(No Model.)

2 Sheets—Sheet 1.

S. H. BOUCHER.

FEEDER FOR INGOT MOLDS.

No. 385,837. Patented July 10, 1888.

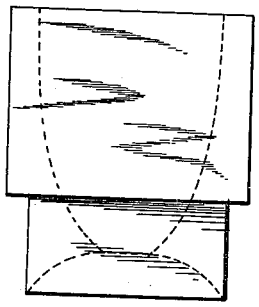

Fig. 1

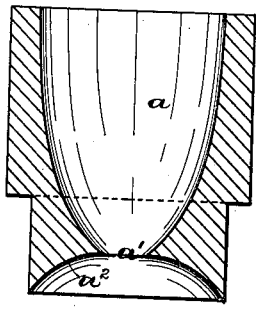

Fig. 2

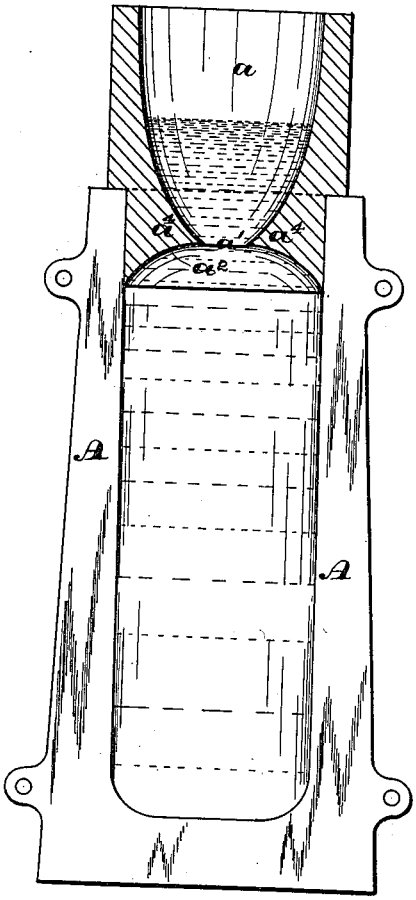

Fig. 3

WITNESSES:

George B. Adams

Russell Wright

INVENTOR:

Sidney H. Boucher,

BY Campbell & Co. ATTYS.

(No Model.)

2 Sheets—Sheet 2.

S. H. BOUCHER.

FEEDER FOR INGOT MOLDS.

No. 385,837. Patented July 10, 1888.

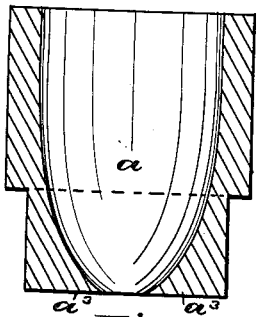

Fig. 5

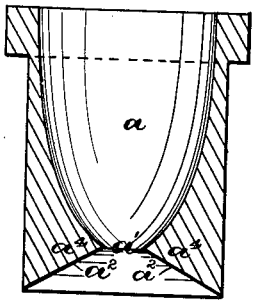

Fig. 4

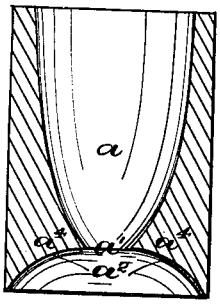

Fig. 6

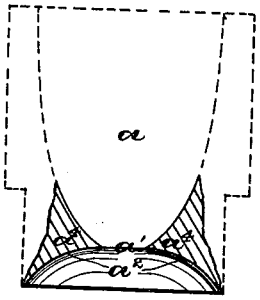

Fig. 7

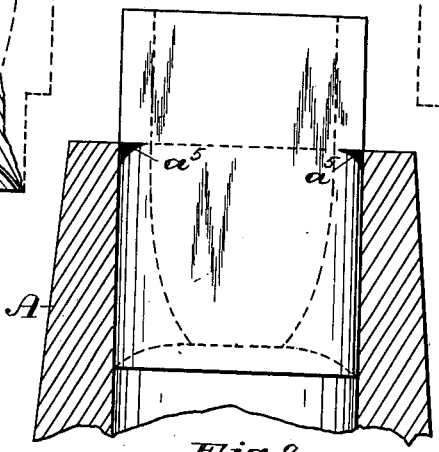

Fig. 9

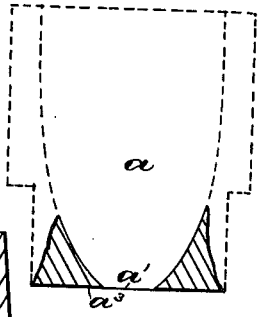

Fig. 8

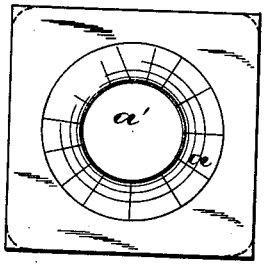

Fig. 11

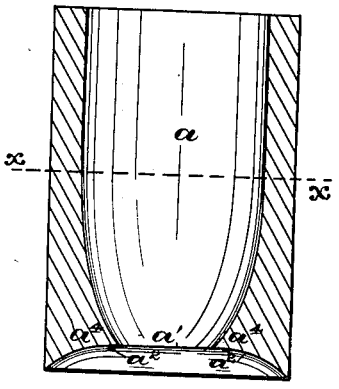

Fig. 10

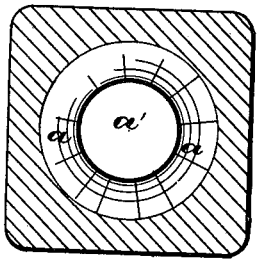

Fig. 12

WITNESSES:

Russell Wright
John G. Medell

INVENTOR

Sidney H. Boucher

BY Campbell & Gattys.

UNITED STATES PATENT OFFICE.

SIDNEY H. BOUCHER, OF JERSEY CITY, ASSIGNOR TO CYRUS C. CURRIER, OF NEWARK, NEW JERSEY.

FEEDER FOR INGOT-MOLDS.

SPECIFICATION forming part of Letters Patent No. 385,837, dated July 10, 1888.

Application filed January 12, 1888. Serial No. 260,490. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY H. BOUCHER, a citizen of Great Britain, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Feeders for Ingot-Molds; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The primary object of this invention is to stop the formation of the pipe in casting ingots of steel, and for this purpose I have devised an improved feeder or reservoir, into and through which the molten steel is poured into the ingot-mold.

The object which my invention is designed to accomplish is effected by means of the peculiar form and construction of the feeder which forms the subject of my invention.

I have found by experiment that in order to prevent the mouth of the feeder from choking by the setting of the steel it is essential that the feeding-reservoir shall be made of such material that it retains the heat, that the thickness of the feeder at the mouth thereof leading into the mold shall be reduced to the minimum, and that the shape of the bottom of the feeder shall be such that the heat is concentrated on the top of the ingot to maintain its fluidity the proper length of time.

In the accompanying drawings, in which similar letters of reference indicate like parts in each of the views, Figure 1 is an elevation of my improvement detached from a mold. Figs. 2 and 3 are vertical sections of the same, taken centrally therethrough, that shown in Fig. 3 being inserted within a mold, a half-section of which is shown.

On Sheet 2, Figs. 4, 5, and 6 are views similar to Fig. 2, illustrating certain changes in construction; and Figs. 7 and 8 are views, partly in section and in dotted outline, of Figs. 5 and 6. Figs. 9 and 10 are sectional views of other forms of the feeder within and without a mold, respectively. Fig. 11 is a plan of the top of Fig. 10; and Fig. 12 is a section through *x*, Fig. 10.

Many of the devices heretofore designed and used for the prevention of the formation of the pipe have either been inadequate for the purpose or have been very expensive and complicated.

The particular kind of devices used with this object in view which resemble more nearly my improvement have been and are impracticable, for the reason that the passage opening directly into the mold has been of such length that before the mold has become full the passage has become choked up because of the setting of the metal, which is due to the difficulty of maintaining the proper temperature of the feeder through the length of the opening.

When the feeder is provided with a cavity into which metal is poured larger in diameter than the passage leading into the mold, the same difficulty is experienced, because of the quantity of material in the feeder intervening between the molten metal in the cavity of the feeder and the metal in the mold, so that the heat resident in the molten metal above and below the feeder is not sufficient to heat the feeder to a temperature capable of maintaining the fluidity of the stream of metal. This difficulty I overcome by means of the form of feeder illustrated in the views of the drawings.

As there shown, my improved feeding-reservoir consists of a reservoir, *a*, into which the molten metal is poured, and in the bottom of said reservoir is an opening, *a'*, through which the metal flows into the mold A. The sides of the reservoir curve gradually downward and inward to the edge of the said opening, which is very thin all around the opening, substantially as indicated. In Fig. 2, &c., the bottom or under side, a^2, of the feeder slopes downward and outward away from the thin edge of the opening *a'*, either in a curved or straight line, while in Fig. 5 the said bottom extends in a straight line out from said opening, forming a flat under surface, a^3. When shaped according to either of these forms, it will be apparent that there is very little of the material which forms the feeder intervening between the fluid and heated metal in the reservoir and that in the mold, as shown in Fig. 4, and in consequence the said intervening portion, a^4, Figs. 7 and 8,

becomes as hot as the molten metal, and remains so until all of the metal has flowed from the reservoir into the mold, or until the mold is full. In this manner and for this reason the opening a' is always kept open so long as there is any metal left in the reservoir.

While the edge of the opening a' is shown in the drawings to be almost of the thinness of a knife-blade, still the thinness or thickness of said edge is somewhat regulated by the strength necessary at that point, in view of which there is some opportunity for a little variation; but my invention purposes to make the said edge as thin as practicable.

The curved form of the under surface of the feeder has some advantages over the flat surface, inasmuch as the curved form gives greater strength to the feeder to hold the weight of fluid metal in the reservoir, and, further, because it provides a larger heating-surface in contact with the top of the ingot and concentrates the heat at the opening a', where it is most needed. As thus formed there is no danger of the opening a' becoming choked by the setting of the metal thereat, because of the small amount of material in the feeder surrounding the opening, and as the said feeder is made of a refractory material—viz., fire-clay, plumbago, or a mixture of the same, which can be molded to the desired shape, and is heated before its insertion into the mold—it retains its heat because of the hot metal above and below the portion a^1 surrounding the opening a'. After the mold has been filled, the heated feeder keeps the metal remaining in the reservoir fluid, which subsequently flows into the spaces made by the shrinkage of the metal known as the "pipe."

The feeder or device herein described is, in addition to its effectiveness resulting from its peculiar form, of great practical advantage because of its extreme cheapness.

In Figs. 9 to 10, inclusive, the feeder, instead of having a shoulder extending entirely around the same, as is shown in Fig. 1, &c., is rounded at the corners in the lower portion to conform to the shape of the interior of the mold, and by thus rounding the corners of the feeder a shoulder, a^5, is left, which rests upon the top of the mold, as shown in Fig. 9. This shoulder, as well as the one shown in Fig. 1, &c., may be formed at any point on the feeder, according to the distance which the feeder is intended to project within the mold.

Having thus described my invention, what I claim is—

1. A feeder for ingot-molds, having a reservoir with an opening in its bottom, the opening having a thin edge arranged to oppose its upper and lower surfaces, respectively, to the metal in the reservoir and in the mold.

2. A feeder for ingot-molds, having a reservoir therein provided with an opening in the bottom thereof, the surrounding edge of which is thin, and a bottom inclining downward and outward away from said opening, for the purposes set forth.

3. A feeder for ingot-molds, having a reservoir therein provided with an opening in the bottom thereof, and a bottom inclining downward and outward away from said opening, the sides of said reservoir and the said bottom curving downward and upward, respectively, and meeting in a thin edge around the opening in the bottom of the reservoir, for the purposes set forth.

4. The combination, with an ingot-mold, of a feeder inserted in the top thereof and having a reservoir therein provided with an opening in the bottom thereof, the surrounding edge of which is thin and arranged to oppose its upper and lower surfaces, respectively, to the metal in the reservoir and in the mold, for the purposes set forth.

5. The combination, with an ingot-mold, of a feeder inserted in the top thereof and having a reservoir therein provided with an opening in the bottom thereof, the surrounding edge of which is thin, and a bottom inclining downward and outward from said opening, for the purposes set forth.

6. A feeder for ingot-molds, composed of a plastic refractory material and having a reservoir therein and an opening in the bottom thereof, the surrounding edge of which is thin and arranged to oppose its upper and lower surfaces, respectively, to the metal in the reservoir and in the mold, for the purpose set forth.

7. A feeder for ingot molds, composed of a plastic refractory material and having a reservoir therein provided with an opening in the bottom thereof, the surrounding edge of which is thin, and a bottom inclining downwardly and outwardly away from said opening, for the purpose set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 9th day of January, 1888.

SIDNEY H. BOUCHER.

Witnesses:

FREDK. F. CAMPBELL,

FREDK. C. FRAENTZEL.