(No Model.)

J. HENDERSON.

MOLD FOR CASTING STEEL.

No. 316,544. Patented Apr. 28, 1885.

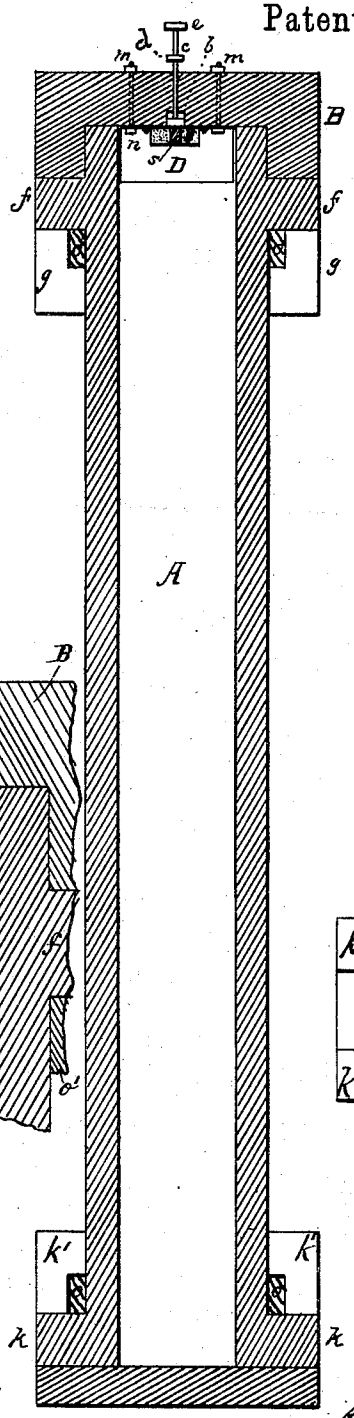


Fig. 1

Fig. 2

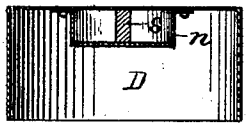


Fig. 4.

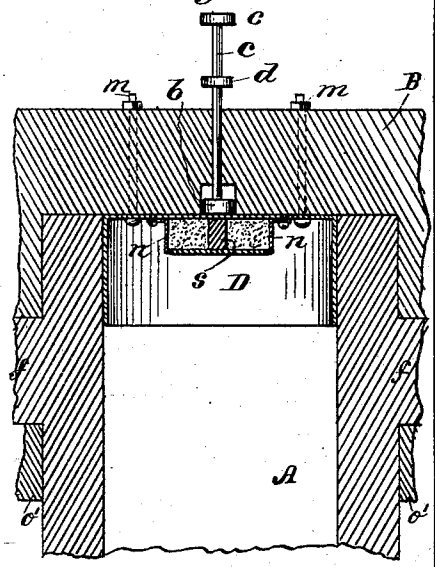
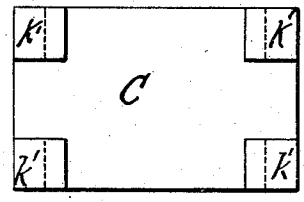


Fig. 3



WITNESSES.

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UNITED STATES PATENT OFFICE.

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MOLD FOR CASTING STEEL.

SPECIFICATION forming part of Letters Patent No. 316,544, dated April 23, 1885.

Application filed October 7, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES HENDERSON, formerly of the city, county, and State of New York, now a resident of Bellefonte, in the county of Centre and State of Pennsylvania, have made an invention of certain new and useful Improvements in Molds for Casting Cast-Steel; and I do hereby declare that the following, in connection with the accompanying drawings, is a full, clear, and exact description of the same.

My invention relates to the molds in which steel is cast and submitted to gaseous pressure for the purpose of expelling the gases contained in the metal and condensing the latter; and the invention consists of certain combinations of a mold closed at the bottom with devices by which the top of the mold can be closed gas-tight with rapidity and at low cost, and the gas for compressing the steel can be generated within the inclosed mold.

The said combinations are recited in the claims at the close of this specification; and in order that these combinations may be fully understood, I have represented in the accompanying drawings, and will proceed to describe, the best mode in which I have embodied them for practical use previous to the date of this application.

Figure 1 of the said drawings represents a central longitudinal section of the ingot-mold and its appurtenances. Fig. 3 represents a plan of the shoe or base of the mold. Fig. 2 represents a section upon a larger scale of the means for making the head of the mold gas-tight. Fig. 4 represents a section of the inverted cup and cartridge chamber, drawn on a larger scale than the other figures.

The said ingot-mold is composed of the body A, the shoe or base C, and the cover B. The body A, which forms the upright walls of the ingot-mold, is fitted to the base or shoe C, so that the ingot-mold is closed at the bottom for the purpose of retaining the liquid steel which is cast in the mold. The body and the shoe or base are strongly secured to each other, so as to prevent them from being separated by the internal pressure when the steel is compressed.

The means which I prefer for securing the body and base are the lugs *k*, which project from the body, and corresponding gib-headed lugs, *k'*, which project from the base C, the said lugs of the body and base being held together by strong keys *o*, which are passed through holes formed in said lugs, as represented in Fig. 1. The upper end of the mold is closed by the cover B, which can be firmly secured to the body A by means of lugs and keys. The lugs *f* of the body project laterally from it, and the corresponding gib-headed lugs, *g*, of the cover project downward from it. When the top of the mold is to be closed, the cover is applied to the upper end of the mold, and the wedges *o'* are driven in between the lower sides of the lugs of the body and the gib-heads of the lugs of the cover.

The gas for compressing the steel is generated from solid material introduced into the mold.

In order that the joint between the cover and the body of the mold may be closed gas-tight, the inverted shallow cup D is employed. This cup is by preference made of thin soft sheet steel or iron drawn to the required shape in a die. This cup is fastened to the bottom of the cover by the bolts *m*. The cup conforms in shape and size with the upper end of the mold, and the rim of the cup projects by preference about one and one-half inch below the joint between the cover and the mold; but my invention is not limited to this or any particular length.

In order to hold the solid material from which the gas is generated for compressing the steel, a chamber, *n*, is formed in the shallow cup. This chamber may be made of pasteboard and pasted fast to the cup, or it may be of sheet iron and riveted fast to the cup. The bottom of the chamber should be tightly fitted to its walls, but should not be fastened to them, so that the said bottom may be readily pushed out of the chamber for the purpose of liberating the gas material.

In order that the bottom of the chamber may be readily forced out, the cover of the mold is fitted with a plunger or piston, *b*, the rod *c* of which is fitted with a collar, *d*, to limit the distance to which the plunger can be moved in a downward direction. The rod *c* is also fitted at its upper end with a knob, *e*, which can be struck with a hammer for the

purpose of driving the plunger downward and displacing the gas material in the chamber *n*.

In order to facilitate the displacement of the bottom of the chamber, a wooden plug, *s*, is by preference placed between the bottom of the cup D and the bottom of the chamber, so that when the blow is applied to the plunger the blow is propagated to the bottom of the chamber *n* by the plug.

The gas material which I prefer to use for generating the gaseous pressure within the mold is a compound of saltpeter and charcoal, similar to gunpowder, and consisting of twenty parts, by weight, of charcoal-powder to eighty of saltpeter. This gas material is secured in the chamber *n* of the cup D before the cover of the mold is closed.

When operating with the above-described mold, the liquid steel is poured into the mold before the cover is applied, the mold being filled to within about one inch of its top. Then the cover B, with the charge of gas-making material within the inverted cup, is applied to the mold and made fast thereto by the wedges. The top of the rod of the plunger is then struck a blow which ejects the gas material from the chamber, so that it falls upon the hot metal beneath, where, if the gas material be the powder above described, it burns and generates gases of high pressure, which compress the metal. When the space between the surface of the metal and the cover is thirty cubic inches, one-fourth of an ounce of said powder, when burned, will produce a pressure of about five hundred pounds to the square inch of surface, and the mold must be strong enough to withstand this pressure. The pressure can be increased by increasing the quantity of powder, the mold being made sufficiently strong to withstand the extra pressure.

Ice may be used in place of the above-described powder, the ice being applied to the chamber *n* directly before the cover is secured to the mold. A cubic inch of ice may be used for every thirty cubic inches of space between the surface of the steel and the under side of the cover.

The ice, when detached from the chamber by the action of the plunger, will generate a cubic foot of steam at the ordinary temperature and pressure of the atmosphere; but as the steam is confined in the small space left unfilled by steel in the upper end of the mold, its pressure is greatly increased, and is increased further by the heat from the hot metal in the mold. The bottom of the mold and the surface of its base are preferably planed true, so that they make a close joint to prevent the escape of the steel. The upper end of the mold and the surface of the under side of the cover are also made true, and the pressure of the gas generated by the gas material expands the cup of sheet metal so that the mold is gas tight.

I claim as my invention—

1. The combination, substantially as before set forth, of the mold closed at the bottom, the cover for the same, and the inverted cup of thin material arranged beneath the said cover, as and for the purpose set forth.

2. The combination, substantially as before set forth, of the mold closed at the bottom, the cover for the same, the inverted cup of thin material, and the cartridge-chamber, as and for the purpose set forth.

3. The combination, substantially as before set forth, of the mold closed at the bottom, the cover having an aperture, the inverted cup of thin material, the cartridge-chamber, and the plunger, for the purpose stated.

In witness whereof I have hereto set my hand.

JAMES HENDERSON.

Witnesses:
EDWARD R. BREVOORT,
J. E. WARNER.