2 Sheets—Sheet 1.

J. OLIVER.

CASTING MOLD BOARD.

No. 175,622. Patented April 4, 1876.

Fig. 1.

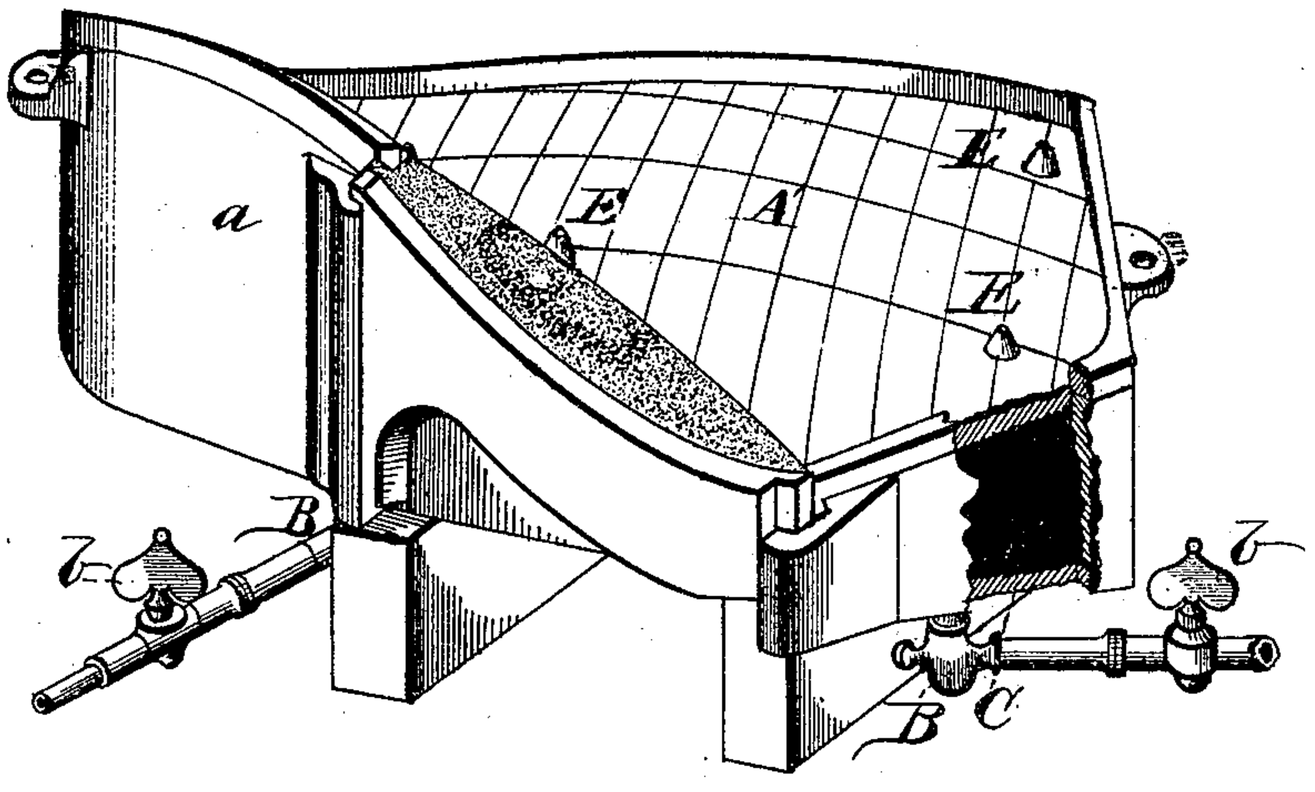
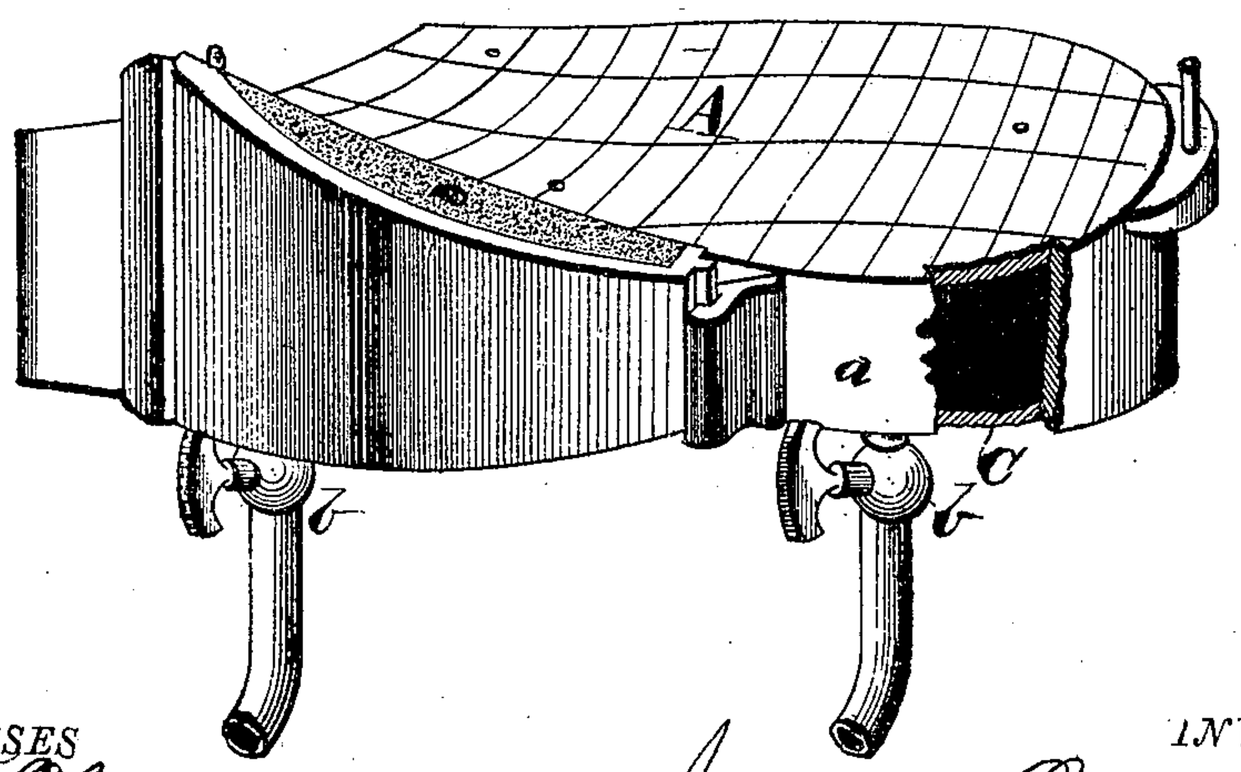


Fig. 2.



WITNESSES

W. D. Newman.

A. M. Paul.

By

INVENTOR

James Oliver.

Leggett & Leggett Attorneys.

2 Sheets—Sheet 2.

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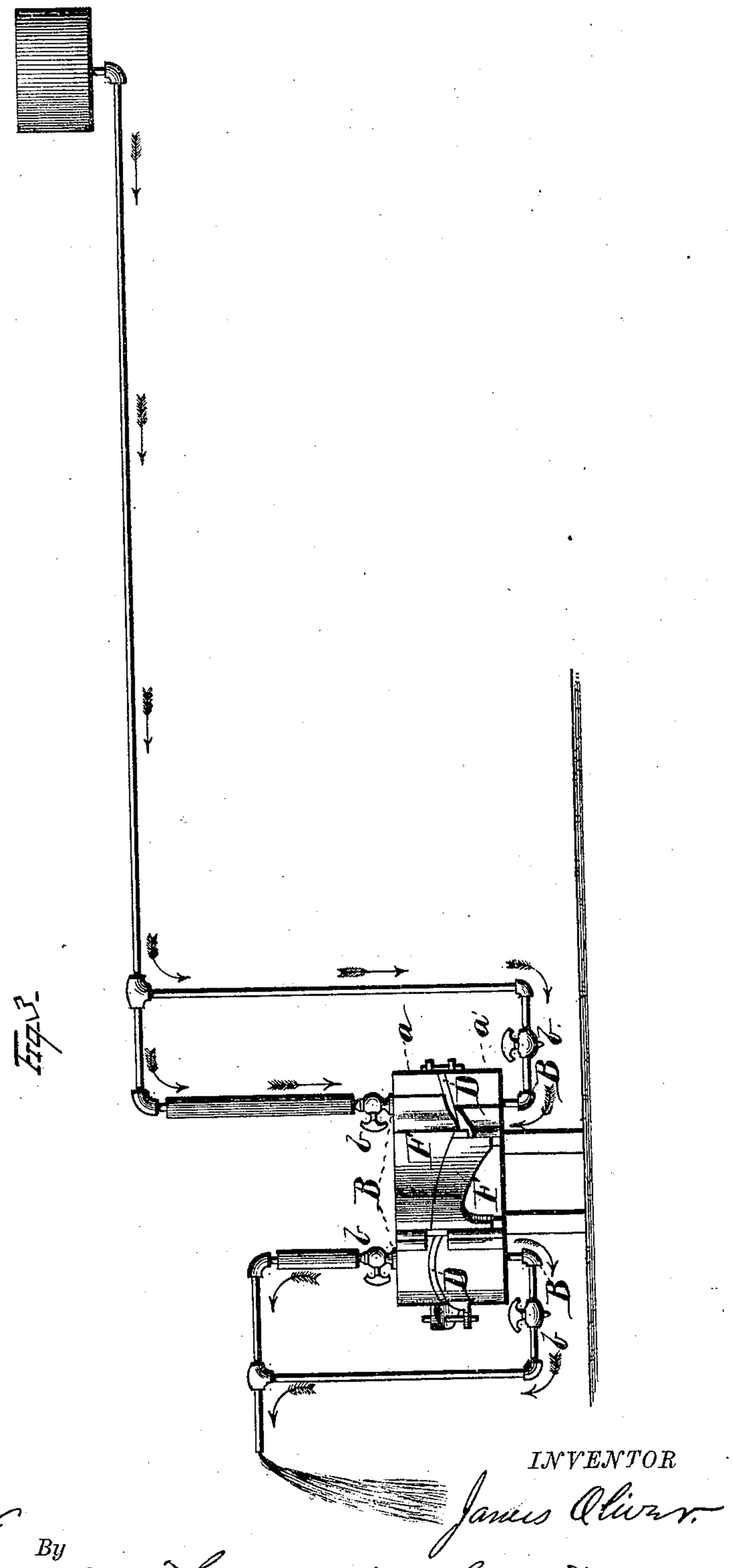
Fig. 2.



WITNESSES
W. D. Newman
C. M. Bard

By Legget & Legget, Attorneys.

INVENTOR
James Oliver

UNITED STATES PATENT OFFICE.

JAMES OLIVER, OF SOUTH BEND, INDIANA.

IMPROVEMENT IN CASTING MOLD-BOARDS.

Specification forming part of Letters Patent No **175,622**, dated April 4, 1876; application filed April 10, 1875.

To all whom it may concern:

Be it known that I, JAMES OLIVER, of South Bend, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Process and Mechanism for Casting Mold-Boards; 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention consists in an improved process and mechanism for casting mold-boards for plows or any other flat castings, whereby said casting is chilled upon both sides, by which process a better article is produced than when the same is chilled only upon the face or wearing side, as has heretofore been done.

I shall proceed to describe my invention as especially adapted to the manufacture of mold-boards for plows, although I wish it to be distinctly understood that I do not confine or limit my invention narrowly to the manufacture of these articles, inasmuch as it may be adapted and applied in the manufacture of other descriptions of castings without in any way affecting the spirit of my invention.

My invention consists in the various parts, combinations, and processes, as hereinafter specified and claimed.

In the drawings, Figure 1 is a view of the bottom pan or chill with its accompanying mechanism; Fig. 2, the upper pan, and Fig. 3 a view of my invention as operating.

It will be seen that I have provided a double chill or hot-water pan, which I consider a great improvement over all inventions of this description of which I am aware, and by means of which double pans or chills or double-chilled mold-board or other casting can be produced. Mold-boards, when chilled on one side of them only, are more or lessed warped and strained, owing to the metal which is chilled being in a more contracted or close-grained condition upon the chilled surface than upon the unchilled portion of the same. This strain or warp renders the casting more liable to break (being in a condition of constant tension) when it receives a sudden jar or shock than it would were both sides or surfaces chilled, and the entire mass of metal forming the casting reduced to a uniform density or texture of grain, such as exists in ordinary unchilled sand-castings.

Mold-boards chilled on one side only are produced by running the metal which forms the casting between a chill and sand, the chill being made to conform to the shape of the face of the chilled surface of the mold-board, while the sand forms the back or opposite side of the same, and supports the casting after pouring the metal. This sand is frequently disturbed by the action of the molten metal when running over it, or by the movements of the hot casting before it has assumed a solid shape, thereby producing imperfections in the casting, on account of which it must be rejected, and loss and damage follow as a consequence.

In my double-pan chill, however, the molten metal flows between two iron surfaces, which, being unyielding, cannot be disturbed by the current of molten metal which flows between them; neither can any inclination or tendency of the casting to move before becoming solidified affect the metal surfaces of the chills as it does the sand. Distortions, therefore, cannot occur in mold-boards or other castings when they are chilled on both sides, as herein shown.

The castings must, of necessity, be exact counterparts of the chill-faces between which the metal is poured, and in setting up the several parts of which a plow, for instance, is to be formed, perfectly-fitting mold-boards or other parts are insured, with but very little, if any, subsequent grinding, filing, or chipping, such as heretofore has been necessary, and which causes great expense and loss of time to the manufacturer.

Double chill-pans in which no sand is used, to come in contact with one surface of the casting to be made, are much easier vented than are single chill-pans, in combination with which sand is so used. The absence of sand inside the flask prevents the creation of a greater portion of the smoke, vapor, or gas which is formed by the molten metal passing over, and in contact with, the damp sand heretofore used. Hence the sweat which is formed on the faces of the chill-surfaces of the double

pans, being comparatively insignificant in quantity, is much easier gotten rid of by being forced out of the space between two chilling-surfaces of the upper and lower pans by means of the grooves in the faces of the chills, as specified and claimed in my Patent No. 114,469. The only sand necessary to be used with my double pans or chills is on the outside of the pans; and here it forms the gate and sprue-hole, through which the molten metal is poured and distributed, which molten metal, coming in contact with this very small quantity of sand, is, consequently, much cleaner and more free from dirt and specks than when poured over a larger quantity, and, as a consequence, the castings are cleaner, smoother, and more free from defective specks upon their faces, caused by floating particles gathered by the molten metal in its passage over the usual quantity of sand employed in all previous devices of which I am aware.

With a double chill-pan constructed substantially as herein shown the production of chilled castings can be accomplished with the help of unskilled labor, for, the space between the faces of the upper and lower chills determining the shape of the castings desired, the use of patterns, and the manipulation of sand, and all the specific steps and operations in general use in making ordinary metal castings, are dispensed with, thus rendering the expensive skill of a regular molder superfluous and unnecessary.

By my invention a mold-board can be cast with its face or wearing side down, which is another advantage obtained over previous devices and processes, for, should any floating particles be gathered by the molten metal as it flows through the small quantity of sand which forms the sprue and gate heretofore mentioned, they would settle on the upper part or back surface of the mold-board, thus leaving the face smooth and perfect. This extra smoothness results in a great reduction in the cost of grinding, polishing, and finishing the chilled castings, for, as made in the double-pan chills, the surfaces have only to be brightened, whereas when made in a flask containing a single chill-pan, wherein the face of the mold-board is cast up instead of down, the grinding and finishing necessary to remove the resulting imperfection from the mold-board face is largely increased, inasmuch as said imperfections frequently and generally extend to the depth of one-sixteenth of an inch or more. This unsatisfactory result is unavoidable when the single chill-pans are used, for the bottom of the pans form the face of the chill, and the face of the chill is made to conform to the shape of the face of the mold-board to be cast, and as the pans or chills contain hot water, and are open from above, it will readily be observed that the mold-board must be cast face upward when one side only, and that side the face, is to be chilled.

Another important advantage is secured by my invention, as herein shown—that of being able to use the softest iron for making chilled castings. The softer the iron used the finer is the grain or texture of the chilled castings. The color more nearly resembles silver, and a smoother, finer polish can be obtained, while the scouring qualities of the plow parts, which are subjected to friction in practical use, are greatly improved.

It has heretofore unfortunately been the case that soft iron could not be successfully employed with a single chill-pan, as it is much more difficult to chill, and, owing to the warping hefeinbefore referred to, caused by the difference in the tension between the chilled and unchilled surfaces, the resulting castings will not fit in their places when the plows are to be set up, and consequently they have to be rejected and cast aside. The double chill-pan, as herein shown, surmounts this difficulty by chilling both sides of the casting, whereby all the advantages of using soft iron are secured, while the disadvantages set forth cease to exist.

As shown in the drawings, my double-pan chill consists essentially of two pans, A A′, provided with metal covers *a*, one pan, A, to sit on the other, A′, as shown in Fig. 3, when castings are to be made.

Through the cover *a* to each pan a short nipple or pipe, B, is inserted, opening into the chamber C formed by the pan A and cover *a*. These nipples or pipes B are connected to their pipes B′ by means of flexible tubes, sliding joints, or the like, in the case of the upper pan A, in order to permit rapid removal of the same from off the lower pan A′, and with the usual steam or hot-water pipe connections in the case of the lower pan A′, which is not required to be moved.

One of the pipes B in each pan supplies warm water to the chambers C and the adjoining pan, the flow of which is regulated by valves *b* suitably placed, while the other pipe B serves as a vent or discharge to relieve the pressure of steam generated by heat from the molten metal of which the casting is made, and which heat is transmitted through the iron chill-pans A A′.

The outer edge of the lower pan A′ is provided with an iron band, D, the height of which obviously determines the thickness of the mold-board, and on the top of this band or flange D the upper pan A rests. The space between the pans A A′ thus formed by the intervention of the band or flange D forms a space or receptacle for the molten metal to flow into, and as the top of the lower pan A′ is made to conform to the shape of the face of the mold-board to be cast, while the bottom of the upper pan A conforms to the shape of the back of the mold-board, it necessarily follows that, when molten metal is poured into this space or receptacle and allowed to solidify, the resulting casting must conform both on its face and back to the shape of the top and bottom of the two pans A A′,

and on its edges to the shape of the inside of the band or flange D. The top and bottom of the reception-pans A A′, which form the chills proper, are provided with grooves in their faces for the purpose of ventilation. This particular feature more fully and at large appears and is claimed in my patent, No. 114,469, of the United States.

Perforated cores E, with wooden pins for making bolt-holes through the mold-board, as shown and claimed in my patent, No. 147,157, may be used in connection with the lower pan or chill A′, while in the upper chill A, exactly over the location of the perforations E, counterpart recesses are made, which being filled with sand, the bolt-hole cores, being made higher than the thickness of the mold-board, embed their upper ends into this sand, thus insuring perfect holes through the entire thickness of the mold-board, which would not be the case were the cores E short enough to permit the molten metal to submerge their upper ends when poured between the pans A A′.

The proper relative positions of the two pans A A′ are secured by means of suitable pins and holes, or any suitable locking device whereby the upper and lower portions of the flask may be kept in proper apposite relations to each other.

The sprue and gate are formed in sand, which is molded in two parts, in a core-box, F F′, and, when to be used, are secured to the outside of the pans A A′ by means of a suitable frame or box, substantially as shown.

In practical use my double pans or chills are operated as follows: First, the face of the lower pan A′ is wiped clean, and the bolt-hole cores E are placed in position. Second, the recesses for the core-heads in the bottom of the upper pan A are filled with sand, and the surface of the surrounding iron is wiped clean. Third, the top pan A is placed on the lower one, A′, in proper position, guided by the pins, guides, or their equivalent, at the edges of the pan. When pressed down so that the bottom of the upper pan A rests firmly and tightly upon the flange D of the lower pan A′, the dies E embed themselves in the sand which fills the recesses in the face of the upper-pan bottom A. Fourth, the frame or box F, containing the sand in which the sprue and gate are formed, is then attached to the pans' bottoms by the tongue-and-groove arrangement shown, or by any suitable means, the lower section of the frame being first located, after which the second or top section is placed in position. Fifth, hot water is now admitted into the chambers over the two pans A A′, and, after they have become heated sufficiently to drive off any moisture or sweat that may have formed on their faces, the pans or chills are ready for the molten metal. Sixth, the molten metal is now poured into the flask through the sand sprue and gate hereinbefore referred to. Seventh, in about half a minute, more or less, after the molten metal has been poured, the water in the pans commences to boil and generate steam, at which instant an additional quantity of water is forced into the pans in sufficient quantity, and as often as is necessary, to keep them completely filled, for some of the water is forced out of the pans, through escape-pipes B, by the steam-pressure inside. This wastage of water must be replaced, or the pans A A′ would become overheated and break. Eighth, the casting is allowed to remain between the pans or chills A A′ until it cools sufficiently to permit it to be handled with tongs, which will require two minutes, more or less, according to the heat of the molten metal when it is poured, after which the top pan A is removed from the lower pan A′. The casting is now taken out and placed in an annealing-oven, and the operation of casting is repeated, as at first, with the exception of the pans being heated by hot water to drive off the sweat heretofore referred to, inasmuch as the chill-pan faces are kept dry and hot by the heat transmitted and retained from the previous casting.

The water to be used for the first heating of the pans may be heated and supplied by any convenient method.

What I claim is—

1. The process of manufacturing double-faced chilled mold-boards, substantially as described, the same consisting in casting the molten metal between vented metallic chills, while the latter are treated to a bath of hot water, whereby both surfaces of the mold-board are chilled simultaneously.

2. The combination of two counterpart chill-pans, the faces of the chills having vents for the escape of gas, one of said chill-pans being provided with a band or flange, D, upon its outer edge, the height and shape of which regulates and determines the thickness and contour of the finished mold-board, substantially as set forth.

3. The combination of two counterpart chill-pans, the faces of the chills having vents for the escape of gas during the process of casting, the space formed between the chills being of the desired size and form to be imparted to the finished mold-board, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 7th day of April, 1875.

JAMES OLIVER.

Witnesses:
O. B. MAPLES,
R. AUTER.