

(No Model.)

J. R. WHITNEY.

MANUFACTURE OF CHILLED CASTINGS.

No. 258,182.

Patented May 16, 1882.

FIG. 2.

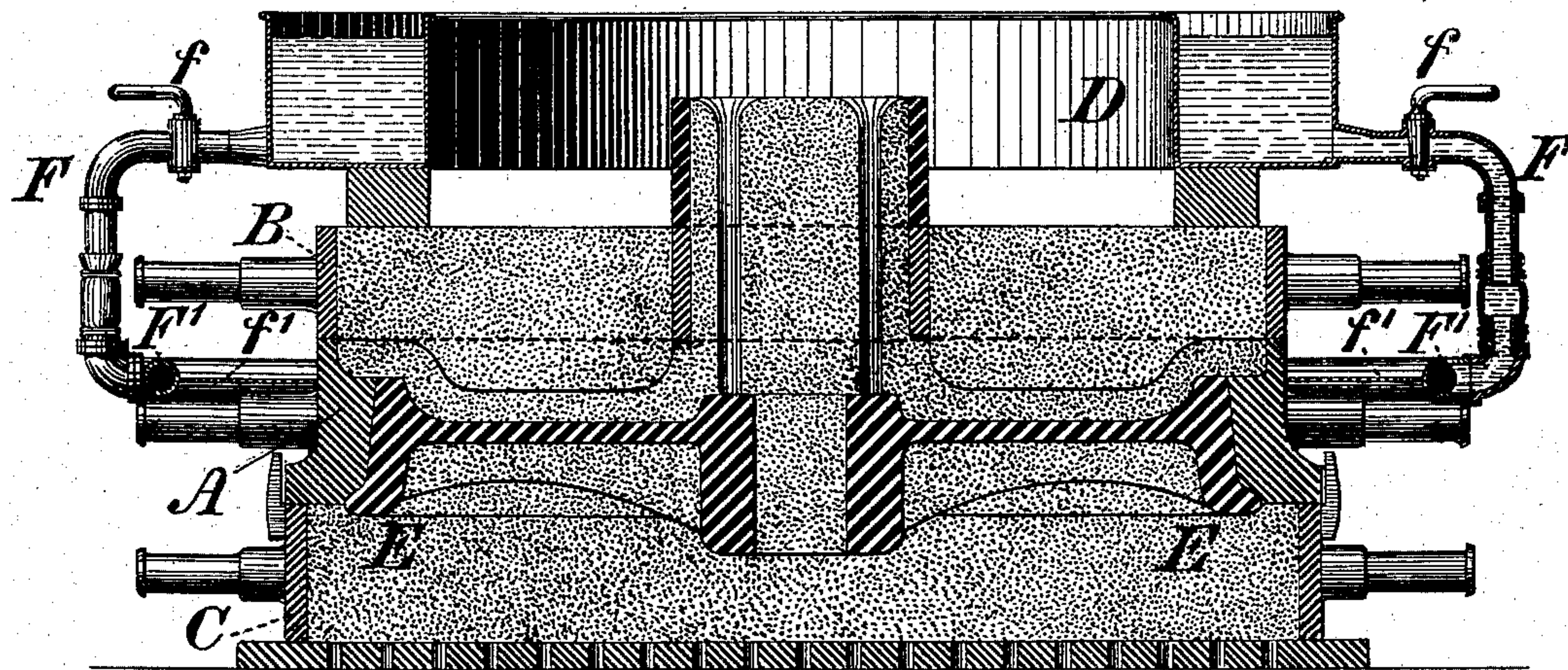
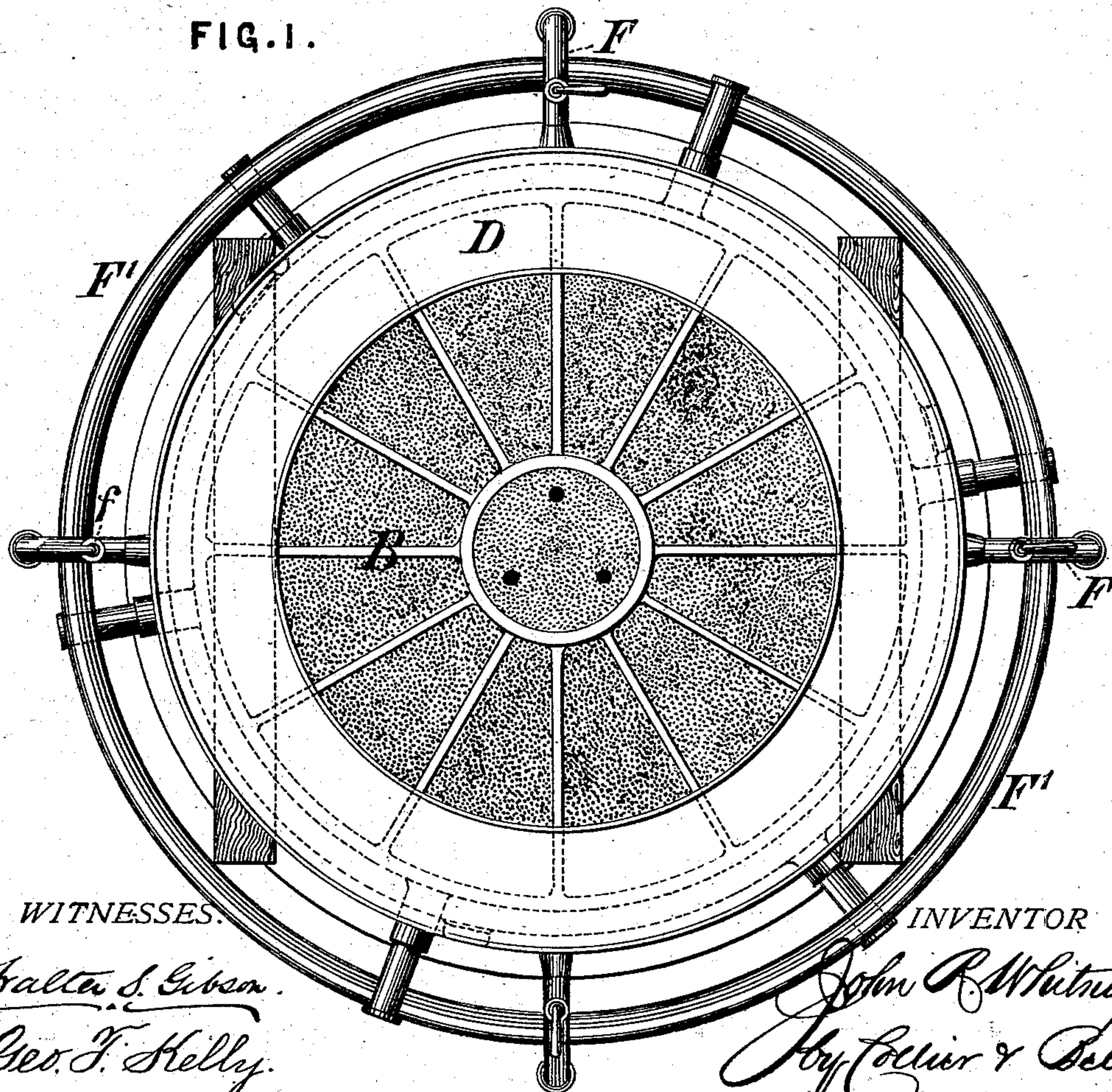


FIG. 1.



WITNESSES.

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MANUFACTURE OF CHILLED CASTINGS.

SPECIFICATION forming part of Letters Patent No. 258,182, dated May 16, 1882.

Application filed November 10, 1881. (No model.)

To all whom it may concern :

Be it known that I, JOHN R. WHITNEY, of Radnor township, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in the Manufacture of Chilled Castings, of which improvements the following is a specification.

The object of my invention is to improve the quality of railroad-car wheels and other chilled castings by utilizing the expansion of metals in solidifying and their subsequent contraction. When the molten metal is poured into the mold and comes in contact with the chill, as soon as it solidifies it expands with great force and perfectly fills the chill. It then immediately begins to contract. The chill, however, as soon as it begins to be heated, expands, if free to move, or breaks, if not. The result of such action is that as soon as solidification of the metal takes place the contact between the chill and the casting is broken, and the space between the two continually grows greater and greater as the chill expands and the casting shrinks. Various practical difficulties arise on this account—such as inequality in the sizes of castings made in the same chill, variableness in the depth chilled in different parts of the casting, liability to chill-cracks, and a gradual lessening of the strength of the chill. Where the chill is bound by clamps or does not set perfectly level, its unequal expansion at different points causes variableness in the depth of the chilled portions of the casting, as well as irregularity in the form thereof. The obvious mode of avoiding these objections is by maintaining the chill in contact with the metal within it from the period when the metal is poured until the stage when the chilling process is completed.

Heretofore, while the necessity of maintaining a continuous contact between the chill and the molten metal may have been recognized, such theory has not, to my knowledge, been successfully applied in practice. A method which, recognizing the validity of this theory, reduces it to practical and successful action is the first part of my invention. This consists briefly in a method of applying in suitable quantities to and distributing over the outer surface of the chill a series of minute jets or currents of water or other cooling medium.

The second feature of my invention relates to the mechanical appliances used in conducting the improved method.

The improvements claimed are hereinafter more fully set forth.

The state of the art to which my invention relates evinces that the employment of a chill surrounded by a chamber through which a stream of cold water is passed for the purpose of abstracting the heat from the surface of the casting is old, an instance being shown in the United States Patent of G. W. Bollman and W. Neemes, No. 50,680, dated October 31, 1865. Such device and its operation differ from my invention, as do the ordinary chill and the process as conducted therewith, and for the following reasons, respectively: In the water-chambered chill the object sought and effect produced in practice is to prevent the expansion of the chill, and thereby hold it in contact with the contained metal, and it is difficult, if not impracticable, to apply the cooling medium at a uniform temperature throughout to all portions of the surface to be chilled, specially in view of the liability of the chill to break and endanger the lives and limbs of the workmen. In the ordinary chill free and unlimited expansion is permitted and no contraction induced, and in each of the above devices the expansion of the metal in solidification is overlooked and unprovided for.

My invention, recognizing the existence and results of the expansion of the metal when solidifying, provides a limit and control, and not a prevention, of the induced expansion of the chill, and a contraction thereof in proper sequence, the result of which is the maintenance of a continuity between the chill and its contents during the operation of forming a chilled casting, which is not attainable under either of the systems above referred to.

In the practice of my invention I employ a chill or metallic mold of the ordinary form, within which the molten metal is poured and allowed to solidify. At the instant when contact between the liquid metal and the chill first takes place the heat of the former begins to expand the latter, such expansive action being thereafter supplemented by that of the metal within the chill at the moment of solidification. In order to limit and retard, without wholly preventing, the expansion of the metal

and the chill, I apply to and distribute as uniformly as may be over the outer surface of the chill a cooling medium, preferably a series of minute jets or currents of cold water, in such regulated proportions as will permit the chill to expand only to such degree as will maintain it continuously in contact with the metal within it until the solidification and expansion of the latter is completed. At this period the contraction of the casting commences, and under the ordinary practice it would cease to be in contact with the chill, by reason of the fact that means have not been heretofore provided for effecting the contraction of the latter. This result I attain under my invention by continuing the application of the cooling medium to the chill, increasing the supply, if necessary, until the contraction of the casting, which is accompanied by a corresponding and coincident contraction of the chill, effected by such application is completed, the result being the complete maintenance of contact between the chill and contained metal to the close of the operation and the attainment of corresponding regularity and perfection in the chilled casting produced.

The accompanying drawings illustrate an apparatus in which my process, as hereinbefore described, can be conveniently practiced, Figure 1 being a plan or top view, and Fig. 2 a vertical central section.

The construction and relative arrangement of the chill A, cope B, and drag C, and the manner of molding and pouring the casting E therein, are similar to the ordinary practice, and, being familiar to those skilled in the art, need not be here specifically described.

A reservoir, D, for the cooling medium employed, which is by preference cold water, is placed in any convenient position adjacent to but out of contact with the chill A, the reservoir being in this instance of annular form and located above the cope B.

A series of supply-pipes, F, each provided with a regulating cock or valve, *f*, communicate at their upper ends with the reservoir D and at their lower with a discharge-pipe, F',

which completely surrounds the chill A at a uniform distance therefrom at all points, and which on its surface adjacent to the chill is perforated with numerous small openings, *f'*, through which a series of currents or jets of the cooling medium received from the supply-pipes may be directed upon the periphery of the chill for the purpose of exerting thereon the cooling action hereinbefore described in the operation of forming the casting.

It will be obvious that the construction and relative location of the reservoir and supply and discharge pipes may be modified in sundry particulars without departing from the spirit of my invention, the requirement of which is the provision of proper and convenient facilities for the application of the cooling medium to the exterior of the chill.

I am aware that chills provided with a surrounding chamber, into which water is introduced for the purpose of abstracting heat from the chill and the metal cast therein, have been heretofore known, and do not therefore broadly claim either cooling a chill by the application of water, or, broadly, apparatus for effecting such result.

I claim as my invention and desire to secure by Letters Patent—

1. The improvement in the art of manufacturing chilled castings, which consists in the suitable application to and distribution over the outer surface of the chill of a series of minute jets or currents of water or other cooling medium, substantially as set forth.

2. In an apparatus for the manufacture of chilled castings, the combination of a chill, a reservoir for water or other cooling medium, a valved supply pipe or pipes, and a discharge-pipe connected to said supply-pipe, and provided with a series of perforations or exit-nozzles, each adapted to discharge a jet or current of cooling medium upon the exterior of the chill, substantially as set forth.

JOHN R. WHITNEY.

Witnesses:

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