J. POWELL.

SAND CORE-BOX.

No. 192,657. Patented July 3, 1877.

FIG. 1.

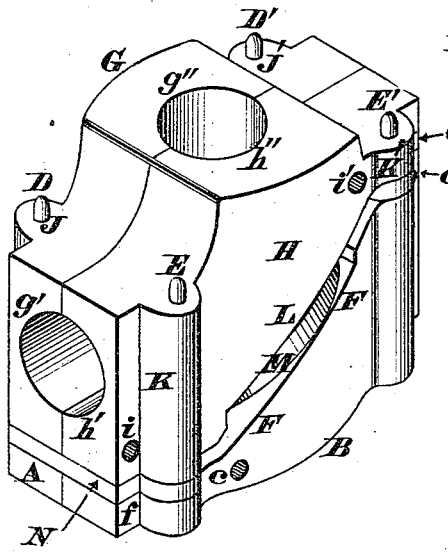


FIG. 2.

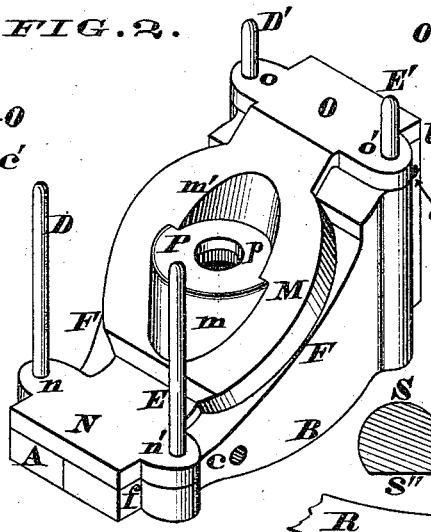
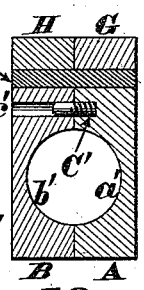


FIG. 6.



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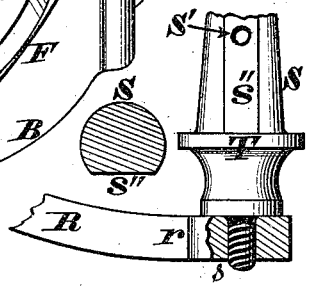


FIG. 3.

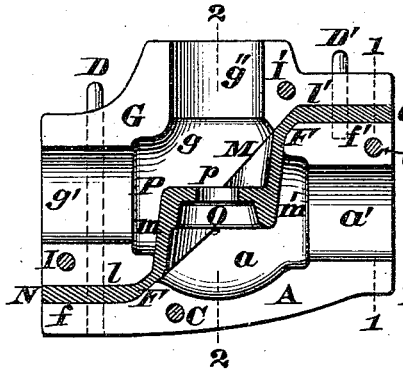


FIG. 4.

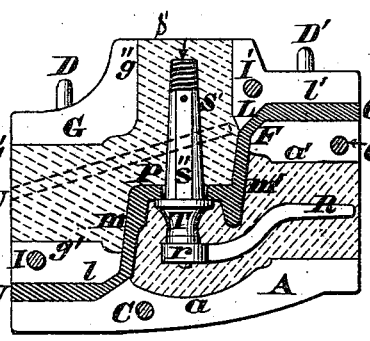


FIG. 7.

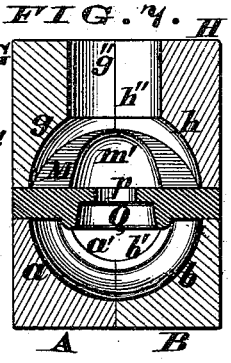


FIG. 5.

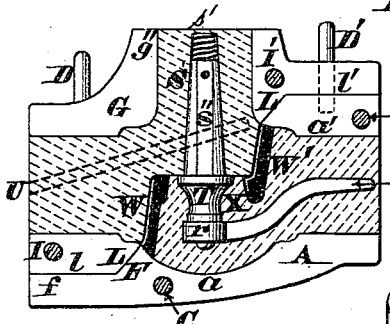


FIG. 8.

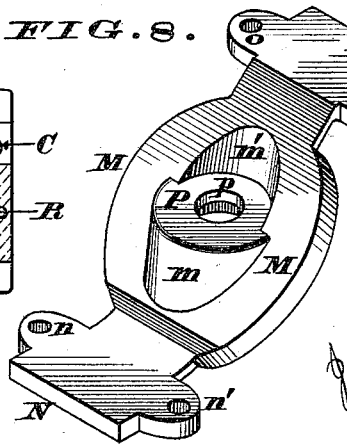
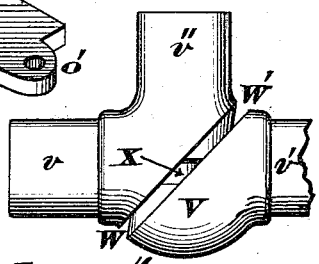


FIG. 9.



Attest.

L. A. Bond

D. P. Kennedy.

Inventor

James Powell

by James H. Layman.

his Attorney.

UNITED STATES PATENT OFFICE.

JAMES POWELL, OF CINCINNATI, OHIO.

IMPROVEMENT IN SAND-CORE BOXES.

Specification forming part of Letters Patent No. **192,657**, dated July 3, 1877; application filed April 12, 1877.

To all whom it may concern:

Be it known that I, JAMES POWELL, of Cincinnati, Hamilton county, Ohio, have invented certain new and useful Improvements in Core Boxes, of which the following is a specification:

The object of my invention is to furnish a convenient box or mold in which cores for globe-valves and cocks can be formed with the greatest facility and in the most perfect and uniform manner. To accomplish these results I make use of a duplex drag, a duplex cope, and a removable diaphragm, which latter member of the box is preferably a single piece of metal or any other suitable material, and is so shaped as to produce in the finished core the necessary channels or passages into which the molten metal flows for the formation of the valve-seat and the walls that connect said seat to the shell or globe of the cock. The duplex drag and duplex cope are formed by dividing both of these members vertically and in the axis of the globe, while the parting between said members is made obliquely, or in the plane of the detachable inclined diaphragm. These five component members of the device are provided with suitable dowels and sockets to facilitate the ready uniting of the box when the material to make the core is to be rammed therein, and at the same time to allow the convenient liberation of said core without causing any of its "prints" to lose their proper relative positions during such removal, as hereinafter more fully described.

In the annexed drawings, Figure 1 is a perspective view, showing the duplex drag, the duplex cope, and the removable diaphragm coupled together. Fig. 2 is a perspective view of the core-box after the cope has been lifted from off the diaphragm. Fig. 3 is a section of the box in the plane of the vertical partings of the drag and cope, the diaphragm being shown in its normal position and the core-bar omitted. Fig. 4 is a similar section, but showing the core-bar inserted in the box, and the latter rammed with the material composing the core proper. Fig. 5 is another section in the same plane, but showing the diaphragm removed and the drag and cope coupled together so as to effect a junction between the two halves of the core. Figs. 6 and 7 are transverse sections of the empty core-box, taken, respectively, at the lines 1 1 and 2 2. Fig. 8 is a perspective view of the diaphragm detached from the box, and Fig. 9 is a side elevation of the finished core, the end of one of its prints being broken away. Diagram 10 represents details of the preferred form of core-bar.

The lower member or duplex drag of the box is composed of two castings, A and B, which are reverse fac-similes of each other, and are, respectively, chambered out, as seen at *a b* in Fig. 7. This chambered portion of the drag is of the same diameter as the interior of the globe or shell that is to be cast around the finished core. The rear ends of chambers *a b* communicate, respectively, with a cylindrical bore, within which is formed one of the core-prints. This bore is composed of one semi-cylindrical portion, *a'*, communicating with chamber *a*, and of another semi-cylindrical portion, *b'*, that joins the chamber *b*. Projecting horizontally from member A of the drag are two or more dowel-pins, C C', capable of engagement with appropriate sockets *c c'* in the other member, B, of said drag.

Furthermore, this member A is provided with two vertical pins, D D', complemented by two similar pins, E E', of the other half, B, of the drag, the duty of which projecting devices will presently appear. The upper surface or part of this duplex drag has its central portion inclined at F, which inclined part terminates with two horizontal bearings, *f f'*, at opposite ends of the box.

The duplex cope is essentially an inverted fac-simile of the duplex drag, being composed of two castings, G and H, chambered respectively at *g h*, which chambers communicate with the vertically-divided cylindrical bore *g' h'*, within which bore the front core-print is formed. In addition to this longitudinal bore *g' h'* the chamber G H communicates with a vertical bore composed of two semi-cylindrical cavities, *g'' h''*, as seen in Fig. 1.

Within this vertical bore is formed the portion of the core that occupies the neck of the valve or cock.

Projecting horizontally from member G of

the duplex cope are two or more pins, I I′, capable of entering sockets *i i′* of the opposite half of said cope.

Furthermore, these two members of the cope are furnished, respectively, with vertical sockets or grooves J J′ K K′, to receive the pins D D′ E E′, just alluded to.

The part of this duplex cope corresponds with the part of the duplex drag—that is to say, the divided cope has an inclined surface, L, and two horizontal bearings, *l l′*.

The diaphragm employed with my core-box consists, preferably, of a single plate or casting, whose inclined portion M has the same slope or angle as the part of the drag and cope. Said diaphragm is preferably furnished with two horizontal extensions, N O, that rest upon the flat bearings *f f′* of the drag, as seen in Figs. 2 and 3. These extensions are perforated at *n n′* and *o o′* to admit the pins D E and D′ E′ of the divided drag.

Cast with this diaphragm is a horizontal circular partition, P, having at its center an aperture, *p*, through which the vertical mandrel S of the core-bar R S is passed. The front margin of this partition is united to the inclined plate M with a curved wall or molding-face, *m*, that has a slight outward flare toward its base or junction with said plate M. The rear margin of this partition is united to plate M by a similar but opposite molding-face, *m′*, that flares outwardly and upwardly to its junction with said plate. The under side of this horizontal partition is counterbored at Q for a purpose that will presently appear. The core-bar, which is preferably used with this box, is constructed in the following manner:

R represents a bar, curved so as to clear the under side of partition P, and at the same time to occupy the axis of bore *a′ b′* of the drag. The front end of this bar has an eye, *r*, into which is screwed the threaded stem *s* of an upwardly-tapering mandrel, S, that is threaded at *s′* for engagement of a nut or any other convenient device capable of retaining said mandrel in its proper axial position within the vertical bore *g″ h″* of the duplex cope. This mandrel is flattened at *s″*, or otherwise arranged to prevent any twisting of the core-neck around said mandrel. The mandrel S is pierced at S′ to admit any implement wherewith said mandrel may be readily unscrewed from the bar R preparatory to removing said core-bar from the cast-cock or valve, it being understood that the sand or other substance composing the core has been previously knocked out of the cock in the usual manner. T is a collar on said mandrel.

The method of forming a core in this box is as follows: The two members A B of the divided drag are first coupled together by inserting the pins C C′ in their respective sockets *c c′*, which act retains these two halves of the box in their proper positions until they are intentionally disengaged from each other. Core-bar R S is then dropped into the now united drag, with the mandrel S presented upwardly, and rod R extending rearwardly, in the bore *a′ b′*.

Diaphragm M is then applied to the united drag, the pins D D′ and E E′ being passed through the appropriate eyes *n o* and *n′ o′*, as seen in Fig. 2. In this condition of the box the mandrel S passes up through and about closes the aperture *p* of partition P, while the horizontal extensions N O rest upon the bearings *f f′* of the duplex drag, the inclined portion M of the diaphragm being supported on the sloping part F, as seen in Figs. 3 and 4.

The two halves G H of the cope are now coupled together by inserting pins I I′ in their appropriate sockets *i i′*, and this united cope is then superimposed upon the diaphragm M N O, the dowel-pins D D′ and E E′ being engaged with the sockets J J′ and K K′ of said cope. In this condition of the complete box the horizontal surfaces *l l′* of the united cope rest upon the flat faces N O of the diaphragm, while the part L of said cope is flush with the inclined plate M of said diaphragm.

A nut is then applied to the screw-threaded top *s′* of the mandrel, and the collar T is drawn up snugly against the under side of partition P.

Drag A B is then rammed with any suitable core material by inserting such material through bore *a′ b′*, care being taken to preserve the bar R about in an axial position with reference to said bore. Cope G H is then rammed in the usual manner, and one or more wires are inserted in the bore *g′ h′*, so as to unite the front and vertical prints of the core together. The position of these wires or nails is indicated with dotted lines U in Figs. 4 and 5.

The box having been rammed, the next proceeding is the removal of cope G H, which united member is readily lifted from off the pins D D′ and E E′ after the nut has been disengaged from screw *s′*, the tapering mandrel S slipping freely from the neck-print of the core. Diaphragm M N O is now removed, and the united cope is immediately applied to the united drag, so as to effect a junction between the two previously-separated members of the core. When the cope and drag are thus coupled together the mandrel S continues to penetrate the neck-print of the core until the two halves of the latter are brought in close contact with each other. The mandrel thus acts as a wedge, and renders more firm and compact that portion of the core formed in the vertical bore *g″ h″* of the cope.

The union of the cope and drag is but momentary, as the cope is almost immediately lifted off, the member A of the box disengaged from its companion B, and the finished core is at once placed in a suitable support preparatory to being baked in the customary manner.

The core is shown deatched from the box in Fig. 9, a reference to which illustration will show that said core is constructed with a spherical portion, V, that was formed in the

combined chamber *a b g h*, which sphere is of the same diameter as the interior of the shell of the valve that is to be finally cast around said core. Projecting from the spherical portion are two horizontal prints, *v v'*, and a vertical one, *v''*, the two former having been made in the bores *g' h'* and *a' b'* of the cope and drag respectively. The other print, *v''*, was formed in the vertical bore *g'' h''* of the cope. It will also be seen that the sphere is divided obliquely by two channels, W W', which were formed by the molding-faces *m m'* of the diaphragm M, and when the baked core is placed in the flask and the molten metal poured into the mold, the metal will flow into these two channels W W', and thus form the inclined walls that unite the shell of the cock with the valve-seat.

Finally, it will be noticed the core is furnished with a contracted circular waist, X, that was formed in the counter-bore Q of partition P.

This waist stops off the flow of metal from the two oblique channels W W', and thereby forms in the center of the shell a circular aperture; which, when properly finished, constitutes the valve-seat.

After the valve or cock has been cast around the core the latter is knocked to pieces, and mandrel S is then unscrewed from the threaded eye *r* of bar R. The now separated core-bar is at once removed from the cast cock or valve, and is again applied to another mold or box, as previously described.

The sectional form of core-bar R S, herein described, is employed only with small valves or cocks, as the larger-sized valves afford ample facility for the removal of a bar made in one piece. It is evident the diaphragm may be retained in its proper position by tongues and grooves instead of the pins and apertures, as herein described. Or, if preferred, the extensions N O may be dispensed with, and the diaphragm may be seated in a recess formed in the inclined part of the drag, or of the drag and cope collectively.

But the arrangement of pins and perforated extensions is preferred, because they facilitate the handling of the box, and thus expedite the production of cores. Finally, the molding-faces *m m'* of the diaphragm may be arranged in any other way, provided they form such channels in the core as will induce the molten metal to unite the valve-seat with the spherical walls or shell of the cock.

I claim as my invention—

1. For globe-valves and cocks, a core-box consisting of a duplex drag, a duplex cope, and a detachable inclined diaphragm, the part between said drag and cope being made in the plane of said diaphragm, substantially as herein described and set forth.

2. For globe-valves and cocks, a core-box consisting of a duplex drag, a duplex cope, and a detachable inclined diaphragm, the part between said drag and cope being made in the plane of said diaphragm, which latter member of the box is provided with two opposite molding-faces, *m m'*, substantially as herein described and set forth.

3. For globe-valves and cocks, a core-box consisting of the duplex drag A *a a'* C C' D D' B *b b' c c'* E E', duplex cope G *g g' g''* I I' J J' H *h h' h''* *i i'* K K', and detachable diaphragm M *m m'* N *n n'* O *o o'* P *p*, substantially as herein described and set forth.

4. The within described diaphragm for core-boxes of globe-valves and cocks, consisting of plate M, having opposite molding-faces *m m'*, and perforated partition P *p*, said plate M being adapted to seat in the inclined parting of the box, substantially as herein described and set forth.

5. The within-described core for globe-valves and cocks, consisting of a spherical portion, V, prints *v v' v''*, and two oblique channels, W W', that join the waist X, the two members of the core being anchored together by a bar embedded in the end print *v'* and the vertical print *v''*, substantially as herein described and set forth.

In testimony of which invention I hereunto set my hand.

JAMES POWELL.

Witnesses:
JAMES H. LAYMAN,
L. H. BOND.