Different types of pumps

LIKE MANY OTHER mechanical devices, pumps have become largely of established design according to particular functions -a state which is likely to continue, except for detail alterations arising either from changes in layout, or from introduction of new materials. Always keeping in mind the necessity to limit complication and expense, the reason why such and such a pump is preferred, or is more practical in particular circumstances, is generally obvious when conditions are analysed.

For raising a fluid like water from a shallow well, the ordinary hand-operated " lift " pump, *A,* can be employed. The rising pipe has a flange on which the body of the pump is bolted, the joint washer between them, usually of pliable leather, in-Eorporating a flap valve.

The pump plunger comprises an inverted cup leather or " bucket " and a flat-seating metal valve. Once the water has been lifted into the pump barrel the flap valve prevents back-flow, and as the plunger descends the valve in it permits water to be displaced above-and on the next stroke it is lifted and flows out of. the spout.

Limit of lift, set by atmospheric pressure and weight of water, is about 30 ft. For greater depths the pump must be down the well and the body extended upwards by a pipe. Alternatively, when the pump is a force type the plunger is mounted on a round rod which passes through a gland in the top cover, where there is generally another valve to hold the column of water above the plunger.

The ordinary cycle or motorcycle pump (and the type used on small blowlamps) also employs a cup leather plunger, ***B.*** Because air is the fluid pumped it is possible to dispense with a valve on the plunger, this function being taken over by the cup leather being flexible enough to'permit air to pass on the return stroke.

An important feature then is a metal backing washer large enough to support the cup leather against pressure and prevent its forward-facing lip turning backwards-as can happen with a small washer when wear occurs. The other essential valve for such a pump is that in the tube-or the finger when this is placed over the outlet hole. A blowlamp pump has a valve in the bottom of the barrel.

Small plunger pumps

A small force pump, as may be used on a model to feed a boiler, is usually to a design resembling that at C. The plunger has a packing gland to obviate leakage and two ball valves are arranged one above the other.

For convenience in reaming or lapping the pump bore in small sizes, it can go right through the body and be blanked off by a screw-in cap. The valves should rest on flat seatings, and their lift be limited. Saw nicks across the faces above the valves prevent flow being stopped by the balls covering the holes.

When the fluid pumped is oil, and operation is slow, an oscillating type of pump can be used-oil feed on some motorcycle engines. This has the advantage of being positive in action, since ball valves could work sluggishly with oil and reduce output.

Layout can be as ***D,*** with the pump body circular to oscillate in a casing, the inlet and outlet ports (bottom and top) being in the end. Here, too, the pump bore can be finished right through. By comparison with the pump at C, this one would not be so suitable for water owing to wear and leakage involved.

When wear and leakage would be insurmountable problems in an ordinary pump a diaphragm type is chosen, E-the petrol pump on cars. With this only the flexible composition diaphragm and the plastic valves are in contact with the petrol, all operating mechanism being isolated. Operated by a cam, a lever pulls the diaphragm down against a spring, which then returns it on the pumping stroke, providing a regular pressure.

Two small gears rotating in a casing, ***F,*** make a satisfactory pump for oil, particularly when submerged in it as in a car sump or motorcycle timing case. No valves are required, and intake and discharge are as shown, the oil passing in the tooth spaces round the outside of the casing. ❑