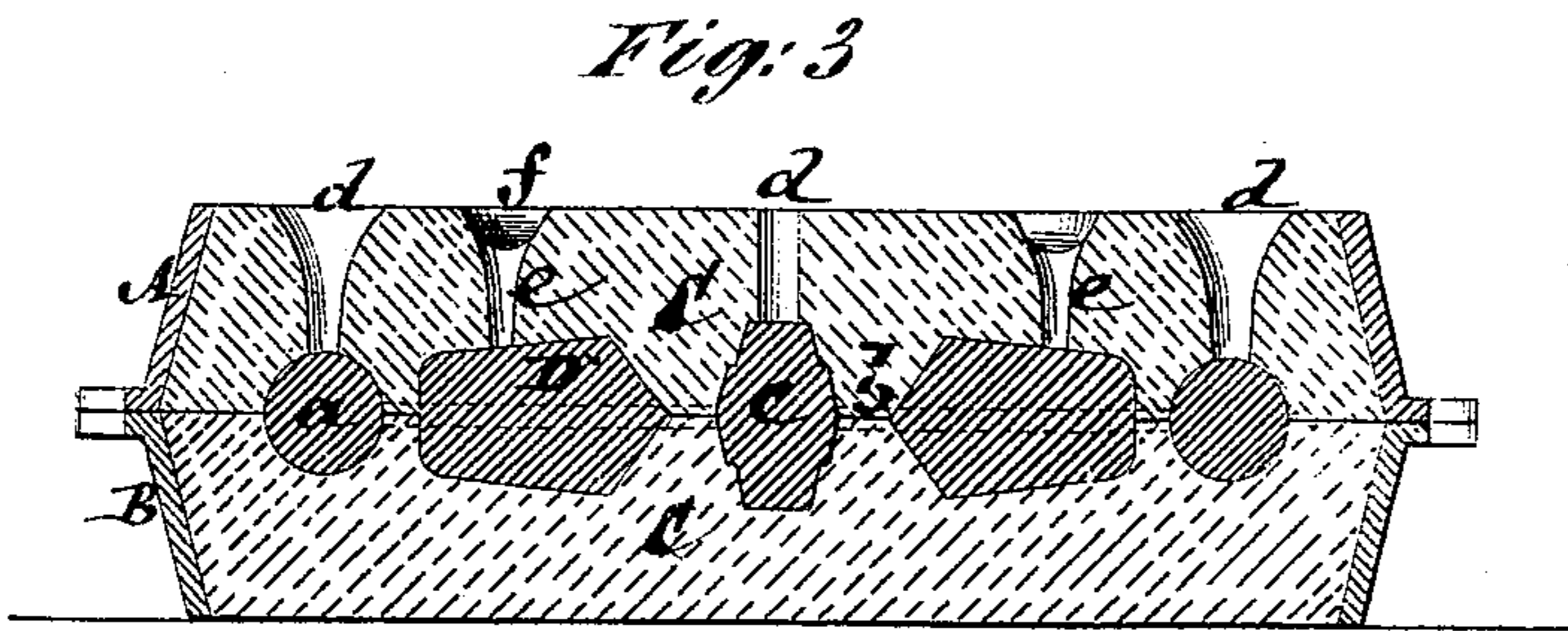
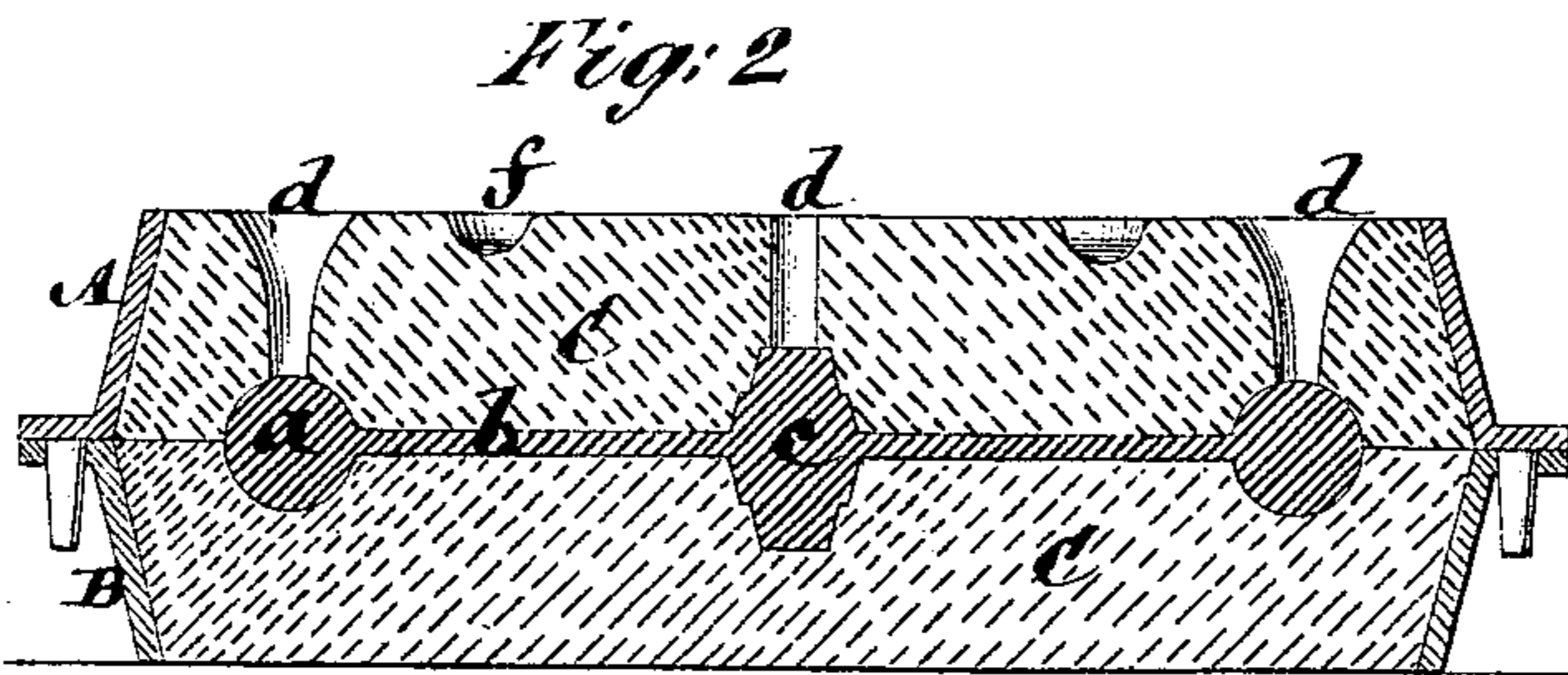
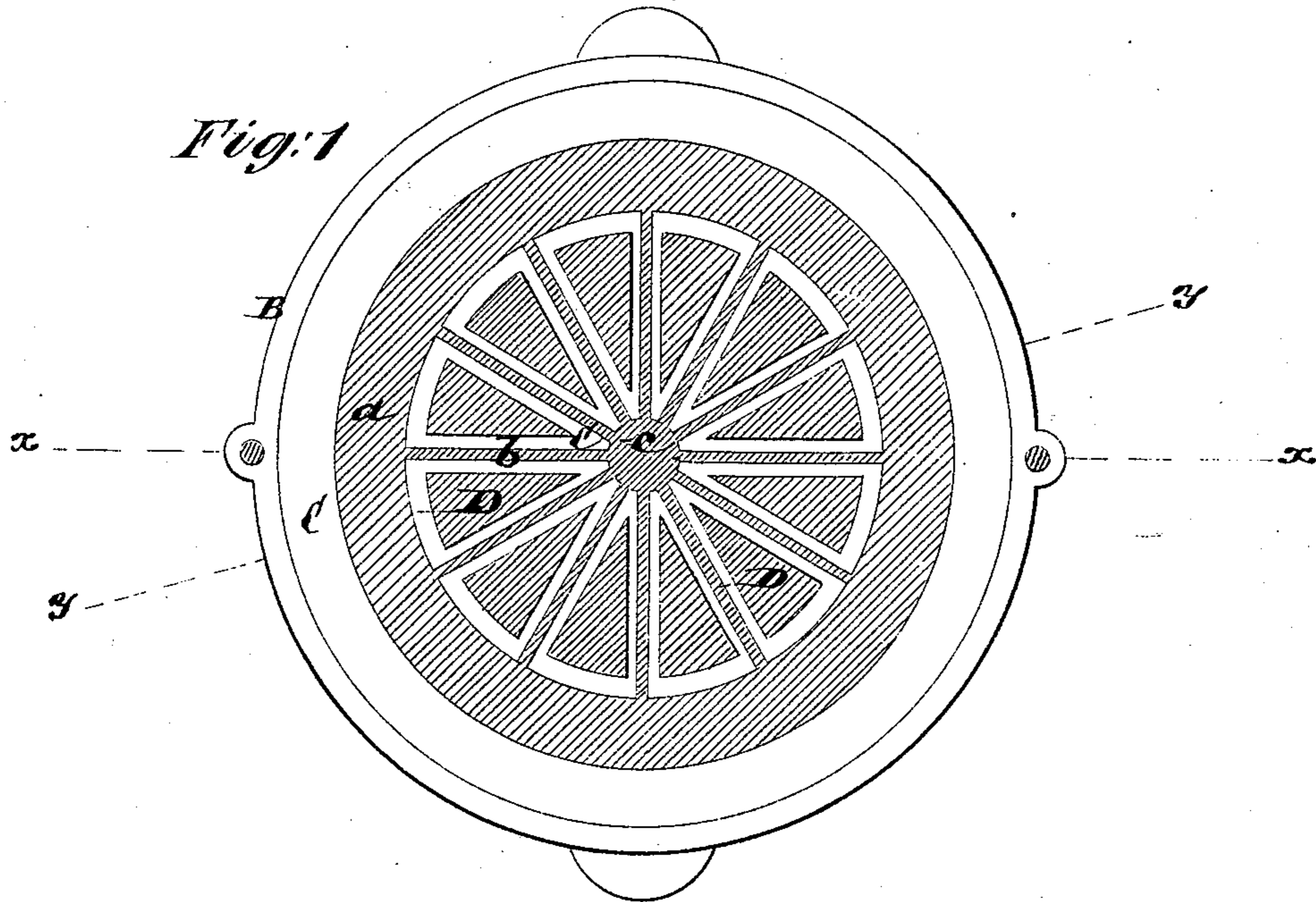


J. L. JACKSON.
Casting Metals.

No. 150,049.

Patented April 21, 1874.



Witnesses:
Michael Ryan
Thos Haring

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UNITED STATES PATENT OFFICE.

JAMES L. JACKSON, OF NEW YORK, N. Y.

IMPROVEMENT IN CASTING METALS.

Specification forming part of Letters Patent No. **150,049**, dated April 21, 1874; application filed March 27, 1874.

To all whom it may concern:

Be it known that I, JAMES L. JACKSON, of the city, county, and State of New York, have invented an Improvement in Casting Metals, of which the following is a specification:

This invention relates to the making of castings of refractory metals; and its object is to insure the production of castings which are perfectly sound, as well as of the exact shape desired, and which, owing to the inequality of their different proportions, it would be difficult, under the process heretofore practiced, to obtain. The invention generally consists in a method or process of establishing an equilibrium of temperature in the casting by means of molten metal run into or around the mold, at the lightest parts of the casting to be produced, to keep the sand of the mold at such parts of an equal temperature during the cooling of the casting with the heavier parts of the casting, thereby avoiding unequal contraction of the different parts of the casting in cooling, and whereby sound castings of various unequal proportions may be made, which it has heretofore been deemed impossible to produce.

A single illustration will serve to explain the principle of action of my invention, and, in the accompanying drawing—

Figure 1 represents a plan of the lower half of a mold suitable for making a fly or other wheel, in which the arms are of a much lighter construction than the rim of the wheel. Fig. 2 is a transverse vertical section on the line *x x*, showing the two halves of the mold, and Fig. 3 a transverse vertical section on the line *y y*.

In carrying out my invention it is necessary, first, to ascertain, from examination of the pattern of the casting to be produced, the parts or places of the casting which will cool first. I then cast into the mold, between and around the thin or lighter parts of the casting to be produced, iron or other metal of sufficient capacity, and so that the same remains in a heated or fluid state before making the casting, to hold the heat in the sand as long, or thereabout, as it will be retained in the heaviest parts of the casting to be produced. Generally these outside gates or bodies of heated metal should be cast before the mold is poured,

for the purpose of getting the sand hot and retaining the heat around the light parts of the casting, and care should be taken to have a sufficient body of sand between these outside masses of heated metal and the mold, to prevent said metal from breaking through into the mold. It is not always necessary, however, to have such external heating masses of metal cast separate or before the mold is poured, such preliminary action only being necessary when the lighter parts of the casting are likely to chill. When, in the judgment of the molder, the same heat, or thereabout, can be kept up in the lighter as in the heavier portions of the casting, by employing side runners and running the whole metal at the same time, it can be done. The object of the invention is to secure, as near as it is possible, a uniform temperature in all parts of the mold during the cooling of the casting; and when this object is attained there will be no warping or twisting of the casting, and no breakage of it in consequence of an unequal contraction, and the casting when made will possess much more strength than when cast in the ordinary manner. When, in accordance with the style of the casting, it is difficult to provide for these compensating heating intermediate or outside bodies of metal being used without endangering the mold of the casting from being broken into by them—as, for instance, in case of a square column with open back molded in the sand floor of the foundry, and in which only a cope is used—dry-sand cores should be made and set next to the mold on the side next to the open or lightest portion of the casting, and which should be of sufficient capacity to hold an amount of metal necessary to insure equal cooling of the casting.

It will be apparent that this separate provision of a gate, runner, or sprue of a casting to be made, for the purpose of furnishing compensating heating masses of metal in vicinity to the lightest or thinnest portions of the casting, is in nowise to be confounded with the gate or gates for the simple running of the casting, although the same may be in connection therewith, and in some instances the metal run into all the gates at the same time. By my invention I can hold a casting in the pre-

cise shape in which it is molded, or change its shape to almost any desired form within the limits of the contraction of the metal.

Referring more particularly to the particular instance of the application of the invention here selected by way of illustration, A, in the accompanying drawing, is the upper and B the lower part of the box or mold; C, the sand with the wheel cast therein, *a* being the rim, *b* the arms, and *c* the hub of the wheel. So far as the mere production of the casting is concerned, gates and vents *d* serve to provide for the pouring of the mold as formed by the pattern. To provide, however, for the sound production of the wheel, free from warping, twisting, or breakage consequent on unequal contraction in cooling of the parts, due to the reduced amount of metal in the arms as compared with the rim or hub, compensating masses D of heated metal are cast by means of suitable formations in the sand, and gates and vents *e*, which may connect with a general channel or gate, *f*, between the arms of the wheel or the cavities in the sand in which the same are formed. This may either be done immediately before or at the time the general casting is made, or thereabout, to keep the sand of an equal temperature about the arms with that of the rim and hub of the wheel, and so to preserve an equilibrium of temperature throughout the entire casting in cooling, the compensating masses D being

proportioned to the difference in weight, or thereabout, between the arms and other part or parts of the wheel.

This invention is applicable to both heavy and light castings, including beams and columns for architectural work; cannon, which may by this invention be cast to preserve a nearly equal density of metal throughout, and so avoid the providing of a surplus length of metal at its outer part, to be afterward turned off or removed; fly-wheels, of any required dimensions, with wrought-iron arms, and in which the rim and the hub are cast at the same time, and, by means of my invention, the arms held at a red heat to equally contract with the rim and hub in cooling; likewise the bed-plate and other parts of marine engines, liable to sudden and severe strains.

I claim—

The process, substantially as herein described, of making castings by means of compensating masses of molten metal run into the mold around or in proximity to the portions of the mold in which the lighter or thinner parts are to be made, whereby the sand is kept hot about said parts, and an equal temperature preserved or approximated during the cooling and contraction of the casting.

JAMES L. JACKSON.

Witnesses:

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