(No Model.)

J. MUNTON.

MOLD FOR CASTING BLOOMS.

No. 352,559. Patented Nov. 16, 1886.

Fig. 1.

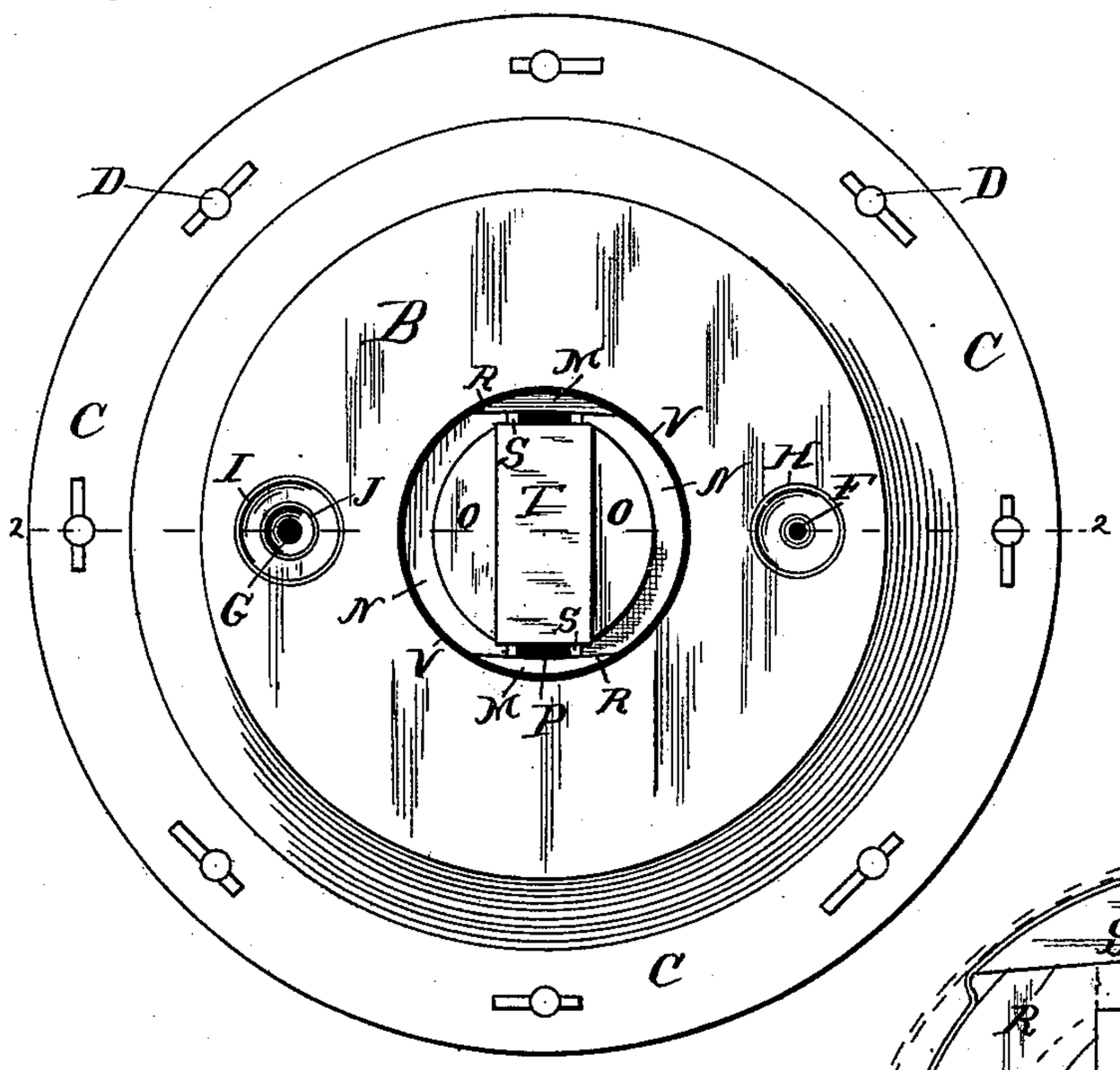


Fig. 4.

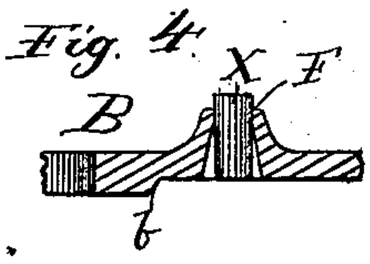


Fig. 3.

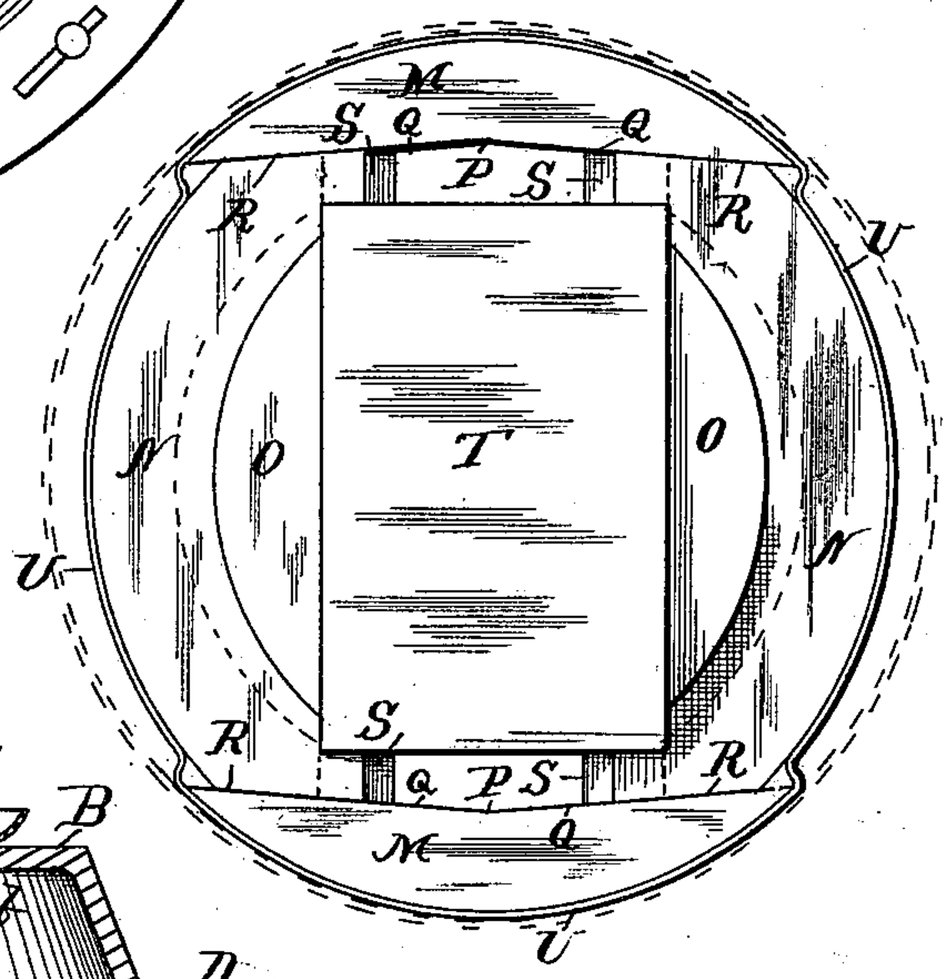
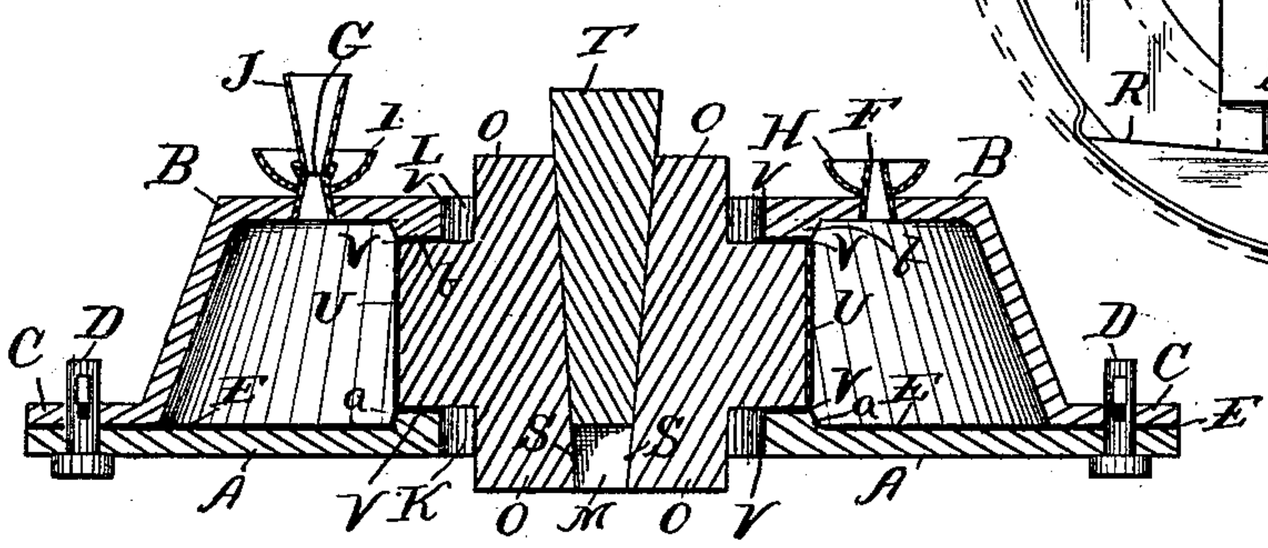


Fig. 2.



Witnesses:
Lew. E. Curtis.
A. W. Munday.

Inventor:
James Munton.
By Munday, Evarts & Adcock
his Attorneys:

UNITED STATES PATENT OFFICE.

JAMES MUNTON, OF CHICAGO, ILLINOIS.

MOLD FOR CASTING BLOOMS.

SPECIFICATION forming part of Letters Patent No. 352,559, dated November 16, 1886.

Application filed December 30, 1885. Serial No. 187,117. (No model.)

To all whom it may concern:

Be it known that I, JAMES MUNTON, a subject of the Queen of Great Britain, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Molds for Casting Blooms, of which the following is a specification.

Steel blooms used in the manufacture of tires for car and locomotive wheels have heretofore usually been cast in one solid piece, the casting being first thinned and consolidated under the hammer, and then the central opening punched through the same to adapt it for the rolls. This method is not only expensive, but it also tends to stretch and fray or otherwise injure the metal, especially at the periphery of the bloom, where it undergoes the greatest strain in the subsequent process of rolling the bloom into the tire, and where the subsequent wear comes upon the tire.

To produce good tires it is essential that the fiber or character of the metal should not be injured by any previous manipulation before being subjected to the rolling operation, and especially that that portion of the metal at the periphery of the bloom should be in good condition.

It is the object of the present invention to provide a means of producing steel blooms of a perfectly solid and homogeneous character, free from air-holes and other defects, without requiring any hammering, punching, or other manipulation of the metal after it is cast, so that when the bloom is put into the rolls to be rolled into a tire the metal will be in good condition, and not injured or exhausted by any previous manipulation. To accomplish this result I cast the bloom in an annular mold of about the form the bloom is desired to be, and in order to solidify the metal, or render it dense and solid and perfectly homogeneous throughout and prevent air-holes or other defects, I, immediately after filling the mold with the molten metal, securely stop or seal up the vent and gate openings by inserting plugs therein, or by other suitable means, and then subject the molten metal in the mold to great pressure, whereby it is compressed and rendered dense and homogeneous in character before cooling or solidification. The core, inner ring, or wall of the annular mold is made in several sections or parts, with wedging or inclined ends or faces, so that they may be expanded radially in all directions against the molten metal confined in the annular mold. These segments are preferably four in number, and they may be expanded or forced outward by a wedge operated by a hydraulic press, hammer, or other suitable power. If the wedging-segments employed are four in number, the operating-wedge should have but two faces, the two faces of the wedge operating to spread radially the two wedging-segments against which it bears, and these two wedging-segments in turn operating to spread radially the alternate wedging-segments against which the ends of the former abut. In this way the inclined ends or abutting faces of the several segments are forced together, so as to form a perfectly-tight joint between the segments by the pressure of the wedge exerted on the one side and the molten metal on the other. It will thus be seen that the greater the pressure exerted by the wedge or other power and the more the segments or parts of the core are expanded the tighter will be the joints between the several parts. The base-plate of the mold will preferably be made about flat, and the upper or removable plate or part of the mold should be of a frustum shape. The expansible core or ring segments forming the inner wall of the annular mold fit between the upper and the lower plates of the mold, so that they may be expanded radially between said plates. As the metal surrounding the outer walls of the mold has a tendency to chill or cool as soon as it is poured and before it is practicable to seal the gate and vent openings of the mold and exert the requisite force or pressure upon the expansible core to expand the same and compress the molten metal, I make the expansible core somewhat less in depth or thickness than the interior of the mold, so that when the segments or parts of the core are expanded radially outward the upper and lower edges of the same will not encounter or be resisted by the chilled and partly-solidified thin portion of the metal near the top and bottom plates of the mold. I prefer, however, to make the expansible core or segments almost equal in depth to the thickness of the bloom. These segments may, however, be made very much less in thickness—as, for example, one-third

of the thickness of the bloom—without departing from my invention. To prevent the molten metal from coming directly in contact with the expansible core or wedging segments, I surround the same with a thin band of sheet metal or other suitable material, which also serves to hold the segments together and in proper shape while the metal is being poured into the mold, and to afford a resistance for the wedge until the mold is filled with the molten metal and sealed. This band, which is preferably made of sheet-iron, also tends to prevent the metal from getting in between the joints of the expansible core. This thin band will be very soon raised to a white heat by the molten metal, and will consequently then offer little resistance to the expansion of the core or ring segments. It will of course amalgamate with the bloom, but it can be readily removed upon reheating the bloom after it has been taken from the mold. The vent and gate openings may be closed in any suitable manner—as, for example, by driving plugs therein. For this purpose I have also devised a means of quickly cooling and solidifying the sprue, and thereby sealing these openings, by surrounding the gate and vent holes or nozzles with annular receptacles for water; but the particular method or means of sealing the mold is immaterial to the other features of my invention, and any means or devices for this purpose may be used.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a plan view of a mold embodying my invention. Fig. 2 is a central vertical section on line 2 2 of Fig. 1, and Fig. 3 is an enlarged view of the expansible core or the wedging-ring segments which form the inner wall of the annular mold. Fig. 4 is a detail sectional view showing the plugs for sealing the gate and vent openings.

In said drawings, A represents the base-plate of the mold, and B the top or upper portion of the same, which, as shown in the drawings, may be frustum-shaped and provided at its lower edge with an annular flange, C, adapted to be connected with the base-plate by means of key-bolts D, which may be tightened, so as to form a close joint, packing E, of asbestus or other suitable material, being interposed between the flange C and base-plate A.

The upper portion, B, of the mold is provided with the vent and gate openings F and G, having upwardly-extending necks, to which are attached the annular concave flanges H I, forming dishes, into which, after the mold has been filled, water may be poured for the purpose of cooling the sprue, and thus sealing the mold. The neck at the gate-opening is also provided with the usual bell-mouthed pouring-gate J.

The base-plate A and upper portion, B, of the mold are provided with the central circular openings, K L, which together form the seat for the expansible core, which I shall now proceed to describe. Said core is preferably composed of four pieces or segments, two of which, M M, may be described as the "end" pieces, while the remaining two, N N, may be denominated the "side" pieces. The parts of the core will be made to fit neatly between the top and bottom of the mold, in which the core may be expanded laterally in all directions, and the several parts of said core may be formed with shoulders O, extending upwardly and downwardly through the openings L K of the mold. The end segments or end pieces of the core are angular or wedging on their inner sides or inclined from their ends to the central point, P, the planes or sides Q Q forming an obtuse angle, as shown. The ends of the side pieces or segments, N N, are cut off wedging or angular, as at R R, so as to register with the inner sides, Q Q, of the end pieces, M, thus enabling the parts to be so placed together as to form the collapsible cylindrical core, as indicated in Fig. 3 of the drawings. The inner sides of the side pieces, N N, are beveled or inclined, as shown at S S, to receive the wedge T, which is inserted between the side pieces for the purpose of expanding the core. It will be seen that when the said wedging side pieces or ring segments are forced apart by the wedge their angular or wedging ends, bearing against the angular inner sides of the end pieces or ring segments, M M, will force the latter outwardly and apart from each other, thus gradually expanding the entire core in all directions.

The core is in practice to be surrounded or encircled by a ring or band, U, of sheet metal, which should be of sufficient size to encircle the said core when the latter is fully expanded, the object of said band being partly to prevent the molten metal from coming into direct contact with the core, and partly to prevent the formation of fins or ridges at the joints of the segments composing the core. When the core is placed in the mold in its collapsed condition, the said sheet-metal band will be indented at the ends of the end segments, as shown in Fig. 3, so as to conform as nearly as possible to the outline of the collapsed core, and thus enable the mold to be completely filled with the molten metal.

Packing V, of asbestus or other suitable material, is to be interposed between the core and the top and bottom of the mold for the purpose of making the joints at these points absolutely close and tight, and thus avoid the formation of fins upon the casting. The gate and vent openings may be closed by plugs instead of the solidification of the sprue; or still other means or devices for this purpose may be employed.

In operation the core in its collapsed condition is first placed upon the base-plate of the mold, the packing V being interposed between the under side of the core and said base-plate. The packing V is then placed upon the upper side of the core, and the upper portion, B, of the mold is then adjusted and secured by means

of the bolts D, the packing E being placed between the flange C and the base-plate, as described. The mold is now ready for filling. When it is full of the molten metal, water or other chilling material is poured or placed in the concave flanges or dishes H I at the vent and gate openings, thus chilling the sprue at these points and sealing the mold; or the mold may be sealed in other ways. The mold is now to be placed in a hydraulic or other suitable press or under a hammer, where the wedge T may be forced downwardly between the sides of the core, the ends and sides of which will thus be simultaneously expanded in all directions, thereby compressing the metal contained in the mold and forming it into a completely solid and homogeneous mass. The vent and gate openings having been previously sealed in the manner described, no escape of the metal is possible at these points, and owing to the disposition of the packing E V and the band U, surrounding the case, a smooth and perfect casting, free from fins and flaws, will be insured.

The upper and bottom plates of the annular mold are provided with shoulders or projections *a* and *b*, so that the depth or thickness of the expansible core or segments M N is somewhat less than the distance between the plates A B or the thickness of the bloom to be cast, and consequently the outward or radial movement of the segments M N will not be resisted by the thin portion of the metal immediately in contact with the plates A B, and which is of course more or less chilled.

By my improved construction of the core, as herein described, the segments or pieces forming said core invariably abut closely against each other at the joints, which latter always remain tight and close, no matter to what extent the said core may be expanded or collapsed. It will be noticed that when the core is collapsed the ends of the end segments extend beyond the periphery of the side segments; but when the latter are forced apart the contour of the core will assume a circular form, and even if the expansion is continued until the periphery of the side sections comes beyond the ends of the end sections the circular outline will be departed from only to a very slight and practically inappreciable extent. The preservation of the smooth and regular outline, which it is so desirable to attain, is greatly assisted by the band U, which encircles the case, as described, and prevents any portion of the molten metal from entering the joints between the segments composing the core. The expansion of the latter is thereby also to some extent facilitated.

I would have it understood that while I have in the foregoing described the construction and arrangement of parts which I prefer, yet I do not limit myself to the same.

X represent plugs which may be driven into the gate and vent openings for closing the same. These plugs should fit the openings closely, so as not to project into the casting, but only about flush with the inner wall of the mold surrounding the openings. The gate-opening, instead of being located in the upper plate of the mold, may be located at any other convenient point, and it is sometimes preferable to locate the same near the bottom of the mold and force the metal in under pressure.

The number of the wedging-segments constituting the expansible core may be greatly varied, though it is preferable to employ four, as shown in the drawings. The wedge should have only half as many operating-faces as there are segments, so that only each alternate segment is forced out radially by the wedge directly, while the remaining segments are forced out radially by the wedging ends of the segments against which they abut. The wedge operating thus upon each alternate segment only, the resistance or pressure of the surrounding metal serves to press and force the segments together and form perfectly tight joints at their abutting faces or wedging ends.

Instead of employing a wedge to force out the segments, other equivalent or substitute devices may be employed.

I claim—

1. An annular mold provided with means for sealing the same, and having an inner wall or core consisting of radially-expansible segments abutting against each other at their ends, and each of said segments having curved outer faces which bear against the molten metal or bloom, substantially as specified.

2. The annular mold provided with means for sealing the same, having an inner wall or core consisting of radially-expansible wedging-segments abutting against each other at their ends, in combination with a wedge having operating-faces acting directly against only the alternate ones of said segments, and each of said segments having curved outer faces which bear against the molten metal or bloom, substantially as specified.

3. The annular sealed mold, having an inner wall or core, consisting of radially-expansible wedging-segments abutting against each other at their ends, in combination with a wedge having operating-faces acting directly against only the alternate ones of said segments, and a band, as B, surrounding said segments, substantially as specified.

4. The combination, with the annular mold-plates A B, of radially-expansible wedging-core segments N M, fitting between said mold-plates A B, means for sealing said mold, and a wedge, T, operating directly against only the alternate segments N, each of said segments having curved outer faces which bear against the molten metal or bloom, substantially as specified.

5. The combination, with annular mold-plates A B, provided with annular shoulders *a b*, of radially-expansible segments N M, substantially as specified.

6. The combination, with an annular mold and means for sealing the same, of radially-expansible segments N M, said segments N M

having inclined or wedging faces, of the segments M M, and a band, B, surrounding said segments, and a wedge, T, for expanding the same radially, substantially as specified.

7. A mold or apparatus for the manufacture of annular castings, comprising a mold-box, the upper and lower sides of which are provided with central openings or apertures, an expansion-core having shoulders extending through said openings, a sheet-metal band encircling the said core, suitable packing, and means for chilling the metal at the vent and gate openings, and thereby sealing the mold previous to the expansion of the core, substantially as set forth.

8. An expansion-core composed of the end segments having angular inner sides, as described, and side segments having angular ends abutting or bearing against the angular inner sides of the end sections, in combination with a sheet-metal ring or band encircling the said core, and means for expanding said core, substantially as specified.

9. A mold consisting of a separable base and upper portion, in combination with an expansible core, interposed packing, and a sheet-metal ring or band encircling the said core, substantially as specified.

10. In an apparatus for the manufacture of annular castings, a mold composed of a base-plate, an upper portion having vent and gate openings, and provided with an annular flange at its lower edge, and suitable connecting-bolts, said mold being equipped with an expansion-core, and packing interposed between the top and bottom of the mold and the upper and under sides of said core and between the base of the mold and the flange of the upper portion of the latter, substantially as set forth.

11. A mold or apparatus for the manufacture of annular castings, equipped with an expansion-core, the latter being encircled by a sheet-metal ring or band, substantially as set forth.

12. A mold or apparatus for the manufacture of annular castings, having concave flanges formed upon or attached to necks at the vent and gate openings, for the purpose of cooling the metal at these points, and thereby sealing the mold, substantially as specified.

JAMES MUNTON.

Witnesses:
H. M. MUNDAY,
LEW. E. CURTIS.