No. 760,991. PATENTED MAY 24, 1904.

B. B. HOUGH.

PUMP FOR MOLTEN METAL.

APPLICATION FILED JUNE 4, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

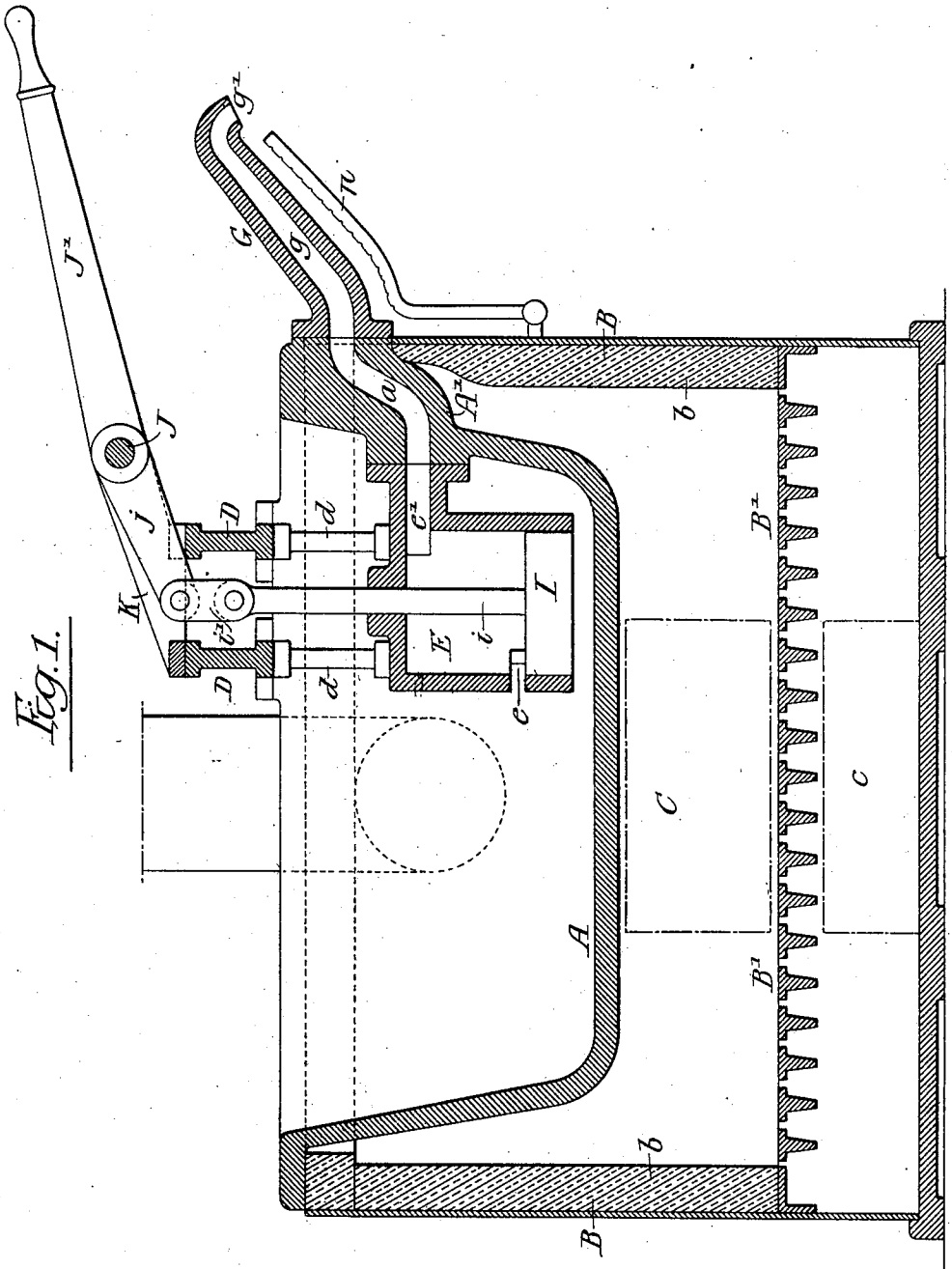


Fig. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

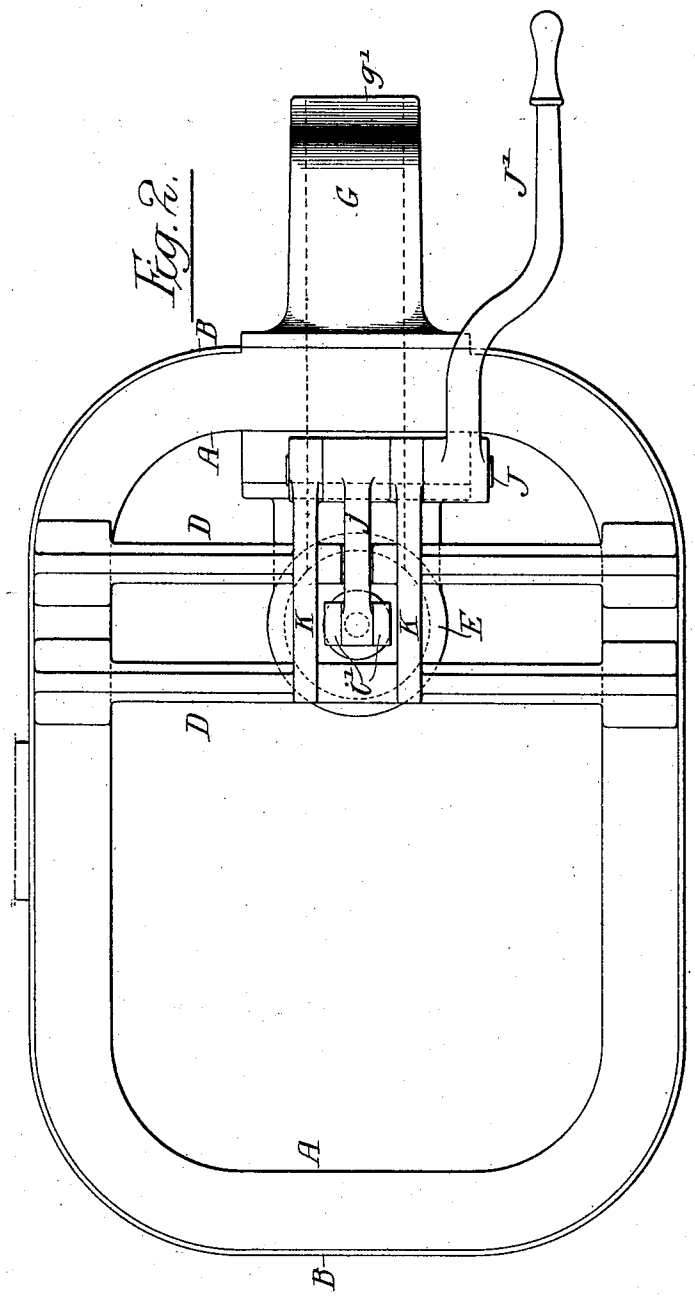
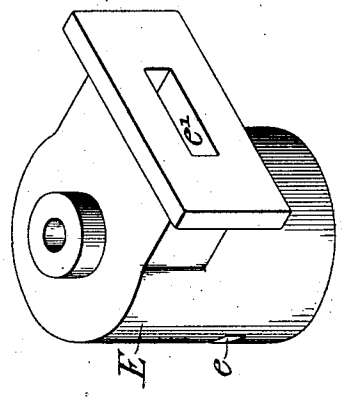


Fig. 3.



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UNITED STATES PATENT OFFICE.

BENJAMIN B. HOUGH, OF PHILADELPHIA, PENNSYLVANIA.

PUMP FOR MOLTEN METAL.

SPECIFICATION forming part of Letters Patent No. 760,991, dated May 24, 1904.

Application filed June 4, 1903. Serial No. 160,122. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN B. HOUGH, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Pumps for Molten Metal, of which the following is a specification.

The object of my invention is to provide means whereby molten metal can be transferred in a steady stream from a melting-pot to a mold.

My invention relates particularly to pouring molten type-metal from a large melting-pot into a large mold in which a matrix is used for making a type-form of a full page of a newspaper.

Different styles of pumps have been used for forcing jets of type-metal into molds for making individual types; but these pumps are on a very small scale and project the type-metal from a nipple in the form of a jet. The usual method of filling large molds is to ladle the metal out of a melting-pot and pour it by hand into the mold; but by my invention I am enabled to transfer a large quantity of metal from the melting-pot to the mold in a steady stream, so that the casting will be perfect throughout. This object I attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of a melting-pot, furnace, and pump. Fig. 2 is a plan view, and Fig. 3 is a perspective view, of the cylinder.

A is the melting-pot, made in the form shown and mounted on a suitable casing B, in which is a grate B′, forming a fire-chamber C under the pot and an ash-pit *c* under the grate. Suitable doors are provided, and a smoke-flue extends from the combustion-chamber.

While I have shown a construction in which coal or wood is used as a fuel, it will be understood that gas or oil may be used without departing from my invention.

The furnace is preferably lined with fire-brick *b*. The melting-pot A is of such a size as to hold a considerable amount of metal, as it will be understood that the use for which my invention is mainly intended is to cast large forms with a single pouring of type-metal.

D D are two beams which extend from one side to the other of the melting-pot, and suspended from the beams by posts *d* is a cylindrical pump-casing E, open at the bottom and closed at the top. This pump-casing has at the lower end an unobstructed inlet-opening *e* and at the upper end an unobstructed outlet-opening *e′*. This outlet-opening communicates with an unobstructed passage through a throat *a* in a portion A′, preferably formed integral with the melting-pot A.

Secured to the melting-pot is a neck G, preferably curved as shown and having a throat *g*, forming a continuation of the throat *a* and terminating in a spout *g′*, which is so designed as to discharge into a mold which is adjusted directly under it.

Snugly fitting the cylindrical pump-chamber E is a plunger I. This plunger has a rod *i*, which passes through an opening in the upper end of the casing and is attached to links *i′*, which in turn are pivoted to an arm *j*, attached to a rock-shaft J, mounted in bearings on the frame K, secured to the cross-beams D. The bottom of the pump cylinder or chamber E is, it will be observed, near but sufficiently above the bottom of the melting-pot to permit the free flow of molten metal underneath the cylinder, whereby it may have access to the under side of the piston or plunger I and whereby the inlet *e* may be brought as near to the bottom of the pot and as far below the normal level of the molten metal in the pot as possible.

Secured to the rock-shaft J is a long operating-arm J′, having a suitable handhold. By pressing down upon this operating-arm the plunger will be raised, closing the supply-opening, and the plunger will then force the molten metal which is in the pump-chamber out through the discharge-opening and through the neck to the mold. The parts are so proportioned that by gradually pressing down the arm a steady stream of metal will be transferred from the pump-chamber through the neck of the mold.

In order to heat the neck G, I preferably

arrange a gas-pipe *n* directly under the neck, as shown, and this pipe is perforated with small holes, so that a series of jets will play upon the neck and thoroughly heat it. The gas-jets are not absolutely necessary when the metal is being poured, but are used to heat the neck prior to casting.

It will be noticed that the inlet to the pump-chamber is considerably below the normal level of the molten metal in the melting-pot. By this means only pure metal will be transferred from the pot to the mold, the dross usually on the surface of the metal being avoided, and by making the cylinder open at the bottom the molten metal in the pot materially aids the plunger to lift the metal in the cylinder.

The operation of the mechanism is as follows: A suitable mold is placed in position directly under the outlet-opening of the neck G. One form of mold is made in two parts and curved so that the casting is made to fit a large cylinder-press. The matrix for the entire page of a newspaper is placed in position in the mold and the mold adjusted to receive the molten metal. The furnace being previously heated, the type-metal in the pot is in a molten condition, The cylinder pump-chamber being below the level of the molten metal in the pot is always heated to such a degree that metal will readily flow into and out of the chamber, so that when the operating-arm J′ is raised the plunger I will be depressed to open the interior of the pump to the melting-pot and the molten metal will flow into the chamber. Then by pressing down upon the operating-arm the plunger will be raised, closing the inlet-opening and gradually forcing a quantity of molten metal from the pump-chamber through the neck and into the mold. As the metal flows in a steady stream it will prevent any unevenness in the casting.

The pump is preferably of such a size that one lifting of the plunger will fill the mold, although in very large castings two or more operations may be necessary to fill the mold.

After the casting is made the mold is opened, the casting removed, and the mold adjusted again to receive another charge.

In some instances the plunger may be operated by power, in which case a crank-shaft may be connected to the lever or directly to the plunger-rod, or a hydraulic cylinder may be used to operate the plunger without departing from my invention.

I claim as my invention—

1. The combination of a melting-pot, a pump-cylinder within the pot below the level of the molten metal therein, said cylinder extending to a point near but sufficiently above the bottom of the pot to permit free flow of molten metal underneath the bottom of the cylinder to the under side of the piston or plunger of the pump and having an unobstructed inlet-opening near its lower end and an unobstructed outlet-opening near its upper end, an unobstructed channel leading from said outlet for discharging the metal into a mold, a plunger in said cylinder, and mechanism for operating said plunger so that on its downward stroke it will open the inlet and allow molten metal from near the bottom of the melting-pot to pass into the cylinder, and on the upward stroke will first cut off the flow of molten metal into the cylinder and lift the metal therein and discharge it through the outlet-opening near the top, substantially as described.

2. The combination of a melting-pot, a pump-cylinder within the pot below the level of molten metal therein, said cylinder being open at the bottom and having an unobstructed inlet in one side near but sufficiently above the bottom to permit free flow of molten metal underneath the bottom of the cylinder to the under side of the piston or plunger of the pump and an unobstructed outlet near the top, an unobstructed channel leading from said outlet for discharging the molton metal into a mold, a piston in said cylinder, and means for operating the piston so that when the piston is raised it will cut off the supply of molten metal to the cylinder and will lift the molten metal in the cylinder and discharge it through the outlet in a steady stream, substantially as described.

3. The combination of a melting-pot, a pump-cylinder within the pot below the level of the molten metal therein and extending to a point near the bottom of the said melting-pot, having an unobstructed inlet-opening near the bottom and an outlet-opening at the top, beams extending across the pot and from which the cylinder is suspended, brackets on the beams, a lever pivoted to said brackets, and a plunger in the said cylinder having a rod coupled to the said lever, substantially as described.

4. The combination of a melting-pot, a pump-cylinder secured to said pot and having an open bottom, said cylinder being below the level of molten metal in the pot, the lower portion of the cylinder extending to a point near but sufficiently above the bottom of said pot to permit free flow of molten metal underneath the bottom of the cylinder to the under side of the piston or plunger of the pump, having an unobstructed inlet-opening near the bottom and an unobstructed outlet-opening near the top, an unobstructed channel leading from said outlet for discharging the molten metal into a mold, a channel in the melting-pot connecting with the outlet-opening, a neck secured to the pot and having an opening forming a continuation of the outlet-opening of the cylinder, a plunger, and means for raising the plunger so as to lift the molten metal in the cylinder, substantially as described.

5. The combination of a casing, a melting-

pot mounted in said casing, a fire-chamber under the melting-pot, a cylinder within the melting-pot having an unobstructed inlet-opening near but sufficiently above the bottom to permit free flow of molten metal underneath the bottom of the cylinder to the under side of the piston or plunger of the pump and an unobstructed outlet-opening near the top, an unobstructed channel leading from said outlet for discharging the molten metal into a mold, a plunger within the cylinder, means for operating the plunger, a throat in the side of the melting-pot communicating with the outlet-passage in the cylinder, the casing of said throat being open to the fire-chamber, and a neck having a throat forming a continuation of the throat in the melting-pot, substantially as described.

6. The combination of a melting-pot, a casing supporting the melting-pot, a grate in the casing, two beams extending across the melting-pot, a cylinder within the melting-pot below the normal level of molten metal therein, posts by which the cylinder is suspended from the beams, said cylinder having a side extension secured to the melting-pot, an outlet-passage in said side extension and an inlet-passage near the bottom of the cylinder, a throat in the walls of the melting-pot communicating with the outlet-passage from the cylinder, a curved neck having a throat forming a continuation of the throat in the melting-pot, a plunger within the cylinder, a rod attached to the plunger, a rock-shaft having an arm, links connecting the arm with the rod of the plunger, an operating-arm on the rock-shaft, a frame secured to the cross-beams and having bearings for the rock-shaft, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BENJAMIN B. HOUGH.

Witnesses:
WILL. A. BARR,
JOS. H. KLEIN.