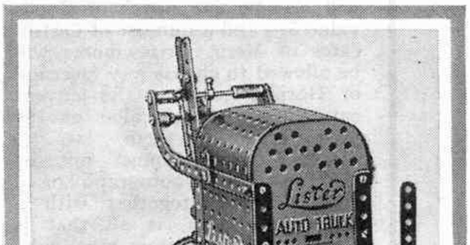
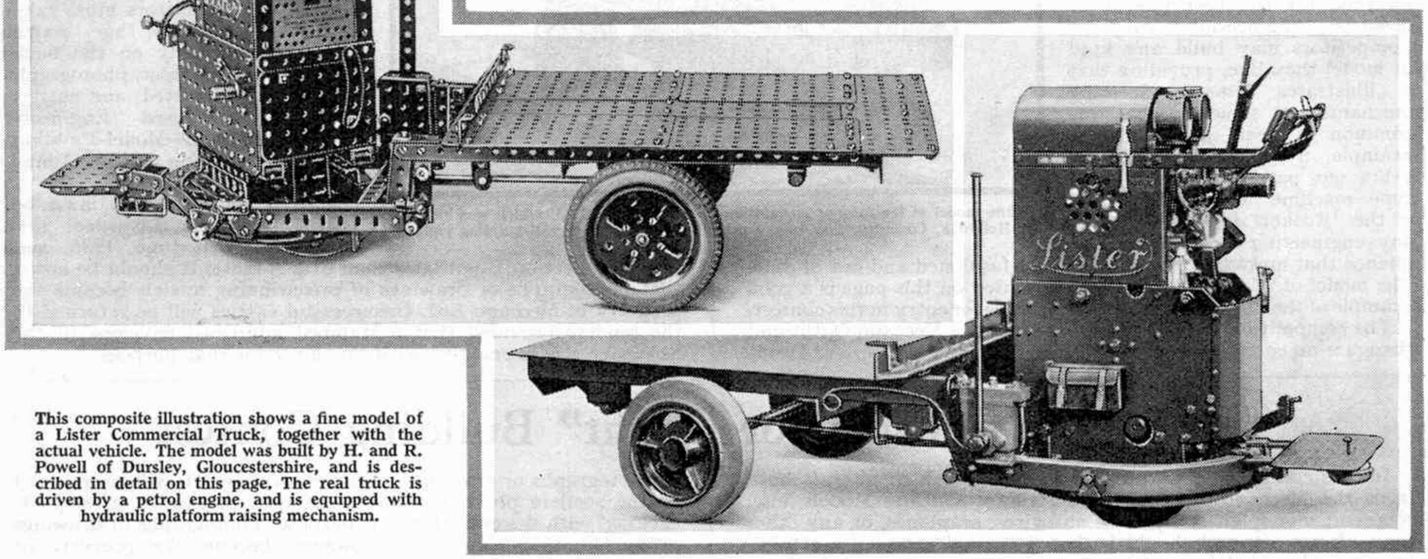
Lister Truck Made With Meccano

A Good Subject for Model-Building

ON this page we illustrate a good model of a Lister Commercial truck that was built recently by H. and R. Powell of Dursley, Gloucestershire. The model won First Prize in a Meccano Model-Building Contest, and as it is simple to construct and possesses many novel features, it should be of interest to other model-builders.

The Lister truck is one of several types used in factories and workshops for transporting goods from one department to another. The goods to be moved are stacked on platforms raised from the ground on runners. When it is required to move a load the truck is run under the platform, between the runners, and a special hydraulic mechanism then raises the platform of the truck and lifts the load and its platform from the ground.





This composite illustration shows a fine model of a Lister Commercial Truck, together with the actual vehicle. The model was built by H. and R. Powell of Dursley, Gloucestershire, and is described in detail on this page. The real truck is driven by a petrol engine, and is equipped with hydraulic platform raising mechanism.

The hydraulic mechanism consists of a piston working in a cylinder into which oil can be pumped by a hand lever. The incoming oil forces the piston along the cylinder, and by means of levers the movement of the piston is used to raise the lifting platform of the truck. To unload the truck it is only necessary to release a valve, which allows the oil to flow from the cylinder, so lowering the lifting platform to its normal position.

The model reproduces all the movements of the prototype, and incorporates the Lister patent steering gear, sprung wheels, internal expanding brakes on all wheels, platform raising mechanism, two speed gear-box and controls. The model is built to a scale of $1:4\frac{1}{2}$ and is 29 in. in length, with a total weight of 15 lb.

Angle Girders, bolted together to form channel section girders, are used for the chassis, and are sufficiently rigid to obviate the necessity for corner bracing. The power unit, a Meccano 6-volt Motor, swivels on a bearing consisting of two Hub Discs, one of which is secured to the main chassis and the other to the power unit. The two bear together, and they allow the Motor and front road wheel to turn easily for steering purposes.

Double coil springing is fitted to the two rear wheels. The bearings are made from Channel Bearings, which are able to slide vertically between two Strips. Two short Rods are pushed through the end holes of the Channel Bearings and are secured to the chassis at the top. Compression Springs are placed on the Rods between the Channel Bearing and the chassis. The rear brake shoes are made by curving a $4\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and securing this to the Channel Bearing by means of an Angle Bracket. A Collar fixed on to the end of a Screwed Rod forms a cam and fits in between the ends of the brake shoes. The brake drums consist of Boiler Ends bolted to the wheels.

The rear brakes are operated by pressure on a foot pedal, which can be seen in the accompanying illustration. The front wheel brake is applied or released by a hand-operated ratchet brake fitted to the motor unit and having a Rack Segment for the quadrant.

The two speed gear-box used in this model is very compact, but unfortunately its action depends on the filing of a flat on one side of the main shaft. Model-builders who do not wish to mutilate their parts, however, may easily overcome the difficulty by modifying the gear-box so as to use standard parts. The two gear ratios are 1:1 and 2:1, and they are obtained by the use of two $\frac{1}{2}''$ Pinions, a $\frac{3}{4}''$ Pinion and a special pinion from a Meccano Clockwork Motor.

The E1 Electric Motor that forms the power unit of the model is located inside a box-like engine casing, and by means of Sprocket Chain drives a 1" and a 2" Sprocket Wheel. The 2" Sprocket Wheel forms the fixed plate of the clutch unit and drives a $1\frac{1}{2}''$ Contrate through friction with a rubber disc. The Contrate is loose on its shaft and is linked to a $\frac{1}{2}''$ Pinion by means of loops of wire wound round the Set Screws of both Gears. The 2" Sprocket is also loose on the shaft, which carries also a $\frac{3}{4}''$ Sprocket. The shaft is journalled in the side plates of the model and also passes through the gear-box. A small piece of Compression Spring between the 2" Sprocket and the Contrate holds the clutch normally out of engagement. The two parts of the clutch are engaged by moving a lever, which bears against the back of the Contrate and presses it against the rubber disc.

The $\frac{1}{2}''$ Pinion drives a second $\frac{1}{2}''$ Pinion on the layshaft, and is forced up against the side plates of the gear-box by means of the clutch spring. The layshaft itself carries another $\frac{1}{2}''$ Pinion and a Pinion from a Meccano Clockwork Motor. Part of the main shaft inside the gear-box is filed flat and it carries a $\frac{3}{4}''$ Pinion and a $\frac{1}{2}''$ Pinion, the grub screws of which are screwed up just sufficient to engage the flat, but yet are loose enough to allow the Pinion to slide along the shaft. By moving a selector lever the two Pinions can be moved along the shaft until either the $\frac{3}{4}''$ Pinion engages the special Pinion, or alternatively the two $\frac{1}{2}''$ Pinions are in mesh. The drive is taken from the $\frac{3}{4}''$ Sprocket already mentioned to the front road wheel (a 3" Pulley fitted with a Dunlop Tyre) by means of Sprocket Chain.

As the road wheel is sprung, it was necessary to devise some mechanism for keeping the driving chain under constant tension. This was done by employing a jockey sprocket *(Continued on page 316)*

Largest Ice Factory—(*Continued from page 271*)

housed heat exchangers and the condensing plant, together with the water circulating pumps. The heat exchangers take up heat set free by compression and condensation of the ammonia, and serve the dual purposes of oil separators and heaters for the water that is used to free the ice slabs from the tanks. The ammonia gas is delivered by the compressors first to these exchangers, where any lubricating oil is cooled and separated, and falls into a collector welded to the underside of the device. It then passes into the condensers, where it is compressed and cooled by means of running water. There are 15 condensers, with shells welded by means of a water gas process and the connecting tubes electrically welded into the shell; and the end covers are readily removable to give access to the water tubes for cleaning purposes. The necessary water is supplied by five pumps, each of which delivers 54,000 gal. per hour. These pumps are of gun-metal and are of the centre suction type, with casings that can be opened so that the impellers can be examined and withdrawn if necessary without in any way disturbing the connecting pipes and valves.

The liquid ammonia passed out of the condenser on its way to the evaporator naturally is at the temperature of the circulating water, and must be cooled to the temperature in the evaporator before the liquid can do effective work. This is brought about by what is known as primary evaporation, and the pre-cooling of the liquid ammonia is carried out in an intermediate vessel in which a portion of the liquid itself is evaporated. Thus the ammonia lowers its own temperature, and greater efficiency is obtained in the evaporation proper. The liquid ammonia is cooled in this manner to a temperature of from 20 deg. F. to 25 deg. F., the flow of the liquid being controlled by two float valves, which are probably the largest ammonia float valves in the world.

There are two primary evaporators, in which this pre-cooling takes place. These are large steel vessels of welded construction throughout, and are heavily insulated. The gas formed in them by evaporation of part of the liquid ammonia is drawn off into the higher pressure suction line for return to the compressors, and sub-cooled liquid from them is supplied to pre-coolers, in which the temperature of the water that is used to fill the ice-making tanks is lowered to 33°F. They are situated on top of one of the transformer stations, at a height sufficient to allow the liquid to flow by gravity to the various ice tanks; and the cooled water is delivered at the rate of 70 tons an hour to a central distributing tank on the roof of one of the factories, from which it flows by gravity to the filling stations of the five ice tanks.

Along the top of each evaporator or cooler runs a long rising suction main, and both suction and liquid mains are connected to the top and bottom respectively of a large vertical trap, the liquid level being controlled by a float type regulating valve. The valve is connected to the side of the trap, and the main suction to the machine room is led away from the top. These float regulating valves are of the Liverpool Refrigeration Company's own design and manufacture, and are remarkably sensitive.

Each of the ice-making tanks has two coolers, which are built in sections on account of the length required, and are fed by inlet pipes passing through the side of the tank. In the tanks are heavy galvanised ice moulds. The water to be frozen flows into these, and is cooled by the brine as this liquid circulates backward and forward between the evaporators and the tank. When ice is formed, the block is freed by bringing the mould into contact with warm water from the heat exchangers already referred to. This thaws a thin layer of ice in contact with the inside of the mould, and the block can then be tipped out.

Some idea of the efficiency of this fine plant can be formed from the fact that during two recent months the factories' approximate output was 5,000 tons per week. With all eight factories on full output the company can now manufacture over 1,000 tons per day, and as their yearly sales amount to over 220,000 tons, they claim to be the largest producers of artificial ice in Great Britain.

Fastest Newspaper Train—(*Cont. from page 290*)

were at the bottom, 150 ft. below the surface of the Bristol Channel. We were rising. The running was perfect. "Best bit of track on the system," I was told later; and I believe it. We rose to the surface, high and dry. The lights of Newport ahead. Should we do it?

A slight jar—we were there at 3.36 a.m., one minute early in spite of the three checks and the three minutes' delay. Black figures stormed the coaches and out came hundreds of our two-thousand packages, to be trundled off on barrows to waiting trains and cars. There, we detached a coach, and soon were on our way again.

Marshfield—a dead stop—a precious two minutes lost. And yet we made Cardiff "on time." More frenzied work, four coaches detached, and we found ourselves on the last stages of our journey.

How the line twisted and turned. How well the enginemen knew the road and worked together in picking out their signals. At every stop, waiting porters and boys, perhaps not quite enthusiastic at having to get up 25 minutes earlier than before, were hot on the job all the same.

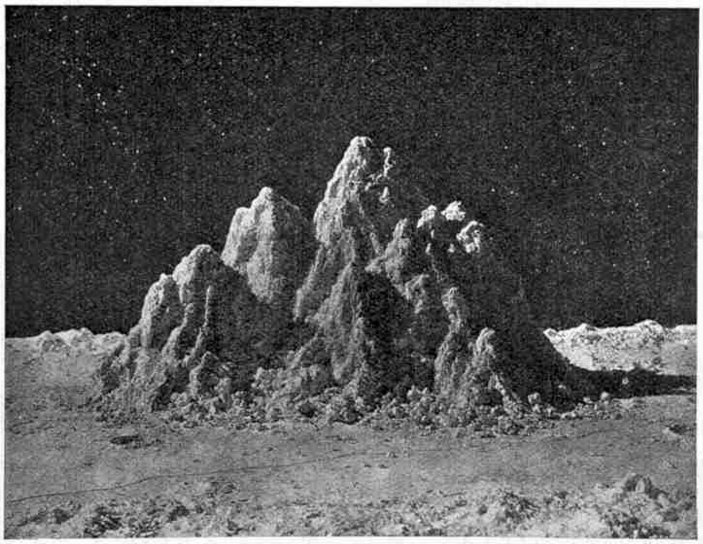
Down the long slope we coursed to Swansea, which was patterned below as with thousands of fairy lamps, round the curve, and then a dead stop within an ace of our goal, to let the "Up Fishguard Boat Express"—running a little late—go by. Foiled—but only just. Swansea at 4.45—one minute late in our 191 miles' dash through the night.

We are indebted to the courtesy of the Editor of the "*Great Western Railway Magazine*" for permission to reprint this interesting article.

Intelligence of Plants—(*Continued from page 267*)

pods which, when ripe, burst and expel the seeds with considerable force.

Plants are dependent on the visits of certain insects to effect the exchange of pollen that is a vital part of their fertilisation. It is important, therefore, that the plants should have some means of attracting these important visitors, and one way of doing this is by showing brilliant colours. The conspicuous bright lines on the petals of the iris, for instance, not only add greatly to the beauty of the flower, but also act as guides to the insects seeking the nectar.



A drawing by James Nasmyth, the famous engineer, of Pico, one of the mountains of the Moon, as it would appear to a visitor to our satellite. Our illustration is from "Through Space and Time," by Sir James Jeans, which is reviewed on page 301, and is reproduced by permission of Mr. John Murray and the Cambridge University Press.

Truck made with Meccano—(*Cont. from p. 311*)

between the gear-box and the road wheel. The jockey sprocket consists of a $\frac{3}{4}''$ Sprocket Wheel mounted on a Pivot Bolt secured in the end hole of the web of a Crank. The Crank pivots about its boss, and is provided with a Tension Spring, by means of which the Sprocket is held in contact with the main driving chain to the road wheel. The front wheel is suspended from leaf springs with shackles made from Double Brackets.

It was impossible to use real hydraulic mechanism in the model and therefore a system of levers was used. This mechanism is housed between a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate and a number of Strips, and consists of a Rod bent into the form of a crank. The Rod is journalled in the Plate and Strips, and carries a Ratchet Wheel. To raise the platform the Ratchet Wheel is rotated by means of a Pawl attached to a hand lever, which is pulled to and fro. A second Pawl fitted to the Plate holds the Ratchet Wheel in position during the return motion of the lever, and the Crank is connected by a simple series of levers to the underside of the lifting platform. To lower the platform the hand lever is operated until the Crank reaches its top dead centre, when the platform falls down.

New Meccano Models—(*Continued from page 307*)

Girders are joined by a Trunnion to the apex of which the sheer-legs are pivoted.

The luffing cord is tied to a $1\frac{1}{2}''$ Strip on a Rod that passes through the vertical Angle Girders, and is then passed round a $1''$ Pulley connected to the jib by Strips, and back over a Pulley on the Rod of the $1\frac{1}{2}''$ Strip. It is finally tied to a $3\frac{1}{2}''$ Rod, journalled in the Sector Plates and carrying a Bush Wheel fitted with a Threaded Pin to form a hand wheel.

Parts required for Derrick Crane: 10 of No. 1; 12 of No. 2; 2 of No. 3; 6 of No. 5; 2 of No. 6a; 2 of No. 8; 6 of No. 10; 1 of No. 11; 10 of No. 12; 2 of No. 12a; 1 of No. 16; 2 of No. 17; 4 of No. 18a; 2 of No. 19b; 1 of No. 19s; 1 of No. 22; 2 of No. 22a; 1 of No. 23; 1 of No. 24; 13 of No. 35; 60 of No. 37; 6 of No. 37a; 3 of No. 38; 2 of No. 40; 1 of No. 44; 1 of No. 48; 1 of No. 48a; 1 of No. 52; 2 of No. 54; 1 of No. 57; 6 of No. 111c; 1 of No. 115; 1 of No. 126.

Capturing an Okapi—(*Continued from page 295*)

not even suspected popped out of the bushes and ran away. A bird call over my head made me look up. There on the branches of a big tree was Lumalese on guard. Following his gesture I walked around the enormous trunk and only then could I understand how the capture had been made.

Among the monumental roots the little stream had formed a cool, limpid pool in which "Beautiful" had thrown himself on his back, pawing the air and noisily splashing, so noisily as not to hear the two men approaching and hiding themselves behind one of the roots. Seizing the right chance, Lumalese, quick as lightning, slipped a rope through the loop tied around the animal's neck, while Kunabo tied the end of the rope around the tree. Then one had run to call me while the other sought refuge on the high branches from the fury of the okapi.

In his effort to free himself "Beautiful" had pulled so strongly on the rope that his breath was beginning to be cut off, and when with a wild lunge he tried to charge me, the rope jerked him back so violently that he was thrown on the ground. Half an hour passed during which we managed to put two other ropes around his feet so as to be able to loosen the rope around his neck. Then, when he had just recovered his breath and was about to get to his feet, a great rolling of thunder passed in the sky. Only then I noticed that the forest had grown even darker than usual and that a particularly violent storm was rapidly approaching. I saw the animal sniff the air, look around, and then without any apparent reason throw himself down again.

"He dies," murmured Kunabo.

But "Beautiful" and I had understood each other. To be a prisoner in the pit, to be surrounded by all those odours and noises; not to eat and not to drink, palisades and shouts, ropes at his neck and his legs—nothing had frightened him. But to have to begin that fight for freedom all over again in the teeth of the coming storm; to have to continue it in the disgusting mud in which in a few minutes the whole forest would transform itself—this was too much for him. Better give up the fight and let himself die, his eyes seemed to tell me with their sad, resigned expression.

"Leave him here until to-morrow, *Bwana*," said Kunabo. "Tied up like that he cannot run away."

It would have been easy then for me to tie the animal up securely and put him on the stretcher. But the storm, which stupefies the native completely, was on us and it was utterly impossible to think of transporting him to the base camp that day. Perhaps on the following day I could have found him there still alive. But to leave him for a long afternoon of torrential rain, a long night of misery—I couldn't do it.

So I made a decision which seemed to me then more than natural. Slowly I approached "Beautiful," talking to him constantly in a soothing voice. He made an effort to get up or to kick me, but once more he seemed to understand, and quieting down remained almost motionless. Caressing his head with my left hand, with the other I cut the three ropes. The okapi gave a jerk, understood that no resistance impeded him. He was free! Before I could retreat for a distance of more than two paces he was on his feet, his face resuming that implacable savage expression.

Blocked as we were between two walls of thick vegetation in a narrow elephant path, his only way out was past the spot where I stood. For a second I thought I was in a bad position, but "Beautiful" knew better. Turning to the right he crashed through the vegetation as if it didn't exist, passing by chance or by fear, or who knows perhaps by gratitude, a good two yards from me.

Under the now unchained fury of the storm my natives stood, marvelling, at a short distance from me.

"To the camp," I ordered.

"*Ndio* (yes), *Bwana*," they replied in low voices, and one by one they followed behind me.

The *Bwana* had let go the okapi that for so many months he had been trying to get; working so hard and making them work so hard. What the whites do and think it is useless to try to understand.

So, I know, they were thinking. To-morrow, I might be thinking the same. But now, as I plodded along through the mud, I was thinking only of "Beautiful," galloping straight and free before the great curtain of the advancing rain.

Speedometers for Cyclists

Readers who love cycling for the sake of the sport, and do not regard it merely as a means of getting from one place to another, will find their pleasure greatly increased by fitting a speedometer to their machines. A ride is far more interesting when one knows one's speed at any moment, up hill or down, or on the level.

A speedometer for bicycles has been specially designed by our advertisers The Cooper-Stewart Engineering Co. Ltd., who will send free an illustrated folder describing this interesting instrument to any reader who writes to them at Dept. 56, 136, Long Acre, London, W.C.2.