

head the barrel needs boring out from end to end, and if not in fairly continuous use is liable to have the friction increased by rust. In a spring testing machine made by the author, with two cast iron spring rings $\frac{1}{2}$ in. wide by $\frac{3}{4}$ in. thick, working in a 20" cylinder, new and well lubricated, it took 100 lbs. to start the piston, as indicated by a Salter Balance, and 90 lbs. to keep it moving. In so simple a type of hoist it is a matter of indifference which way the cylinder is set. Given sufficient head room it is suspended vertically from a two-wheeled tandem trolley moving on a single bar runway, so that load, hoist and trolley have horizontal freedom. If head room is wanting it is set horizontally, and the outer end of the piston rod coupled to a chain passing over one or more pulleys, thus changing the direction of the pull, and so used the piston rod on upper surface has been notched so as to form a rack into which a pall falls, thus locking the suspended weight at any height; and when the hoist cylinder is put on to an old hand crane it is often set at an angle, being for convenience of attachment secured to the diagonal strut. A flexible hose of small diameter gives it elastic connection with the shop air-main.

The widest variation in practice is in the controlling valve used, a three-way plugcock being the cheapest to make and the most troublesome to keep tight. Mitre valves or flat valves with recessed elastic seating are more certain. They require a separate spindle (and cotton-packed gland) for each valve, but each pair is movable by one double-ended lever.

Where air enters the barrel of hoist a very small hole or self-closing check valve is desirable, so as to prevent the load running down dangerously fast in case of injury either to the air-main or the supply hose; also it is desirable to have a check or stop on the piston rod so coupled to valve that in case of over-stroke the valve is reversed and air is admitted to the opposite side of piston cushioning it. The same end may be attained by the piston itself striking and opening a supplementary valve, or if the non-working end of barrel is open to the atmosphere by small hole in the side of the barrel, so locating this hole that the piston will block it and the confined air act, first as a cushion and then as a stop. Such a hole sucks in the shop dust and grit, increasing friction and leakage, so that a valve admitting compressed air or exhaust air only, is the better practice.

It is perhaps over the wide surface of a foundry floor and in the midst of its sand, grit and dust, that pneumatic hoists best show their good qualities, and Russel & Co., of Massillon, O., who early appreciated their value two years ago were using 26 cranes of 5 ton capacity, a cupola stock elevator, and many simpler hoists of from 400 to 1,000 lbs. capacity. Under such shop conditions every foot of air exhausted adds to the health and comfort and therefore working capacity of the moulders.

HOSE FOR HOISTS.

In trying to use a portable suspended hoist, and move it under a long length of shop roof, in most cases—even of modern equipment—the flexible air-hose has to be detached, and after the hoisting cylinder has been moved to a new location the air-hose recoupled to the air-main branch. To avoid this delay and inconvenience the C. & N. W. Ry. Co., use a long length of air-hose, equal to half the total length of the runway that carries the hoist, coupling the hose to the air-main at the centre of the length of the runway. Then, at points some 20 feet or more apart, the hose is suspended from a two-inch grooved pulley running freely on a horizontally tight-stretched wire. Each such suspending pulley requires an independent wire, and the wires are arranged so as not to be in the same vertical plane. The result of this ingenious arrangement is that as the hoist moves towards the centre of its runway it crowds or loops the hose, and then when closely massed each suspending pulley runs past its neighbour as the hoist passes the centre, then, extending and straightening the looped up hose, the hoist is free to travel as far to the left hand of the centre (or point of connection to the shop main) as it was originally to the right hand of that point.