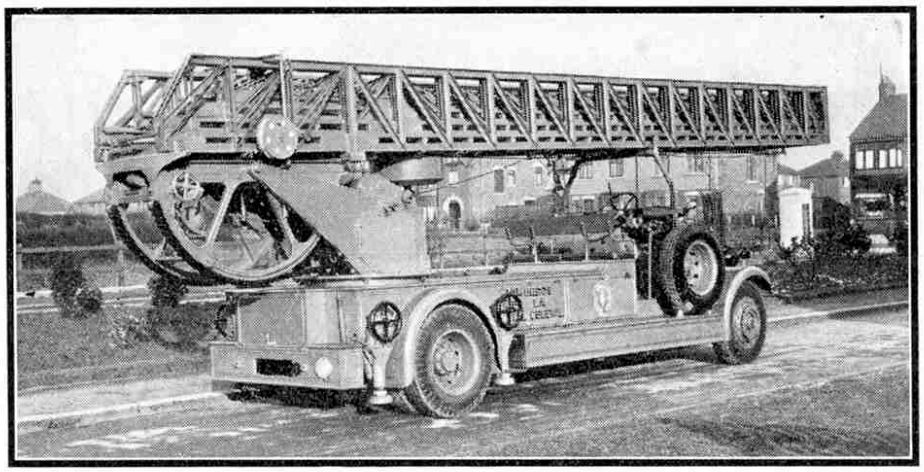
A Modern Fire Escape

Steel Ladder 132 Feet in Length

THERE are few greater thrills than the sight of a modern fire engine speeding on its way to a fire. All traffic is halted at the sound of its clanging bell and as far as possible it is given a clear run to the scene of the fire in order that there shall be no delay in beginning the fight with the flames.



A Leyland fire escape built for the Buenos Aires Fire Brigade. The escape is equipped with a pump that can deliver 500 gallons of water a minute. The illustrations to this article are reproduced by courtesy of Leyland Motors Ltd.

Modern fire engines and appliances are wonderfully efficient in comparison with those of 20 to 30 years ago. The coming of the motor car has been responsible for great changes. Motor fire engines are far speedier than the old-fashioned horse drawn vehicles, and also are larger and can carry more men and equipment. In addition they have powerful engines that can be used for driving the pumps employed, which are more effective than the steam driven pumps of former times as well as more convenient to bring into action and control.

The standard pumps of the Leyland range of fire engines deliver 500 and 700 gallons per minute respectively at a pressure of 125 lb. per sq. in. They are compact and light in weight, and are made of gun metal with stainless steel driving shafts, so that sea water and water containing corrosive acids can be used without ill effects.

It is not always realised that it is difficult to hold the nozzle of a hose delivering water at the high pressures employed in fire-fighting, and to direct the jet effectively to where it is most needed. The explanation will be found by a few trials with an ordinary garden hose. If a length of this connected to a tap is laid on the ground, turning on the water suddenly causes the nozzle to go backward. When the tap is turned fully on, so that the water pressure in the hose is increased, the nozzle reacts more violently and the hose writhes about like a serpent, shooting water unexpectedly in various directions. The nozzle must be held firmly in order to overcome jet reaction causing this.

When the ladder is to be raised and extended, jacks on outriggers are lowered in order to give stability to the escape.

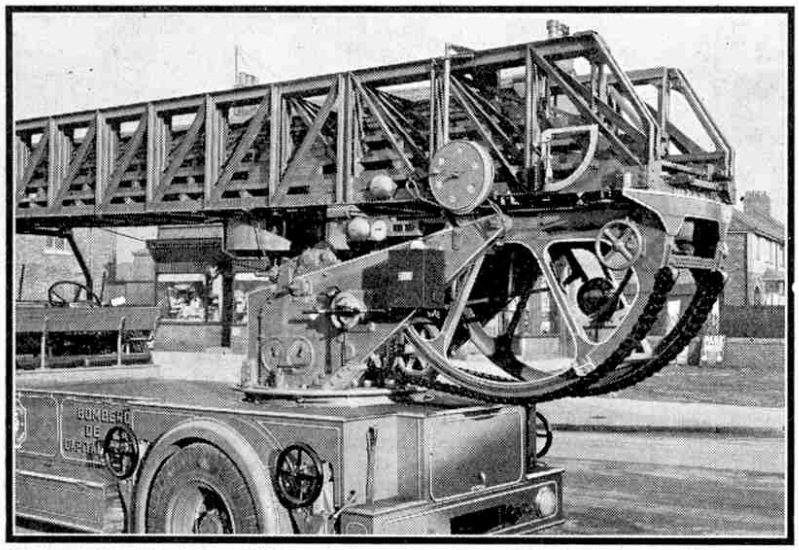
The reaction of a fire-fighting nozzle may be so great that more than one fireman may be required to hold it. On a large nozzle the backward thrust may be considerably more than 100 lb. This would soon exhaust the strongest of firemen, and is avoided by fastening the nozzles to something rigid on the ground or to a portable bracket. The nozzles also can be fastened to escape ladders, and indeed often have to be used in such positions in order to pour water downward into a burning building. The jet reaction from the nozzle then gives rise to considerable leverage and widespread rigid supports are provided for the escape platform or turntable on which the ladder is supported. With small escapes the tendency to sway is overcome by the use of hinged props fastened to the ladder at heights of about 16 ft., and spread out with their feet as far apart as possible. Large escapes have the bases of their chassis increased by means of steel beams or outriggers, supported rigidly by screw jacks. The weight of the vehicle then is transferred from the springs and wheels and borne by the ground through the jacks.

The escape illustrated on this and the opposite page is an excellent example of a modern fire-fighting appliance of this kind. It is of the Leyland-Metz type, and was built for use in Buenos Aires, in Argentina. It is mounted on a Leyland chassis, which has a six-cylinder engine of 49.8 h.p., R.A.C. rating, but actually developing 115 brake horse power.

The Metz design of ladder employed has many advantages. Each section is built in box form of angle and channel sections so that it is open and easily inspected, while offering little resistance to the wind, an important feature of a ladder that can be raised to great heights without supports for its upper end. The ladder is in five sections and can be extended to a total length of 132 ft., but similar ladders can be constructed with total

lengths of from 60 ft. to 164 ft. It is made of steel, a form of construction that the makers particularly recommend for ladders of 100 ft. or more.

The ladder is provided with several movements, and the drive for these is taken from the main gear box through shafts and reduction gearing to bevel gears at the base of the turntable. This drives the gears for the various operations, and these are put in motion by means of hydraulic clutches, the necessary pressure being supplied by a rotary oil pump, also driven from the engine.



The turntable of the ladder. All the controls are grouped near it, and indicators show the operator the position and slope of the ladder, and tell him how far it is extended.

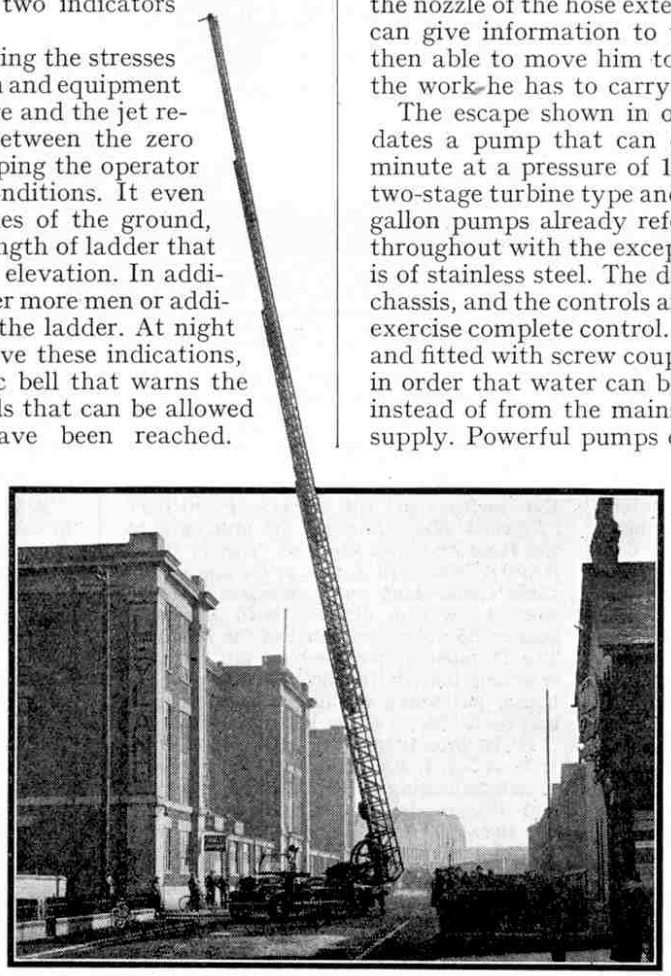
All the controls are grouped together at the base of the escape, and the speed of the engine also can be varied as desired from this point. As the various levers are moved, the ladder is extended or contracted, swung round on its turntable, and varied in slope in order to suit the conditions in which it is required to work. Its exact position is always known to the operator, for this is registered continuously on three dials and two indicators in front of him.

On one dial is a pointer showing the stresses introduced by the weight of men and equipment on the ladder, the wind pressure and the jet reaction. This pointer travels between the zero mark and the safety limit, keeping the operator constantly informed of the conditions. It even takes into account irregularities of the ground, automatically governing the length of ladder that can be allowed at any angle of elevation. In addition the indicator shows whether more men or additional hose can be allowed on the ladder. At night illuminated coloured arrows give these indications, in conjunction with an electric bell that warns the operator when the highest loads that can be allowed are being approached or have been reached.

Safety measures are fitted on a generous scale, so that nothing can go wrong during operation. One operator can exercise complete control, and it is impossible for him to carry out movements in the wrong order, for all the controls are automatically interlocked. The safety limits for the extension of the ladder at any slope are not only shown on one of the dials, but are enforced by the automatic stoppage of the mechanism, and the ladder can only be extended beyond these limits by the deliberate manipulation of a patent trip catch. Automatic stopping gear also brings the ladder to rest when it strikes any obstacle while it is being raised, extended or turned round. No damage therefore can be done by accident of this kind, even at night, when it may be difficult to see the top of the ladder. A special device keeps the escape upright, however uneven the ground on which the vehicle stands may be. The rear road springs of the vehicle are locked before the ladder is brought into use, in order to make sure that the escape is perfectly rigid, and the four powerful and quickly operated screw jacks that are fitted give a firm foundation.

All the operations of the ladder can be carried out by hand if this course becomes necessary. Other interesting features are that the steel ladders are double trussed, so that they can be leaned safely against buildings, or even used for bridging purposes. Their rungs are covered with wood in order to give a good foothold. A lifeline and a searchlight are included, and a telephone is fitted, so that the fireman on the top of the ladder, with the nozzle of the hose extending over its end in his charge, can give information to the operator in charge, who is then able to move him to the most suitable position for the work he has to carry out.

The escape shown in our illustrations also accommodates a pump that can deliver 500 gallons of water a minute at a pressure of 125 lb. per sq. in. This is of the two-stage turbine type and, as with the 500 gallon and 700 gallon pumps already referred to, is made of gun metal throughout with the exception of the main spindle, which is of stainless steel. The drive is from the gear box of the chassis, and the controls are so arranged that one man can exercise complete control. A suction hose 5 in. in diameter and fitted with screw couplings and a strainer is provided in order that water can be pumped from a pond or dock instead of from the mains, or in addition to the normal supply. Powerful pumps can force the water to a height of 160 ft.



The ladder extended to its full length. It is in five sections with a total length of 132 ft., but similar escapes may have ladders up to 160 ft. long.

To-day there is a tendency to erect larger buildings in the busy central areas of our great cities, and to crowd into them more occupants, thus increasing the danger that would follow an outbreak of fire. For this reason escapes are being constructed with longer ladders. An even longer escape of the Leyland-Metz type than the one we have described was constructed last year for the Hull City Police Fire Brigade. The ladder is 150 ft. in length when fully extended. It is of record height for the British Empire, and possibly is the longest in the world.