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MOLD FOR CASTING METALS

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Fig. 1

Fig. 2

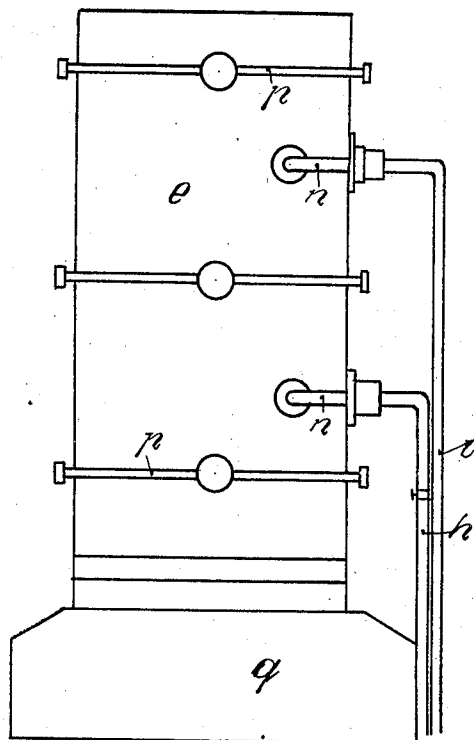
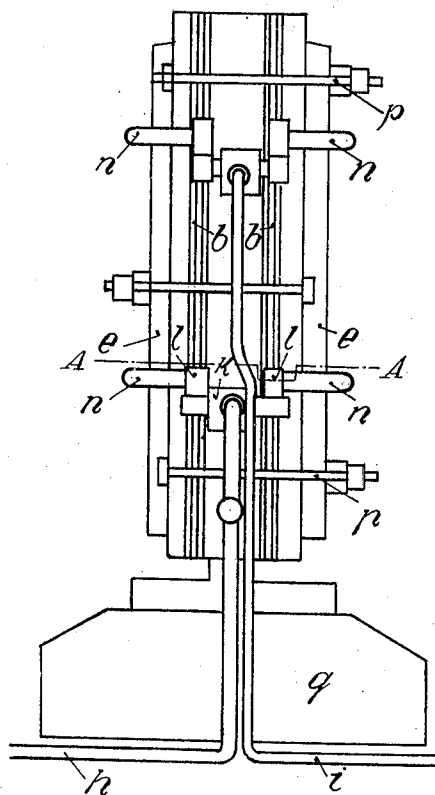
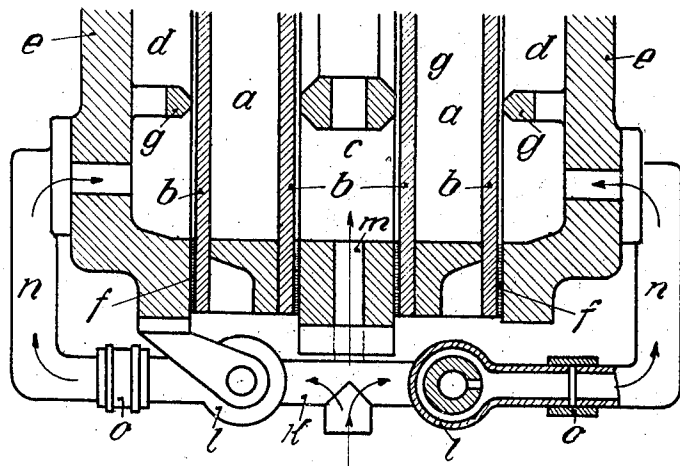


Fig. 3



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UNITED STATES PATENT OFFICE.

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MOLD FOR CASTING METALS.

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This invention relates to chill molds and more particularly to chill molds with water circulation for casting metal plates for use in rolling mills.

Chill molds with water circulation have been known for a considerable time. They have the drawback that the metal plates cast therein are considerably inferior to those cast in sand molds, i. e. metal plates cast in a bad heat conducting material. In water cooled chill molds the outer layer of the liquid metal becomes chilled and great differences in the grain and consequently great stresses occur during the setting of the cast plate, which exhibit very harmful effects during its further treatment.

In order to avoid this drawback, it has previously been suggested, to bring the cooling fluid to a comparatively high temperature. For this purpose, however, not only is it necessary to have recourse to a rather complex arrangement, but the metal molds are liable to wear out rapidly on account of the high temperature to which they are continuously exposed.

It has, moreover, been suggested to employ metal chill molds having thin walls provided with a hollow space filled with sand around the thin walls of the mold.

The cooling in such chill molds is still slower than in common sand molds, but the casting, although being free from stresses, possesses a loose texture and a rough surface in consequence of too slow a cooling.

The present invention enables these drawbacks to be avoided and results in the production of metal plates which are free from stresses and at the same time possess homogeneous and fine grained texture. The invention solves the problem by providing a chill mold in which the walls—so far as their heat conductivity is concerned—consist of water.

For this purpose, the two walls of the chill mold which contact with the metal plate to be cast, are made of very thin sheet metal and water is brought into contact with their rear sides. In this manner, a chill-mold is obtained, in which the water, being a bad heat conductor, prevents any sudden, deeply penetrating chilling of the metal plate to be cast, the chilling, on the contrary, taking place as follows:—

The thin plates of sheet metal take up the first heat from the liquid metal and produce, by their heat absorption an initial skin on

the outermost layer of the casting. This skin, however, on account of the lightness of the thin plates of sheet metal is so thin by the naked eye alone it cannot be ascertained in the microscopical texture of a casting. As soon as the sheet metal, while forming the first thin skin, has been heated, the water cooling of the chill mold commences to be effective, that is to say, the continuously renewed water behind the sheet metal causes further heat absorption. The drop of temperature between the material of the chill mold and the metal to be cast is kept constant by said continuous supply of fresh water. Due to the bad heat conductivity of the water a casting is thus obtained having a uniform texture of medium grain size over its entire cross section. The outermost skin formed on the casting is too thin to enable cracks penetrating deeply into the casting, and stresses in the latter to occur.

One constructional form of the improved chill-mold is illustrated by way of example in the accompanying drawings in which:—

Figs. 1 and 2 show the chill mold in front and side elevation respectively; and

Fig. 3 shows a part cross-section on an enlarged scale on the line A—A of Fig. 1.

The construction shown illustrates a double chill mold in which two metal plates may be cast simultaneously in the spaces *a*, *a*. The lateral walls of each casting space are formed by very thin plates of sheet metal *b*, for example sheets of copper. The rear surfaces of these sheets are in contact with flowing water. In this particular example a central water space *c* and two lateral water spaces *d* are provided, the latter being situated in the two covers *e* of the chill mold. The water-tight closure is effected by packings *f*. In order to prevent the thin sheets *b* from bellying under the pressure of the metal to be cast, they are supported rearwardly by ribs *g* provided on the mold.

Peculiar also is the arrangement of the water supply and discharge, which are effected by a system of pipes rigidly connected to the chill mold, i. e. the water supply takes place through the pipe *h* and the water discharge through the pipe *i*. The supply pipe *h* terminates in a tubular cross piece *k* carrying two hollow hinge heads *l* for the oscillable covers *e* of the mold. The water supply to the middle space *c* of

the mold takes place by way of the channel *m*. On the other hand, the water supply to the two cover spaces *x* is effected through the hollow hinges *l* and the bent tubes *n*.
5 Each of these latter is provided with an elastic connecting member *o* adapted to yield when the closing of the chill mold is effected by means of the presser screws *p*.
10 While the water supply takes place at the lower part of the chill mold, the water discharge is effected at the upper part of the mold by means of a similar system of pipes, as will be understood from Figs. 1 and 2,
15 in order to ensure the entire filling of the water spaces.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

A double wall metal mold for casting 20 metals, comprising in combination thin inner walls which are smooth on both sides, and thick outer walls provided with ribs on their inner sides, said ribs being disposed in contact with the inner walls thereby to 25 support the latter and prevent outward bulging thereof.

In testimony whereof I have signed my name to this specification.

OTTO JUNKER.