(No Model.)

F. X. BLACK.

MOLD FOR CLOSED CYLINDERS.

No. 481,295. Patented Aug. 23, 1892.

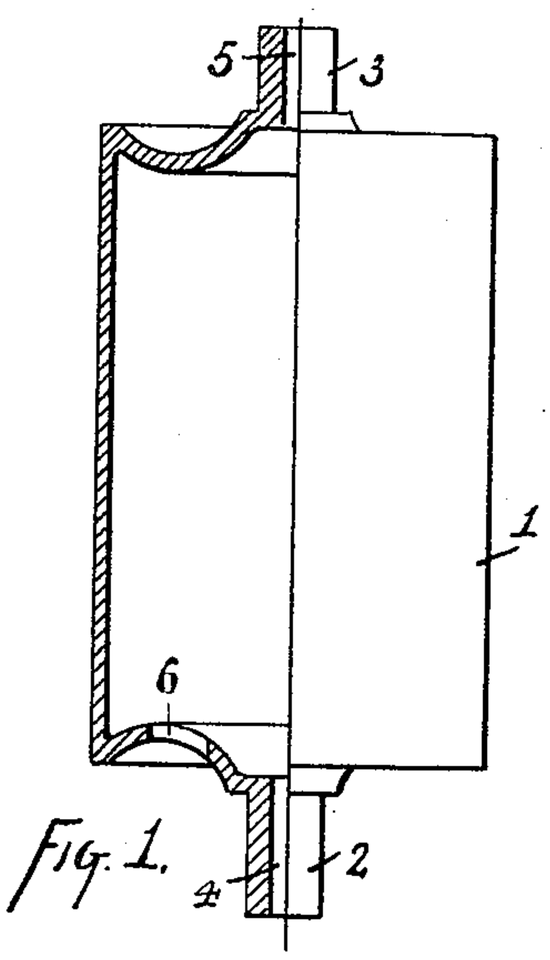

Fig. 1.

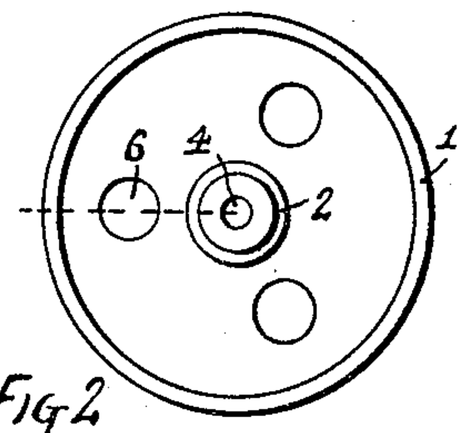

Fig 2

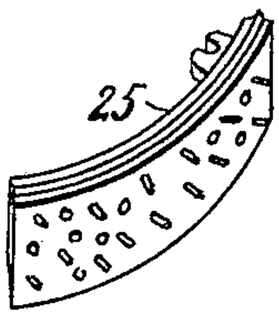

Fig. 4.

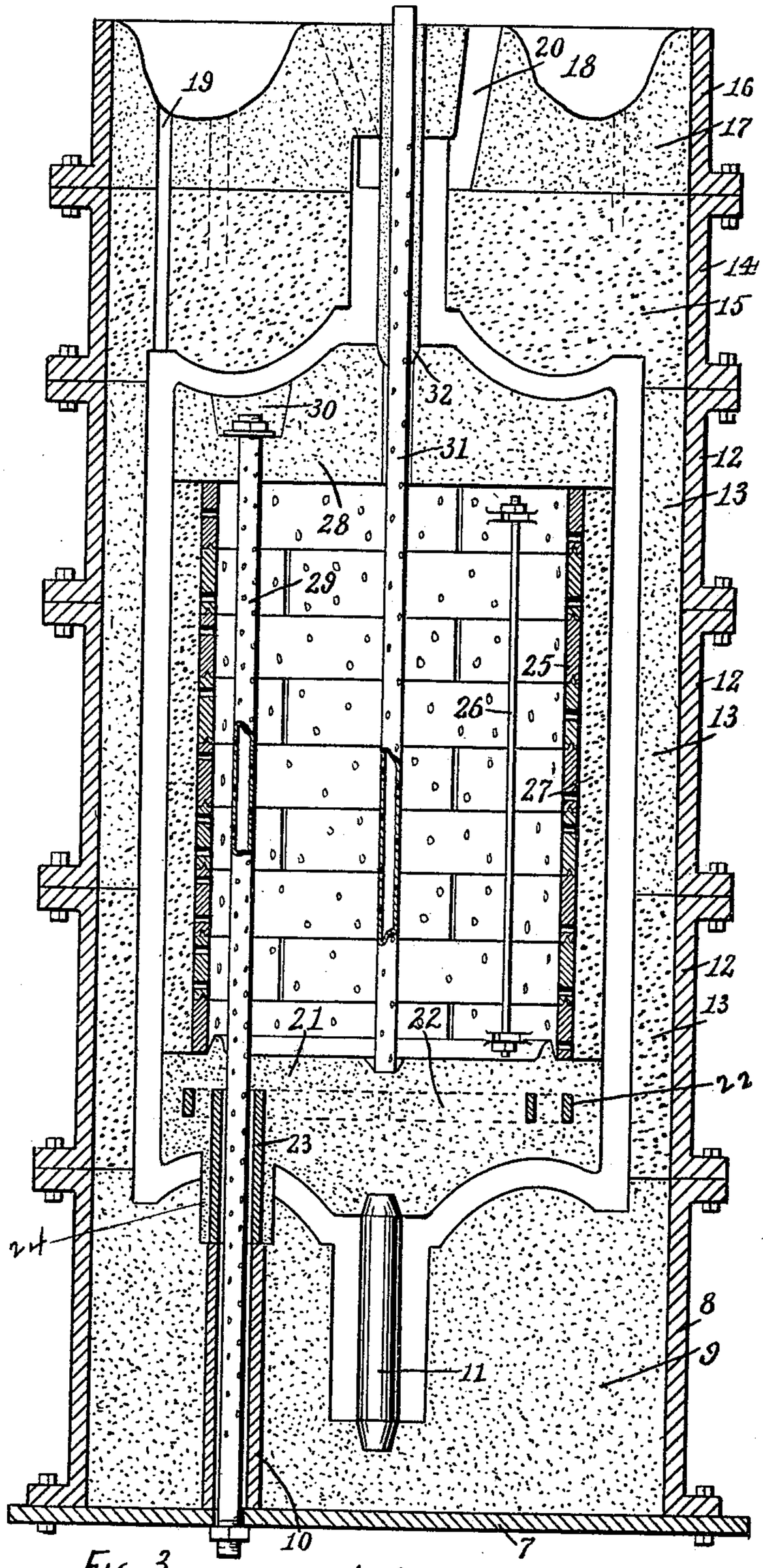

Fig. 3.

Witnesses:
P. P. Sheehan.
W. S. Belden.

Frank X. Black Inventor
by James N. See
Attorney

UNITED STATES PATENT OFFICE.

FRANK X. BLACK, OF HAMILTON, OHIO, ASSIGNOR TO THE BLACK & CLAWSON COMPANY, OF SAME PLACE.

MOLD FOR CLOSED CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 481,295, dated August 23, 1892.

Application filed March 22, 1892. Serial No. 425,945. (No model.)

To all whom it may concern:

Be it known that I, FRANK X. BLACK, of Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Molds for Closed Cylinders, of which the following is a specification.

In certain kinds of closed cylinders—such, for instance, as those employed in drying-machines for paper-making, &c.—the cylinders are often quite large, from two to five feet in diameter and several feet in length, and the journals are comparatively small, and consequently the bore of the journals where the steam enters must be quite small. Such cylinders have generally been made by casting the shell and the heads separate and then after machine-finishing the joints bolting the heads to place, the conclusion having long since been reached that it was impracticable to cast the cylinders entire, owing to the fact that the small cores available at one end of the cylinder could not be made to withstand the crushing strain of the very heavy body-core. Furthermore, the core could not be steadied from the outside of the mold, as the use to which such cylinders were to be put would preclude the use of chaplets, which would disfigure the surface of the shell and often be productive of leakage. Pure surface being required would necessitate the casting of such cylinders on end, thus imposing the weight of the body-core entirely on small cores available at the lower end of the cylinder in casting. I mold such closed cylinders in a single piece by improved methods and by the use of improved molds, which molds form the present subject-matter. By the improved means I am able to insure uniformly-good castings in molds made with comparative rapidity and by the handling of a comparatively small quantity of sand. By preference I make the molds in dry sand, properly baked, though satisfactory results may be obtained in green sand.

My improvements will be readily understood by those skilled in the art by reference to the following specification, taken in connection with the accompanying drawings, in which—

Figure 1 is a plan, half in longitudinal section, of a casting for a closed drying-cylinder as produced in my improved mold; Fig. 2, an end elevation of the cylinder at the end containing the hand-holes, which end will be the lower end in the mold; Fig. 3, a vertical diametrical section of the mold ready for pouring, and Fig. 4 a perspective view of one of the core-barrel segments.

In the drawings, 1 indicates the casting of the drier, with its heads and journals integrally formed with the shell; 2, the lower journal; 3, the upper journal; 4, the usual axial bore of the lower journal; 5, the usual axial bore of the upper journal; 6, the hand-holes in the lower head, by "lower" being meant the lower end of the cylinder in casting; 7, the base-plate of the mold, a strong plate with a true upper surface; 8, the drag setting upon the base-plate and preferably bolted to it and having a depth sufficient to properly form the mold for the lower head and journal of the cylinder; 9, the sand in the drag, forming the mold for the lower face for the lower cylinder-head with its journal and preferably also a trifle—an inch or so—of the shell of the cylinder, it being understood that core-prints at the hand-holes 6 and journal-bore 4 of the cylinder will leave their proper imprints in the drag-mold; 10, iron tubes embedded in the drag-mold and extending from the base-plate up to the base of the imprints formed by the core-prints for the hand-holes, there being one of these tubes at each hand-hole point, the tubes being of accurate length and truly faced on the ends; 11, core for the lower journal-bore; 12, flask for the main portion of the cylinder setting upon the drag and bolted thereto and formed, preferably, of several short sections bolted together, the sectional construction of this portion of the flask adding to the convenience of molding-cylinders of various lengths by using a greater or less number of sections and also for the convenience of ramming this portion of the mold; 13, the sand within this portion of the mold, forming the exterior of the shell; 14, the cope resting upon and bolted to the flask portion below; 15, the mold portion therein, comprising the upper face of the upper cylinder-head and also its journal; 16, a basin-section of the flask above the cope and preferably formed separately from the cope and bolted to it; 17, the sand in this basin

portion of the mold to provide for a pouring-basin and for sinking-heads; 18, an annular pouring-basin formed in the top of the mold; 19, gates formed in the upper portion of the mold and extending from the basin down to the shell-cavity, these gates being preferably somewhat numerous and equally distributed around the mold, so that when the mold is poured the metal will go all around the shell with fair uniformity; 20, a space or channel for a sinking-head or riser, of which there may be several, extending from the top of the upper journal-space to the top of the mold; 21, the base of the body-core; 22, an iron spider or grid embedded in this core-base to stiffen the core; 23, bosses projecting from this spider downwardly into the hand-hole imprints of the drag and resting upon the upper ends of the tubes 10, the lower ends of these bosses being preferably truly faced off; 24, core-bosses for the hand-holes, formed with the core-base 21 around the metal bosses 23 and extending down into the hand-hole imprints in the drag; 25, a series of segments built up to form a core-barrel resting upon the core-base 21, these segments interlocking at their upper and lower edges to prevent their shifting upon each other, the height of the individual segments not exceeding the diameter of the hand-holes in the cylinder, the segments having exterior pegs or prongs, as is usual with core-barrels, to give a foothold to sand upon their outside surfaces and being perforated for the inward passage of gas; 26, bolts, of which there may be any desired number, extending the length of the core-barrel and binding the segments into an integral structure; 27, sand formed upon the outside of the core-barrel and forming the main body-core of the cylinder; 28, the top section of the core resting upon the core-barrel and that portion of the core formed with the core-barrel; 29, perforated tubes, open at their lower ends and extending up through the base-plate and through the bosses 23 and on up through the core-barrel and partially through the top core-section 28, and provided with nuts at their lower ends and with nuts and washers at their upper ends; 30, sand-filling over the upper ends of these tubes to fill pockets left in the upper surface of the top core-section for the purpose of permitting the nuts at the upper ends of the tubes to be manipulated; 31, a perforated tube, open at its top and extending from above the mold down through the upper journal-space and through a central hole in the top core-section and through the interior of the core-barrel and resting in the center of the core-base, and 32 the core for the upper journal, formed on the tube 31 and steadied in the mold portions at its two ends and sealed by usual pasting to the top core-section.

The entire mold, being bolted together, may be lifted and set where desired, as in a casting-pit, and it should be set with free space under the base-plate for the escape of gas from the tubes 29. When the mold is poured, the gas escapes through the tube, some downwardly through tubes 29 and some upwardly through the central tube. When the casting is shaken out, the tubes 29 project from the hand-holes, and so, also, do the grid-bosses 23, and the central tube projects from the upper journal. The central tube may be withdrawn by simple traction. The other tubes may be withdrawn after unscrewing them from their top nuts. A few hammer blows on each of the grid-bosses 23 break those bosses from the spider and break the spider into fragments. The grid-bosses may then be withdrawn, leaving the hand-holes open. The core-base may then be broken up by means of a spud and its sand and spider fragments removed. The bolts 26 may then be loosened and removed and the segments loosened and removed one at a time, after which the top section of the core may be spudded to pieces and removed.

In constructing the mold the procedure may be as follows: The patterns required will comprise a head-pattern, and two of them if the two heads differ, and a short shell-section—say a couple of feet long. The drag is first rammed upon the head-pattern in the usual manner, the tube 10 being molded in or properly-molded cavities being left to receive them. The drag is turned over and set upon the base-plate and the pattern withdrawn. The core-base 21 is molded in a proper core-box with the spider embedded in it. Core 11 is set, and then the core-base is set, the lower ends of the grid-bosses resting on the tubes 10. The core-base thus has solid metallic supports from the base-plate of the mold. The core-bosses 24 should be sealed into their imprints to prevent improper running of the iron. The shell-pattern is now set in the mold, surrounding the core-base and resting in the drag. The core-barrel, having been properly built up, is set in place on the core-base concentric with the shell-pattern. A flask-section 12 is now secured in place. The sand is now rammed outside the shell-pattern and also inside it around the core-barrel, and as the work progresses the short shell-pattern is raised from time to time until the proper length of core and body mold has been rammed up, after which the shell-pattern is removed. The top section of the core 28, having been previously formed in a proper core-box with its central hole and holes for the tubes 29, is now set in place on the core-barrel, and the tubes 29 are put in place and screwed up, after which the cavities 30 are flushed up. The top head-pattern is now put in place and the cope applied and rammed up to form the mold for the upper head and journal and the gates and risers, and in doing this it will be found convenient to have the basin-section separate from the cope-section of the flask. The upper portion of the mold being removed and its pattern parts withdrawn, the mold portion is replaced, thus closing the mold, after which the central tube is inserted, and with it the core 32, thus putting the mold in condition for pouring.

In molding by the dry-sand process the proceeding will be as has been indicated, except that when the mold is completely formed it will be separated and its various parts properly baked, after which the parts will be reassembled. It is to be noticed that in reassembling the mold parts there are metal contact-points for all the necessary joints for the main portions of the mold, thus avoiding the difficulties incident to assembling mold portions more or less distorted in baking. In the present case the flask-sections join metal to metal, and the core-base is supported metal to metal from the base-plates. In fact, if one will imagine the other parts absent and the core united to the base-plate by the tubes 29 and tubes 10 it will be seen that the core is a well-supported structure rigidly founded upon the base-plate.

I claim as my invention—

1. In a mold, the combination, substantially as set forth, of a base-plate, a drag thereon containing vertical tubes standing on the base-plate, a core having core-bosses, a spider in said core, having bosses projecting through said core-bosses into contact with the upper ends of said tubes, and tube-bolts anchored in said core and passing through said spider-bosses and tubes and base-plate and clamping the core to the base-plate.

2. In a mold, the combination, substantially as set forth, of a disk-like core-base, a disk-like core-top section, an annular shell-like core-body section, and an annular series of bolts uniting the three core-sections and clamping the annular section endwise between the base and top sections.

3. In a mold, the combination, substantially as set forth, of a sectional metallic core-barrel, an annular body-core thereon, a core-base, a core-top section, and bolts clamping the base and top sections endwise to the core-barrel.

4. In a mold, the combination, substantially as set forth, of a hollow cylindrical core, a perforated tube disposed centrally in said core and projecting out of the top of the mold and perforated tubes disposed eccentrically in said core and projecting out of the bottom of the mold.

5. In a mold, the combination, substantially as set forth, of a vertical series of interlocking core-barrel segments, an annular series of bolts uniting the top and bottom members of the series and clamping the intermediate members of the series between them, and a core surrounding said segments and supported by them.

6. In a mold, the combination, substantially as set forth, of a drag, a cope, an intermediate mold portion formed of a vertical series of separate sections, a core-base, a core-top section, and an intermediate body-core having a barrel formed of a vertical series of barrel-sections.

FRANK X. BLACK.

Witnesses:
J. W. SEE,
JAS. FITTON.