

W. R. HINSDALE.

HEATED FUNNEL FOR INGOT MOLDS.

No. 363,828.

Patented May 31, 1887.

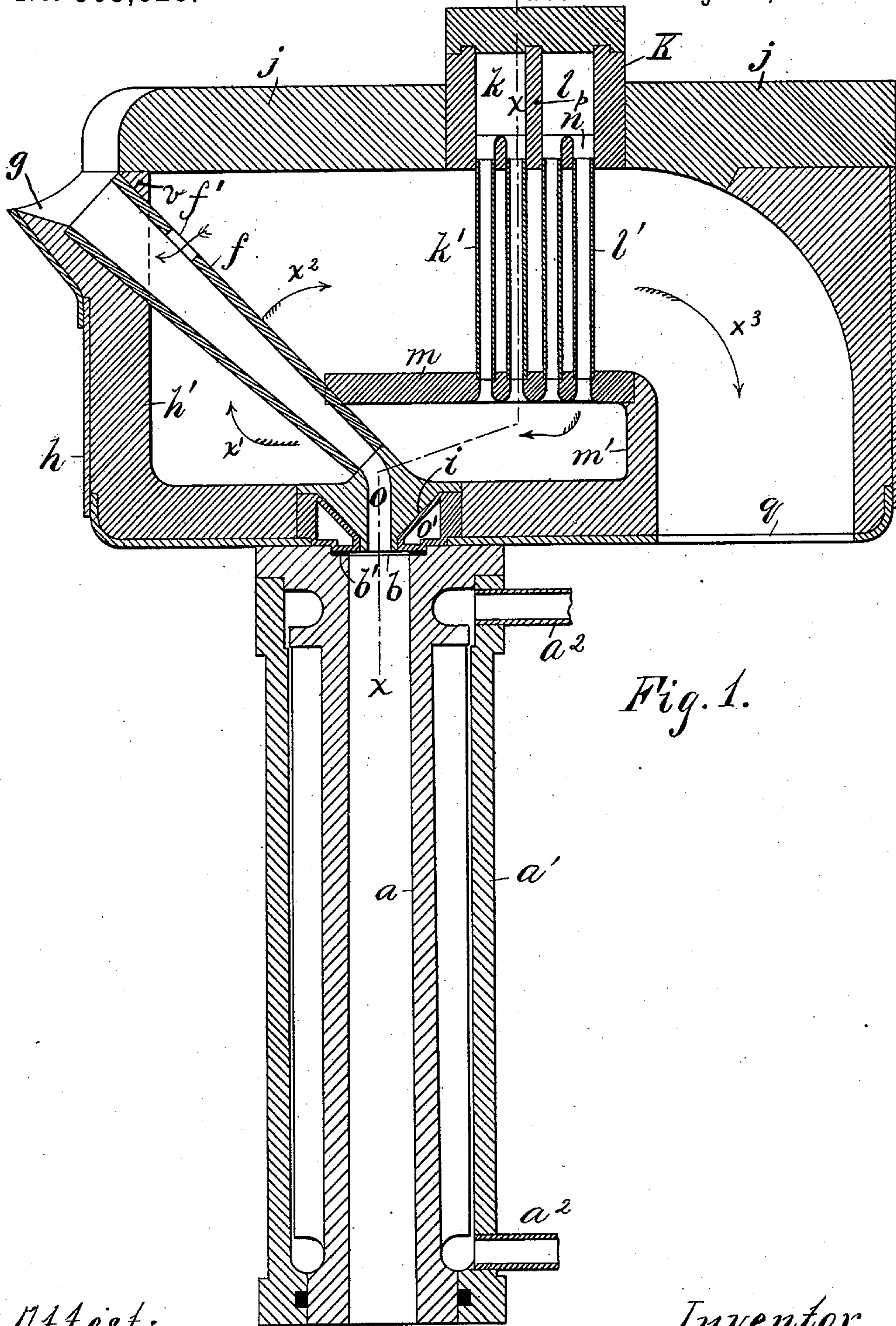


Fig. 1.

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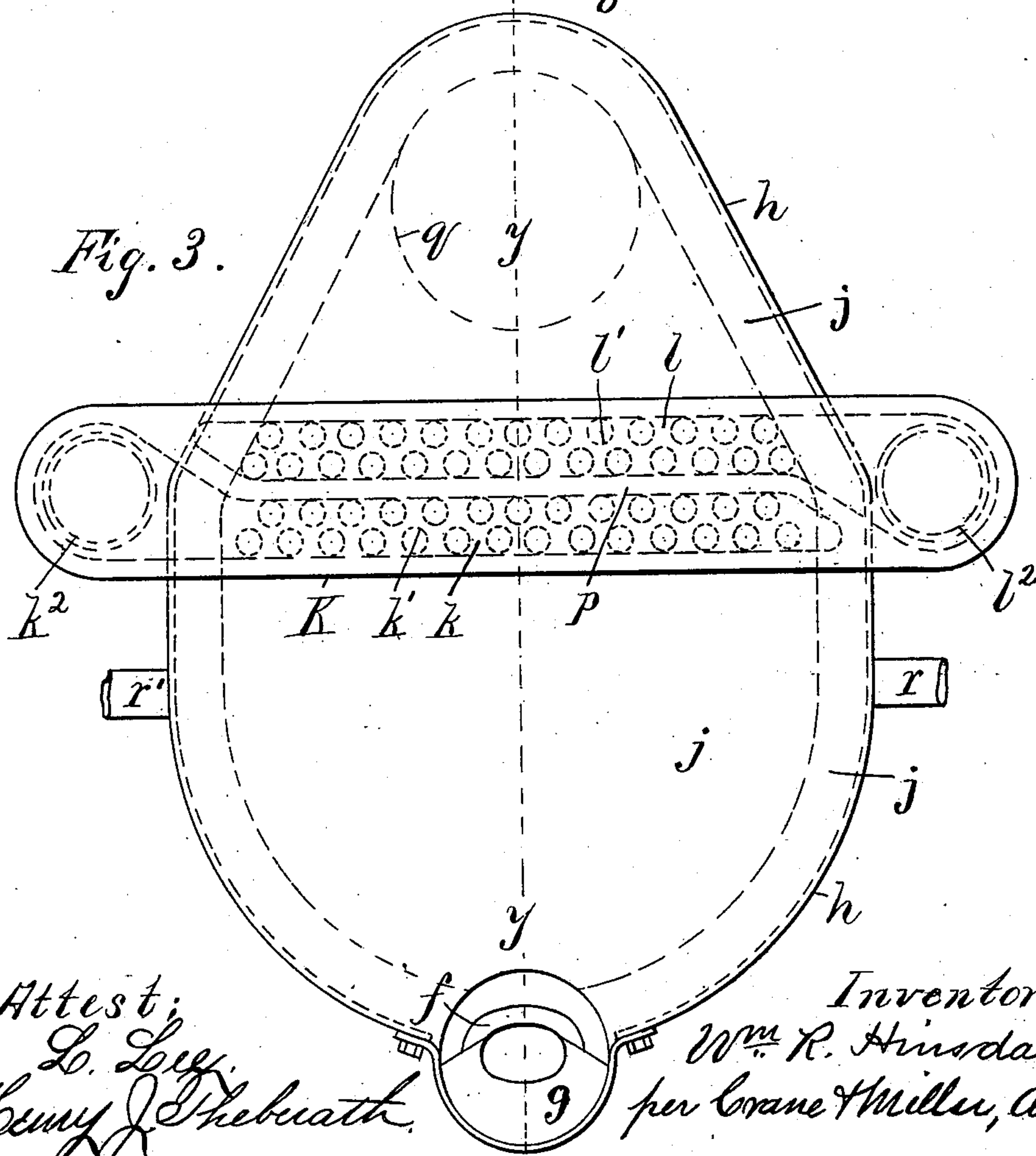
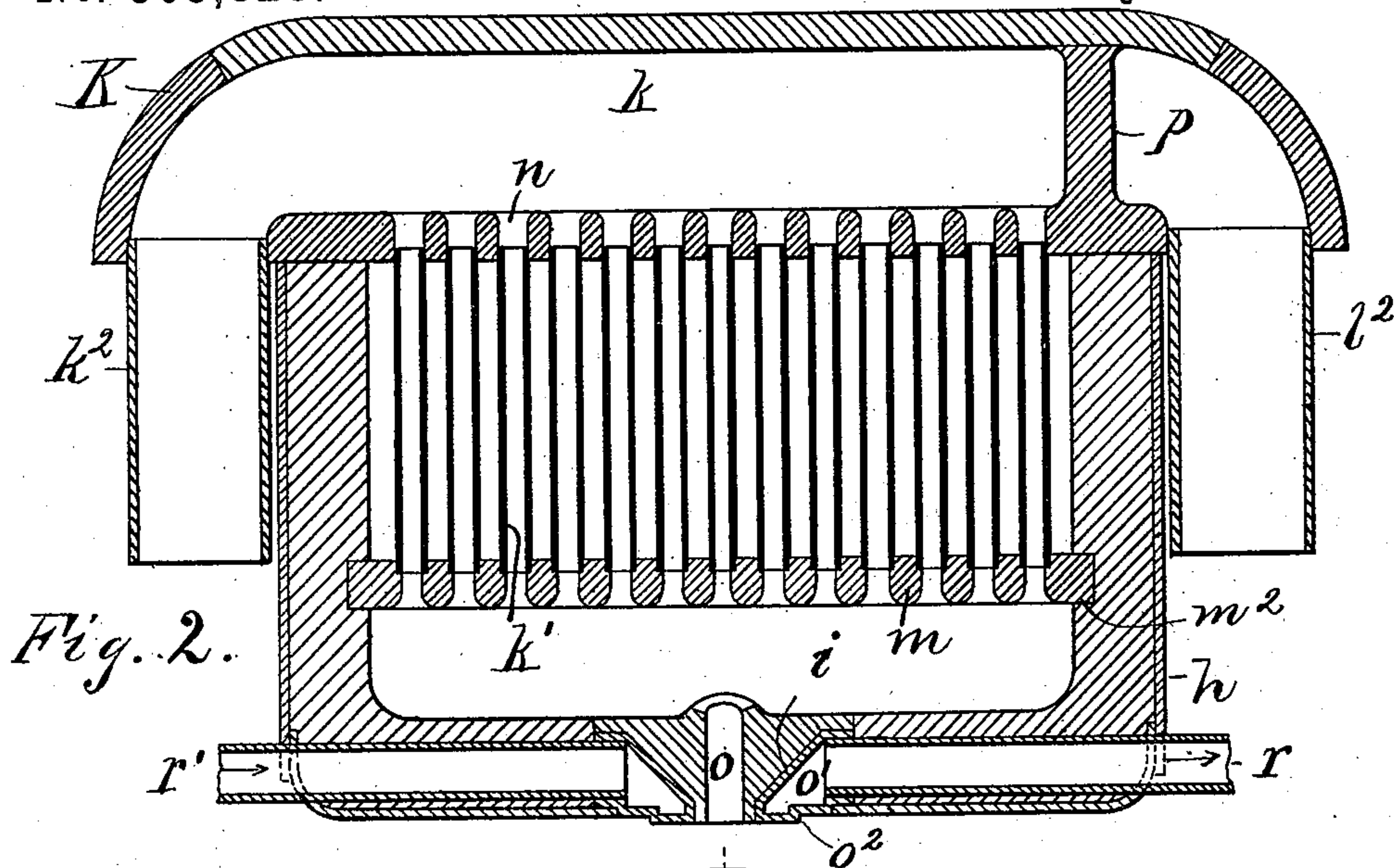
Inventor:
Wm R. Hinsdale
per Crane & Miller, Atty

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UNITED STATES PATENT OFFICE.

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HEATED FUNNEL FOR INGOT-MOLDS.

SPECIFICATION forming part of Letters Patent No. 363,828, dated May 31, 1887.

Application filed December 29, 1886. Serial No. 222,949. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. HINSDALE, a citizen of the United States, residing at Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Heated Funnels for Ingot-Molds, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The object of this invention is to preserve the metal in a thoroughly-fluid state, and to protect it from oxidation in its passage from a ladle or crucible into an ingot-mold; and it consists in the particular construction of the
15 funnel or ingate and of a gas-heater connected therewith and applied directly to the top of the mold.

The invention is particularly adapted for use with the processes and apparatus claimed
20 in my previous patent applications, Nos. 219,455 and 222,371, and the heater is provided with a special cooling-chamber at the neck of the funnel, for use in connection with such processes; but the other parts of my invention
25 may be used without such cooling-chamber when required.

The device consists in a funnel of refractory material adapted to lead the metal into the mouth of the mold, and forming a passage of
30 sufficient length to extend from the outside of a heating vessel or chamber through the same and through its bottom, and gas and air pipes for generating within such heating-chamber a temperature nearly or quite equal to that of
35 the molten metal, so that radiation of heat from the latter may be effectually prevented, as well as oxidation, in its passage from the fluid-metal receptacle to the mold.

My invention also includes specific means
40 for generating the desired heat about the funnel, all of which will be understood by reference to the annexed drawings, in which—

Figure 1 is a vertical elevation of an apparatus embodying my invention, including an
45 ingot-mold and jacket-casing similar to that shown in my patent application No. 219,455, the view being taken in section on line *y y* in the heater shown in Fig. 3. Fig. 2 is a transverse section of the heater, taken on line *x x*
50 in Fig. 1; and Fig. 3 is a plan of the top of said heater.

a is the ingot-mold; *a'*, the jacket-casing surrounding the same and provided with pipes *a''* for cooling-fluid.

b is a recess formed in the top of the mold 55 to receive a gasket of elastic packing, *b'*, formed of asbestos or other suitable material.

h is the shell of the heater, lined with refractory material, *h'*, and *o* is the aperture through the bottom of the heater for introducing the
60 fluid metal to the mold, and is shown surrounded by a cooling-chamber, *i*, in which an annular space, *o'*, is formed to circulate a cooling-fluid.

The opening through the center of the cool- 65 ing-chamber is made somewhat larger than the aperture *o* to admit the lining *h'*, and the upper side of the chamber is preferably flared to thicken such lining where it is united to the funnel *f*. 70

The funnel is shown fitted to the aperture *o* in the bottom of the heater and sloped to one side of the heater near the top, an opening being made through the wall of the heater and formed with a mouth, *g*, to direct the fluid 75 metal into the funnel.

The heater is shown supplied with gas and air introduced through passages *k* and *l*, formed across the top of the heater and transmitted through separate pipes, *k'* and *l'*, to a point 80 near the bottom of the heater adjacent to the aperture *o*. The passages *k* and *l* are formed in fire-brick material resting upon the top of the heater, and a cover, *j*, is applied at each side of the casting to prevent the escape of the 85 flame upward, an outlet, *q*, being provided in the bottom of the heater remote from the aperture *o*, to form a downward flue for the escape of such burnt gases.

The tubes *k'* *l'* are fitted in holes *n* in the un- 90 der side of the passages *k* and *l*, and their lower ends are supported by a refractory plate, *m*, sustained a little distance above the bottom of the heater by a bridge-wall, *m'*, and grooves *m''* in the lining *h'*. 95

The plate *m* is formed with holes for the escape of the gas from the pipes *k'* and *l'* below the plate, and the bridge-wall is formed adjacent to the flue *q*.

The gas and air are ignited where they mix 100 together below the plate *m*, and the bridge-wall operates, in conjunction with the plate, to

direct the flame toward the neck or lower end of the funnel and that part of the lining h' which is packed within the flaring top of the annular chamber i .

5 The plate m is preferably extended from the bridge-wall to the side of the funnel, as shown in Fig. 1, and the heat of the combustion is thereby concentrated with its greatest force upon the neck of the funnel, as indicated by the arrow x' .

10 The gases pass upward from the neck of the funnel around the body of the same over the plate m , as indicated by the arrow x^2 , and pass around and between the tubes k' and l' on its passage to the flue g , as indicated by the arrow x^3 . The body of the funnel is thus also maintained at a very high temperature, while the gas and air tubes are also heated above a red heat, and the entering gas and air are thereby fitted to produce a more intense combustion.

20 The passages k and l are shown formed in a fire-brick, K , which projects over each side of the heater to receive gas and air supply pipes k^2 and l^2 , the passages extending from their respective supply-pipes across the top of the heater within the casting, but separated by a partition, p .

30 The annular chamber i is provided with inlet and outlet pipes r r' , by which a circulation of cooling-fluid may be maintained in the annular space o' . The aperture in the bottom of the heater being made smaller than the mouth of the ingot-mold, the edge of the annular chamber projects inward all around the mouth of the mold sufficiently to chill the top of the ingot at its margin when the fluid metal is filled in contact with the cold metal of the chamber.

40 The lower part of the chamber is preferably formed with a boss, o^2 , adapted to fit within the recess b around the mouth of the mold, so as to center the aperture o over the center of the mold, and the packing shown at b' is shown in contact with such boss to prevent the escape of the metal when the mold is filled.

50 From the above description it will be seen that my device affords a means of keeping the funnel heated in the most effective manner, and that its temperature may be readily raised to that desired in the fluid metal, so that the cooling experienced in flowing from the mouth of the ladle into the socket g may be entirely corrected and the metal introduced to the mold in the hot condition desired.

60 My apparatus is especially desirable in an apparatus where the ingots are drawn through the bottom of the mold as they are successively formed therein, and in which the funnel may be retained for a long time in connection with the mouth of the mold. Without such means as I have claimed herein for maintaining the high temperature of the funnel, the interior of the funnel would become obstructed and a deposit of metal and slag would

form therein, called "sculling," and the funnel would be unfit to use in a very short time.

By my invention the heating of the funnel near or quite to the temperature of the melted metal entirely prevents sculling, and enables the funnel to be used until it is gradually worn thin and requires renewal.

70 The inclined arrangement of the funnel obviously brings its upper end into a more convenient position in applying the mouth of the ladle or other fluid-receptacle, while it also affords the means for circulating the heat about its neck and body in the manner described. The arrangement of the gas and air pipes k' and l' in the path of the burnt gases also tends to utilize the waste heat of the latter in a high degree, and produces the effects of a regenerator, with the economy in the consumption of gas which is consequent thereon.

80 An aperture, f' , is shown in the upper side of the funnel, near the mouth g , to permit a portion of the neutral gases to escape toward the mouth. The neutral gases are those which contain no free oxygen and are thus incapable of oxidizing the metal in the funnel, and such a neutral condition naturally results from the proper proportioning of the gas and air admixed therewith to effect perfect combustion. The supply of gas and air to the heating-chamber would in practice be regulated to produce the most perfect combustion, and the products of combustion would thus retain no free oxygen. By projecting such neutral gases from the mouth of the funnel toward the mouth of the ladle the metal flowing from the ladle to the funnel is thus prevented from oxidation as effectually as if it were conducted through an air-tight passage, and the entrance of air to any part of the funnel is likewise prevented, as well as the oxidation of the highly-heated metal therein.

100 An arrow, u , is shown in the aperture f' , to indicate the passage of the gases to the mouth g ; but it is obvious that any aperture extending from within the heating-chamber to the mouth would have the same effect, and that such a passage could be made above the upper end of the funnel without perforating the latter, as at the point lettered v . The aperture for conducting the neutral gases to the mouth g may therefore be made in any convenient manner without departing from the scope of my invention.

110 Having thus set forth the nature of my invention, what I claim herein is—

1. The combination, with the top of an ingot-mold, of a heater lined with refractory material and provided with air and gas supply pipes and an escape-flue, an aperture in the bottom of the heater, and a funnel of refractory material extending from the aperture in the bottom of the heater to the outside of the heater, as and for the purpose set forth.

2. The combination, with the top of an ingot-mold, of a heater lined with refractory material and provided with air and gas sup-

ply pipes and an escape-flue, an aperture in the bottom of the heater, a funnel of refractory material inclined from the aperture in the bottom of the heater to or through the side of the heater, and a mouth to direct the fluid metal into the funnel, as and for the purpose set forth.

3. The combination, with the top of an ingot-mold, of a heater lined with refractory material and provided with air and gas supply pipes and an escape-flue, a cooling-chamber with recessed top and formed of cast-iron in the bottom of the heater, a packing of refractory material applied to such recess, with an aperture through the same to admit the passage of the fluid metal, and a funnel of refractory material fitted to said aperture and extended to or through the outside of the heater, as and for the purpose set forth.

4. The combination, with the top of an ingot-mold, of a heater lined with refractory material and having an escape-flue and a bottom aperture, and a funnel extended therefrom to or through the side of the heater, a refractory plate sustained above the bottom of the heater adjacent to the neck of the funnel, separate gas and air passages formed in the cover of the heater, and gas and air tubes extended from such passages to holes in the said plate, as and for the purpose set forth.

5. The combination, with the top of an in-

got-mold, of a heater lined with refractory material and having an escape-flue and a bottom aperture, and a funnel extended therefrom through the side of the heater, a bridge-wall upon the bottom of the heater between the said aperture and escape-flue, a refractory plate fitted upon such bridge-wall and extended to the funnel, gas and air holes through the said plate, separate gas and air passages formed in the cover of the heater, and gas and air tubes extended from such passages to the said holes in the refractory plate, as and for the purpose set forth.

6. The combination, with the top of an ingot-mold, of a heater lined with refractory material, an aperture through the bottom of the heater to the mold, a funnel of refractory material extended from the aperture in the bottom of the heater to or through the side of the same, a mouth to direct the fluid metal into the funnel, and an aperture for leading the neutral gases from within the heater to the said mouth, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM R. HINSDALE.

Witnesses:

THOS. S. CRANE,

HENRY J. MILLER.