

33—Hot Working of Metals

Tapping out

A tapping platform on pivot-type hinges may be installed which can be swung out in front of the furnace after the ladle has been placed in position so that men can tap the furnace with a long bar.

A rope should be attached to one outer corner of the platform so when the metal starts flowing, a man on the floor can swing the platform back against the side of the furnace, allowing the men who have done the tapping to get back safely without having to jump down.

For tapping acid furnaces, substantial tapping platforms, either permanent or portable, should be provided.

In jet tapping, safe procedures must be followed. The manufacturer of the equipment may be consulted for specific information. (Also see NSC Data Sheet 394, *Jet Tapping of Open Hearth Furnaces*.)

A whistle or gong installed in back of the furnace can be sounded several times to allow ample time for all men to get out of the pit. This is a good way to warn men the furnace is about to be tapped.

Ladle additions should not be thrown into the ladle from the tapping platform with shovels or in bags. This is a hazardous practice if the platform has no railings. A chute to add materials to the ladle is preferable. Such a chute may be constructed to feed material into the flowing stream of molten metal from the furnace spout or to swing out over the ladle and feed directly into it. Ladle additions, particularly charcoal, should not be made until there is some molten metal in the ladle.

An oxygen torch can be used to meet a number of emergency conditions in furnace work. For instance, it can open the way for a stuck tapping bar, cut away the dam formed when the tapping hole is a little above the furnace bottom, or open frozen tuyeres.

When tap-out holes are to be lanced or burned out with oxygen, a guard should be placed in front of the tap hole to prevent hot metal from being blown onto the workmen performing the operations.

Crucibles

The principal danger in handling refrac-

tory clay crucibles is that one may break when full of molten metal.

All new crucibles should be inspected for cracks, thin spots, and other flaws by a competent inspector. Those showing signs of dampness should be put aside to be returned to the manufacturer. Examination of the packages and car in which they were shipped may reveal whether or not they were exposed to moisture in transit.

Crucibles should be stored in a warm (about 250 F), dry place and protected from moist air as much as possible. It is generally best to place them in an oven built on top of a core oven or at some other point where waste heat can be utilized. If not all crucibles in stock can be kept in ovens, those stored elsewhere should be accurately dated and the oldest and best-seasoned crucibles should be selected first.

In the annealing process, the crucibles are brought up to red heat very slowly and uniformly, usually over a period of eight to ten hours. Crucibles should not be allowed to cool before being charged, because as they cool they may again absorb moisture. Moisture in the walls of crucibles that are heated quickly is converted into steam, which expands and causes cracks or ruptures and may also cause pinholes or "skelping." Neither damp or high-sulfur coke or coal nor fuel oil containing excessive moisture should be used to heat crucibles.

Too high a percentage of sulfur in the fuel used in the drying or annealing process is likely to cause fine cracks, sometimes called "alligator cracks." Too little oil or too much air or steam used at the burners of oil furnaces tends to oxidize a portion of the graphite in the crucible wall, leaving the binding material somewhat porous.

Charging and handling

Proper care of crucibles is good economy as well as good safety. Since crucibles are costly, they should be made to last through as many heats as possible.

Crucibles should be charged carefully. Ingots should not be thrown in with such force that they may bend the bottom or walls of the crucible out of shape. Neither should the ingots be forced into the crucibles so as to become wedged or jammed.