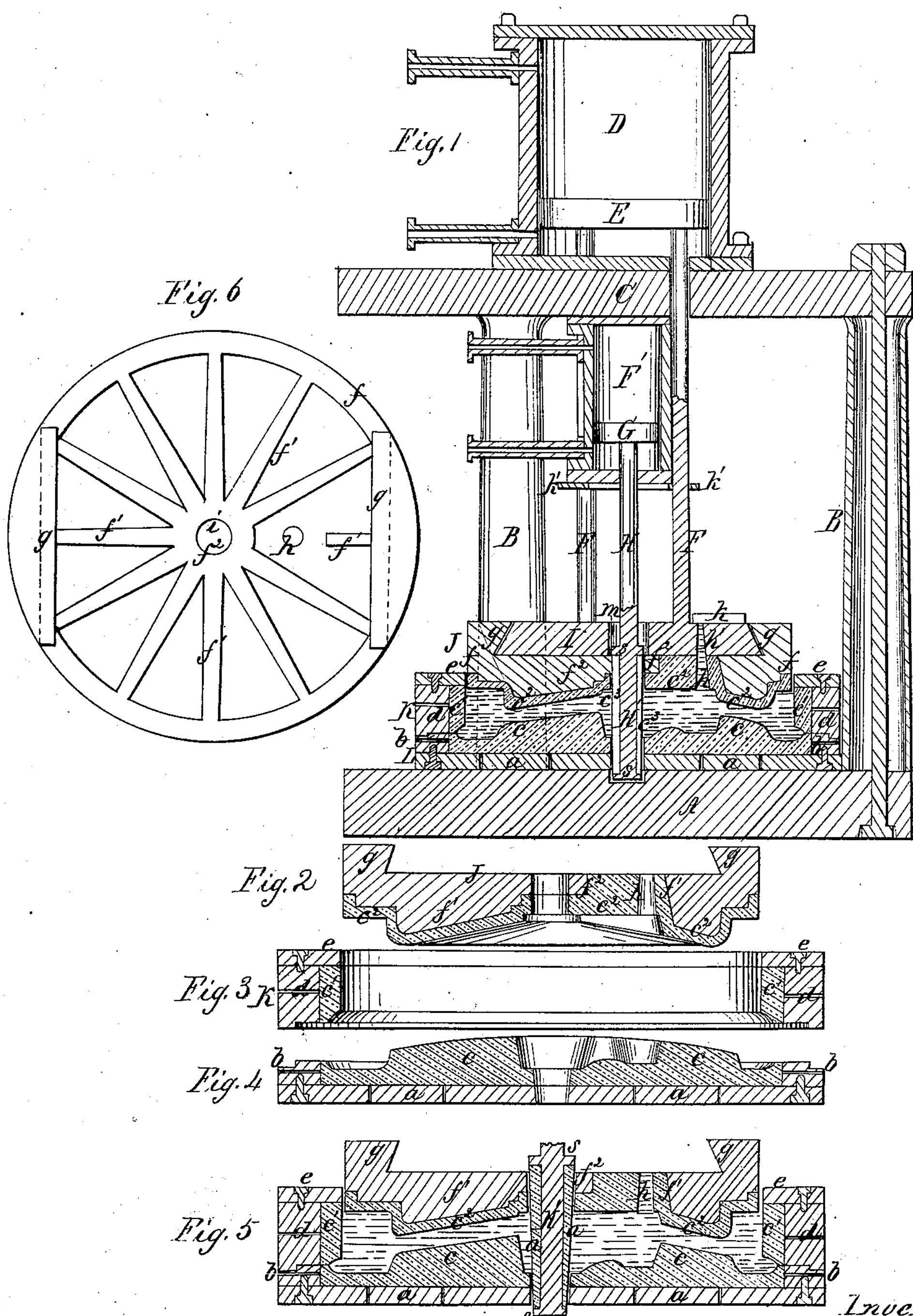
J. B. Tarr,

Car Wheel Molds,

No. 110,307, Patented Dec. 20, 1870.



Witness

J. W. Campbell

Inventor

John Blake Tarr
by
Mauri. Francis M. Lawrence

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN BLAKE TARR, OF FAIRHAVEN, MASSACHUSETTS.

IMPROVEMENT IN MOLDS FOR CASTING UNDER PRESSURE.

Specification forming part of Letters Patent No. **110,307**, dated December 20, 1870.

To all whom it may concern:

Be it known that I, JOHN BLAKE TARR, of Fairhaven, in the county of Bristol and State of Massachusetts, have invented a new and Improved Mode of Preparing Molds to be used in the Production of Compressed Metal Castings; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a vertical section taken centrally through molds and a press, which are adapted for making condensed metal driving-wheels for locomotives. Fig. 2 is a diametrical section through the upper section of the mold. Fig. 3 is a diametrical section through the intermediate section of the mold. Fig. 4 is a diametrical section through the bottom section of the mold. Fig. 5 is a diametrical section through the three mold-sections and core, showing these parts in proper position for producing a pressed wheel. Fig. 6 is a top view of Fig. 2.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to a new and improved method of making molds in which to produce condensed metal castings, such as locomotive driving-wheels, car-wheels, cannon, ingots, and other objects which are required to be made by casting under pressure.

The object of my invention is to obtain a mold, in one or more sections, which will safely stand the pressure required in the operation of condensing the metal casting while in a liquid or semi-liquid state, and which will allow a free escape of gases from every part of the melted metal and the mold during such application of pressure; also, to obtain a mold which will neither burn nor crumble while pressing a casting, but which will yield or crumble when the pressure is removed to allow the casting to contract without resistance; also, to obtain a mold which shall be sufficiently refractory to withstand the intense heat of melted steel or cast-iron, and which shall present smooth surfaces to which the metal casting will not adhere, as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will describe my improved mode of making molds in which to produce a locomotive driving-wheel, reserving to myself the right to change the form of the mold according to the form of article which it is desired to cast.

The mold shown in the accompanying drawings is composed of three section, J K L, and a core, H′, which sections are made partly of metal and partly of a molding composition, hereinafter explained.

The bottom section, L, of the mold consists of a flat circular base-plate, *a*, and a ring, *b*, secured together by means so that in producing the mold *c* from a pattern the plate *a* can be detached from the ring *b* and the molding composition rammed hard upon the pattern within the ring. This part of the mold forms the inner surface and a portion of the flange of a driving-wheel.

The intermediate section, K, of the mold consists of rings *d* and *e* and a lining or mold, *c′*, which latter forms the tread and outer portion of the wheel's flange. The bottom edge of the ring *d* is rabbeted, so as to fit snugly upon the corresponding rabbeted upper edge of the ring *b*, as shown in Fig. 5, and thus prevent lateral displacement of the sections K L.

On top of the ring *d* is secured by screws the ring *e*, the inner diameter of which is less than the inner diameter of ring *d* by the thickness of the composition lining *c′*, as shown in Figs. 1, 3, and 5. This ring *e* should be removed when the ring *d* is applied to a pattern to form said lining *c′*, and afterward secured firmly in place.

The upper section, J, of the mold consists of a circular metallic rim, *f*, radial spokes *f′*, a perforated hub, f^2, and two beveled elevations, *g g*, together with a filling and a bottom surface, c^2, of the molding composition hereinafter described. One of the spokes *f′* of the metal portion of this mold-section is broken away, as shown in Fig. 6, to allow a downwardly-flaring sprue-hole, *h*, to be molded in the composition c^2, through which hole the melted metal is poured into the mold. The spokes *f′* are designed to hold the molding composition securely in place within the rim *f*. The central hole, *i*, through the hub f^2 is designed to allow the core H′ to enter the mold and pass down through a hole made through the center of the bottom section of the mold, and the beveled elevations *g g* are designed to receive a follower-plate, I, and allow this mold-

section to be securely attached to said plate I, as shown in Fig. 1. The follower is provided with an ingate, *h'*, which registers with the sprue-hole *h* through the mold-section J, and this follower is also provided with a sliding cut-off, *k*, for closing the ingate *h'* after the mold has been filled with metal and before pressure is applied. The central hole, *m*, through the follower allows the core H' to pass freely through it. The diameter of the rim *f* of the mold-section J is slightly less than the inner diameter of the top ring, *e*, of mold-section, so as to leave an annular space between said sections for the escape of gas during the compression of the metal in the mold. In practice the metallic parts of the several mold-sections should be perforated at many points, to allow a free escape of gas from every part of the mold during compression and condensation.

From three or more points concentric to the center of the follower I, and arranged at equal distances apart, guide-rods F rise perpendicularly, and are rigidly secured at their upper ends to a piston, E, working up and down in a cylinder, D. These guide-rods pass through suitable stuffing-boxes applied to a head-plate, C, of the press-frame, and also through holes made through a plate, *k'*, secured to the bottom end of a cylinder, F'. By this means the horizontal position of the follower and mold-section J is maintained in their rising and descending movements. The head-plate C is mounted upon pillars B, which, with this plate, are secured down strongly upon the base-plate A, upon which the mold-sections K L are supported while a casting is being made. The core H' has annular flanges *s s* formed on it, between which and surrounding this core a coating, *c*^{3}, of the improved composition is applied, as shown in Figs. 1 and 5. This core H' is secured in a suitable manner to a piston-rod, H, which passes through the lower head of a cylinder, F', and is applied fast to a piston, G, which works up and down in this cylinder. The pistons E and G are operated and pressure applied to them by the use of hydrostatic engines, substantially as described in my Letters Patent of the United States numbered 67,000.

Having described one form of mold for making cast-metal drivers for locomotives, and also described a press by which the metal while in a liquid or semi-liquid state can be forcibly condensed, I will now describe the composition which forms part of said mold and the method of treating it. I take sharp molding-sand—say about fifteen parts—and add to it one part of a mixture composed of rye-meal and molasses, the whole being thoroughly mixed. With these compositions the mold-sections and core, if a core be used, are prepared as described above. When the patterns are removed from the mold-sections, these sections are put into an oven and baked for about twelve (12) hours. Then they are taken out, and while hot the surfaces of the composition are painted or saturated with a mixture composed of plumbago about one part and fire-clay about three parts, made thin by the addition of beer. After thus painting the mold-sections repeatedly and drying each coating, the surfaces are smoothed. The last coating given to the surfaces should be very thick, so that it will partially fill up the pores in the sand and leave these surfaces very hard and smooth. Such a mold will answer all the requirements mentioned in the preamble of this specification, and also allow the metal portions of the mold-sections to be used an indefinite number of times without injury by the highly-heated metal. Such a mold, while it is very hard and tenacious, will allow a free escape of gas through every part of it during the application of pressure to the melted metal. Consequently in such a mold I am enabled to produce castings under pressure which will be free from the imperfections found in almost every casting made under the old process and without the application of pressure.

Having described my improved composition for molds and shown a mode of applying it to a mold for producing condensed metal driving-wheels, what I claim as new, and desire to secure by Letters Patent, is—

A mold for casting metal under pressure, constructed in the manner substantially as herein described, and for the purposes set forth.

JOHN BLAKE TARR.

Witnesses:
JOHN S. HOLLINGSHEAD,
THOS. L. BAYLIES.