W. R. JONES.

PROCESS FOR COMPRESSING INGOTS WHILE CASTING.

No. 186,576. Patented Jan. 23, 1877.

Fig. 1.

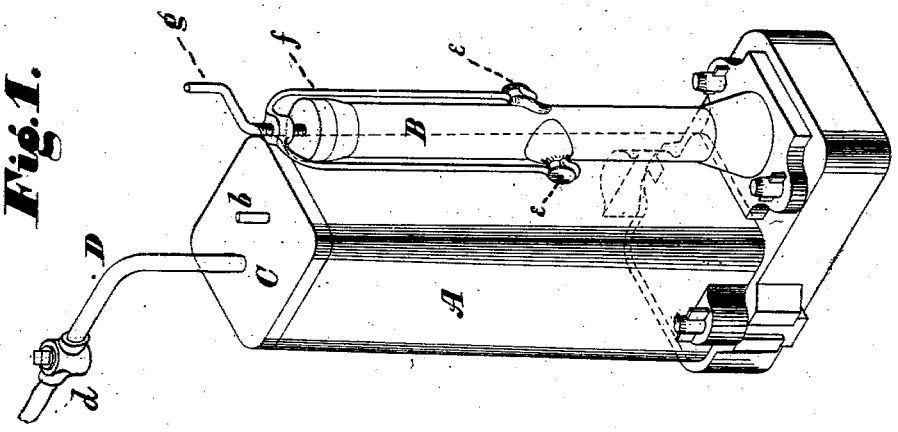


Fig. 2.

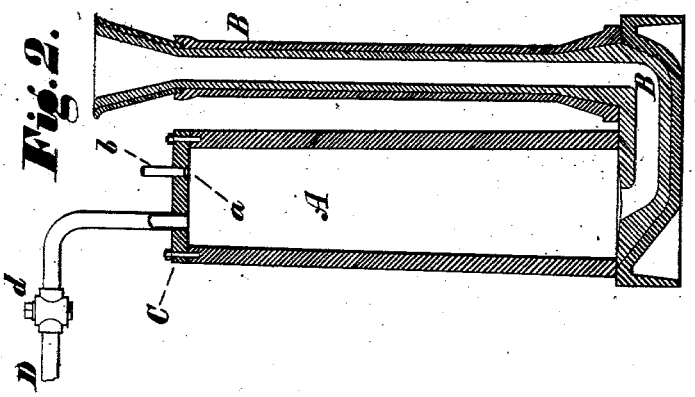
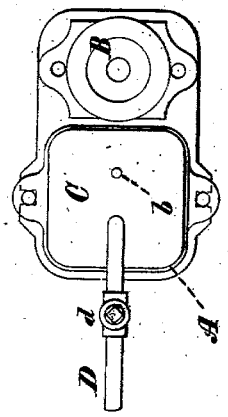


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM R. JONES, OF BRADDOCK'S, PENNSYLVANIA.

IMPROVEMENT IN PROCESSES FOR COMPRESSING INGOTS WHILE CASTING.

Specification forming part of Letters Patent No. **186,576**, dated January 23, 1877; application filed October 16, 1876.

To all whom it may concern:

Be it known that I, WILLIAM R. JONES, of Braddock's, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in the Process of Compressing Ingots while Casting; 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, in which—

Figure 1 is an isometrical perspective of the apparatus. Fig. 2 is a longitudinal vertical section. Fig. 3 is a plan of same.

This invention relates to improvements in the process of compressing ingots while casting, and apparatus therefor; and consists in admitting a direct steam-pressure upon the surface of the molten metal, and also in allowing the steam to superheat after closing all vents, and in the apparatus, as hereinafter fully described.

My invention has reference particularly to the casting of Bessemer ingots, though it may be applied to foundry purposes generally. It is a well-known fact that by reason of the process used in the Bessemer plant the resulting metal is honey-combed and extremely heterogeneous. Consequently it requires much reworking to render it solid and homogeneous. This irregularity of the ingot makes it difficult—almost impossible—to produce a constant and invariable quality of finished material, no matter with how great precision the conversion is accomplished, because no two ingots will be honey-combed in the same manner and proportions; and as there can be no positive determination of the interior, so there can be no accurate standard of comparison between one ingot and another as to the amount of rolling or hammering necessary to bring them to the same quality of fineness and homogeneity. This defect is one which steel-producers have long endeavored to overcome, but with little success, as the state of the art shows. I propose, then, to make use of a process by means of which the ingots will be solid throughout their whole structure, so that when rolled or hammered equally all the products shall be of a definite uniform quality, which can be constantly maintained, making the product in every way far more reliable and marketable, enhancing its value to the consumer, and enriching the producer.

The accompanying drawings illustrate my invention as applied to a single Bessemer flask, A, which is of the usual form, having the vertical sprue B, leading the metal down to the ingate and into the bottom of the flask, whence it rises by gravity. The shape of the flask or style of ingate or sprue is not of the essence of my invention, though I have adopted this form as being already in use, and very suitable to my purposes. The flask A is topped by a strong cover, C, tightly clamped down, which has a vent-hole, *a*, for the escape of air and gases from the flowing metal. This vent has a removable plug, *b*, fitted to it. Coming from the boiler is a steam-pipe, D, which passes through the cover C, and delivers inside the flask at the top. The pipe D is fitted with a stop-cock, *d*, which may be at any point, but preferably near the point of delivery. It may also be desirable to have a flexion-joint on the pipe, to facilitate the removal of parts when necessary. On the shaft of the sprue B are two pivot-lugs, *e e*, which constitute a bearing for the bail or arch *f*, which is provided with an adjusting-screw, *g*, which bears down upon the cover *h* of the sprue and binds it in place.

The apparatus being understood, the operation is as follows: Everything being in readiness for pouring, the sprue uncovered, the vent *a* open, and the cock *d* shut, the ladle is swung over the sprue and the metal allowed to flow in till the flask is almost full; then the usual sand or loam is filled into the top of sprue B, its cover *f* applied, and screw *g* tightened down. After this the plug *b* is driven into vent *a;* then cock *d* is opened, and when the steam has filled the space at the top of the flask the vent is closed. This takes but an instant's time. There is, to begin with, an initial pressure downwardly upon the fluid contents of the flask equal to the pressure of the boiler. Ordinarily this is about seventy-five pounds per square inch, which, upon an ingot twelve inches square, would give a pressure of nearly eleven thousand pounds. But

the vividly-intense heat of such a molten mass of incandescence will immediately effect the superheating of the steam above it, and almost instantaneously s[illegible]d the pressure up to an enormous degree. The result is that the ingot is compressed into a perfectly solid and homogeneous mass of metal, which, when cut in sections, exhibits a smooth and even structure throughout. It necessarily follows that such an ingot requires little or no reworking, nothing being needed further than the usual reduction to form and gage. Hence, since all the ingots produced are of the same degree of perfect solidity and homogeneity, all products of similar size and shape will have precisely the same tensile strength—a result never before accomplished in wrought-iron or steel.

Instead of a single flask, groups may be used, the operation being the same, with the necessary disposition of steam pipes and cocks.

Having thus described my invention, I claim—

1. The herein-described process of compressing ingots while casting, consisting in admitting direct steam-pressure to the surface of the otherwise confined molten metal, substantially as set forth.

2. In the process, as herein described, of compressing ingots while casting, the method of utilizing the expansive force of steam, consisting in first admitting live steam to the surface of the otherwise confined metal, then closing the steam-inlet and allowing the steam to superheat, substantially as and for the purposes specified.

3. In an apparatus for compressing ingots while casting, the sprue B, provided with an adjustable cover, and the steam-supply pipe D, having a cock, *d*, in combination with the flask A, or group of flasks, having an outlet or outlets for the escape of air, and constructed substantially as described, so that the same may be opened and closed at will, as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 11th day of May, 1876.

WILLIAM R. JONES.

Witnesses:
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THOS. J. McTIGHE.