

25—Hoisting Apparatus and Conveyors

that the rod will pull out of the piston, thus letting the load drop. It is recommended that the locknut be secured to the piston rod by a castellated nut and cotter pin. Whenever an air hoist is overhauled, a check should be made to see that the piston is well secured to the rod.

If an ordinary hook is used to hang the hoist from its support, the cylinder may come unhooked if the piston rod comes in contact with an obstruction when lowering. A clevis or other device should be used to prevent the hook from being detached from the hoist support.

To prevent the hoist from rising or lowering too rapidly, a choke, such as a washer with the correct opening, can be placed in the air line coupling.

It is recommended that a rotary air hoist be provided with a closed loadline guide.

Hand-operated chain hoists

Chain hoists may be portable, but should be either permanently hooked onto a monorail trolley, or built into the trolley as an integral part. They are suitable for many operations on which a block and tackle, fitted with fiber rope, is used and are stronger, more dependable, and more durable than fiber-rope tackle.

There are three general types of chain hoists: spur-gear, differential, and screw-gear (or worm drive). The spur-gear type is the most efficient as it will pick up a load with the least effort on the part of a man. The differential type is the least efficient.

Screw-gear and differential hoists are self-locking and will automatically hold a load in position. Since the spur-gear type is free running, it tends to allow the load to run itself down. Therefore, an automatic load brake, similar to that on a crane, is provided to hold the load.

It is recommended that the use of common gray iron be avoided for main load bearing parts. The use of ductile materials, such as steel, malleable iron, nodular iron, or aluminum alloy, is suggested as they will withstand sudden shock better. Chains should be made of the best quality of welded steel with a load safety factor of 5. Chain hoists should be of larger capacity than the regular work requires. Supports for the hoists must be strong enough to carry the load imposed on them.

Chain inspection is described in Chapter 26, "Ropes, Chains, and Slings."

When a man hangs up a chain hoist prior to using it, he must exercise care not to strain or otherwise injure himself.

Cranes—design and construction

OSHA requires that all new overhead and gantry cranes, constructed and installed on or after August 31, 1971, meet the design specifications of the American National Standard B30.2-0, *Safety Code for Overhead and Gantry Cranes*. Overhead and gantry cranes constructed before August 31, 1971 should be modified to conform to those design specifications by February 15, 1972, unless it can be shown that the crane cannot feasibly or economically be altered and that the crane substantially complies with OSHA requirements.

All parts of every crane (Fig. 25-3), especially those subject to impact, wear, and rough usage, should be of adequate strength for maximum service. Journals and shafts should be of sufficient strength and size to bring the bearing pressure within safe limits.

Open hooks should not be used to support human loads, loads that pass over workmen, or loads where there is danger of relieving the tension on the hook due to the load or hook catching or fouling.

Outdoor storage bridges should be provided with automatic rail clamps. A wind-indicating device should be provided which will give a visible or audible alarm to the bridge operator at a predetermined wind velocity. If the clamps act on the railhead, any beads or weld flash on the railheads should be ground off.

Structural members of cranes should never be made of cast iron or other frangible metal. In the fabrication and assembly of structural work, such as girders, end frames, operators' cages, booms, and brackets, hot-driven rivets or welding should be used instead of bolts. Where bolts must be used, they should be of the "through" type, with locknuts or conventional nuts and lockwashers.

Each independent hoisting unit of a crane should have brakes complying with the requirements of American National Standard B30 Series, "Safety Code for Cranes, Derricks, Hoists, Jacks, and Slings."

The rated load of the crane should be plainly marked on each side of the crane. If