Get the men out!"

Then the current broke. "Who — says — that?" ticked the instrument falteringly.

"Freckle Hogan — first Bear Paw Bridge. That you Frank?"

"Yes."

"Get the night shift out — ".

"O.K."

"He's gone — after the — men — " murmured Freckle dreamily; then he rolled back in Burke's arms and darkness floated over him.

Almost at the same moment a young red-headed fellow with an arm in splints dashed out of the iron shed near the mouth of Tunnel 13.

"Get away from in front of the tunnel, get out of it," he yelled, as he dashed headlong into the bore. "Out of here every mother's son of you! Runaway train on fire — powder in train! Out of here!"

Sixty men came out of the works with the speed that terror of death alone can put into human legs. The head foreman was with them. "Scatter," he yelled, for the rails were whining and the canyon was roaring with echoes.

Then suddenly round a bulging point the fearful thing came into view, and the faces of the sheltering men turned still whiter. The ties were ablaze clear to the powdered car, and the forward end of that car was sheeted with fire and cinders and sparks were dropping down upon the cases. Into the tunnel rushed the flaming train with a seething roar—then came an appalling crash and the Saddle Bow range quivered to its foundations. Stones, twisted rails and broken machinery gushed from the tunnel mouth. There was a roar of boulders turning over—then silence.

As Burke gently laid Freckle on the seat cushions in the caboose he heard the detonation. "Rawlins," he shouted, "we'll run down to 13."

When they got down from the caboose near Tunnel 13 the foreman met them.

"Well?" said Burke in a curious, strained voice.

"No one hurt, but machinery and everything gone," replied the foreman.

"All right," said the Superintendent, with a long breath of relief. "Where is the Doctor?"

"Over there in the shed with McGuire."

"Get him, there's a boy with a broken leg here in the caboose. Fetch McGuire if he's able, I want to promote him."

Shortly afterwards Freckle went to the company's hospital at Paley Fork, and he went in a special car. One morning Burke and Manvell stepped into the accident ward; Freckle looked up from his cot, and his brown eyes glistened.

"Mr. Burke thinks we'd better make a place for you here at Headquarters," said Manvell, smilingly.

Freckle tugged nervously at the counterpane. "Don't know that I'm good enough; but if you think — "

"We'll manage that all right," laughed Burke. "You see, we're Irish"!

Famous Inventors—*(Continued from page 18)*

were connected by treadles operated alternately by the feet of the driver.

During the later years of his life he became interested in agriculture, and here again his love of mechanics found scope for expression. About 1793 he constructed a reaping machine, and 10 years later the Society of Arts awarded him a silver medal for a three-furrow plough that he had invented. With the exception of the rope-making machine and the grooved brick, Cartwright did not patent these various inventions, perhaps because he had found by experience that in those days a patent did not deter others from copying an invention.

When the patents for the power loom expired and the invention was no longer protected by law, the Lancashire mill-owners quickly adopted the loom. During

An interesting old woodcut, showing the interior of a printing works in the early 16th century. An impression from type set up by the compositor on the right is being pulled on the crude but powerful press, and on the left is a man with ink swabs waiting to ink the types.

1806 Cartwright was led to make enquiries as to the extent to which his invention was in use in the Manchester district, and he found that power-loom weaving was being done to a much greater extent than he had anticipated, and at considerable profit to the manufacturers. In a letter to a friend, an eminent physician in Manchester, Cartwright spoke bitterly of the unfairness to himself of the millowners' tactics. The letter aroused the sympathy of the doctor, and he communicated Cartwright's remarks to certain influential men in the city, who recommended that Parliament should be approached with a view to obtaining compensation for the inventor. They offered their aid in the matter, and in August 1807 a memorial on the subject, signed by 50 of the "most respectable and influential gentlemen of the town and neighbourhood," was presented to Parliament. This petition was backed up in the following year by a personal application from Cartwright, in which he stated his claim for recognition as the inventor of the power loom. The Government appointed a committee to investigate the matter, and it was revealed that he had spent between £30,000 and £40,000 in perfecting and promoting his inventions. Ultimately a grant of £10,000 was made to him in recognition of "the good service he had rendered the public by his invention of weaving."

The grant was sufficient to enable Cartwright to live in comfortable retirement, and he bought a small farm at Hollanden, between Sevenoaks and Tunbridge. There he spent the rest of his days carrying out various experiments in agriculture, mechanics and chemistry. At a time when there was an epidemic of banknote forgeries, he suggested a method of preventing them. On another occasion he submitted to the Royal Society a paper in which he expounded a new theory of the planetary system, "as far as relates to the power by which the planets are impelled round the sun." In July 1823, three months before his death, he was busy seeking a satisfactory means of using gunpowder in place of steam to operate the piston of working engines. Shortly afterward his health began to fail, and on 8th October he removed to Hastings. He did not benefit by the change of air, however, and he died on the 30th of the same month, at the age of 80.

Transport of the Future—*(Cont. from p. 11)*

Attempts have been made to do this without wires, but so far there seem to be serious difficulties in the way of wireless power transmission, the amount of power received at any one place being a very small fraction of that radiated. Some development of the beam system may solve such difficulties, or an entirely new method may be introduced; but in any case great modifications will be necessary in wireless apparatus if a really satisfactory proportion of the power developed at the generating station is to reach a distant point in this manner.

Wherever transmission of electricity by wire or any other means is possible, this method of power distribution will no doubt be adopted. But for aeroplane propulsion, and for ships, either surface or submarine, liquid air may prove to be valuable. It may be produced in compressors at the great power plants near the equator and stored under pressure in cylinders that are easily transportable.

This power medium may be used in two forms. In one it will be allowed to expand in some kind of turbine where, because of its enormous pressure, it will be far more effective than steam is at the present day. For an aeroplane, in which additional weight makes additional power necessary, machinery and propellers will be omitted altogether, the liquid air being allowed to expand through nozzles directed to the rear of the planes, to propel it forward like a rocket. This is by no means a visionary scheme, and suggestions for using liquid air in this manner have already been made. Its use is not feasible at present on account of its high cost.

The fantastic stories that we often read of the enormous power that will be obtained in future from the disintegration of atoms may be disregarded. It is quite true that the temperature of radium is higher than that of its surroundings, and that this remarkable source of heat continues to operate for incredibly long periods. A few tons of radium would thus be very valuable; but so far the total amount that has been extracted is only one pound, and there is no indication that any such quantity as a ton exists in the Earth within easy reach.

New Meccano Models

Swing-Boat Tank Locomotive

THE simple model of a swing-boat seen in Figs. 1 and 2 can be built from a No. 3 Outfit. The model is shown operated by a Crank Handle, but if desired it can be driven by a *Magic* Motor.

The base consists of two $12\frac{1}{2}$" Strips. The swing-boat is supported at each side by two $5\frac{1}{2}$" Strips, which are joined at their upper ends by a Semi-Circular Plate, and bolted at their lower ends to Trunnions and Flat Trunnions fixed to the base. The Trunnions are connected by a $2\frac{1}{2}$" Strip, and the Flat Trunnions by a $2\frac{1}{2}$" Strip and two Angle Brackets.

The bottom of the swing-boat is a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate, and the sides are $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates. Its ends are $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates, and they are connected to the sides by $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips 2. The framework of the roof consists of $5\frac{1}{2}"$ Strips 3 attached by Angle Brackets to $2\frac{1}{2}"$ small radius Curved Strips. It is bolted to $2\frac{1}{2}"$ Strips fixed to the sides. The roof is a $4\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate extended by a $1\frac{11}{16}"$ radius Curved Plate, and it is attached to the framework by Angle Brackets.

The swing-boat is pivoted on a $3\frac{1}{2}"$ Rod mounted in the Semi-Circular Plates. This Rod carries two 1" Pulleys, which are fitted with Rubber Rings and arranged to press against the Strips 3.

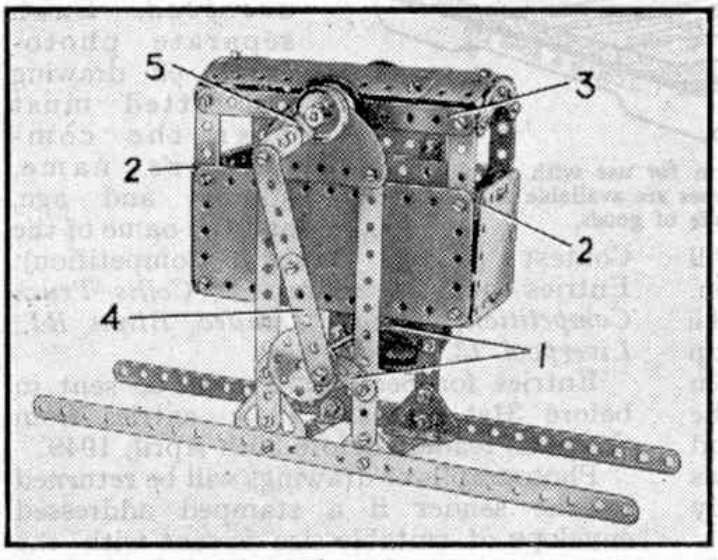

Fig. 1. A simple model Swing-boat that can be built from Outfit No. 3.

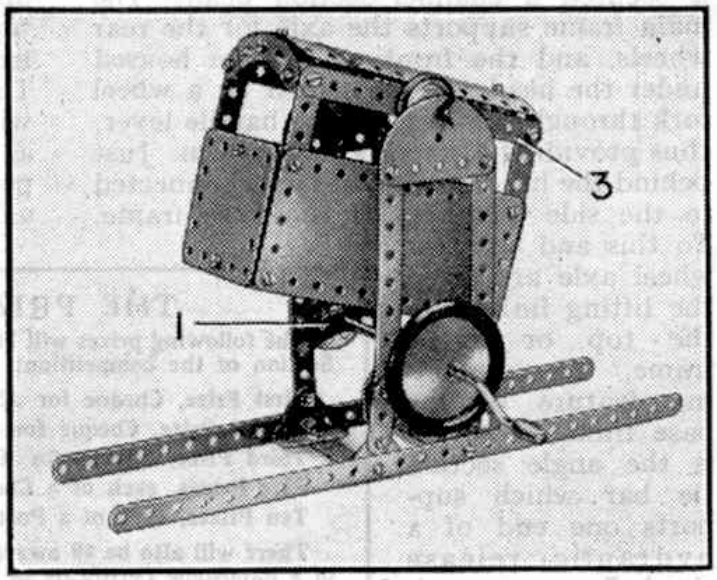

Fig. 2. Another view of the Swing-boat.

The outer end of the $3\frac{1}{2}"$ Rod carries a 1" Pulley, to the boss of which an Angle Bracket 5 is bolted. The Angle Bracket is extended by a Fishplate, to which a compound strip 4 is lock-nutted. The strip 4 is made by joining together two $2\frac{1}{2}"$ Strips, and its lower end is lock-nutted to a Bush Wheel fixed to a Crank Handle journalled in $2\frac{1}{2}"$ small radius Curved Strips 1 bolted to the vertical supports.

Our other new model is the fine locomotive shown in Figs. 4 and 5. This is based on a type of 4–6–2 tank engine used for local passenger and goods traffic.

The main frames of the locomotive are formed by a compound angle girder 1 on each side of the model. These consist of $12\frac{1}{2}"$ and $3\frac{1}{2}"$ Angle Girders and they are connected at each end by a $3\frac{1}{2}"$ Angle Girder. Two $12\frac{1}{2}"$ Angle Girders 2 are bolted between the girders 1, at the front to the $3\frac{1}{2}"$ Angle Girder, and in the centre to $3\frac{1}{2}"$ Strips bolted across the girders 1.

The sides of the water tanks and the coal bunker consist of $5\frac{1}{2}" \times 2\frac{1}{2}"$ and $3\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates respectively. These are bolted to $9\frac{1}{2}"$ Angle Girders 5, and the $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates are strengthened by $5\frac{1}{2}"$ and $2\frac{1}{2}"$ Angle Girders, while the $3\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates are braced by $3\frac{1}{2}"$ and $2\frac{1}{2}"$ Angle Girders. The front and rear of the coal bunker are each represented by a $3\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate.

The forward section of the boiler

is made by curving four $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates around two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips to form a cylinder. The rear section consists of two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates bolted together and to the cylinder. The edges of the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates

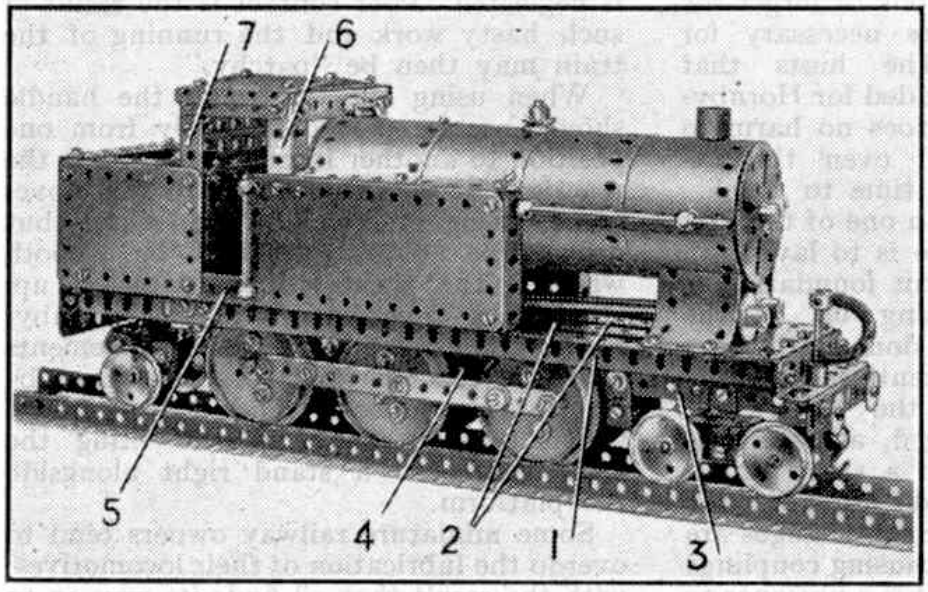

Fig. 3. This fine 4-6-2 type tank locomotive makes an interesting subject for a working model.

are attached to the tops of the water tanks. The front of the boiler is supported by a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate bent as shown and fixed to the girders 1.

The cab roof is supported by four 2" Angle Girders, two of which are seen at 6 and 7. The Girders 6 and 7 are connected by a $2\frac{1}{2}''$ Angle Girder, and joined to the Girders on the opposite side by $3\frac{1}{2}''$ Strips. The roof is a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate curved slightly and bolted in position. The back of the cab is filled in by $3\frac{1}{2}''$ Strips, and the rear of the boiler by a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate and a Semi-Circular Plate. The floor is a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate.

A $12\frac{1}{2}''$ Flat Girder 3 is bolted to each of the Angle Girders 2, and extended downward by a $9\frac{1}{2}''$ Flat Girder 4. The Flat Girders 4 provide bearings for the driving wheels, which are made by bolting Wheel Flanges to Face Plates. The Flat Girders 4 are connected by three $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips 8.

The driving wheels are fixed on $2\frac{1}{2}''$ Rods and spaced from the Flat Girders 4 by Washers. The wheels on each side are linked by a connecting rod formed from two $5\frac{1}{2}''$ Strips overlapped nine holes. The connecting rods are pivotally attached to the wheels by $\frac{3}{4}''$ Bolts and spaced by Collars and Washers.

The front bogie is made by bolting a $2\frac{1}{2}''$ Strip to each of the lugs of a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The $2\frac{1}{2}''$ Strips are spaced inward by four Washers. The wheels are $1\frac{1}{8}''$ Flanged Wheels fixed on 2" Rods mounted in the $2\frac{1}{2}''$ Strips. The bogie is attached to the leading Double Angle Strip 8 by a $2\frac{1}{2}''$ Strip held by a lock-nutted bolt.

The rear bogie is made by bolting $1\frac{1}{2}''$ Flat Girders to the lugs of two $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The Flat Girders are spaced inward by four Washers, and the wheels are fixed on a 2" Rod mounted in the Flat Girders. The bogie is bolted to a $2\frac{1}{2}''$ Strip lock-nutted to the rear $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 8.

The front buffer beam is built up from two $3\frac{1}{2}''$ Angle Girders, and the buffers consist of $\frac{3}{4}''$ Washers and Washers placed over $\frac{3}{8}''$ Bolts. The vacuum pipe is a Spring passed over a $1\frac{1}{2}''$ Rod held in a Rod Socket. The rear buffer beam is a $3\frac{1}{2}''$ Flat Girder.

The smoke-box door is a Face Plate fitted on a Threaded Pin attached to the centre of the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip at the front of the boiler. The chimney is a Chimney Adaptor and a $\frac{1}{2}''$ Pulley is used to represent the steam dome.

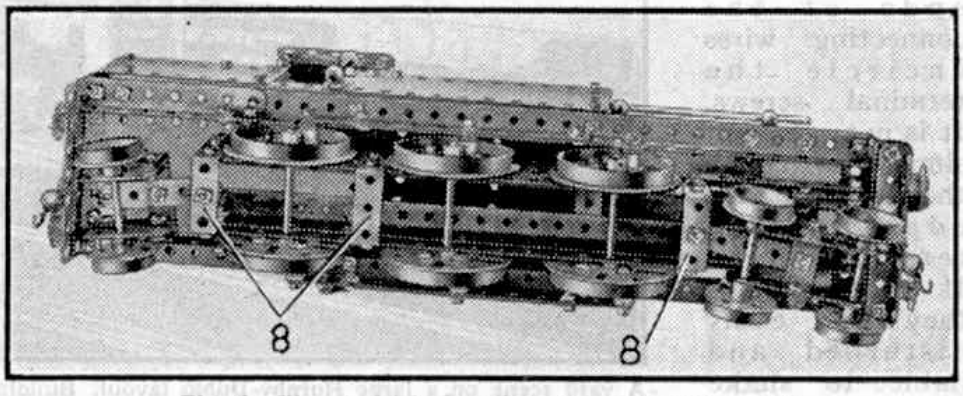

Fig. 4. The model locomotive seen from underneath.