcusable in any circumstances. But an appeal to herself had, on the other hand, its merits. And Zan, just preserved in time from injury, had an added value at the moment.

'Remember, Zan, I will always protect you,' she assured him.

'M-m-m,' said Zan, not at all graciously. In truth he preferred infinitely to protect himself. Yet he could not but admit there were occasions, such as that lately past, when he was inadequate. Something within him bade him now acknowledge it.

'I was glad you came,' said Zan, if reluc-

tantly.

Lulu was content. The reluctance, too, she could understand. Together she and Zan went to fetch the baby mammoth, and found it still grazing on the plain above. It had not, in fact, wandered far, and as soon as it caught sight of them, it came to meet them with upraised trunk and welcoming squeals.

CHAPTER XVI. FOREST FOLK.

Ir food and fuel were both obtainable in Zip-Zip's country, both had to be collected daily. There was always work to do. The fish were not big enough to dry, and did not keep long fresh. Each time the water touched the dark line, it is true, it left fuel behind it, but rarely a large quantity. Each separate piece had a value.

Luckily, save for the thing on the ledge, there seemed to be no dangerous beasts in the immediate neighbourhood. And the thing—Zip-Zip called it a turtle—came no nearer. At midday it could be seen, sunning itself usually, and Lulu or Zan, Zip-Zip or Brild, Bobo too, would steal a glance at it some-

times.

Lulu was content to leave it unmolested, nor was she drawn to make a pet of it. She acknowledged that it was as far beyond her control as, she was discovering, was the salt water with which, despite her best endeavours, she could only come to terms. That is to say, she learnt to time her comings and goings so that the water never caught her, but with this she had to be content.

But she liked the salt water very much. It was good to swim in, better than the river water, more amusing. It changed so often it was never monotonous. Sometimes it was rough and boisterous, or smooth with hardly a ripple within a few hours. And the sand that edged it was a great improvement on matted undergrowth. Lulu, Zip-Zip, and Zan raced along the beach and chased each other into deep water, yelling.

Zan could swim as well as he had claimed. His head would go bobbing away until it was almost out of sight. The three of them, indeed, spent all the time they could spare in the water. Brild did not ask, nor wish, to join them. As his leg improved, he pottered about the beach looking incessantly for something new to eat,

and his greed had its uses.

It was Brild who discovered, for instance, that tasty, fishy lumps could be picked out of shells with a shoulder-pin. It was he who first cracked the claws of pinching fish between two stones, and found that there was meat inside. And he dug up the little wriggling fish-worms that were hiding in the wet sand just below the surface.

Lulu, Zip-Zip, and Zan watched him while he gorged. If afterwards he was not sick, if he did not double up with pain, they ate the new food too, and fed Bobo with it. And once a day Lulu drove Brild into shallow water, and made him wallow there until he was clean.

A dirty thing, she knew well, is often a sick thing. A sick Brild would be once more merely a burden, and it was good for him to remember who ruled. He had not attempted to bully Zan again. She judged he was sufficiently cowed, as she had hoped, but to keep him in a state of subjection seemed both wise and pleasant.

And there was the baby mammoth to train, too, though on different lines. Lulu coaxed it, little by little, until it would drag a log of wood for her, or roll a boulder over and over with its forehead. More than once she actually got on its back with Zip-Zip's shoulder for a mounting-block. And it let her sit for a little, enthroned, until perplexed it shook her off.

And she found a name for it to which it certainly began to answer. Hrump she called it, since Hrump was the nearest she could get to its own language.

(Continued on page 146.)



**Lulu coaxed the baby mammoth."



"There, a little distance away, crouched a man and a woman."

THE DIM RED DAWN.

By MRS. HOBART HAMPDEN, Author of 'Louisa,' The Hidden City,' Princess Ooma, '&c. Illustrated by E. S. FARMER.

(Continued from page 143.)

RUMP'S affection for her obviously grew. He did not like the sand. Hard though it was, because of his weight he sank in too far. He did not like the salt water; perhaps he thought it was chasing him. But he would appear unexpectedly at the water's edge to look for Lulu, touch her with his trunk tip, and return to his grazing, satisfied. And in every way he was more docile, and had begun to wait until he was let out in the morning instead of smashing the barricade at any point that suited him.

At night, as well as occasionally by day, Bobo studied Hrump's shape and was deep in a picture of him. So huge it was, that further and further into his chosen cave Bobo penetrated, until he made a somewhat startling

discovery.

Down to the beach he rushed immediately, to find Lulu, Zip-Zip, and Zan drying themselves in the sun while Brild was hunting for sea-birds' eggs. All four stared astonished at Bobo, for he was obviously deeply moved. He seized Zip-Zip by the shoulder, dragging her to her feet.

I have found a picture,' he yelled into her 'A picture full of arrow-holes. What does it mean? Who did it? Will my pictures,

too, be spoilt?'

Then, as Zip-Zip, bewildered and deafened, gaped at him, speechless, Bobo began to stamp with rage. 'Answer!' he bellowed, until Lulu intervened.

'She can't answer. She never can unless you let her think,' Lulu warned, tingling pleasantly herself with excitement. However full her life might be, she had always room in it for something more. Bobo's discovery might prove valueless, nor did the possible fate of his pictures worry her greatly. But there was a light kindling in Zip-Zip's eyes that promised well, and suddenly Zip-Zip yapped as though she had picked up a trail she had over-run. In fact she had now but to recall a happening she had already glimpsed in part.

'My dream,' she panted. 'My dream, Lulu. My dream that I said was not a dream, perhaps. That first night?'

And, as Lulu nodded, on swept Zip Zip triumphantly on a full tide of speech.

' People came from the forest,' she cried. 'I remember. Oh, yes, I remember. They came if they were afraid of something, or if they wanted good hunting. And my grandfather made a picture for them, and he made magic, He muttered and shut his eyes—that was the magic part, he said—and afterwards, he stuck arrows into his pictures. And where his arrows went, their arrows would go, he told them.'

'Ow!' said Bobo, slightly bewildered in turn. 'It happened not once, but many times,' Zip-Zip assured him. 'You will find more pictures with holes in them if you look. And the forest people brought presents,' Zip-Zip finished, complacently. 'Perhaps they will come again, and again bring gifts with them." But at that, Bobo, in renewed alarm, hastened back to the cave.

'They shall not touch my pictures if they come,' he shouted over his shoulder. 'I have put on the colours most wonderfully. Not messily, like your people,' he flung scornfully at Zip-Zip. But with a little bit of fibre frayed out at the end as you frayed it for your wick.' With which he vanished, leaving his niece to solve the problem he had set, while Brild, who had slunk close to listen, began to shiver.

'Perhaps these people will hurt us if they come,' he sniffed. At which Lulu glared at

him, on the defensive immediately.

'I will deal with them. You will not be hurt,' she promised. She did not believe she was faced with much of a difficulty. If these people had been docile before, why should they not answer to similar handling? 'If they come, I will deal with them,' Lulu repeated. 'You can show me how to make magic, Zip-Zip, and there are plenty of old pictures.' But Zip-Zip shook her head.

My grandfather drew a new picture each time, she explained. 'A picture of the thing the forest people had in mind. They told him what it was and then he drew the thing itself."

'I can't paint, I can't draw,' Lulu acknowledged. 'But I can carve,' she told herself as she recalled the wooden fish. If her carving fell below Bobo's exacting standard, the forest people might like it as much as she did herself. Yes, I will deal with them,' she said aloud, for

the third time, and, as she did so, she felt Zan's hard little fingers pinching her arm.

'Now, Lulu, now,' he whispered, his eyes sparkling as were hers. 'Look, they have

come already.'

With his free hand he pointed to the cliff edge. There, a little distance away, crouched a man and a woman who must have crept up stealthily. At the same moment from the ravine came the rattle of falling stones. Down it Hrump was pounding in search of Lulu as usual.

(Continued on page 154.)

IF I COULD BE A BIRDIE.

I I could be a birdie,
I know which I would be—
A little robin redbreast
A-singing on a tree.

If I could be a flower,
I know which I would be—
A dainty little violet
Beneath the robin's tree.

MARGARET G. RHODES.

MY DIARY.

Written and Illustrated by RUTH COBB.

VI.-THE HERO WORSHIPPER.

JAMES BOSWELL was a hero worshipper. It is to that fact we owe the most wonderful of English Diaries. Although he wrote it for one particular purpose, to tell all that he knew and he saw of Dr. Samuel Johnson, we also come to know a great deal about the author also.

James Boswell was Scotch, and was born in 1740. His father, the Laird of Auchinloch, was a well-known Scotch lawyer. He did not get on well with his son, who was of a clever, cheerful disposition, and somewhat wild, and of the opposite political opinions to his father. At the same time, he was somewhat vain and fussy, but with a wonderful gift of friendship, and, most of all, a great hero worshipper.

Boswell studied for the Law, and he says, 'I went along with my father in the northern circuit. I kept an exact journal at the particular desire of my friend, Mr. Love, and sent it to him in sheets every post.' This seems to have been the beginning of the habit of diary keeping that was to bring the writer such

fame.

He first visited London in 1760, but he did not meet Dr. Johnson then. He came south again in 1762, and it was on May 16th, 1763, that the longed-for meeting took place. Boswell had conceived a great admiration for the writings and ideas of Dr. Johnson, and he desired an introduction to the great man. For Johnson was a great man: there was something large in his writings and thoughts, as well as about his person; but posterity has come to consider his biographer not much less great.

Johnson's English Dictionary had been published in 1755, and although he had earned

fame by this and other books, it was not until he was awarded a pension that he was able to live in any degree of comfort. His conversation was greatly admired, and he and his circle of famous friends, David Garrick the actor, Sir Joshua Reynolds the painter, Goldsmith the writer, and Edmund Burke the statesman, constantly met at a literary club, held at an inn called 'The Turk's Head.' Dr. Johnson

was its most important member.

Boswell describes his feelings when he first saw his hero. His friend, Tom Davies, an actor, also kept a bookseller's shop in Russell Street, Covent Garden, and was an intimate friend of Dr. Johnson. 'At last on Monday, 16th of May, when I was sitting in Mr. Davies' back parlour, after having drunk tea with him and Mrs. Davies, Johnson unexpectedly came into the shop; and Mr. Davies having perceived him through the glass door in the room in which we were sitting advancing towards us, he announced his awful approach to me, somewhat in the manner of an actor in the part of Horatio, when he addresses Hamlet on the appearance of his father's ghost-"Look, my lord, it comes."

Boswell became seized with nervousness, especially as Mr. Davies immediately mentioned the one thing he had been asked not

to sav

'Mr. Davies mentioned my name, and respectfully introduced me to him. I was much agitated, and recollecting his prejudice against the Scotch, of which I had heard much, I said to Davies, "Don't tell where I come from." "From Scotland," cried Davies roguishly. "Mr. Johnson," I cried, "I do indeed come from Scotland, but I cannot help it."... This

speech was somewhat unlucky, for with that quickness of wit, for which he was so remarkable, he seized the expression "come from Scotland" which I used in the sense of being of that country, and as if I had said that I had come away from it or left it, retorted, "That, Sir, I find is what a great many of your countrymen cannot help." Boswell felt greatly snubbed, but Tom Davis reassured



James Boswell.

him, when he went away, 'Don't be uneasy, I

can see he likes you very well.'

Boswell, acting on his friend's advice, resolved to call on Dr. Johnson, and on the 24th May, he went to his rooms, on the first floor of

1 Inner Temple Lane.

'He received me very courteously, but it must be confessed, that his apartment and furniture and morning dress were sufficiently uncouth. His brown suit of clothes looked very rusty: he had on a little old, shrivelled, unpowdered wig, which was too small for his head: his shirt-neck and the knees of his breeches were loose, his black worsted stockings ill drawn up, and he had a pair of unbuckled shoes by way of slippers. But all these slovenly particulars were forgotten the moment he began to talk.' So began this historic friendship.

There is no doubt that Johnson was fond of Boswell, who was an engaging and amusing person socially; but he also snubbed him unmercifully. Boswell must have been very annoying at times. He was constantly putting

questions to lead Johnson on to talk, all of which he writes down in his diary, even though it was to his own disadvantage. A friend said, 'Boswell's conversation consists entirely in asking questions and is extremely offensive.'

Dr. Johnson was pleased with the idea of Boswell's journal, but there were limits to his

patience:

'I will not be put to the question. Don't you consider, Sir, that these are not the manners of a gentleman? I will not be baited with what and why, and what is this? what is that? why is a cow's tail long? why is a fox's tail bushy?'

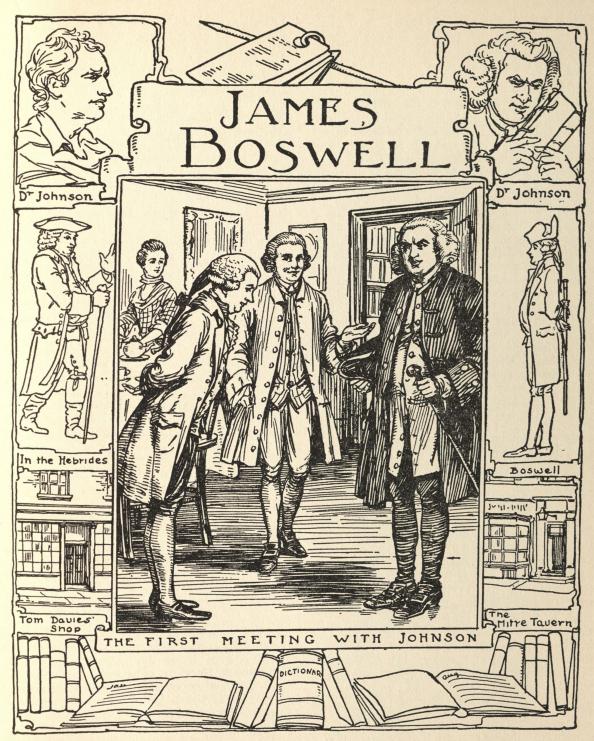
Another time he said, 'Sir, you have but two topicks, yourself and me. I am sick of

Fanny Burney, another great diarist, considered that Dr. Johnson usually treated Boswell like a little schoolboy, and describes how once, at dinner, Boswell rose from the table



Boswell in Corsican costume.

too soon. 'The Doctor calling after him authoritatively, said, "What are you thinking of, Sir? Why do you get up before the cloth is removed? Come back to your place, Sir!" Again, and with equal obsequiousness, Mr. Boswell did as he was bid.' Boswell's behaviour constantly seemed rude to others. He was absorbed in his object of observing everything about Johnson, and it led him to ignore every one else. 'It was his habit



to sit down, note-book in hand, to record the conversation, and even lay down his knife and fork, while at dinner, take out his tablets, and write down what he considered a good anecdote.'

From these notes, much of the journal was written, though he wrote, in the early part of his life of Johnson, 'in progress of time, I could with much facility and exactness, carry in my memory, and commit to paper, the exuberant variety of his wisdom and wit.'

Boswell first became well-known as a writer through the publication, in 1758, of another journal, which he had kept during a tour in Corsica, when he was two and twenty. Here again, hero-worshipping came in. He had a great admiration for General Paoli, who was striving to rid the Corsicans from the yoke of the Genoese government. Boswell pursued the method of taking notes on his tablets of the General's conversation, and elaborating them in his journal. Paoli himself has written an amusing account of his impression of Boswell. 'He came to my country, and he fetched me some letter of recommending him; but I was of the belief he might be an impostor and I supposed he was a spy, for I look away from him, and in a moment I look to him again, and I behold his tablets. Oh, he was to the work of writing down all I say! Indeed I was angry. But soon I discovered he was no impostor and no spy. I only find that I was myself the monster he had come to discover. Oh, he is a very good man. I love him indeed, so cheerful, so gay, so pleasant, but at the first, oh! indeed I was angry!'

In 1773, Dr. Johnson and Boswell went for a holiday together in Scotland. Boswell kept a special journal which was published separately. Dr. Johnson also wrote an account of their travels, which is in diary form. He begins by saying, 'I had desired to visit the Hebrides, or Western Islands of Scotland, so long, that I scarcely remember how the wish was originally excited, and was in the autumn of the year, 1773, induced to undertake the journey, by finding in Mr. Boswell a companion whose acuteness would help my inquiry, and whose gaiety of conversation, and civility of manners, are sufficient to counteract the inconveniences of

This holiday did away with much of Dr. Johnson's prejudice against the Scots, although

Boswell says that the publication of Johnson's account, 'to my utter astonishment, has been misapprehended even to rancour by many of my countrymen.' That was not always 80, for on Monday, Sep. 27th, Boswell enters, 'He was quite social and easy amongst them... His conviviality engaged them so much that they seemed eager to show their attention to him, and vied with each other in crying out with a strong Celtic pronunciation, "Toctor Shonson, Toctor Shonson, your health!" On the same day, 'He read to night to himself, as he sat in company, a great deal of my journal, and said to me, "The more I read of this, I think the more highly of you."

On Tuesday Oct. 12th, 'He read this day a good deal of my journal, written in a small book with which he had supplied me, and was pleased, for he said, "I wish thy books were twice as big." He helped me to fill up blanks, which I had left in first writing it. When I was not quite sure of what he had said, he corrected any mistakes I had made. "They call me a scholar," he said, "and yet how very little literature there is in my conversation, Boswell." That, Sir, must be according to

your company.'

The diary was published seven years after Dr. Johnson's death. Boswell shows in it his reverence for his hero, but it also shows that in it he had achieved one of his greatest ambitions—to write a great book. And from that book people have been able to realise that its writer, laughed at, and loved, was himself a genius.

DEC.-PERP.

YOU will meet, in *Chatterbox* and elsewhere, those strange words—or rather abbreviations. They mean certain dates (roughly speaking) in English architecture, and there are others too.

Of course you cannot say they are exact dates, but they correspond, broadly, to the changes in building design in England. The Saxon period lasted up to about the Norman Conquest. The Normans built differently, and their style lasted from about 1060 to 1160 A.D. Norman taste died, and the Early English ('E.E.') came in, and lived till about 1300. Then a richer style known as Decorated succeeded (about 1300-1400), and the Perpendicular (i.e., a style relying on straight lines) came after that. There were more styles later, but these are the chief dates in the older buildings of England.

'THIS LITTLE WORLD.'

SOME PORTRAITS OF GREAT BRITAIN.

Drawn by J. A. SYMINGTON.

II.-YORKSHIRE: THE WEST RIDING.

YORKSHIRE, in the old Anglian kingdom of Deira, is the largest county in England, and for practical purposes is divided into three 'Ridings,' just as Sussex is divided into two 'counties' (East and West Sussex). That kind of division is a record of English history. The 'shire' is a piece sheared out of an ancient kingdom or earldom (alderman's land, the territory of an elder or earl). The 'county' is a portion of land governed by a 'count'—but counts did not arrive till the Norman Conquest. The shire of York is also a county. Its Ridings should really be Trithings—third parts, into which the whole area was divided long before 1066 A.D.

York itself (where two Roman Emperors died) lies just on the edge of the West Riding. It is one of the most ancient and honourable cities in England, but falls outside the range of this article. The West Riding contains nearly all that all England contains: great industrial centres like Leeds, Bradford, Sheffield, and Halifax, which in the long run draw their wealth and population from the coal on which they are built: noble lake country and high hills (from which many rivers rise) on the edge of Westmoreland, with pasture - land for sheep: lovely valleys - 'dales,' always, to a Yorkshireman: proud old cathedral towns like Ripon, quiet villages, battlefields like Towton, an inland 'seaport' in Goole, a huge railway centre and famous racecourse at Doncaster.

The population (1921) was over three millions—about 1100 to the square mile. Except Lancashire, it is the most densely peopled part of England. The Riding is over 1,700,000 acres in extent, and is larger than Lincolnshire.

ADEL (population 1083 in 1921) is Adel cum Eccup or Echope. It was a station on the great Roman North Road—near Burgodunum—and there are remains of a Roman village close by. Though it is a small place, it has much history in it. It has a very fine Norman church, dating from about 1130 A.D., and in this is glass dated 1681.

ADWICK-LE-STREET (population 5723) is also close to the Roman Road ('le Street'—

strata, the Road). Besides having four generations of architecture in its church, it is connected with the family of George Washington.

ALDBOROUGH is the old Roman settlement, Isurium, and there were a temple, an aqueduct, and villas: it was the capital of the Brigantes, a strong British tribe.

ALDFIELD is notable as the birthplace of a famous Victorian painter, William Powell Frith, the friend of Dickens and Thackeray. He had the then unique experience of having his pictures 'Derby Day,' 'Railway Station,' and 'Margate Sands' railed off at the Royal Academy from the huge crowds that flocked to see them. They are still popular, and are wonderful reproductions of the life of his time (1819–1900).

At Altofts (population 4689) was born the great seaman and explorer, Martin Frobisher. To-day it is a colliery village, and an experimental station for mining difficulties.

ARNCLIFFE is a beautiful village high up in the hills, with wonderful views from the ridge above it (1550 feet high) over Wharfedale and Littondale.

Austerfield (population 370), though it is a tiny place, has in a way a large history. There is a Roman camp here, and probably it was here that the Roman general, Publius Ostorius Scapula, was defeated by the Brigantes in his campaign of 47-49 a.d. Ostorius was the capturer of Caractacus, who had fled to Yorkshire. The Normans also came to Austerfield, and there is some Norman work in the old church. But perhaps the village's widest fame is in its having been the birthplace of William Bradford (1590-1657), one of the Pilgrim Fathers who sailed from England to America in 1620, and founded there what is now the State of Massachusetts: he was the second governor of Plymouth in that State.

Balby (population 11,570, with Hexthorpe) has a seam of clay which makes fire bricks, and so is important in industry. It is famous for being the place where George Fox held the first meeting of the Society of Friends—'the people commonly called Quakers': the publishers of *Chatterbox* were formerly Quakers.

(To be continued.)

THE WIND AND THE SEA.

NOTHING seems so free as the wind and the sea. They appear to be able to do just as they please. When the storm is out and all is black and wild, especially if one lives beside the sea, one feels their power. The waves dash and splash and roll and roar, and it seems as though nothing could stop them. They play with great rocks as easily as boys play with marbles. Yet the sea is not free to do as it pleases. It has to obey. The Maker has said to it, 'Hitherto shalt thou come, but no farther; and here shall thy proud waves be stayed.'

When I lived beside the sea I often thought of those words from the Book of Job, which God spoke to Job when He wanted to make him feel how great God was. There was only a field between our home and the sea, and I used to think how easily some night the sea might come just too far, and wash us all away while we slept. But it never did. We had terrible storms, wild winds blowing right across the Atlantic at sixty or eighty miles an hour; yet the waves never came too far. Their bounds had been set, and because of that we could lie down in peace to sleep.

Nothing seems freer than the wind. It dashes along, and yet it is never out of control, We think it may blow any whither, yet it may not Like the stars, it has its orbit. It is chained to the earth. Every particle of the air is held by the earth's gravitation. There it belongs, for strictly speaking the air is the earth's thick covering. It does for the earth what glass does for a hothouse, It permits the sun's rays to come in, but refuses to let them out again with equal freedom, On very high mountains the covering is not so thick and there, of course, it is much colder. If there were no air, it would be eternal winter every. where. Some worlds, like the moon, have no atmosphere to cover them, and they are stark and cold.

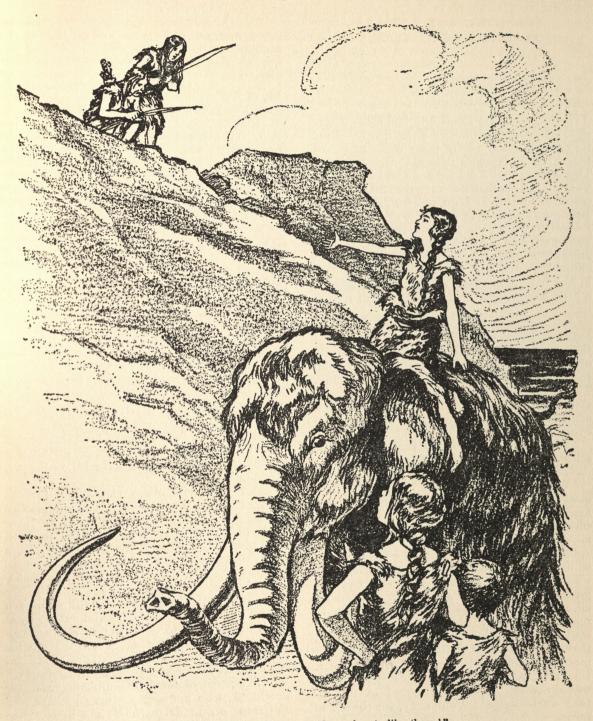
So, however much the wind may blow, it is free only within limits. It has its laws, and it has to obey. Like the sea, it may go thus far and no farther. It may not, however much it may desire, play truant into space.

Such is the condition of its usefulness. Both wind and sea serve God and man best by obedience. So do we. In obedience we also find beauty and true freedom.

F. C. HOGGARTH.



The Hay Wain. A Woodcut by Ernest Prater.



*** I am a great magic-maker; I ride on beasts like these,'"

THE DIM RED DAWN.

By MRS. HOBART HAMPDEN, Author of 'Louisa,' 'The Hidden City,' 'Princess Ooma,' &c. Illustrated by E. S. FARMER.

(Continued from page 147.)

CHAPTER XVII. MAGIC.

N what mood the forest folk had come it was impossible to be certain immediately. That they had not arrived in force went to prove they were as friendly disposed as heretofore. The two on the cliff did not seem hostile, though As motionless as wild things they crouched, staring at Lulu and Zan, Zip-Zip and Brild, until their eyes shifted to Hrump as he joined them and there remained fixed. Lulu, watching, told herself gleefully that Hrump might well prove an asset on which she had omitted to reckon. She had grown so used to him herself by this time, she had forgotten a little how strange he had appeared to her at

And while the forest folk took their fill of looking at him, she had time to take stock of them in detail; to note carefully what manner of people they were. They were smaller than the members of Zend's tribe, but tough-looking. They were wiry, if less muscular. They were clad in skins, but were armed with bows and arrows only. Suddenly the man spoke, his eyes still on Hrump.

'Why have you brought that thing?' he

asked. 'Is it a new magic?'

'Why have brought it?' the woman echoed. 'Where is the old man?' her companion questioned next. 'We have not seen him since first you came into our forests. We were not sure that you were you at first, but we dared

not come too close because of it.'

'Because of it,' the woman echoed again, while Lulu listened, a little disconcerted. was not pleasant to learn that she had not guessed she had been shadowed. all, nothing is easier, she knew well, than to But after remain completely hidden and yet keep a watch on strangers in your own country. And that no attack had followed was an added proof that makers of magic had little to fear. But this demand for Zip-Zip's grandfather was awkward. Lulu had hoped to fill his place unchallenged. Cautiously, she began to

'What do you want? What do you need?' she asked. And, at the same moment, she caught a warning whisper from Zip-Zip, who

had edged very close to her.

'If they ask for anything, bargain with them,' Zip-Zip urged softly. 'My grandfather always bargained. When they told him what they needed, he asked what they would give for it.' And though the man on the cliff could not have heard what she said, he, too, perhaps, had recalled past bargainings, for he answered Lulu cautiously.

'A trifle of help we need, that is all,' he said. 'Nothing much. Pig have come into our hunting grounds; a herd of pig. Before the herd leaves we wish to kill many. To be full, quite full, of pig. There are pig by tens.

The magic will be easy.'

'If I make magic, what will you give?' Lulu returned, prodded again by Zip-Zip.

'What is asked of us?' fenced the man on

the cliff.

What was most needed? There was no time to consider at length. But, at least, there were two things that never came amiss, Lulu reflected, wood and food. And if she was going to spend her time magic-making, she would have the less to spare for other things.

'Wood,' she answered, therefore. 'Plenty of wood. And when you have killed the pig,

then pig.'

'And who will make the magic for the killing?' came the answer. It was impossible to evade the direct issue any longer. Some proof of power must now be given perforce. But what proof was there to hand? As, a shade uneasily, Lulu pondered, Hrump moved restlessly behind her. She saw her chance and seized it.

'I am a magic-maker. I will show you what I can do,' said Lulu. Calm outwardly at least, she signed to Zip-Zip; in another moment she was astride Hrump's neck while the forest folk watched agape. To her delight she could see she had impressed them deeply.

'I,' she proclaimed, triumphant from her perch, 'I, who am a great magic-maker. I,' she went on to drive the lesson home, 'who ride on beasts like these, who make them obey me.' She touched Hrump with her heel. A trifle, just a trifle, he swung to one side, and

back from the cliff edge scrambled the man and woman.

Across the plain they began to run, shouting as they went: 'We will bring the wood tonight, tamer of beasts, but do not let that thing hurt us when we come. Be merciful.

We only wish you well.'

Complacently, Lulu slipped to the ground and sauntered into the cave. Her course was clear, it seemed to her. She knew now what she must make, a pig. She need not wait till the last moment; she could set to work at once. And to carve a pig was lengthy business, she found, as soon as she began to hack and hew. She had flung aside the first piece of wood she had chosen because it was too hard, when Zan came running up to look, his hands smeared with clay. While Lulu had been carving and Zip-Zip and Brild watching her with varying anxiety, Zan had been amusing himself with the stuff Bobo had brought into the cave for his pictures.

'I can make things faster than you,' said Zan, 'out of that squashy heap. I have made a man's head already, twice as big as my head,

with white stones for teeth.'

Before he had finished Lulu's fingers were clay-smeared too; Zip-Zip was helping to pile the clay up, now completely reassured. Her grandfather's pictures had been on a large scale always, she knew. Lulu's wooden pig could not have equalled them. But from the clay a full-sized pig could easily be shaped; she did not doubt Lulu would contrive it. Brild, reassured also, watched awhile greedily as he thought of the live pig the clay pig represented, until presently he sneaked off to tell Bobo all that had occurred. His father might be interested and be pleased with him. Besides, to gossip pleased Brild himself.

(Continued on page 167.)

BIRD CAMEOS.

III.—THE WOOD-PIGEONS OR RING-DOVES.

THE wood-pigeons only cooed in nesting-time and very sunshiny weather, and I listened for them as the bright spring days came round, and filled the water-dish with the freshest water, and laid a feast of maple peas under the tree to tempt them.

One morning I heard their call. The two beautiful grey and pink birds, with their gleaming white neck-rings, were strutting about the lawn. The larger was showing the other the best peas: then he spread his dark-tipped tail into almost a perfect semicircle, bowing and curtseying with the utmost precision.

'Come away, come away,' he cooed. 'We

must make our nest.'

At last she yielded to his entreaties and off they flew. There, in the old elm-tree which had stood for so many years, and learnt so many secrets, they built their nest together. At first sight you would think it was very simple and unplanned, but if you had watched them closely you would have seen that each twig they carried up to the branch they had chosen, was laid carefully in such a manner that it somehow crossed and caught the others, so that it could not fall, or be blown down.

When the nest was ready, the hen-bird laid her two snow-white eggs, and if you had stood right underneath the nest you might have even seen their shape through the twig home. Those two eggs took a long weary while to hatch longer than almost any other bird—over a

month

I think the poor hen-bird must have got very tired, for her mate made special efforts to cheer her, circling low over her head so that she could see underneath his beautiful wing-feathers, and then spreading his wonderful tail that the sun could make it glow, and stretching his neck to show his shining ring.

Often he would fly to our garden, and collect as many maple-peas as his crop could carry for her. Once doing this, he nearly lost his life.

I looked out of my window and saw him drinking, and behind him, stealthily creeping up, was a huge blue Persian cat. As I opened the window to call she sprang on him. There was a whirl—a shower of white and grey feathers—and to my delight he rose high in the air, was gone, and the cat slinking away.

For a week or two the ring-doves did not dare come, but by the time their babies were big enough to fly, the attack was forgotten, and the proud parents brought them to the ash tree just when the leaves were breaking the buds, but were not big enough to hide the gentle colours of their feathers, as they pecked happily at the tender shoots.

G. L. D.

SOME HINTS.

A HALFPENNY measures exactly one inch across.

THREE PENNIES weigh almost exactly one ounce.

A HALF-CROWN is almost half an ounce.

A PINT OF WATER weighs a pound and a quarter.

HYDRAULICS.

By P. M. BAKER, B.Sc., M.B.E., A.M.I.E.E., A.M.I.Mech.E.

Illustrated by Bernard Way.

(Continued from page 141.)

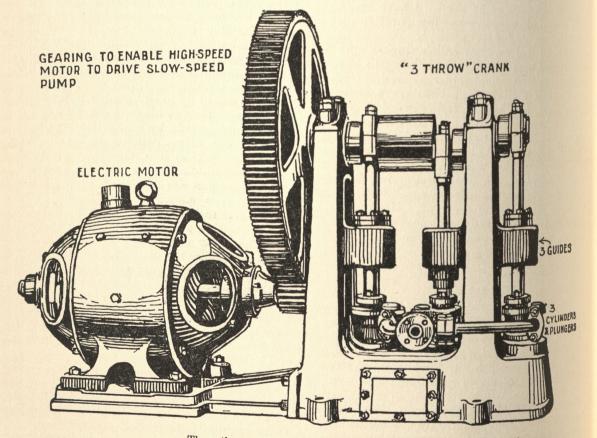
THE WATER SUPPLY FOR HYDRAULIC APPARATUS.—If you have read this article carefully it may have occurred to you that we seem to have put the cart before the horse; we are talking of how high-pressure water can be used before finding out where it is to come from. We did it on purpose; for now that you know why we want high-pressure water you will appreciate the importance of the apparatus which supplies it. How are we to supply water at high pressure?

We shall obviously require a pump or pumps driven by a gas or steam engine (possibly even by hand), unless a public company does this work for us and there is a public supply of 'power water,' in which case the company will

have engines and pumps instead.

We have only illustrated one type of pump, and it is electrically driven. The electric motor drives a three-throw crank shaft, as you will see in the drawing, and there are three plungers, each in its own cylinder, which is provided with an inlet and a delivery valve and with a U leather gland, all pumping water into the same delivery pipe; and as the three cranks are at 120 degrees to each other, this secures a steady supply of water of a quantity and at a pressure which depends on the size of the plungers and the power of the motor. Of course any sort of engine could take the place of the motor, although perhaps not generally quite as well.

The water pressure is usually very high, being in some places 1000 pounds per square



Three-throw Crank Shaft with Electric Motor.

inch. London has a supply of water, at that pressure, for the purpose of driving lifts, cranes and other such appliances. The chief reason

for using this very high pressure is that a small quantity of water at very high pressure can transmit as much energy as a much larger quantity of water at a lower pressure, and it is, therefore, economy of water rather than of energy that causes us to use a very high pressure, although the efficiency of the highpressure arrangement is higher than that of the low. You can see a powerhouse which supplies high-pressure water for

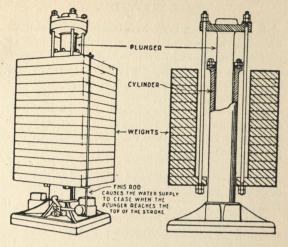
use in cranes, lifts and capstans in the goods yards, from trains leaving Liverpool Street Station. It is situated under the arches near the now-disused Bishopsgate Station. Those who live in many of our provincial towns can see similar powerhouses in the goods stations near their homes.

Fluctuations of Load. -The load which the hydraulic system has to meet varies practically all the time. Sometimes there is no one using water, and then,

we should imagine, the pressure would rise to a dangerous extent, while, on the other hand, it might happen that all the users might want water at the same moment and the pumps would, in consequence, be called upon to do a great deal of work in a very short time.

A Simple Accumulator.

Some sort of storage is obviously necessary, but storage of what? Clearly storage of energy is required, not simply storage of water. For



An "Intensifier."

this purpose it is usual to connect what is called an 'accumulator' to the water-pipe system at a convenient place near to the pumps. The simple accumulator is just a cylinder with a loaded plunger. When the pump is supplying more water than the consumers require for the moment, the plunger of the accumulator rises, carrying with it the big 'dead weight,' which is usually made of bars of pig iron, until it gets to the top of its stroke. It then lifts the lever shown in the diagram, and this shuts off the pump. When consumers again commence to take water, the first thing that happens is that the accumulator falls slowly, supplying the demand until the lever is cleared, when the pumps again start to deliver water.

Large accumulators frequently carry eighty to ninety tons of pig iron, so that it is natural that on board ship we cannot use a dead-weight accumulator such as that shown for use in a land station. The hydraulic appliances for a ship are, therefore, supplied with an arrangement known as a steam 'intensifier.' This consists of a steam cylinder with steam always pressing on one side of the piston. The piston rod forms the plunger of a hydraulic cylinder which is connected to the hydraulic supply pipe. When the pumps are supplying more water than is necessary, the plunger forces back the piston against the steam pressure and the water cylinder is filled with high-pressure water ready for use immediately it is required.

(Concluded on page 172.)

TRINITY-TIDE.

As far as Great Britain is concerned, Trinity-tide has ceased to be regarded, except as a Festival of the Church, but in the olden days it was almost as popular a holiday as Whitsuntide. Processions took place, and old parochial records contain many entries of sums paid to those who took part in them. An extract from the Churchwardens' Accounts at Lambeth, for the year 1519, gives the following quaint particulars:—

In Aubrey's Miscellanies 1714, we find a letter from a certain 'E. G.', dated Ascension Day, 1682, where there is an account of a custom observed at this season, to perpetuate the memory of a donation by King Athelstan of a common, and a house for 'the hayward,' or person who looked after the animals who fed on this piece of ground: 'On every Trinity Sunday, the Parishioners being come to the Door of the Hayward's House, the door was struck thrice, in honour of the Holy Trinity; they then entered. The Bell was rung; after which silence being ordered, they read their Prayers, aforesaid. Then was a Ghirland of Flowers (about the year 1660, one was killed, striving to take away the Ghirland) made upon a Hoop, brought forth by a Maid of the Town upon her neck, and a young Man (a Bachelor of another Parish) first saluted her three times, in honour of the Trinity, in respect of God the Father. Then she puts the Ghirland upon his Neck, and kisses him three times, in honour of the Trinity, particularly God the Son. Then he puts the Ghirland on her neck again, and kisses her three times, in respect of the Holy Trinity, and particularly the Holy Ghost. Then he takes the Ghirland from her neck, and, by the Custom, must give her a penny at least, which, as Fancy leads, is now exceeded, as 2s. 6d., or &c.

The method of giving this Ghirland is from House to House annually, till it comes round.

In the Evening every Commoner sends his supper up to this House, which is called the Eale House; and having before laid in there equally a Stock of Malt, which was brewed in the House, they sup together, and what was left was given to the Poor.

The feast in the evening was merely an instance of the Whitsun-Ales, or Church-Ales, held in so many parishes in England, particularly in the South and West, about this season.

There is a custom in a few Churches still of strewing the Church with green rushes, or new-mown hay, on Trinity Sunday; and in Ireland, Corpus Christi Day (the Thursday in Trinity Week) was formerly known locally as 'Rushy Thursday,' from a similar custom. According to Pennant, in some parts of Wales, on the Thursday after Trinity, they used to strew a kind of fern called 'Redyn Mair' before the doors, the day being known as 'Dydd gwyl Duw,' or 'Dudd son Duw.'

Of course, in all Roman Catholic countries, Corpus Christi, or 'Fête-Dieu,' as the French call it, was, and is, associated with many ceremonies. In our own land many pageants and Mystery Plays were acted at this season. In 1483, Richard III. went to Coventry to see the famous 'Corpus Plays,' and in 1492 Henry VII. and his Queen, Elizabeth of York, attended them, and commended them highly. At Chester the Miracle Plays were acted by the Guilds of the City, as was also the case in Dublin.

In Cornwall 'The Gnary Miracle Plays' were acted in the old Cornish language at this season. The Bodleian Library has MSS. of three of them—the Deluge, the Passion, and the Resurrection.

In spite of the efforts of the Puritans to prevent it, the custom of walking in procession, and acting in plays and pageants, lingered in many parts of England long after the Reformation.

On the Continent such amusements were common up to the outbreak of the Great War—I do not know if they have been revived since the cessation of hostilities.

There used to be a great Kermesse, and a curious combat between St. George and the dragon at Mons on Trinity Sunday, before the Belgian town was the scene of a fiercer conflict. This is one of the many places where our patron saint is supposed to have slain the dragon, who is said to have met his doom in a marsh near the town.

St. George is revered in Belgium, as well as in Russia, Malta, Arragon, and several other

places. The person who represented him used to ride in the procession which set out to kill the dragon, headed by a band of musicians, after whom came the saint, with a bright vellow jacket, and a brass helmet, swinging a gilt-tipped wooden spear, and making his horse prance and rear, as he rode to fight the dragon of canvas and wicker-work, whose great body was made of osiers, covered with vivid green canvas, his ten-feet-long tail tied gaily with the Belgian colours, that became so familiar to us all during the War. One man, hidden inside the osier frame, held the dragon up in the air, while three other men at each side guided his movements in attacking the saint, assisted by attendants, dressed as devils, who beat the crowds of spectators with bladders. They wore black caps, with red ears, and on their black-clad backs the head of an awful ogre was painted. There were also two men completely dressed in trails of ivy, and carrying big clubs with red spikes. They danced along beneath the dragon's tail, and represented the wild men of the marshes who helped to kill the monster. Four men, mounted on osier hobby-horses covered with cow-hide, were dressed in gaudy Tartans, their legs sticking out beneath the gay plaids. These represented the hounds, which figured in local legends.

The fight took place at 12.30 in the Public Square, or Grande Place, and the sham battle was accompanied by a monotonous old tune, to whose strains St. George made his horse prance and curvet round the ring, in an opposite direction to the dragon, sometimes touching the monster with his spear, sometimes making the steed rush under its uplifted tail, for the dragon was raised high above the ground by his attendants, who tried to knock the hero from his seat with the heavy wicker-work body of the dragon, or to lay one of the hounds prostrate, when the dog found it hard to get on its legs again. If St. George or his men knocked over a devil, he was seized by the dogs, and dragged round the ring by his legs, flat on his back! Rather a trying ordeal.

The spectators had some trouble in avoiding the 'don-don's' tail, which was often swung suddenly into their faces. If boys grabbed the great tail, the police ran to help the dragon, the demons with their bladders and the plaid dogs making common cause, and attacking the boys. Every few minutes the soldiers fired a volley, till finally St. George discharged a couple of shots into the stuffed body, and the

'don-don' fell down dead. The man escaped from its prostrate body, and went to get some refreshment, which he must have needed after his imprisonment in the hot stifling frame of wicker-work and canvas!

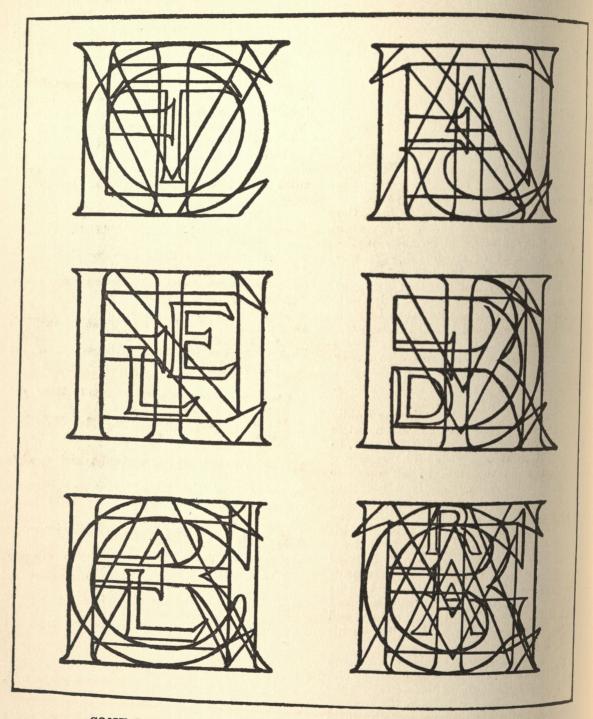
The killing of the dragon was preceded by a religious procession, bearing an effigy of the saint. This took place at 10 o'clock. Immediately afterwards the Place was roped in, and the ground sanded for the combat.

Perhaps Mons will revive this quaint custom, or perhaps the gallant town had too bitter an experience of real warfare to care for even mock fights!

MAUD E. SARGENT.

THE OLD GREY MILL.

- DO you know the little pathway that climbs
- Between the gorse and buttercups to reach the old grey mill?
- Do you know the old grey miller and the miller's old grey horse,
- That crops the shining buttercups among the clumps of gorse?
- Do you know the old grey waggon? Have you ever had a ride—
- A bumpy, jumpy journey—on the floury sacks inside?
- Have you ever lived with Sandy, and Sandy's sister Belle,
- Inside the little mill-house, 'cause your Mummie wasn't well?
- I have! I have! Not long ago I did for weeks and weeks—
- My Daddie says you'd guess it if you saw my rosy cheeks.
- Have you ever helped a miller? Do you know the lovely 'feel'—
- As soft as fairies' party frocks—of flour and barley meal?
- I do! I do! I've felt it I did not long ago, When I helped a proper miller in a proper mill, you know.
- Of course it's very sorrowful that Mummie should be ill.
- But oh! I did love summer-time with Sandy at the mill.



SOME PUZZLE MONOGRAMS.—What Girls' Names are hidden here?
(Solution on page 203.)



"Bob and I were seized in the powerful grip of our enemies."

A MOORLAND ADVENTURE.

(Continued from page 139.)

WHILST the horse browsed quietly on the sweet down grass above the wood, May noted printed on the cart—'Hawkins, butcher, Windwell.'

At once she darted off like an arrow for that village—three miles away across the moors—where lived a policeman, a friend of hers, too, his daughter being in service at the Lushingtons.

Whilst the sheep was being skinned, he of the spade dug a hole, into which the fleece with the incriminating L was quickly thrust.

After the earth had been filled in, moss and beech leaves were used so skilfully to camouflage the spot that a casual observer would never have guessed that the ground had been recently disturbed. We inwardly chuckled to think what a long start this delay would give May.

'They are too big to tackle,' whispered my cousin Harold, 'but let's stick close to them and make sure of the road they take, as they may not go straight back to the address on the

cart.'

By the time they reached the trap we were in hiding behind some bramble bushes, trembling with excitement, but ready to hear and see all

that we could.

'I had a rare bit of fun the other night,' said one rogue as he lifted the carcase into the back of the cart. 'The "Captain"'-meaning my uncle-'called in as he was riding past with a receipt for some porkers I'd just paid him for. All of a sudden he says, "Sheepstealing has begun again along the Hoddermoors, Hawkins, so you'll have to be careful what sheep you're buying." "Oh!" says I, solemn as an owl, "they won't dare come here, squire, so long as we've got such sharp magistrates about to deal with them, and even if they did, it would not be worth the while of a respectable tradesman, as I've always kept myself, to mix in any such outrageous jobs." I nearly bust myself to keep from laughing, thinking as how I'd already chosen the very fat sheep we meant to have; but the old boy gave me a dry look, for he don't swallow soft sawder well. "You must catch rogues before you can deal with them, Hawkins," he says, "and as they are often screened by men who should know better, it's not so easy to do," and with that he rode off looking sour.

'I suppose,' said the man of the spade, 'he had not forgotten the evidence you gave last year; well, I always thought you was fortunate not to have been tried for perjury.'

Here, to the great wrath of the respectable tradesman, his two mates had a hearty laugh

at his expense.

'You wipers, you snivelling hyperkrites,'he roared, 'who could only produce half the money collected for the chapel tea, and took care that the cat upset the lamp, and so the accounts were burnt when the rumpus came.'

This turned the tables, and the red and angry faces of the shady financiers, as they spluttered with rage, was too much for that idiot Harold, who suddenly came out with a great guffaw, which instantly changed their

rage into terror and astonishment.

When they turned towards the sound, they saw the bushes still shaking with Harold's attempts to stop his laughter; and as we attempted to bolt, Bob and I were seized in the powerful grip of our enemies, though even two of them found my cousin no end of a handful. Strongly built for his age, he fought hard, and the blood streaming from Hawkins' nose told of the severity of the struggle.

'What will you have, a stone round your necks and a last dive in the Hodder, or swear by all that's holy to keep your mouths shut, you sneaking young spies?' cried my captor.

We looked at one another, and each refused to take the oath. The same thought occurred to us both, that it would take a good while to drag us to the Hodder, and we should gain time by refusing, whilst help might come along the road at any time; besides, we had yet our trump card to play about May, and then, even the chance of our story being true, would prevent their daring to drown us.

Cursing our obstinacy, they started to drag us towards the river, evidently thinking that the sight of a black pool would change our

minds.

Poor Bob had been so knocked about that Hawkins could now manage him alone, and the man who held me muttered to his mate to hide the cart again, which that worthy set off to do, calling to us that we should make good food for the fishes.

(Concluded on page 175.)

FROM CHATTERBOX OF SIXTY YEARS AGO.

V.—THE PEDLAR AND THE MOUSE.

VERY many years ago a poor pedlar was going through the Bohemian forest towards Reichenau. He was tired, and sat down to eat a crust of bread, the only thing he had with him to satisfy his hunger. While he was eating he saw a mouse creep out from under his feet, and at last it sat down opposite to him looking as if it ex ected something from him. He good-naturedly threw it a few crumbs, much as he wanted all the bread himself.

When the mouse had eaten it, he gave it some more, till all the bread was gone, so that it had quite a good meal. Then the pedlar got up to get a drink of water from a spring close by. When he came back, behold! a gold piece lay upon the ground, and the mouse was just coming with a second piece, which it laid down and ran away to fetch another. The pedlar went after the mouse and saw how it went into a hole and fetched the money out from thence; so he took his stick, opened the ground, and found there a great treasure of gold pieces. He took it out and looked after the mouse, but it was gone.

Then, with great joy, he carried the gold to Reichenau, distributed half of it among the poor, and built a church with the other half

and built a church with the other half.

This strange legend is engraven upon a stone tablet, which may be seen any day in the Trinity Church at Reichenau in Bohemia.

SPRING.

WHEN the golden orb of day Gilds the merry month of May. Bursting buds and sweet spring flowers Clothe the groves and deck the bowers; Then the plaintive cuckoo comes; Then the lovely garden blooms. O'er the fields the harebell blue Bows beneath its crown of dew: Furze and heath, and wild-flowers tangled With the pearls of morn are spangled. From the woods the timid hare Bounds along the valleys fair; Leaping rills with silver sheen Dance among the meadows green. Green the grove, and green the meadow, Blue the heavens without a shadow. Not a cloud above is driven 'Cross the azure hue of heaven! Light the rosy milkmaid's song As she trips the flowers among, Light the thoughtless plough-boy's whistle O'er the lonely heath and thistle; Merrily, merrily sing the birds, Songs without the pomp of words! Streams and insects join the chorus, Heaven is smiling sweetly o'er us! Sweet the balmy breath of air, Loudly bays a watch-dog there. Happy hearts and healthy swains Toil along the verdant plains; Ever varying, ever new, How these charms enchant the view. S. S.

THE WEARING OF THE GREEN.

THE Emerald Isle and the 'Most Distressful Country.' These are two names which have been given to Ireland, and we can use which of them we like best, choosing according to our nationality, our character, and our personal opinions. It depends entirely upon the point of view, for while some people think of 'John Bull's Other Island' merely as a romantic, light-hearted, fertile country, inhabited by red-cloaked girls and clever, jovial young men, who dance jigs, drive donkey carts, crack jokes, and eat potatoes—to others it appears as a grim, hostile region, where the skies are always grey—even if the grass be

'The Most Distressful Country.' Yes, surely that is the best name that we can give to Ireland, for all through her long turbulent history she has had her share, and more than her share, of woe and tragedy. Famines and fevers, rebellions and reprisals, sorrows and

suffering, death and disaster—we read of one misfortune following another all through the centuries, until it seems no wonder that the people deserted their homes by the hundred, going westward into exile under a new sky and a new flag, until in some districts, even now under happier conditions, there appear to be only empty spaces, untilled fields, and ruinous cabins left in the land.

The 'Emerald Island' and the 'Green Isle'; those are both obvious names for a country that lies in the Atlantic Ocean and is kept verdant and humid by the warm waters of the Gulf Stream and by the west wind that brings rain clouds in plenty to its shores. Green, therefore, is the national colour of Ireland and her emblem is the shamrock of St. Patrick, and on his March festival day every loyal son and daughter of Erin may be seen wearing a cluster of the little clover leaves that, it is said, the saint used as an allegory to explain the difficult

doctrine of the Trinity when he was preaching Christianity to the pagan Irish. This St. Patrick, who lived in the fourth century, was a very famous saint—and an historical character, too, who really lived and worked in Ireland, although there may be less of truth than of fiction in some of the tales that are told of his doings and miracles. Thus, while we hear that he converted the savage heathens of his adopted



St. Mertogh and the Serpent.

country, founded bishoprics and built abbeys, he is also said to have banished snakes from the land, and once to have swum across the river Shannon with his head in his mouth. We may believe these legends or not, as we like, but true it is that present day Ireland is singularly free from reptiles, although there is an ancient story of a fearsome serpent who, once upon a time, lived in a lonely glen and devoured any unfortunate wayfarer who chanced to approach his lair.

This dreadful creature, it is said, was a terror to the whole neighbourhood, and, at last, the people appealed to a powerful saint named Mertogh O'Henry, begging him to intercede with Heaven on their behalf. The holy St. Mertogh had pity on the poor persecuted peasants, and, having prayed to God, he was

enabled to bind the serpent with three green rushes and cast him into a lake, where he still lies waiting for the day of Resurrection.

This is a strange tale to have lingered through the centuries in a snakeless island, but the Irish are a superstitious folk who still believe in fairies, and think that they hear the dread voices of the old pagan gods in the roar of the waves on their rocky coasts and in the mournful wailing of the west wind. Romance and cruel reality, comedy and tragedy—these things live side by side in Ireland, for it is a country of strange contrasts and contradictions.

Green seems to have been the chosen national colour of Ireland from very early times, for we hear of the ancient kings marching into battle with green standards; but it was probably only in the eighteenth century that bunches of shamrock and knots of green ribbon came to be used as political emblems, and it was later still that, as the song tells us, men and women were killed in Ireland for 'the wearing of the green.' Poor Ireland! In the time of the old kings and the saints and the fairies, she may have been a happy land enough, but when she came into conflict with her stronger neighbour, England, then wrong and tragedy and grievance began to spread like wildfire, and they endured





An Irish Lake Scene.



An Irish Peasant's Cottage.

without respite all through the centuries, for Ireland was a conquered land—that fact must be remembered, for it has been at the bottom of all the trouble. What has been won by the sword must needs be held by the sword, and the Irish, proud and liberty-loving as they are, hate to be held by any one in any way and for any length of time. They hate and resent it more than ever when their masters are those age-long enemies, the English.

The pity of it is, that a little luck and a little tact might well have made all the difference in the world to the relations between the countries, for, if we look northward into Scotland and over the mountains into Wales, we see two other Celtic races which at one time were as hostile as Ireland herself, but which now have almost forgotten that they were ever angrily separate. Wales was pacified and united to England—so tradition, perhaps truly, declares—by King Edward the First's opportune gift of

the principality to his son, or, rather, by his gift of the baby prince, born at Carnarvon, to the turbulent principality; while as for Scotland—well, it was not the king of England who acquired Scotland, but the other way about, King James VI. inheriting the English crown and thus uniting the two realms at the death of his cousin, Queen Elizabeth.

With regard to Ireland, however, it has always been a case of might not right, and a subject nation being ruled with a rod of iron. The Irish have been for ever fretting and chafing against a sense of grievance and injustice, and each century had its revolts, which were followed by punishments and reprisals and vengeance.

It has been, indeed, a case of history repeating itself again and again, each rebellion with its consequences being almost exactly like the insurrection of a previous century, so that the account of Ireland given by the poet,

Edmund Spenser, four hundred years ago might almost have been written the day before yesterday; while, at a still earlier date, Sir John Froissart, in his famous chronicles, declared that 'Ireland is one of the evil countries of the world to make war against or to bring under subjection.' Even during late years we have seen how true this description is, but, at last, Ireland has been given the longed-for independence and is free to work out her own salvation in her own way.

It is to be hoped that now, after all the long centuries of strife and bloodshed, the beautiful 'Emerald Isle' has found peace, and that she will be, not the 'Most Distressful Country,' but one of the happiest and most prosperous lands in the wide British Empire. A. A. METHLEY.

THE RAT AND ITS BURDEN.

ONCE, in a vessel sailing from New York to Lisbon, the rats were found to increase very fast and to be very mischievous. They ate so much and destroyed so much that the sailors grew quite angry with them, and resolved on the first chance to get rid of them. Accordingly, when the vessel was safe in Lisbon harbour, the captain ordered sulphur to be kindled in the hold. The rats, unable to endure the fumes, left their holes, and in trying to escape were killed in great numbers by the sailors. At length one appeared on the deck, bearing on his back another rat which was quite grey with age, and also blind. The men, supposing the old rat to be the father of the young one, were touched by the sight. They could not think of killing an animal which showed such tenderness; it was allowed to pass in safety, and to carry its aged parent to some other home.

SANDWICHES.

WHAT should we do without sandwiches? Sandwiches for picnics, sandwiches for parties, sandwiches for journeys—in fact, sandwiches for any time when we haven't the opportunity, or desire, for a proper 'sit-down' meal.

But why should meat between two pieces of bread, or jam between sponge cake, or a man between two boards be known as a 'sandwich'?

The name dates back to the 18th century. There was a certain Earl of Sandwich who was a terrible gambler. So keen was he that he couldn't drag himself away for his meals, but had slices of bread and meat put at his side, and when he could spare a moment placed the meat between the bread and ate it. This combination became known by his name, and has ever since been called a sandwich. The term is now used as a verb, as when a person is sandwiched between two others.

RABBIT AND STOAT.

ROM the high moors, on the highest point of which stands Hardy's monument, a splendid view is obtained of Weymouth and its bay, the Chesil beach stretching from the town and, far at the end of it, like a large wedge in the sea, the island of Portland.

A bridle track branches off the main road and runs eastward along the crown of the ridge. For many miles this ridge dominates the moors to right and left, revealing glimpses of the Fleet water, half salt, half fresh, which here and there is enclosed by that same Chesil beach that forms along the Dorset coast a barrier twenty miles long

from Portland to Bridport.

Upon this ridge, some five miles from the sea as the crow flies, the air seems sweeter to me than anywhere else, and I was making the most of it by inhaling deeply there one golden summer morning years ago. The country was green with fern and brown with heather, the sun shone gaily and sparkled in laughter on the brimming waters of 'the dew-pond on the height.' A whole choir of larks shed their tinkling drops of music from the deep blue of the sky. A fresh breeze came gossiping over the heather from the south—it stimulated like wine—and far away to east and south the green-blue, white-crested sea drew the eye like a magnet to the haze-dimmed horizon.

As I walked along the bridle track musing upon the David and Jonathan affection of Nelson and Thomas Masterman Hardy, I almost ran into a rabbit that loped across the path, apparently oblivious of my presence. 'Stoat somewhere,' I said to myself, and climbed on to a loose stone wall, nearly five feet high, that bounded the path on my right. As I sat there silent and motionless, the stoat soon appeared, and—the ground sloping gently in all directions—I had a splendid view of all his motions as well as of those of the rabbit he

had chosen for his prey.

The rabbit had popped through a hole in the wall. A moment later the stoat popped through the same hole and, after running south some fifty yards, entered the same hole in the ground into which the rabbit had run. This hole was one of many, all belonging to the same rabbit-burrow, and

all visible from my perch.

I waited expectantly, and was soon rewarded by the sight of the rabbit issuing from the same hole which both he and the stoat had entered. This struck me as odd, and I concluded that Bunny had jumped over Foumart the stoat underground. Back came Bunny towards the wall, back came Foumart some eight or ten yards behind him. Through the hole in the wall they went, and some sixty yards north into another burrow. Soon they were out again, through the wall, into the southern burrow, and so on perhaps a dozen times.

The most curious part of the performance was that neither rabbit nor stoat seemed to vary its pace. They cantered along as if in a dream, the rabbit looking nowhere, moving mechanically, the stoat looking nowhere, nose to the scent, cantering, cantering, cantering, as if wound up and set going. It seemed to me that Bunny had lost his first poignant dread of the stoat, and was now, in despair, accepting him as inevitable fate. Cantering, cantering, they went without sound, without pause, without variation, over the same course again and again, like ghosts in a dream.

At last I tired of sitting still, and ran to the mouth of the hole they had just entered. I lay down, and raising my stick, waited. Out came the rabbit screaming, out came the stoat close behind him—he must have gained on him underground down came my stick breaking the stoat's back, and then, instead of joyfully running away as I had hoped, the rabbit crouched down and continued to Several minutes passed after I had picked him up, stroked, talked to and soothed him, before he could be made to realise that I was not the stoat, and had no evil intentions towards him. At last, however, he suddenly awoke from his hypnotic trance, life and hope surged back, he sprang from my arms and disappeared into the fern, whilst I continued my journey much edified by this tragi-comedy of Nature.

Many times since that day have I watched a stoat hunting a rabbit, and on each occasion has this dream-like chase repeated itself. Game-keepers will tell you that the rabbit is mesmerised and cannot run faster, that at the beginning of the hunt he will make two or three rushes, but finding that the stoat always overtakes him wherever he may hide, he gives up at last, and losing all hope, merely prolongs the agony in a dazed attempt to live a little longer.

The reason that the stoat does not rush in earlier and make an end is variously explained. Some say that he is too cautious, and waits till the rabbit is almost dropping from fatigue; others that he likes to play with his victim as a cat plays with a

mouse. This latter I do not believe, since all the stoat tribe kill at once when they get the chance, and continue to kill whilst any living thing is in their power; for instance, a ferret in a fowlhouse. On the other hand, it is easy to see that should the rabbit not be exhausted when the stoat leaps upon his neck and fastens his grip upon him, a bad time might follow for the stoat. Many rabbits weigh eight times as much as a stoat, and could with ease gallop off with the little creature clinging to their necks, banging him against the ground, the bushes, or the edge of any hole through which they rushed. An unlucky blow thus delivered might kill the stoat, and therefore I think he prolongs the chase until such behaviour on the part of Bunny is physically impossible.

Armed as he is with sharp claws and immensely strong incisors, it is strange that a wild rabbit offers so little resistance. Only once have I known one to bite a man, and then his teeth met in the thumb by way of nail and bone; only once to resist in any way the attack of a stoat. This happened in the middle of an open field. When the stoat approached the rabbit turned, nodded his head, and advanced upon his enemy. The stoat immediately fled, but later returned to the charge three or four times until finally driven off for good, all the honours of war remaining with the rabbit.

A. F. H.

VALUE OUTAIN COLUMNIA

THE MOST EXPENSIVE BOOK IN THE WORLD.

IT is impossible to say what the value of a book is. In the best sense, the Bible is the most valuable of all. But even rare early editions of the Bible do not cost very much, as the prices of books go when they come up to auction. The highest sum ever paid (hitherto) for one volume was 15,100*l*.

This was given at a great sale in London in 1919 for a copy of Shakespeare's *Venus and Adonis* (bound up with Marlowe's *Passionate Pilgrim*). It is one of two known copies of that edition, and was found sixty years ago in an old lumber-room.

THE DIM RED DAWN.

By Mrs. HOBART HAMPDEN, Author of 'Louisa,' 'The Hidden City,' 'Princess Ooma,' &c.

Illustrated by E. S. Farmer.

(Continued from page 155.)

CHAPTER XVIII.
WHENCE AND WHITHER,

'PIG, pig,' Lulu repeated, in order that she might keep a pig's shape in her mind's eye as she punched and moulded. A big roll of clay, that made a lovely body. Four smaller rolls for legs on which to dump the larger, she and Zip-Zip prepared next. But as Lulu put her head on one side to admire the result, the pig,

to her annoyance, wobbled and collapsed. Not to be baulked, she immediately set to work on it again.

'Some pigs lie down. This pig shall lie down,' she decided. But presently, when the head was reached, she was obliged to own she was in a difficulty. Every head she fashioned looked as absurd as the giant's head Zan had made which grinned at her from a corner.

As she stood frowning perplexedly, Bobo strolled towards her. Having listened to Brild's tale, he had come to the conclusion it was time he took a share in Lulu's doings, and as he caught sight of the object at which she was working, he snorted. Pushing it aside, he set to work himself. Under his fingers new lines began to appear, and presently, the pig was standing up again—somehow he had contrived it with the aid of sticks. It stood at bay, its snout towards the cave entrance. So striking did it look that Bobo began to eye it dolefully as he pictured its coming destruction.

'But it is not really good; you spoilt it so at first, Lulu,' he grumbled to console himself,

while Lulu listened respectfully.

She could not but own that Bobo made better animals than she did. In the flickering firelight the pig seemed breathing almost; of daylight there was little left, for Bobo had worked until it was almost dark.

Zip-Zip was beginning to look frequently at the cave-mouth, sure that the forest folk would not delay much longer. They must recross the plain after the magic was made, and open though it was, wild things no doubt used it by

night.

'My grandfather always made the forest people come at night,' Zip-Zip explained. 'But they always hurried away as soon as they could. I do not know why he chose night, nor if the night had anything to do with his magic. All of the magic I remember is the muttering

and the shutting of his eyes.'

A little apprehensively she looked at Lulu, for Zip-Zip was just beginning to realise fully, as was Lulu herself, that neither of them really knew of what, in fact, magic consisted. This had not seemed of great importance at first, when the actual making of the magic was still distant. But now, obviously, a further explanation would be helpful. That there must have been more in her grandfather's proceedings than Ziv-Zip had as yet recalled seemed almost certain. Something that really helped to guide the arrows aright of those who came, or would they have gone away satisfied? Was it likely they paid in advance for anything they were not sure they would get? But what was the secret? From whence had Zip-Zip's grandfather obtained the for 'e he wielded?

'He must have been talking to something when he muttered,' Lulu reasoned when this point was reached. To some one, then, he could

not see as he shut his eyes? And to some one stronger than himself? 'For, of course, he'd have made the magic alone if he could,' she argued further, judging Zip-Zip's grandfather by herself. And if he, old and wise, needed an ally, she must need one too. To whom, invisible, could she appeal?

'Why, to Zend,' Lulu told herself. Of course, to Zend. That Zend would help if he could possibly do so, she had no doubt at all. How far his spirit had wandered as yet she could not guess. But she had taken for granted hitherto that it still hovered near. That it could see her when she took the weapons from the grave, and hear her when she promised later that with those weapons she would conquer.

Thus thinking, she picked up Zend's spear, and stuck it upright beside the clay pig to help her to feel that Zend was standing beside

her.

'Zend will help us,' she told Zip-Zip, who listened, overawed by so bold a solution of the magic problem. Zip-Zip's respect for anything invisible was boundless.

'You must not use the spear to kill the pig,' she warned. 'The forest people would not be content with that. They will want you to do what they do. You saw they had only bows and arrows. Had you not better take Zan's bow?'

'Yes,' Lulu agreed; but then it seemed to her that she could improve on Zip-Zip's suggestion. 'Zan shall shoot,' she ordained. 'He shall

stand beside me.'

Zend would be pleased, she reasoned, that his son should play so important a part, and would be all the more ready to help.

'Listen, Zan,' said Lulu. 'Loose an arrow when I give the word. Take care that it flies

straight.

'Yes, yes,' Zan breathed, enthralled. Snatching up his bow and quiver, outside he darted to practise shooting at the seagulls while Zip-Zip, a shade blankly, looked after him and then at Lulu, who was busily polishing the spear shaft.

Zip-Zip had followed Lulu's argument; she could not but admit that it was sound. Yet that Zan should help and not herself was a development she had certainly not foreseen. It might be wise; nevertheless, nothing could shake Zip-Zip's firm belief that she herself must be at Lulu's right hand.

'Zan,' said Zip-Zip to herself, startled. 'Zan.'

(Continued on page 170.)



"'Shoot, that these may have their pig as I promised."

THE DIM RED DAWN.

By MRS. HOBART HAMPDEN, Author of 'Louisa,' 'The Hidden City,' 'Princess Ooma,' &c. Illustrated by E. S. FARMER.

(Continued from page 168.)

CHAPTER XIX. THE SYMBOL.

LREADY Zan had come running back, for he had found that he could scarcely see a yard in front of him. It was not only almost dark, but the salt water incoming had brought a mist with it. Brild, meanwhile, had been cooking such fish as there was in the cave lest the forest people should appear and demand a share before the five of them were satisfied. But he had not been quite quick enough. As the first mouthful disappeared down his throat footsteps grew audible, creeping down the ravine. As he reached out for another helping from the steaming heap he had piled by the fire, Bobo unexpectedly caught at his wrist.

'Wait,' said Bobo, who had plenty of common sense on which to draw when he cared to use it, in addition to the knowledge his years had brought him of men and the ways of men. Moreover, as he worked at the clay pig he had

leisure for further thought.

'Let them eat with us, these strangers,' he decreed now. 'If they are not too many. They will be all the better-tempered, more easily pleased afterwards. Food shared willingly is always a bond. Food taken by force, that is different.'

As he spoke a shadow darkened the cave entrance. A moment later the man and woman who had been on the cliffs that morning slipped through. Both were carrying huge bundles of dry wood, and both looked eagerly at the fish, though they spared a quick side-glance for the back parts of the cave where Hrump was asleep.

'We have come,' said the man breathlessly, looking at the fish again, and letting the bundle slide from his shoulder to the ground while he signalled to his companion to follow his

example.

Lulu beckoned them closer. Though she certainly did not mean to relinquish the leadership to her uncle, still she realised that the advice he had given was worth taking; and that in the game she was about to play, she must use all the weapons at her disposal.

'Come,' she invited, 'sit down with us and

eat.'

There was no need for a second invitation.

In a moment the forest folk were stuffing them. selves with fish. And in the firelight their eves showed sunken; their skin looked tight over their cheek-bones.

'They need food more than they wanted us to think,' Lulu concluded as she watched. Even Brild could not eat as much, nor as quickly, as the new-comers; even he had stopped swallowing before they had finished. Not until Hrump woke snorting did the two slacken to rub their middles happily. So soothed were they now they could even look casually at the little mammoth. It was not until they caught sight of the clay pig, which they had been too absorbed to notice hitherto, that again they grew apprehensive.

'Is that a new magic?' the man asked, his voice shaking a little. 'We have not seen the

like of it before.'

'It is new,' Lulu affirmed. She sprang to her feet, eager to begin while the strangers were so meek. Looking round for Zan she found him waiting just behind her, and as she strolled towards Zend's spear, he followed hard on her heels.

'Be careful,' she warned. 'Be cool.' 'I am cool,' Zan answered hurriedly.

Cool he certainly was not, but he was stubbornly set upon success. With eyes glued to Lulu he waited, biting his lip unconsciously as he had bitten it when seated upon the oak bough. And now, to increase his likeness to Zend, a little blood trickled down his chin and on to his tunic, and almost, Lulu reached out a finger to catch it. It seemed to her Zend's blood had sealed their pact anew. Up went her head. She faced the audience waiting on her confidently.

For the moment those composing it seemed one, strangers all who had come to ask her help. Bobo, Brild, Zip-Zip, as well as the two from outside. She was about to make a magic for each equally, she felt. To bring the strange mysterious thing called by that name from nowhere, or rather from the unknown where Zend dwelt. All of herself she flung into her part. Her very voice changed of its own accord and sunk to a sombre, more impressive note.

'What do you want?' she questioned royally,

VALDUSIA STATE COLLEGE

as if the world were hers to give. She caught the murmured answer, 'Pig,' looked at the

spear and shut her eyes.

'Zend!' Lulu conjured. Against the darkness of her eyelids did she see him? He smiled, she thought. Out she flung her hand to Zan, wrapt and caught up; Lulu no longer, but a magic worker.

'Shoot,' said Lulu, 'that these may have

their pig as I have promised.'

(Continued on page 178.)

GENERAL SUWAROFF'S RUSE.

THE Russian General Suwaroff knew by instinct how to rouse a valiant spirit in his soldiers, and was not above resorting to what we might call

'play-acting' when he was anxious to gain his

For instance, during his famous passage of the St. Gothard (when the Russians were fighting the French in Italy, at the close of the eighteenth century), his soldiers, exhausted by the hardships of the march, threw down their arms and refused to proceed any farther.

Suwaroff did not reason with them, but at once ordered a grave to be dug across the path, and having taken off his uniform he lay down in the grave, calling on his soldiers to bury him, as he 'could not survive the disgrace of abandoning the

expedition.'

This ruse was entirely successful! The troops had no wish either to bury or disgrace their brave general, and the march was resumed without any further grumbling.

BIRD CAMEOS.

IV.-THE GRATEFUL HEN.

HEY were a very happy company of cocks I and hens, certainly! They had everything to make them so-the kindest of mistresses who looked after their comfort, giving them the cleanest and freshest of water, and the best of grain. And they had plenty of liberty too, for they knew they might wander at will down the shady path that skirted the kitchen garden, where the roses and hollyhocks peeped over the wall on one side, and the buttercups covered the meadow on the other, making it look like a cloth of gold. Then at the end of the path was the orchard where the birds called and the pony stood under the apple-trees, flicking the flies away with his tail. The hens would bring their babies down as soon as ever they were big enough, and would cluck anxiously, as the chicks, growing bold, ran away faster than their mothers could keep pace with. One, specially, was full of care. Her name was Mrs. Faithful.

She was rather a dowdy-looking bird, and was always slower than the others, and as soon as she reached the orchard with her ten chicks, kept telling them to keep away from the stream that splashed over the stones near the bank where the forget-me-nots grew. And her fears never died until, at sundown, their mistress called them to supper and bed. Hurry, scurry, helter-skelter, back all the birds ran; big and little, gay and drab, young and old; and always last with her swaying, sidelong run, our friend Mrs. Faithful.

One day a stranger called them in; their good

mistress had been taken ill. The hens were all sorry, but as they got as much food as usual, they soon gave up regret, and almost forgot their kind mistress. All but Mrs. Faithful; she could never get used to the newcomer, and sighed longingly for the one she had known all her life, and wondered each day why she did not come.

The days lengthened into weeks, then into months, till the leaves began to fall, and at last their mistress had come back and stood with her basket of grain calling down the path to the orchard. She was well and strong again and smiled as she saw the birds running Mrs. Faithful was making a towards her. tremendous effort. She was so pleased to hear her mistress's voice again, and actually arrived first instead of last. Indeed, her behaviour was quite peculiar. She clucked, and rushed round and round her mistress' feet, and took no notice at all of the food the others were snatching, and tumbling over each other to get. Then she turned and ran as fast as she could down the path she had come. Her mistress was rather disappointed. She liked her show of affection, but then she was only an As she was scattering the last handful of grain, Mrs. Faithful reappeared. In her beak was something she was carrying so carefully that she could only cluck in a whisper. Straight she went to her mistress and laid it at her feet. It was the fattest worm she could find, and it was to show her mistress how glad and grateful she was to have her home, well again.

HYDRAULICS.

By P. M. BAKER, B.Sc., M.B.E., A.M.I.E.E., A.M.I.Mech.E.

Illustrated by BERNARD WAY.

(Concluded from page 157.)

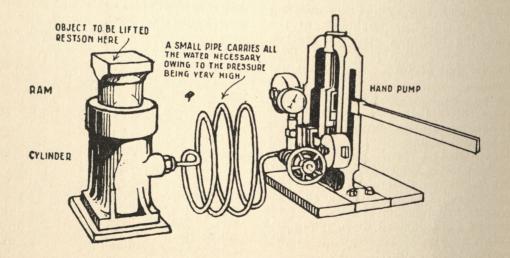
HAND-DRIVEN HYDRAULIC APPLIANCES.—
There are many jobs for which we cannot conveniently have pressure water 'laid on.'
Think of the man who is erecting a heavy machine and has to lift its heavy bed-plates, or one who has to lift a bridge or its girders, as you will have read in one of my other articles. He has no convenient supply of water at high pressure (although on many bridge jobs a portable plant is used), so he has to use a hand pump.

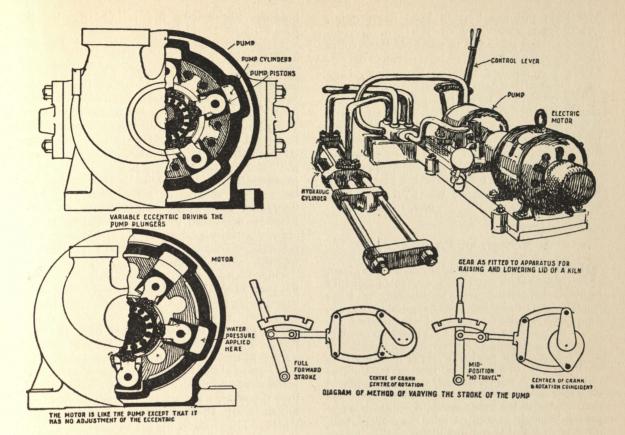
The diagram shows a lifting jack with a hand pump. The man working the pump makes many 'strokes' with a tiny plunger, and pumps a tiny quantity of high-pressure water at each stroke into the hydraulic cylinder (which has its U leather just like any other cylinder), and so he lifts a load of five, ten, twenty, fifty tons according to the size of the apparatus. Similarly a 'punching bear,' much like the riveting machine shown in the diagram in shape, might be used with a hand pump to punch a hole in a railway rail, miles from a town where water was available. In some machines the pump and a small water tank are built into the machine itself. The hand wheel seen in the diagram is intended to release the pressure and allow the load to fall gently on to a bearing prepared to receive it.

Modern Hydraulic Developments.—There are numerous modern developments of hydraulic transmission which are of very considerable interest, including applications to the steering of ships and the aiming and loading of big guns.

In one apparatus a special form of pump is used, that invented by Dr. Hele Shaw. This pump can be caused to pump water or oil (oil is often used) from one pipe to another in either direction at variable speed, or, if necessary, simply to turn round without pumping. It has a number of cylinders, each containing a plunger, carried on a rotating shaft. The heads of the plungers travel round an eccentric path so that, as you will see from the diagram, the plungers move in and out of the cylinders, their stroke depending on the eccentricity and being obviously nil when the two centres, those of the shaft and the path of the plunger heads, coincide. The diagram shows one method by which the centres of the crank and of rotation can be relatively displaced so as to vary the stroke of the pumps.

The water thus pumped can be used in a variety of ways. It may operate a water motor, as shown in the lower part of the diagram, to work machines at varying speeds.





It may supply two hydraulic cylinders operating on the tiller of a ship for steering purposes, or to train or 'lay' a gun. If the pump and motor are combined they may be used in a motor-car instead of the gear-

box, giving infinitely variable gear ratios between engine and car speeds. You will see that there are many possibilities in hydraulic transmission and that it is a subject worth further study.

THE RAINBOW.

A LEGEND is told of how once long ago the colours were never able to agree. They were ever quarrelling as to which of them was most important.

Blue thought she must be chief because she gave the sky its colour, but Green did not agree; she surely was more important, for she gave colour to the trees and the grass of the field, and without the restful green shades of forest and field the earth would be a poor place.

Whilst these two were getting quite angry with each other, Yellow said she was more important than both of them put together. She was the colour of the sun that gave life to

the earth, and the colour of the greatest number of flowers, especially the year's early flowers, and even flowers of another colour had often enough yellow hearts or yellow eyes. She was surely queen of the colours.

So they argued in their blindness, and none seemed able to make peace between them.

At last the Sun and the Rain decided to put an end to this state of things; for, as the Rain said, they were really brothers and sisters if they only could see it.

It was arranged that all the colours should meet the Rain and the Sun on a certain day. The Rain arrived first, and shortly after the colours came they began to quarrel as usual. The Rain did her best to keep them quiet, but did not succeed until the Sun arrived. Together they managed to persuade the colours that they were brothers and sisters. Recognising one another for the first time, they threw themselves into one another's arms.

The result was wonderful—the bow in the clouds, the beautiful union of all the colours, where each has its own proper place and importance in the whole. In that way were their differences healed; and just as musicians say each note in a chord enhances each other note, so each colour adds tone to all the rest, and in harmony they seem more beautiful than they ever seem alone. F. C. HOGGARTH.

A NOVEL TEA-KETTLE.

WHEN a large tea-party or school-treat is given, its promoters often meet with some difficulty in obtaining cooking utensils numerous or large enough to provide for all the guests. Surely, however, no one has made use of a more novel teakettle than the organisers of a big luncheon recently given to a multitude of visitors at the opening of a new dock. The meal was served in a very long shed, outside which ran a line of rails. Two railway engines were obtained, and one was placed at either end of the luncheon shed. Each was connected with the water-mains, from which water passed through hose-pipes into the boilers, and, after being boiled there, was distributed by means of other pipes into parts of the shed convenient for making coffee or cooking. When luncheon was over the useful, if unusual, kettles were employed to boil water for washing up of dishes, glasses, knives and forks-for everything, in fact.

WHEN THE CHILD IS FATHER TO THE MAN.

THANK heaven, in England, the days of Fagin are past, when children often not only lived by their wits, but sometimes even maintained their parents in idleness, when boys could often earn as much money by being hired as chimney sweeps, as many men were able to earn. In France, however, in the poorer parts of Paris, many a gamin of tender years, but withal very experienced wits, is the only support of lazy and drunken parents.

'S'il vous plait, Effendi, s'il vous plait?'

It was the very piteous tones of the onearmed Turkish boy of nine years that arrested me, as he sat in the main street in Stamboul, holding his empty fez solicitously to the passer-by.

'How did you lose your arm?' I asked

He could not remember. The breast of his ragged tunic protruded suspiciously where the 'stump' of his left arm reposed, whilst the empty sleeve hung limp by his side. Before I parted with my gift, however, I made bold to thrust my hand under his tunic, and sure enough—there it was—the 'missing limb,' the hand grasping tightly the handful of paras successfully solicited from the charitable. The lad was not abashed at my discovery, he only laughed. He was de jure at school—as education is compulsory by law, which is not always enforced—but de facto earning more per week than were many skilled artisans. He was the family bread-winner. . .

Our vessel was slowly steaming into the harbour at Malta, and I was hurrying on to the deck. 'Throw a sixpence, sir,' 'throw a sixpence, lady,' were the clamorous sounds which greeted me as I looked over the deck rails. They came from a number of little naked Maltese boys, in as many boats. The lads gesticulated wildly as they hove their boats close under our vessel. I tossed a penny into the water near a boy, whose goose-skinny, naked body showed that he was none too warm. He screwed up his eyes as he watched the coin spinning in the air towards him.

'Me not dive for penny, only sixpence,' he retorted, ere the coin had touched the water;

'only sixpence, sir,' he added.

'Why?' I asked. 'Me cannot see copper on the sea bottom,' he replied; 'besides, it's too leetle, throw a

sixpence, sir,' he continued.

I could not resist his importunity, and threw one. His eagle eye discerned its value whilst it was in the air. He tensed his muscles, and in a flash had disappeared, head downwards, after the fugitive coin. In a few seconds a few bubbles heralded his reappearance on the other side of his boat with the money in hand. He climbed into his boat again, dropping the recovered coin into a receptacle.

'Throw a sixpence, sir,' he resumed, eagerly scanning the faces of other passengers.

I thought of a trick. Feeling in my pocket, I extracted therefrom a five millieme Egyptian coin. It was the same size and colour as an English shilling, but had a small hole in the

WALLSON OTHER COLLEGE

centre, as Egyptian coins have. 'Will a shilling do?' I queried.

'Yes, sir, please,' he answered, eagerly

stretching himself for the dive.

I threw the coin. Again he screwed his eyes as he peered upwards in the sunlight at the oncoming coin. Then—'No good, sir, no good,' he shook his head and relaxed his frame.

'Why?' I asked.

'It's not enough, sir. It's only Egyptian,' he answered, disappointed.

'How do you know it's Egyptian?' I de-

manded.

'I saw the hole in it. Throw a sixpence,

sir,' he continued.

This clever boy—able to detect the value of a coin whilst in mid-air—able, unfailingly, to pick a silver coin from the bottom of the sea, was only eleven years of age, but was earning a weekly wage to which many a good workman has unsuccessfully aspired. His average

earnings were a pound a day.

'Shake hands with the Effendi in the English way.' The speaker was a Turkish father, as he proudly presented his fourteen-year-old son to me. 'He has just become hafiz, and is in consequence granted a sum sufficient to maintain himself comfortably. To be hafiz is to be able to repeat the whole of the Koran by heart,' he explained.

The boy—who was destined for Holy Orders—was a very intelligent lad, and the committing to memory of the 114 Surås of the Koran was a feat of which any one might justly be

proud.

But for sheer precociousness I must award the

mural crown to a very youthful felaheen who strolled up to me as I sat on a seat in front of an hotel in Cairo. He was clad only in a long, loose cotton robe, and he had a tribal cut across his cheek. After gazing at me inquiringly for a few seconds, he thrust his hand into his very ample pocket and dragged therefrom—by the head—a very feeble chicken of but a few days old. Planting the reluctant bird in his other palm, he asked: 'See the hen lay an egg, sir?'

I shook my head, but he was not to be gainsaid so easily, and persisted, 'It lays an egg for threepence, sir;' and without waiting for an answer, he made a clucking noise, and suddenly produced from somewhere an egg in his other hand. He handed me the egg and

waited. I was still adamant.

'It will lay another, sir,' he resumed; and, clucking again to the bird, he produced another egg, from where, I could not tell, though I watched him closely. Certainly not from his pocket. It was really clever. I gave him sixpence.

'How much do you earn a day?' I asked him.
'Often fifteen shillings,' he replied, trium-

phantly.

'But the poor chick—why, it's nearly dead with being dragged out of your pocket so often.'

'When it's dead I fetch another,' he replied nonchalantly, adding: 'I wore four chickens

out yesterday.'

I passed him again some hours later; he had found another client, and his chicken was again busy 'laying eggs.'

D. WILKINSON.

A MOORLAND ADVENTURE.

(Concluded from page 162.)

WE now began to wonder where Harold had got to, and to realise that he had managed to escape the observation of our captors. Our anxiety was quickly satisfied, for a shout from the road caused us to turn our eyes in that direction, and there, standing up in the cart, was Harold, who, as he waved the whip round his head, yelled, 'I'm off for the police!'

The man making for the cart broke into a run, calling to the horse to stand; but it was no good, for with a crack of the whip, Harold started him off at a pace which made it impossible for any man on foot to overhaul him.

After a hurried consultation, our enemies dashed away across the fields, and in our joy at being free again, we gave them a hearty view holloa.

The men were evidently making for Windwell village, which we could not understand, as they must know that on arrival they would be taken into custody. We could just see Harold top the hill at a spanking trot, before disappearing with his spoil into the valley below. Keeping as much as possible out of sight, we followed the sheep-stealers across the fields, through gaps in the stone walls, and

over fences, sometimes being so near them that we could hear their laboured breathing, for running was less in their line than swilling

beer in the bar of a snug pub.

As we drew near the village they disappeared behind a clump of thorns, where we lost sight of them altogether. After a few minutes we cautiously approached, but on entering the bushes it was only to draw a blank. Just as we were about to leave them for the village, with a shout of laughter, Bob pulled out from under a bush a black beard, and then, stamped into the clayey ground, we found two white ones. Quickly pocketing the beards, we made for the high road and entered the village close to the shop of the butcher, who was just entering with his friends by the back door as Harold drove furiously up to the front one. We had hardly reached the shop, when May arrived with two policemen, upon which, to our astonishment, out rushed the butcher, followed by his friends. They had evidently not seen me and Bob; and, pretending to be in a towering rage, Hawkins demanded to know who was driving his cart. Harold, who did not now recognise him, told his story.

The butcher declared that the cart must have been stolen by the old scoundrels he had described, and whom he had seen hanging about his stable-yard. 'I should have been after them directly I found my cart gone,' he added, 'if I had not been so busy in the shop,'

I now pushed forward, and giving the policemen the wink, remarked, 'But you've only just come in, for we saw you all enter by the

back door.'

He and his friends changed colour on seeing us, but with an attempt to speak calmly, he said that they'd only just run out for a smoke, as his missus couldn't abide the smell of tobacco.

'Oh!' chimed in Bob, 'then we've found some of your property, which you left behind among the bushes,' and out came the beards.

Denial was useless, for the gum stains on their chins fitted too well with those on the beards, and the consternation on their faces

told plainly of their guilt.

We were rewarded by a considerable extension of our holidays, in order that we might give evidence against the culprits at the assizes.

A. H. P. HARRISSON.



"Out rushed the butcher, followed by his friends."



"If you are a magic worker, Lulu, why, so am I!"

Spinone .

THE DIM RED DAWN.

By MRS. HOBART HAMPDEN, Author of 'Louisa,' The Hidden City,' Princess Ooma,' &c.

Illustrated by E. S. FARMER.

(Continued from page 171.)

CHAPTER XX.

HOW SHALL IT PROFIT?

Look! look!' Lulu heard Zan shout as, dazed a little, she opened her eyes again. He had left her side and was capering about the cave, she saw, while in the clay pig's head there stuck an arrow. And the forest folk began to yell shrilly, but stopped, however, petrified, as from Hrump's corner came a grunt and bellow.

'Hrump!' said Hrump. Awoken by the noise, he was cross, since his sleep had been broken. He lumbered to his feet and stood swaying. Then, frightened too, he made for Lulu, brushing Zan aside with his shoulder, heedless of all that stood in his way. And down went the pig beneath his feet in fragments, amidst a deepening silence.

'What does this mean?' the forest people whispered presently. And Lulu, hearing them, realised she might lose what she had gained.

'He wishes you good fortune, he who serves me,' she said hurriedly. She had Hrump by the ear by this time, more or less under control. 'He says your triumph shall be complete,' she improvised. And at that the forest folk seemed satisfied. They scurried towards the cave entrance, but they were smiling. And, ere they vanished, they turned.

'We will bring the pig that is your due, magic maker,' they promised. And there was more to come to add to Lulu's triumph. Bobo, who had been watching, chin on hand, pulled out from his tunic the string of bears' teeth he had destined for Zend's burial. It was still blank, for he had not rethreaded the tooth he had exchanged for Lulu's fish, and since coming to the cave he had left the rest of it untouched. Now he drew the string through his fingers thoughtfully, looking meanwhile at his niece.

'I will make a carving of all that has happened to-night,' he began dreamily. 'On this'—his fingers lingered round a fine large tooth—'Lulu shall stand by the spear. On this shall be the clay pig, and here Zan's bow, the arrow pointing. Next, Zan himself.' And down Bobo took his carving-tools from the

ledge where the lamp was kept and where he had put them out of harm's way, and set to work immediately. He motioned to Lulu to stand beside the spear, and pridefully she obeyed. This was a foretaste, surely, of what was coming? A foretaste she had fully earned too, she considered, as she posed with chin uplifted, hand out-thrown once more. She remembered, however, to throw a word of praise to Zan—generously, she thought.

'You did well. I am pleased with you,' said Lulu blandly. Then motionless she stood, aware of Zip-Zip's and Brild's admiring eyes upon her, for even Brild had been deeply impressed, though why exactly he did not know. But there had been something so strange about Lulu; something that had altered her, he vaguely felt. Something that almost made Brild believe in her as did the forest folk. Something that changed his grudging fear for a while at least to a respectful awe.

'What did you do, Lulu?' he asked, agape. 'I was frightened when you shut your eyes. I shut mine too,' he owned.

'And I shut mine,' Zip-Zip chimedin, the more eager to offer her homage because of what she had so lately felt. 'It was better magic than my grandfather made.' And as Lulu graciously accepted these tributes, up came Zan, pirouetting. All this while he had been dancing a weird dance of his own invention round the big cave, and in and out of the smaller caves in turn. But he had been listening meanwhile, if disjointedly, and he had begun to feel it was time that some of this admiration was lavished on himself. The crumb that Lulu had deemed sufficient Zan found quite inadequate. Lulu had talked only; the real work he had done. She had given the order, but it was his hand that had sent the arrow on its way. He stood in front of Lulu, balanced on the tip of his toes.

'If you are a magic worker, Lulu, why, so am I,' Zan boasted. 'A mightier magic worker too. What use would your magic have been without mine?'

It was a rash question, he found a moment later, for Lulu instantly abandoned her pose to catch and smack him, holding him in a grip from which he could not escape. She was in no mood to deal lightly with a rebel nor brook the slightest contradiction. She smacked with a will, while Zan in vain tried to break loose, until at last she let him go, and he fled to a safe distance to scowl. Zip-Zip watched his downfall approvingly, while Brild thoroughly enjoyed the skirmish, and would have offered Lulu a stick had not her hand proved so very effective. After Zan he edged finally to add a finishing touch. Softly, lest Lulu should overhear and unreasonably be annoyed, Brild mocked at the child.

'U-r-r-h!' growled Zan, but softly also since he did not wish Lulu to come to his aid; he was hating her. And Bobo, vexed too with Lulu on his own account, sent the tool with which he had been working spinning across the cave, and the string of teeth

after it.

'How can I carve if you will not stand still?' he raged. Still fuming, he lit the lamp and took to his retreat again. Lulu watched him go in silence; if she had been provoked, she admitted she had been provoking. She retrieved the necklace presently to look at the work that Bobo had done. Her profile was already outlined. If it was difficult to be certain it was in fact her own, no doubt the likeness would be more striking when the details were filled in, and with this Lulu was well content. The necklace in her hand, she squatted down by the fire with Zip-Zip beside

her, and all at once she began to talk of her secret goal. It had seemed too distant for discussion hitherto. But she was inclined to think the evening's triumph had brought it perceptibly nearer. Was not an alliance with the forest folk possible?

'They could help us put Zan in Zend's place,' said Lulu to Zip-Zip. 'To make him chief. I meant to go back to the tribe when Zan was big enough. Now, we need not wait

for that.'

'Back to the tribe?' Zip-Zip repeated, taken by surprise again, and equally unready for this second blow. She had but just been telling herself she need trouble no more about Zan, that he was definitely deposed from Lulu's favour, to learn abruptly that for Zan's sake the cave life was to be abandoned; her country, she had thought Lulu liked, cast aside for him. And meanwhile Brild, having finished with Zan, had come close to the fire again. He too had been listening though uninvited. If Zip-Zip was dismayed, Brild was appalled.

Back to the tribe? Back within reach of Churruk, the awful?' Almost Brild voiced his rising fear. Then, happening to glance at

Zip-Zip, arrested, he choked it back.

'How strange she looks,' said Brild to himself. It was a strangeness, moreover, that just possibly was promising, he thought. And Lulu, deep in her own imaginings, was evidently unaware of it.

(Continued on page 191.)

BRIDGES.

By P. M. BAKER, B.Sc., M.B.E., A.M.I.E.E., A.M.I.Mech.E.

Illustrated by BERNARD WAY.

WITHOUT adequate means of communication it is impossible for trade to be carried on, and one of the earliest difficulties met with by primitive man was that of crossing rivers. One direction in which engineers have done much to help the progress of civilisation has been in the building of bridges. Most of us are disposed to look upon a bridge, when we see it, as an accomplished fact, and to forget many of the difficulties which it presented to its designer and its builder. We just see the bridge, and we fail to observe its special features or to realise why they are there.

In this article we are only going to deal with what may be regarded in a special sense as

engineers' bridges, i.e., those built of iron and steel; not because we forget the splendid work of the bridge-builders who used masonry and whose works are true engineering structures, but because we have only time and space to deal with the works of the Steel Age—to-day's

Look at any bridge you know and you will find that it consists of two parts—the bridge itself and the supports, piers or abutments on which it is carried. Let us think of the bridge itself first and return later to the supports—not perhaps the logical order of looking at things, but somewhat easier for us to follow.

Spanish and the contraction of t

The Simplest Bridge.—What is the simplest kind of bridge you can think of? Surely a plank resting on the banks of a stream which it spans. We can learn a good deal about bridges from our simple plank!

If we sit near the centre of such a plank we notice that it bends, and that the bending is greatest at the point where we are sitting, i.e., where the weight is applied (see fig. 1). There is no bending at the ends, where the plank rests on the banks. Further, the bit of plank on which we are sitting is practically horizontal, while the ends are tilted up, or inclined, a little. The plank illustrates a very simple series of laws relating to beams, or bridges, carrying a load. We may summarise these in a general way thus:

I. The tendency to bend, or 'bending moment' as it is called, is greatest under the load.

2. The 'deflection' or sinking of the loaded beam below the level of the supports is greatest where the bending moment is greatest, and there the beam is not tilted or inclined.

3. The tilting or 'inclination' of the beam is greatest where there is no bending moment.

How is this Bending Moment resisted by the Plank or Beam?—You may best answer this question by trying an experiment for yourself.

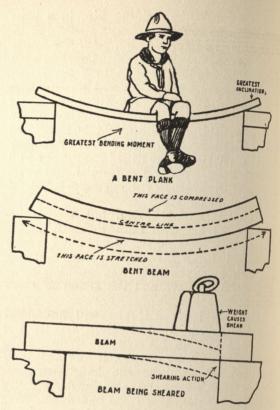


Fig. 1.—The simplest Form of Bridge, and some of its Problems.

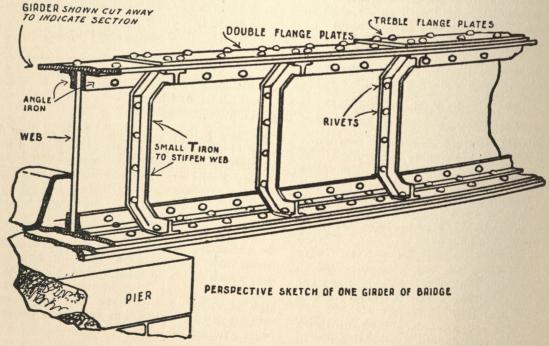
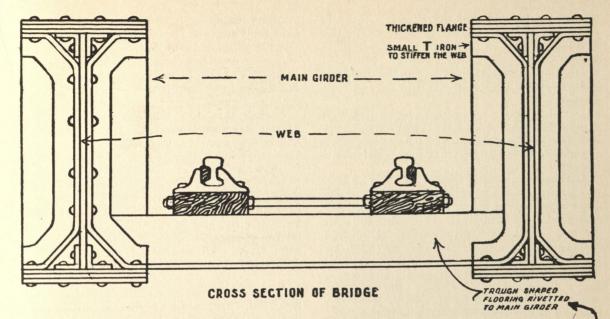


Fig 2.



Rest a piece of wood on two bricks and then load it, either by placing bricks on the centre or by getting a friend to sit on it, while you watch its behaviour carefully. You will notice that the under-side of the wood is stretched and that, when it finally breaks, it does so by the bottom layers parting first; the upper layers are in compression and may fail by crumpling up, although wood rarely breaks in that way. Look at the middle diagram in fig. 1, which is exaggerated in order to bring out this point clearly, and you will see that the upper curve is shorter and the lower curve longer than the central line shown dotted in the diagram, which is the original length of the beam. It is because the wood near the upper surface resists compression, and that near the lower surface resists tension or stretching, that the plank is able to resist bending; and exactly the same goes on in our simple bridge.

There is another form of loading (or stress as we call it) which the material of the bridge has to withstand, beyond that which is imposed by bending. If a heavy load is carried quite close to one of the supports (see the weight shown in the bottom part of fig. 1) it causes practically no bending, and yet, at the same time, if it is sufficiently heavy, it may cause

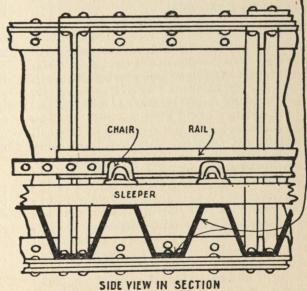


Fig. 3.—Sections showing Strengthening Girders.

the material to break right through, as the dotted lines show, or to 'shear,' as it is called. This explanation is not quite scientifically correct, but it gives you in a general way the idea of what 'shear' means. The forces which tend to 'shear' the beam are greatest when the load is near to a support, but they are present wherever it is placed, and it is

interesting to note that the shearing force is (with most kinds of load) greatest where the bending moment is least and vice versâ. The ordinary beam does not, however, generally shear, for in almost every case the bending moment is much more serious than the shearing force.

If you think it over and look at the diagrams again, you will see that the bending moment produces forces, or more correctly stresses, along the plank, while the shearing force produces a stress across it.

If the experiment is tried with a bar of soap or of rubber—either of which makes a quite good experimental beam, because the material will bend more than wood—the results are even clearer, particularly if its surface is covered with paint or paper beforehand, as these, by crumpling up, enable us to follow the stretching and compression of the material, and where heavy loads are applied near the support, failure 'in shear' can be observed. Even the bending of the pages of a book will help you to understand this point.

Simple Girders.—The simple plank bridge can only be made to span across very small streams. Wooden beams can be used for somewhat larger and longer bridges, but timber is expensive and liable to rot, and so engineers frequently use simple girders or 'rolled joists' of '1' section made in a rolling mill, in place of wooden beams in the construction of small bridges, and from these we can learn many things.

(a) The bending moment is almost entirely resisted by the top and bottom flanges of the girder. These flanges are either compressed or stretched in the operation of bending, and their resistance to this distortion withstands the tendency to bend. So far as bending is concerned, the central web does very little beyond serving the purpose of connecting the two flanges together. Remember that the top of our plank was compressed most and the bottom most stretched.

(b) When it comes to shearing, however, there is a totally different state of affairs. The flanges cannot seriously help to withstand shearing, as they would naturally bend quite readily if the web itself was sheared, and we may, therefore, consider, in a rough-and-ready way, that the whole of the tendency to shear at the ends of the girder is resisted by the web.

Many engineers, who wish to decide what load they may safely place on a girder, calculate what bending moment its flanges will withstand and what shearing force its web can carry, and estimate the load accordingly, and they are not far wrong in so doing; they are, indeed, a little on the safe side.

Seeing that the tension and compression of the top and bottom flanges have to resist a bending moment, you will understand that they will be better placed to resist bending if they are a good distance apart; in fact the strength of the girder to resist bending depends largely upon its depth. The rolling mill cannot, however, make very large | girders economically, and so there is a limit to the size of rolled section girders which we can use efficiently. How are we to get over this difficulty?

Plate Girder Bridges.—Many bridges of quite good size are made of girders which are of practically the same shape as rolled joists or I girders, but which, on account of their size, are built up of plates fixed together as shown in figs. 2 and 3. The top and bottom members are made of plates, which are connected to the web by means of L-shaped 'angle irons,' made in the rolling mill, riveted to both the web and the flanges. As the bending moment is greatest in the centre, the flanges are there generally made of double or even treble thickness, while at the ends only single plates are used.

As the tendency to shear is greatest at the ends, the web, which withstands shearing, may there be thickened up by having additional plates secured to it. The small angle irons (T irons are shown in fig. 2), which are riveted across the web in places, are intended to enable it to connect the two flanges together without crumpling (see figs. 2 and 3). Such girders are very frequently used in bridge work and, generally speaking, they stand on piers consisting of masonry or concrete, or they have other suitable bearers to carry them, these being the supports which have to be referred to later. The two main girders, one for each side of the bridge, are connected by smaller 'cross girders,' generally secured to them by steel brackets riveted to each end and often provided with 'gusset' plates to prevent the main girders tipping over sideways.

(Continued on page 195.)

[NOTE.—Mr. William Rainey, whose work is familiar to countless readers of Chatterbox, is the senior—and certainly the most vigorous—of the artists and authors who contributed to the magazine under its first Editor. He has been drawing or writing for Chatterbox for fifty out of its sixty years. He wrote and illustrated the serial story At the Sign of the Mulberry Tree, in the 1926 volume of Chatterbox, and the Editor is very glad to be able to obtain his work for the Diamond Jubilee Volume. It would be possible to say a great deal about Mr. Rainey, and the high, honest standard of all he does and has done; but space allows us only to say that he always keeps the Chatterbox tradition of remaining young and doing his very best.]

SIXTY years ago! Well, I was quite a little chap then—about so high. Hadn't long been breeched. We boys used to wear petticoats with a little bit of lace showing below, till we were eight years of age or thereabouts; then we were plumped into long trousers—there was nothing betwixt and between; no knickers or anything of that sort.

I was rather stupid at school—always had one eye on the school-room window, and a head chock-full of impossible adventures.

Did I ever tell you how I ran away from

what are you laughing at, you young monkeys? Yes, 'ran away from home to go to sea.' I didn't always go hobbling about with a stick as I do now. I was sprightly enough then — could have walked you youngsters off your legs: three miles to school and three home again every day except Saturday, and then I doubled it on my own account. There were no 'buses then to go from one street corner to the next—we used our legs.

There was a great deal of talk about running away and going to sea at our school, but it was mainly talk, you know. When a boy had had a thrashing or had been kept in to write a thousand lines, or was generally what you boys to-day so elegantly call 'fed up,' it was sure to be heard in the play-ground. It was our way of letting off steam; there was no football, or at any rate not in our part of the country, and no Boy Scouts to provide an outlet for the spirit of adventure. I doubt if Gen. Baden-Powell had got into trousers by then. Still, the desperate deed was occasionally done, and caused a mighty sensation in the play-ground when it happened.

There was a Joe Pettigrew who lived in Chapel Street, Chichester. He was long before my time, and, boy or man, I have never seen him; but reports of his prowess had made me gasp with awe. He turned out a roughish sort of customer, I believe.

'Joe,' said his mother to him one morning—so the story goes—'Joe, go and see what the time is by the town clock.'

Joe went, and did not return for twelve years. He met a friend of the same kidney in South Street, and together they tramped to Portsmouth. Being sturdy lads, they got berths on board ship, and when he returned he had been half over the world and was a hulking great sailor man with a ginger beard and hands like bunches of bananas.

Straightway went Joe to his mother's house in Chapel Street, lifted the latch, and looked into the little sitting-room he remembered so well. The door from it to the kitchen stood open, and there, sure enough, was his mother at the fire bending over the frying-pan and making the grease splutter.

'Mother,' said Joe, without any preamble, 'it's twenty minutes to twelve by the town clock.'

But that's not the story I was going to tell you. The story is, How I ran away to go to sea, or rather, How your Uncle Bert and I ran away to go to sea.

Your Uncle Bert is two years younger than I. At that time he was a nice little chap with a lot of fair curly hair and a face like a Dutch doll—a 'nice little chap.' He always agreed to everything I proposed. He has altered very much since then. His head is as bald as a doorhandle, and as to agreeing to everything I propose—why, he wouldn't so much as lend me his motor-car the other day.

Well, one day I had had a particularly rough time in school. Our schools were not so good as yours by a long chalk—you're lucky young dogs, if you only knew it. Arithmetic was one of my bad subjects. Our master never explained anything. He hustled us on from one rule to another till our minds were always groping about in a fog—at least, that was the case with me; and our singing master was a terror—he was a Swiss or a German, I don't know which. That day he vowed I sang bass and put the others out. He lugged me up by my left ear till I stood on the point of my right toe—he did, the brute—and that ear has stuck out more than the other ever since. That was not the way to give me an ear for music, was it?

I think it was this that brought matters to a head. This and the fact that tucked up between my waistcoat and shirt was a weekly number of a boy's 'Penny Dreadful,' bearing the thrilling title, 'Dare-devil Dick, the Boy King of the Smugglers.' I had eased my pain and humiliation with a heavy dose of this mixture.

'Bert,' I hissed, getting my brother into a corner of the play-ground, 'I shan't stand it any longer: this is a dog's life here. I am going to run away and go to sea. To-morrow morning I start. You can do as you like about

it-come or stay.'

Bert looked up at me aghast. So, seeing I had made an impression, I went on. 'If we mean to be sailors, we must run away and go to sea. Father won't let us go. Of course, when we grow up we could go, but that will be too late. You see, you must begin while you're young. They would take us now as cabin-boys, and that's mostly how they begin.'

'But-but,' stammered Bert, 'where

can we go to get a ship?'

Then I unfolded to him my dark plans.

'Portsmouth,' I announced, impressively— 'that's the place for ships and sailors. I've thought it all out. It's only a matter of ten or twelve miles' walk to Chichester; there we could take the railway right into Portsmouth. We shall want some money for the train and for something to eat on the way. I've thought it all out, and I've been saving up. I've got four and twopence. How much have you got?'

Bertie had but three-halfpence.

'Four and threepence halfpenny. That will be enough,' I decided. 'I'm glad I didn't buy that lop-eared rabbit.'

(Concluded on page 198.)

A CURIOUS SAXON CHURCH.

NEAR Ongar, in Essex, is a tiny ancient church of which the walls enclosing the nave are actually composed of split tree-trunks, the round side outward, which were hewn before William the Conqueror came to England!

It is the parish church of the little hamlet of Greensted. Tradition says that a wooden shrine was erected here in the year 1013 to house for one night the remains of Edmund, that king of East Anglia who was shot to death with arrows by the Danes at Hoxne in Suffolk, about 870. His memory was so revered by the Saxons that they removed his bones from Bury St. Edmunds in 1010 to preserve them from the Danes who were still raiding the Eastern Counties, and when they were taking them back to that town, the cavalcade halted for a night at Greensted, which was on the old main road into Suffolk from London.

Originally the upright oak timbers rested on a wooden 'sill,' and for hundreds of years they were covered with plaster on the inside, and probably on the outside as well, which would help to preserve them. In the middle of last century it was found that they were decaying at the bottom; so they were taken down, and replaced on low walls of brickwork. Curiously enough, while the timbers were lying on the ground, an old tree known as King Edmund's Oak, situated in a field near Hoxne, fell down, and it is said that an arrowhead was discovered embedded deeply in the trunk. The tree is thought to have been more than a thousand years old, so that it may really have been connected with King Edmund's death.

The nave of the little church, which is dedicated to St. Andrew, is only thirty feet long and fourteen feet wide, so that it must be one of the smallest in England. One of the timbers is cut away in such a manner as to cause some people to think that there had once been a 'lepers' squint' in the wall, but this is doubtful. A 'lepers' squint' was a hole made in the wall of a church for the purpose of allowing lepers standing outside to see the service of Holy Communion being performed within.

AN UNKIND WISH.

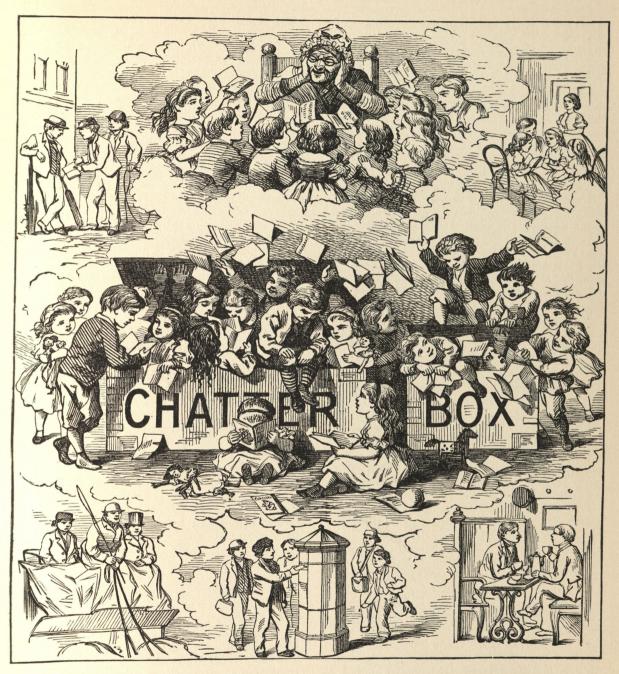
A BOUT the time of the Crimean War, Admiral Dundas gave up the command of the British Fleet and returned to England. He was succeeded by Sir E. Lyons, between whom and Dundas a 'signal' parting took place which was for a long time a standing joke in the Royal Navy.

As Admiral Dundas quitted the Fleet at Kamiesch, the crews of both French and English ships manned yards, and gave him a parting cheer. At the same moment, by order of Dundas, there was run up on his vessel a signal of farewell to the new Admiral: 'May success attend you!' To this Sir E. Lyons intended to reply: 'May happiness await you.' Now, although in real life happiness is not considered to have any connection with hanging, the words in the signal code are very much alike, and, in their hurry, the signallers said to the departing Admiral: 'May hanging await you!' The blunder was not perceived until the whole Freet had seen and read it.





THE DEACON'S TRIP TO TOWN.



1867. THE FIRST PAGE OF 'CHATTERBOX'S' FIRST NUMBER.

SIXTY YEARS OF 'CHATTERBOX.'

THIRTY years ago the present Editor of Chatterbox - only the second Editor Chatterbox has ever had-sat a stone's-throw away from Chatterbox offices, in the stand specially erected for the great City Companies round the walls of St. Paul's Cathedral, to view the Thanksgiving Procession of the Diamond Jubilee of Queen Victoria. The Editor was only a young man then, and he did not guess that a few years later he would succeed the founder and first Editor, Canon John Erskine Clarke, and be at work on the famous magazine under the very shadow of the great Cathedral. Nor did he foresee that he would be writing now, so many years afterwards, about another Diamond Jubilee-Chatterbox's own, still hearing the great bells booming, still able to go into the vast silences and depths of the Cathedral, and rest and worship. It makes even the Editor of a journal so young (in spite of its age) as Chatterbox feel terribly old: 1927 sees his silver wedding to Chatterbox!

By a queer chance, some buildings not fifty yards away from *Chatterbox* offices have just been pulled down in this Diamond Jubilee year. They must have been about the same age as *Chatterbox*. As they were being pulled down, the space cleared opened up a view of St. Paul's Cathedral, which probably no one living can ever have seen before, and which probably also no one living will ever see again when the new buildings rise to shut out the sight once more. The new buildings will probably have their own Diamond Jubilee, too, sixty years hence, but the Editor of *Chatterbox* will certainly not be there to celebrate it.

We are fortunate in being able to show Chatterbox readers a fine drawing of this view by Mr. L. Russell Conway. It was made in the huge roar of Newgate Street, just by the entrance to the Post Office (Central London) Tube Station; and that shows how things have changed, for the Editor of Chatterbox made a journey on that Tube on the second day after its opening-he had walked or taken a 'bus before. And there were no motor-'buses then, but the Editor tried them too in their first week of life; and a very terrifying experience it was, for the drivers were not so skilled as now, and not so much was known about the prevention of skidding. London was more peaceful then.

The Editor passes along the little lane (Ivv Lane) in the picture almost every day of his life. It leads from Paternoster Row-where Chatterbox was first published, in 1867, at No. 24 -to Newgate Street. That building-No. 24 rebuilt some time ago-is still occupied by publishers, but not the same ones. Paternoster Row and Square are nearly the oldest haunt of London publishers, but before they settled there, booklets (chapbooks)—two hundred years and more ago-were issued in Little Britain, almost opposite the Newgate Street end of Ivy Lane; and these chapbooks (books sold by hawkers or chapmen) were in a way the forerunners of the 'penny dreadfuls' which Chatterbox was founded to oppose.

Half the City of London has been rebuilt in the last few years. It is not even the London of 1897, much less that of 1867. The Old Bailey itself in Newgate Street—the old New Gate Prison of London—is younger than the present Editor's work on Chatterbox. But age is nothing in London. The Post Office-behind Newgate Street-has also been rebuilt, and Christ's Hospital—the old Bluecoat Schoolwas moved into Sussex from Newgate Street in the very year when the present Editor succeeded Canon Clarke. Under its foundations, in the spacious Post Office yard of to-day, lies, fifteen feet deep or so, a bastion of the wall of Roman London (but even that is not the oldest London). What do sixty years of Chatterbox matter to an old age like that? Yet it matters, when you can look, for once in a lifetime, at this strange view of St. Paul's Cathedral, that you should have the imagination to guess what change means, and perhaps not to be too proud of being new and up-to-date, You also will grow old : keep young, as Chatterbox does, but do not forget the past, nor lose what was good in it.

Now as to the birth of Chatterbox. One of the first editor's oldest friends wrote, just before his death:—

'John Erskine Clarke was a clergyman in Derby when he started the magazine destined to become such a general favourite. It grieved him to see young people devouring the poisonous stuff which he called "blood-and-thunder stories," and he thought that he would try to provide them with more wholesome fare.

While he was thinking about this, the word "Chatterbox," he said, arose, as it were, before his mind's eye, and he said to himself, "What a splendid title for my new magazine! It would look well in type, because the letters go up and down so nicely."

'So Mr. Clarke wrote to a skilled wood engraver, a Mr. Johnston, and with his valuable help brought out a most attractively illustrated magazine, which was published in London, its publisher for three years being Mr. William

Macintosh.'

Its success was immediate and great. In 1870 it was transferred to the present publishers, who have issued it ever since. It has been printed throughout by the same printer, and until a very short time ago, authors, artists, and engravers were still working for it who shared in the first of its volumes. (The oldest survivor is Mr. William Rainey, R.I., who has contributed to Chatterbox for fifty years, and contributes to this year's issue.) It has never lost its original distinctive character. It belonged to the 'great' early period of English magazines—the 'sixties'—when many a journal now of world-wide fame came into being.

But there are only three or four older English magazines for children in existence, and one of them, *The Prize*, originally called *The Children's Prize*, was also founded by Canon Clarke, and is still issued—in its sixty-second year—by the

publishers of Chatterbox.

The first halfpenny number of the 1867 volume of *Chatterbox* appeared on December 1st, 1866. Canon Erskine Clarke well remembered the keen pleasure it gave him to see his *Chatterbox* displayed in the shop-windows, or

in the hands of the young people.

Canon Erskine Clarke was a great child-lover; in fact, he never left off being a child himself. When, in 1872, he left Derby for London, he opened in his parish of Battersea a school for girls. This was called 'The Vicarage School,' because it was first installed at the old Vicarage house near the river. Afterwards it was moved up to Clapham Common. It was fortunate not only in its founder, but also in the lady who was its first and only Principal. She, too, came from Derby. The earliest scholars at this happy school tell countless anecdotes of the Canon's humour and geniality.

Much good work of other kinds the creator of *Chatterbox* did. One who knew him well said that his mere presence brought sunshine

into a dark place. How proud and happy she felt one Sunday when he greeted her with

'Good morning, dear!'

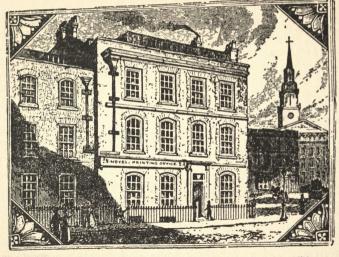
Canon Clarke's successor remembers him as a burly Englishman with a fine voice, very like the typical portraits of John Bull, suitably to his simple, robust ideals. He looked like the proper founder of Chatterbox, and he gave the magazine a personal, individual character which, in spite of necessary but imperceptible changes of thought and in methods of reproduction, it has tried to keep ever since. Old readers, being shown (say) the 1926 volume, have said, 'Why, that's the Chatterbox I read when I was ten.' But they knew that only its superficial face had changed (with the times) when they were confronted with the volumes of their youth.

How far these ideas and ideals have spread may be seen from a very widely answered competition announced in the 1926 volume of Chatterbox, as a preparation for its Diamond Jubilee. Among the many Overseas entries received were some from the North-Western Provinces (India), Hong Kong (both via Siberia and via Singapore!), Cape Town, Rhodesia, California, Victoria (Australia), Victoria (B.C.), Jamaica, Argentina, Calgary, Brisbane, Burma, Italy, France—why, the Editor has thought of resuming the habit of stamp-collecting which he gave up when he was about fifteen. And he feels very nervous about broadcasting this article to so far-flung a population. It means that if he makes a slight mistake in a fact about a backyard at the end of the world, some one will write and complain about it.

On the other hand, he has had friendly letters from the ends of the earth, and from all the ages of mankind. He has had a photograph of an eight-months' old baby looking at the pages of *Chatterbox*, of a contributor of eighty-seven, and of a reader—still 'Constant Reader'—of over eighty. In this very volume is printed a little poem (p. 7) on the second volume (1868) which came in, by chance, entirely unasked for, from a contributor pre-

viously unknown.

Chatterbox has always relied on solid merit in its contents, and has not cared twopence about great names. Nevertheless, it has had its great names, and those not always among writers for boys and girls only. Take a few authors. John Masefield, Archibald Marshall, H. de Vere Stacpoole, Harold Bindloss, Fred Whishaw, W. M. Letts, Mrs. Hobart Hampden,



The first Printing Office of Chatterbox, burnt down in 1878. Old Castle Street, where it stood, no longer exists. St. Martin's-in-the-Fields is in the distance. (From a block lent by Mr. T. White, of Messrs. Strangeways)



3 and 4 Paternoster Buildings, where Chatterbox is published to-day.

'Bessie Marchant,' Stephen Southwold, C. F. Argyll - Saxby, A. A. Methley, Archibald Williams, W. P. Pycraft, F.Z.S., A. L. S., G. Belton Cobb, Frederick Niven, 'Ascott Hope' (R. Hope Scott-Moncrieff), Thomas Cobb, Mary Debenham, Elizabeth Grierson, are a few of the contributors of literary articles. Harrison Weir, Gordon Browne, R.I., H. J. Ford, William Rainey, R.I., C. M. Brock, Hugh Thomson, Frank Adams, T. C. Dugdale, J. Ayton Symington, Roland Wheelwright, H. M. Brock, Harry Rountree, are among the artists. But even the most eminent, the Editor is certain, would feel sure that their less-known company is not unworthy of their association.

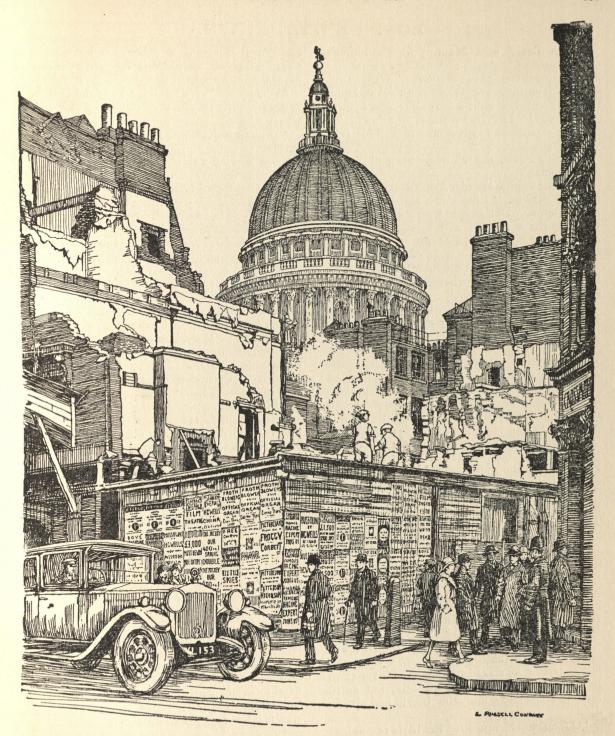
As has been said, Chatterbox has hitherto been printed by only one firm, Messrs. Strangeways & Sons. One of the 'Sons' is the head of the business, and he well remembers reading the first number of Chatterbox in his own printing house. (He is too modest to let a portrait of him appear, but he must be our senior reader.) He saw the extraordinary success of the first issues of the magazine, and the difficulty of keeping up with the demand. But except for one incident, the printing side of the work has been peaceful and straightforward-not anything in the nature of a chatterbox, except when Canon Clarke (as a true Editor should) became indignant about slight 'printers' errors, which occur even in a house where 'printers' readers' ('the Correctors of the Press,' to whom all authors, editors, and publishers owe an endless debt) are so skilled as those who look at every syllable and letter in *Chatterbox*

to see that it is right.

That one exciting incident was the fire of 1878, when Messrs. Strangeways' premisesthen in old Castle Street, which no longer exists-were burnt out. Fortunately for Chatterbox, the fire occurred about Christmas time, when most of the volumes had left the building to go to the sellers and buyers and readers. But a great number of wood-blocks were destroyed. The printing of the magazine was transferred temporarily to Messrs. Bradbury, the printers of Punch. Chatterbox was in good and even older company. The burnt building appears in an illustration: there the first number of Chatterbox appeared, to meet with far greater success than its founder and printer expected.

After the fire Messrs. Strangeways moved to Tower Street, where they still print Chatterbox. The firm is older than the name—it was Moyes, before in 1860 the present Mr. Strangeways father took it over; but 1860 is a date prior to Chatterbox's 1867. It has always been a great pleasure to the present Editor to work with so kindly a firm and its venerable head.

Well, this Editor of Chatterbox will unfortunately be unable to write an article on the Centenary Number in 1967. But he hopes it will be much the same as this commemoration of the Diamond Jubilee.



NEVER AGAIN.

This view of St. Paul's can never have been seen for sixty years past. As these words are being written it is being hidden by tall hoardings, and probably no one alive will ever see it again.

It is within fifty yards of the offices of Chatterbox.

LOST ON THE LAWN.

JOHN dear, said Mummy one summer's morning, 'Auntie Ann has lost her lovely diamond out of her brooch. She thinks she dropped it on thelawn. Willyou go out and look for it? You know what it looks like, don't you?'

'Oh, yes! Just like a great big dew-drop. But what will she give me if I find it?'

asked John.

'I don't know, dear. Something nice, you

may be sure.'

'Lots of things are nice,' said John as he ran into the garden. 'Like guns, and knives, and real watches. But people won't give them to you. Perhaps Auntie will this time, though, if I find her diamond for her.'

He knelt down on the edge of the lawn and began parting the thick blades of grass, peering here, there, and everywhere, and moving on

slowly from tuft to tuft.

'It's like a dew-drop,' the little boy repeated to himself. But there were a great many dewdrops on the grass spears that morning.

'Oh dear!' he said at last, 'I don't believe I'll ever find it.' And he watched a tiny beetle wandering slowly in and out of the thick grass.

'How awfully funny it must feel to be as small as that!' he thought. 'And how difficult it must be to walk through all that thick grass-just like crawling through a jungle.'

He lay and watched the beetle for a long time, thinking how small it was. 'Perhaps it knows where the diamond is,' he said to him-

self. 'I wish I could ask it.'

He stared very hard at the beetle, and while he was looking, such a funny thing happened. The tiny beetle seemed suddenly to grow larger and larger, until it was as large as John himself.

'Or have I grown smaller?' thought the little boy, rubbing his eyes. 'Anyhow, I must

still look for that diamond.'

'Good morning,' he said aloud, and was surprised to find what a funny little squeak his voice had become. 'Good morning, Mr. Beetle.

Have you seen a diamond?

'What?' said the beetle, pushing his way on through thickets of trees with enormous long leaves that waved in the wind over their heads. John ran after the beetle, but as he had only two legs and the beetle had six, he didn't get on so fast.

'Oh, do stop!' squeaked the little boy at last,

and the beetle did stop.

Perhaps it was because John asked him to,

but more likely it was because it was tired 'What do you want?' it boomed, twiddling its front legs about.

'Oh, please,' cried John, 'I'm looking for a diamond. Have you seen one lying about any.

where?'

'What's a diamond like, pray?' asked the beetle.

Rather like a dew-drop—a solid dew-dron. 'Well, there are a heap of ordinary dew. drops about,' said the beetle-'too many for my taste-nasty wet things. No, I haven't seen any solid dew-drops. Go and ask the ants, They go about a lot. They may have seen it'

John pushed on through the long-leaved trees until he suddenly saw hundreds of queer, thin, brown creatures, running about in every direction. For a time he watched them, feeling a little bit afraid, because although they were not nearly so large as the beetle, yet they looked very fierce. Besides, there were such lots of them. Presently some of them saw him, and came running up and began to stroke him with their feelers.

'What a queer-looking thing this is!' they said to each other. 'What can it be? Is it

good to eat?'

'No, I'm not,' cried John squeakily, and he was very glad to see his old friend the beetle come hurrying up.

'Now, don't be rough, friends,' said the beetle. 'This—er—this—er. Well—er, what are you?' he asked, turning to John.

'I'm a Boy,' said John as loudly as he could. 'Oh!' said the beetle. 'Well, this-er-Boy is looking for a thing like a solid dew-drop.

Have any of you seen one?'

The ants looked at each other, and then they said that none of them had ever seen 8 solid dew-drop in their lives.

'Is it good to eat?' they asked.

'No!' said the beetle crossly, stamping two of his six feet at the same time. 'And you had better go and see if you can find it now.

The ants seemed a bit afraid of the beetle, but John did't wonder why when he saw what awfully strong pinchers he had on his forehead; even while the boy was watching he saw him give a hard nip to a lazy ant that was not looking for the diamond.

Dear me! 'thought John. 'I must keep on the right side of the beetle, because he is quite as large as I am, besides having those awfulpinchers.

However, Mr. Beetle suddenly said: 'Good-bye! I'm off. Hope you find your diamond.' And suddenly he flicked his hard back open, and out came two gauzy wings, and off he flew with a booming noise just like a toy aeroplane.

'Well, I hope all those ants won't come back now I'm alone. I'd better go away myself, I think,' said John; and he pushed his way along what seemed to be a path through the thick jungle, when suddenly he came face to face

with a most odd-looking creature.

'It must be a black dragon,' thought poor John, looking at the creature's shining scales and many legs. But to his surprise, the 'Dragon' seemed just as afraid of him, and curled itself up into a tight ball.

'Why, it's only a wood-louse after all,' laughed John, for he had often picked up the little creatures in the old days just for fun.

'Ho, wood-louse!' cried John, now quite brave. 'Open up and tell me if you have seen

But the wood-louse only uncurled a little bit and peeped at him with one eye.

'Eh?' it said stupidly.

'Have you seen a diamond?' shouted John.

'What's a diamond?' asked the wood-louse, unrolling a bit further and waving several legs.

'It's a solid dew-drop,' said John firmly. 'Yes, I have, then,' said the wood-louse. bruised my nose on it just now. Beastly thing to leave about. Is it yours?'

'No-but I want it,'said John. 'Where is it?'

The wood-louse took John a little further into the jungle, and showed him where the diamond lay glittering and sparkling in the sun,

just like a dew-drop. But it was so large and so heavy that poor little John couldn't move it.

'What shall I do?' he asked, nearly crying. 'Why, get all the ants to move it for you,' said a voice, and there was the friendly beetle again. 'Come on, ants,' he said, and they all came running through the grass at his bidding.

Just then there started the most deafening noise you can imagine—far worse than the 'Whatever is that?' worst thunderstorm.

cried John, quite frightened.

'It's the mowing machine coming to mow the lawn,' said the beetle. 'Fly while you can. Fly! Fly! Fly!' And he flew away.
'Run! Run!' cried the ants. And

they all ran away.

'Roll! Roll! Roll!' said the wood-louse, and the next minute he was a tight little ball. John was left alone clutching at the great

diamond.

'I can't fly, and I can't run, and I can't roll!' he said sadly. 'What shall I do—if I stay I shall be cut to pieces by the mowing machine, and if I go I must leave the diamond.

'Hullo, Master John!' said a voice. 'What are you a-doing of, lying down and staring into the grass like that? You've been asleep.'

John looked up at the gardener, who was

pushing a mowing machine.

'Why, I've found Auntie Ann's diamond,' he cried, 'although it looks awfully small now. I do hope she gives me something nice for finding it.'

And he ran into the house, holding the precious stone in his hand, and quite forgetting all the help he had had from the beetle, the

ants, and the wood-louse.

DIM RED DAWN. THE

By MRS. HOBART HAMPDEN, Author of 'Louisa,' 'The Hidden City,' Princess Ooma,' &c. Illustrated by E. S. FARMER. (Continued from page 179.)

CHAPTER XXI. BONES, ONLY BONES.

'TIP-ZIP,' Brild whispered, very late that same night, 'I want to talk to you. I must talk to you.'

As he spoke he pulled at Zip-Zip's tunic where shelay curled by the fire; beyond her were Lulu then Zan, then Bobo, all three asleep.

The five lay usually in a circle, head to foot, and Brild's place was always next Zip-Zip's. He had but to stretch out his hand to reach the tunic's edge. And he need not pull hard, for he knew that Zip-Zip was already awake. He had not slept himself as yet, and he had been watching her closely. He had seen her fingers clench and unclench more than once, and was vet more firmly convinced in consequence that in her he had a possible ally.

But he would have clutched at the moment at the smallest hope. Since Churruk had swung him aloft in the river bed, Brild had not been so frightened. As he had lain, sleepless, again and again he had felt that sickening fall and crash.

He did not want to go back to the tribe in

any case. The prospect was entirely distasteful. He had never been popular. Many a cuff and Life in the cave, kick had come his way. though it had its drawbacks, had, from his point of view, many advantages. He had more than enough to eat. And even if Lulu lorded it over him, she was but one instead of many. Yet, unaided, how could he hope to turn her from her purpose? But with Zip-Zip to help him something might perhaps be done.

'Come away from the fire. Come where we can talk,' he urged, and edging a little nearer to Zip-Zip, he made sure she was awake as he supposed. Through the tangle of her hair, her eyes looked at him. And if they were half hostile, she raised herself and crept with him to Bobo's cave. Within it they could crouch out of earshot while the flickering firelight reached them still, and showed to each the other's face plainly. Zip-Zip still looked

strange-stranger if possible.

'She shall not do it,' said Zip-Zip suddenly. Pondering unhappily, she had in the quiet night hours recalled something fresh that made the odds against Lulu very heavy; something she felt she could not keep to herself but must impart. Even Brild was preferable to the empty night. She looked for no help from him as he did from her, but speak she must.

'The forest folk,' said Zip-Zip jerkily. 'There are very few of them. I am sure of it. have no huts. They are afraid of huts. think huts are like traps. They live in trees, and when the nights are cold the young ones fall and die. But will Lulu listen if I tell her?

She will not. No, she will not.'

'Ow!' quavered Brild, past speech.

'And all for Zan,' said Zip-Zip miserably, and promptly scowled forbiddingly at Brild. Hard driven, she might share her fears for Lulu with him, but he should not think he might presume to criticise.

But Brild, fortunately for himself, did not reply at once. He had food too for thought. At Zip-Zip's inner feelings he could now guess, and nothing could have suited him better than

this development.

'For Zan,' said Brild to himself, lingeringly. He had not grasped before how large Zan bulked in Lulu's scheme; how essential he was to its completion. And Zip-Zip had evidently had enough of Zan. And if she had a grudge against him, was not his own grudge greater? Was not Zan the cause of all his own mishaps from the very beginning? If there had been

no Zan, there would have been no tale to carry to Churruk in the first instance, Brild argued And if there were no Zan now! Brild looked at the hunched shoulder Zip-Zip had turned If it was a warning that he must proceed cautiously, at least he had something on which to build. Carefully, he felt his way.

'If Zan wasn't here,' Brild began, 'Lulu would not want to go back to the tribe.'

'Zan is here,' Zip-Zip fractiously reminded him. It was worse than useless to talk to Brild. she was telling herself already. She might be able, however, to sleep now. She half rose, but Brild caught at her.

'If Zan went hunting,' Brild propounded, persistent though as yet uninspired. 'He might go hunting alone, he is so angry with Lulu. If he went hunting he might lose

himself.'

'Lulu would soon miss him,' Zip-Zip returned, still scornful. 'She would track him and bring him back, she who tracks so well.'

'But Zan might be killed and eaten before she found him,' Brild reasoned, he thought

cleverly.

'The things that kill to eat, kill at night,' was Zip-Zip's answer. 'Lulu would look for Zan long before dark. She is not so stupid as you are, as Churruk told you,' she finished, at

the end of her patience.

'M-m-m-m!' said Brild flatly, daunted by the reminder; for the moment he was completely at a loss. Around the cave he looked in search of aid. Over the group at the fire his glance wandered. Over Zan, asleep between Lulu and Bobo, maddeningly safe. Past Zan to the corner beyond where, so it chanced, Brild usually prepared the fish for the fire and threw the bones. The bones had increased to a heap, gleaming white.

'Bones—only bones,' said Brild to himself vaguely. But the words recalled something definite. Bones; only bones? Bones on a ledge? And that thing on the ledge fed by day -the turtle that left only bones behind it. Eagerly Brild turned to Zip-Zip again. He was sure he had hold of something of value, but not sure yet if he dared use it. The first

step only was clear to him.

'If you took Lulu to the forest,' said Brild. 'If Zan stayed with me? Perhaps Zan would be gone when you came back.'

More he would not say lest he should commit

himself too deeply.

(Continued on page 194.)



"Again he pushed at Zip-Zip."

THE DIM RED DAWN.

By Mrs. HOBART HAMPDEN, Author of 'Louisa,' 'The Hidden City,' 'Princess Ooma,' &c.

Illustrated by E. S. Farmer.

(Continued from page 192.)

CHAPTER XXII.
ALLIES.

If Zan had not still been angry when he woke, if Zan had been sensible instead of silly, why then Zan would have gone to the forest too, Zip-Zip argued with herself next morning. Was she to blame for all Zan's foolishness? She had given Brild no promise overnight; she had not even answered him. She had not asked him what he meant. She had simply, silent, crept back to the fire again and slept. And now she felt as if she were merely watching something in which she had no direct concern, but which was arranging itself obligingly.

Not only had Zan woken still angry, but he was sulky too. He kept aloof in the back parts of the cave until it was empty. Then he raced down to the water, plunged in, and was soon almost out of reach. No doubt Lulu, had she wished, could have chased him, caught him and dragged him to shore. Instead, she preferred to ignore him. Was this Zip-Zip's fault either, or in any sense of her contriving?

'Silly child!' she heard Lulu say scornfully to Bobo, who was looking for more clay, since his reserve supply had been used for the pig. He was back at his pictures again, for he had broken his carving-tool when he had flung it across the cave, and was not at the moment inclined to mend it. But he was better-tempered after a night's rest, and he laughed. He often found his niece entertaining when he had time to spare for trivial things.

'So Zan ought to be humble?' Bobo mocked.
'Only Lulu may be proud?' Then, pleased because he had caught sight of a yellow streak—he was partial to yellow—he bestowed on Lulu a hint of which it seemed to him she was in need.

'It is best to coax sometimes,' Bobo pronounced. 'Now you, my girl, you always domineer. But some need leading, some driving. You will learn it for yourself one day,' he finished, chuckling, as Lulu turned her back on him, chin in air. Though Bobo's hints might on occasion be useful, as she had already owned, she was still sure that when it came to leadership she knew far more than he did.

Did not Zip-Zip follow her unquestioningly, Lulu thought? Was not Brild cowed her humblest slave? Had not Zan broken away from Ullah at her behest? Did not the forest people already revere her? Thus reminded of their existence, she was eager to come to terms with them as soon as possible. It was Lulu, not Zip-Zip, who proposed that they two should go to the forest and with no further delay.

'We will wait at the edge, and the forest people will very likely see us, and come and talk to us,' Lulu thought. 'Perhaps they've killed heaps of pig already and are bringing us our share, and we shall meet them.'

And up the ravine she darted, calling to Hrump as she went that she was coming to take him to feast on the leaves and branches he liked so much. Even then Zip-Zip paused ere she followed, while Brild watched her closely. That she must now make a definite choice she was aware. She could no longer refuse to face the fact that for anything that might follow she as well as Brild would be responsible. To the two of them this moment had come ere they expected it. Brild at least did not mean to let it slip, for they might have to wait very long for another chance so good. He pushed Zip-Zip ravinewards. They were practically alone, for Bobo had his back to them as he dug at his clay.

'Keep Lulu in the forest as long as you can,' Brild urged, and glanced at the water. Even that was on their side and was creeping in. Again he pushed at Zip-Zip as still she lingered. Then looking seawards, too, she caught sight of the black dot that was Zan's head. She nodded and ran after Lulu, who was already calling for her.

'And now how shall I do it?' Brild asked himself, triumphant but a little flurried, as he watched Zip-Zip go.

He could not construct any very subtle scheme; he was not equal to it. But his main idea still held, for no other way of disposing of Zan completely had occurred to him. And fear still drove him ruthlessly as it had done in the night, and was lending him the courage it had lent him before when he hid beneath dead Zend's hut. Brild had something to go by too.

He could picture what Lulu would have done had she carried out her threat against himself.

'She would have made me go to the ledge,' thought Brild. 'She would have dragged me on to it, and broken my leg and left me there. She would not have minded if the turtle had been watching all the time. But I mind,' thought Brild apprehensively. 'And how can I get Zan to the ledge if he does not want to go? He would not do what I told him.'

Nevertheless, Brild began to look for a stick amidst the heap of firewood the forest folk had brought, the most of which was still unburnt—a stick with which a leg might easily be broken; and to tell himself a little tale at the same time of the great things he might

possibly do.

'When Zan came out of the sea,' Brild invented, as if he were rehearsing a play, 'Zan said, "Where have they gone?"—And I said, "They have gone hunting without you. They thought you were too little to take with them."—And Zan was angry. And I said, "Come fishing with me. I will show you how to teach Lulu a lesson. Take a bone from the ledge," I said; "that she has never done."—And Zan ran to fetch a bone, and

I came a little behind with the stick. And if the turtle was not very near . . . ?'

Even yet Brild was doubtful if he could carry the thing through. But if he failed there was Churruk. And he had found his stick. He balanced it in his hand. The tale was almost finished. It needed but a concluding sentence.

'Zan went fishing. I stayed in the cave,

Lulu,' Brild rehearsed.

Already he was at the cave mouth again. Again he looked at the water. It was distinctly nearer. And Zan was emerging from the shallows—Zan was wading to shore.

'Where have they gone?' Zan actually

panted as Brild reached him.

As well as he could from the sea level, treading water, Zan had been watching all the time. He had seen to his dismay Lulu, Hrump and Zip-Zip disappear, and instantly had made for the beach. He had never meant his hurt pride to deprive him of a fresh adventure. His eyes were dark with angry disappointment as he waited for Brild's answer.

'They have gone hunting without you. They thought you were too little to take with

them,' Brild replied by rote.

(Continued on page 202.)

BRIDGES.

By P. M. BAKER, B.Sc., M.B.E., A.M.I.E.E., A.M.I.Mech.E.

Illustrated by Bernard Way.

(Continued from page 182.)

THESE cross girders, together with the main girders, form the essential part of the bridge, but trains cannot run on cross girders, neither can foot passengers nor carts do so, and there are, therefore, floor plates, usually also of steel, inserted between these cross girders in order to carry the roadway or the railway. The bridge illustrated in fig. 3 has a kind of flooring which takes the place of the small cross girders as well. Most of the readers of Chatterbox will find, somewhere conveniently near their homes, examples of plate girder bridges in which they can observe the points mentioned above, viz.:—

(a) The thickening of the top and bottom

flanges in the centre of each span.

(b) The thickening of the web towards the

ends of the span.
(c) The small angle iron or **T** iron stiffeners to prevent the web crumpling up.

(d) The cross girders.

(e) The floor plates which support the road-

Sometimes the floor plates are omitted, particularly in railway bridges abroad, in which the sleepers are secured to bearers or girders fixed to the cross girders. It requires a steady head to cross, on foot, one of these bridges spanning a raging stream at a good height.

In some plate girder bridges the depth of the girder is increased towards the centre of the span instead of the flanges being thickened up. If you have read the paragraph about the | girder you will realise that this produces the same effect (see fig. 4).

Other Girder Bridges.—One of the duties of the engineer who has to design a bridge is to examine very carefully the cost of the bridge which he proposes to erect, and when the bridge is intended to span a very wide obstacle, such as a river, we find that a plate girder bridge becomes very expensive. Now I dare say that you will have observed, from what has already appeared, that the web of a plate girder is almost always stronger than it need be; by that I mean that the bending moment stresses in the top and bottom flanges are usually a good deal greater than the stresses in the web.

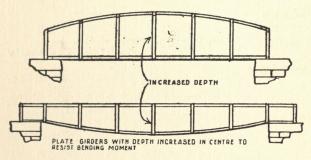


Fig. 4.—Increasing the Depth of the Girders.

We cannot make the web thinner or it might crumple up, as it has to connect the two flanges and hold them apart; so in a very big girder bridge we usually replace the web with a series of small girders, and when that is done we get a built-up girder which may be like those shown in the picture of a railway bridge over a stream (fig. 5). Here let me explain that there are many ways in which these small girders can be arranged. In one type, that known as the Warren girder, they are arranged to form equilateral triangles with the top and bottom 'booms' of the girder, but in the one



Fig. 5.—A framed Girder Railway Bridge over a Stream.

shown in the picture they are arranged N-wise; the shorter vertical members hold the booms apart, the longer sloping ones being in tension. As between them these small girders have to resist the shearing force acting on the whole girder, those near the ends have more to carry

than those in the middle, and in consequence generally made heavier.

Other features which you can see in the diagrams are the method of fixing together the booms and the other members by plates riveted to each, and also the form of the end support. You will see that the end of the girder is supported on a roller, so that the bridge can deflect without injuring the support, while the pad carrying one end of the girder is free to move on a series of rollers.

In hot weather the bridge is longer than in cold, so one end alone is fixed and the other is permitted to move freely on these rollers and so to adjust itself as the temperature of

the air requires.

You may also notice that there are girders connecting the top booms of the main girders and bracketed to them, forming a sort of roof to the bridge, so that they shall have no tendency to fall over or to swing sideways, and this arrangement is generally used when the main girders are high enough to permit of it.

Two of the pictures in figs. 6 and 7 show a bridge similar to that illustrated in fig. 5

during the period of construction.

Have you also observed that the two middle 'panels' of the girder have two diagonal members each? These are provided because the sloping members are intended to be in tension, i.e., to resist a pull, and the pull has to be exerted at a point in the bottom boom as near as possible to where the load is applied, so, when the train enters on to the bridge and its load is mainly concentrated near one end, these double diagonals ensure that one in each panel is in tension.

If you have an opportunity of seeing a bridge of this sort (there is a large one crossing the approach to Liverpool Street Station), it will interest you to note that the top and bottom booms are generally thickened up in the centre of the span, exactly as is done in the case of the plate girder, while the diagonal and vertical members may be doubled and perhaps trebled as we approach the ends of the bridge.

Still Bigger Bridges.—Girder bridges like those already illustrated become so heavy and expensive to build when the span is great, as when we have to cross a wide and deep river, as to be impracticable, and we have to find some other method of supporting the weight of the bridge and the load it carries.

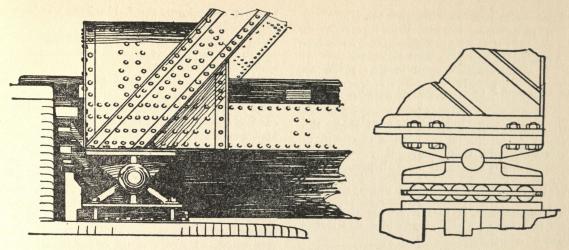


Fig. 6.—End Support of Bridge Girder, showing method of fixing members together.

Have you noticed that all the girder bridges are really glorified examples of the simple plank crossing the stream from which we started? The girder is just a stiff frame capable of resisting bending moment and shearing stress, and resting on supports on each side just as the plank was. It is, in fact, a self-contained bridge. In very large works this scheme has to be altered and a new idea adopted —some arrangement which is not necessarily self-contained. One of the simplest of these

Fig. 7.—Bridge and Girder ready for moving into position.

is the suspension bridge, in which the load is carried by means of chains or cables slung from bank to bank.

In the picture of Clifton Suspension Bridge (fig. 8) it will be seen that the suspension chains pass over the tops of the towers between which they are stretched, and are fixed at their ends to anchors which are placed deep down in the earth. The bridge floor is carried from the suspension chains by means of tension rods or hangers which support the cross girders on which the floor rests. The load of the bridge itself, together with such vehicles or foot passengers as may be crossing it, is transmitted by the hangers to the suspension chains, on which it causes a pull which is very considerably greater than the actual load carried on account of the small angle at which the ends of the chains are inclined.

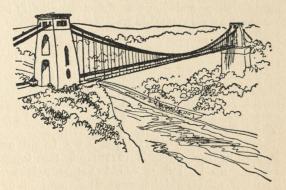


Fig. 8.—Clifton Suspension Bridge.

Those who are keen on the mathematical side of their school work may be interested in the fact that if there are two chains, each has to withstand a pull F in its horizontal portion (i.e., near the middle) equal to that given by the equation $F = \frac{WS}{16d}$, where W is the weight

of the bridge and the load it carries, which we have supposed to be distributed all along the bridge, S is the span and d the dip of the chains, and that where they reach the supports this is increased by multiplying it by

 $\sqrt{1+\left(\frac{4d}{S}\right)^2}$, an expression which, together with the former, is just a simple deduction from the 'triangle of forces' which one learns about in school.

(Continued on page 212.)

SIXTY YEARS AGO.

By WILLIAM RAINEY, R.I. (Concluded from page 184.)

WE were on the road next morning, our school-books in full view to keep up appearances on leaving the house, but seeing we should require them no more, we pushed them into the hedge by the road-side and strode jauntily on.

About two miles out of the town we came to

the straggling shops of a small village.

'We'll buy something to eat here,' said I, 'in case we can't get anything further on. And I'll tell you what we'll do, Bert; we'll get them to let us write a letter to Father and Mother telling them not to worry as we're going to sea.'

Bertie had a funny look on his face when I mentioned Mother. However, we went into a baker's shop and bought some cakes. The woman was very obliging. She supplied me with a sheet of note-paper, an envelope, and stamp, and I sat on a high stool at the counter and wrote:—

'Dear Father and Mother,—Don't worry. Me and Bertie are going off to sea, and we shan't come back till we have distinguished ourselves, and then you will be proud of us. Your affectionate son, James Goldering.'

As we posted the letter we got a fright at beholding the carrier's cart from the town coming up behind us—old Peters driving. Fearing we should be recognised by him or some one else on the main road, we decided to

leave it and take to the fields, keeping as much as possible within touch of it.

This is where I made a mistake, and how we got into trouble. I forgot that the road to Chichester turned off to the right further on at Singleton, and we found ourselves gradually bearing to the left.

Well, to cut it short, we got hopelessly lost on the big commons about Heyshot. There had been heavy rains, so there was bog as well as common, and Bertie's legs gave out. We were famished, too, for the cakes had been devoured almost as soon as bought. We toiled up the Downs, thinking to get a view from the top and make out the lie of the land; but the crest and further side of the Downs were covered with thick forest—Charlton Forest, you know. There was no opening where we could get so much as a glimpse of the spire of Chichester Cathedral.

The days were short, and now the setting sun was glinting red through the pine-trees. Then darkness came, and with it the rain. We crawled under the straggling branches of a holly tree to wait till it left off—but it didn't. Poor Bert was done for, and I was not much better.

'Don't cry, Bertie, there's a good chap,' I said. 'Come up close to me, and I'll hold you tight. There, don't cry, and I'll take you

home again as soon as it's light.'

It was pretty terrifying in that gloomy old forest, I can tell you, for a couple of kiddies: the solemn old pine-trees sighing and creaking in the darkness, now and again the hooting of owls, and the howling of a vixen fox. Bertie thought there were wild beasts in the forest. I knew better, but I didn't feel as sure of it as I should have liked to be.

Bertie cried himself to sleep. I dozed in a stupid sort of way, and the shivery dawn came at last. From the side of the Downs facing the way we had come we could, in the growing light, make out the high road at Cocking Causeway, and in an hour or so we were there without further adventure.

A lift in a market waggon was a stroke of luck, and about eight o'clock, when the milkman was going his rounds and the servant maids were shaking their mats on the door-

steps, we reached home.

I drew back at the door, but Bertie tugged at the bell with both hands. Out flew Mother and clasped him in her arms. Then came Father looking very pale and without

his shirt collar. They took us into the front sitting-room. Bertie lay sobbing in Mother's arms.

Father eyed me very sternly. 'Now, sir,

where have you been?' he exclaimed.

Before I could reply, there came a rat-tat at the door—the postman's knock. A letter was handed to Father. He looked at it, broke it open — read it — re-read it — then read it aloud :-

'Dear Father and Mother,—Don't worry. Me and Bertie are going off to sea, and we shan't come back till we have distinguished ourselves, and then you will be proud of

'Proud of you?' he said. 'Proud of you? Pretty objects to be proud of---'

I groaned, and Father reached down the cane

from the bookshelf.

FLOWER TRAGEDIES.

FLOWERS offer many inducements to insects to visit them for their cunningly concealed nectar. Colour, shape, scent-markings are all displayed to this end. It is intended that the insect seeking the nectar shall carry away to another flower the pollen necessary to fertilise the neighbouring flower's seeds. But this does not always come to pass.

The balsam 'Touch-me-not' is difficult to enter, so frequently the bee straddles the spur where the nectar lies, bites a hole, sucks the sweet, and goes off to do the same to another. It has been known

to visit ten in one minute.

Of course, such flowers wither unfertilised, and

no seeds follow.

'Bumble' bees will bite the spurs of Columbine, and the honey-bees help themselves to the nectar which they cannot reach with their short tongues by entering the flowers.

Butterflies will sip nectar without paying for it by fertilising the flower's neighbour. They steal from the blue flag and from sweet peas and

vetches.

Many moths, too, are robbers.

Beetles are shocking marauders, and devastating to roses, poppies and St. John's wort, which they visit for pollen. Some beetles will eat the anthers of grasses, and the rose chafer eats the stamens and petals of the rose.

Wasps prefer to rob a flower of its nectar rather than go in by the front entrance and do a little work in exchange for the sweets provided

for it.

Red clover, dead nettles and larkspur are some of the flowers that suffer from this unfair treatment at the tongues of the insect robbers.

AN ENIGMA

WITHOUT my first there cannot be In any meal a piquancy; 'Tis black, 'tis white, 'tis red, 'tis brown, Bought overseas and sold in town. Without my second it were vain Entire perfection to attain; From garden-bed proclaiming well Its power, to any sense of smell. Behead my third, and take the next, You will not then be much perplext; This, too, will have its humble part Where Nature is allied with Art. My fourth will stand for several things. And Erin's isle its glamour flings O'er one of them—the rest may be Used in my whole with frequency. (Solution on page 223.)

MORE LOST LONDON.

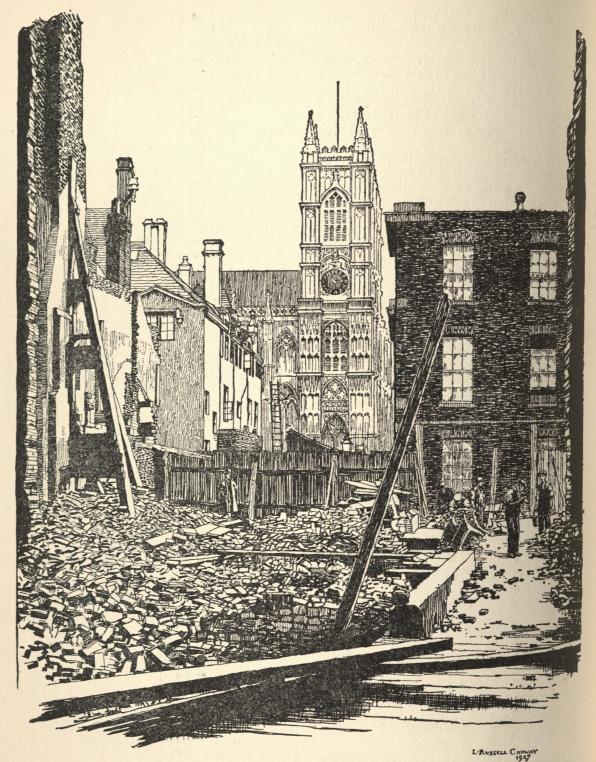
WE reproduced on page 189 a view of St. Paul's Cathedral which probably no one now living will be able to see again (or has seen before). By a queer coincidence, there can be seen in this, our Diamond Jubilee year, an unique view of Westminster Abbey, which also, in a few weeks' time, will not be visible again within the lifetime of Chatterbox readers of to-day. Mr. Russell Conway has done a picture of it, which, like that of St. Paul's, we reproduce here by arrangement with the Editor and Proprietors of The Field.

The drawing was made in Great George Street, and shows the Western towers of the Abbey through the ruins of some pulled-down old houses. These towers—since the Abbey had been allowed to fall into partial decay-were almost certainly designed by Sir Christopher Wren, though he did not live to see them completed—in 1740.

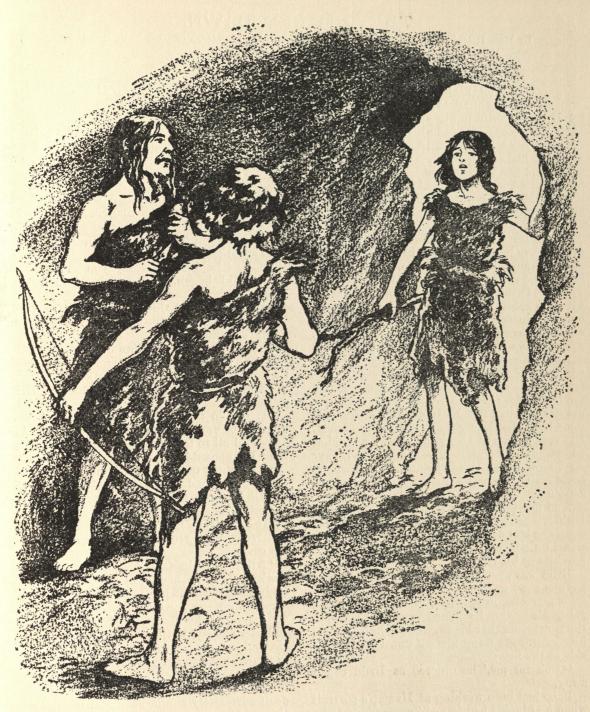
GUN MONEY.

NOW that paper money has taken the place of our former golden sovereigns and halfsovereigns, the only coins of the realm which are issued are those made of silver and copper. It seems bad enough to have no gold coinage, but it would be worse if we were compelled to use coins made out of brass or kitchen utensils.

Such coins, however, were once issued. In the years of 1689 and 1690, when James II. was trying to get together an army strong and big enough to help to place him again on the English throne, he had not sufficient money for all his purposes. So, to increase his supply, he ordered coins to be made out of kitchen articles of brass and copper, and also from the metal which could be obtained from brass cannon called gun money, and the pieces issued were supposed to represent coins worth from five shillings to sixpence.



A NEW VIEW OF WESTMINSTER ABBEY. No one living is likely to see it again after 1927.



"Had she heard what he had said?"