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P. COOKE.
MACHINE FOR FORMING REFRACTORY MOLDS.
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Fig. 1.

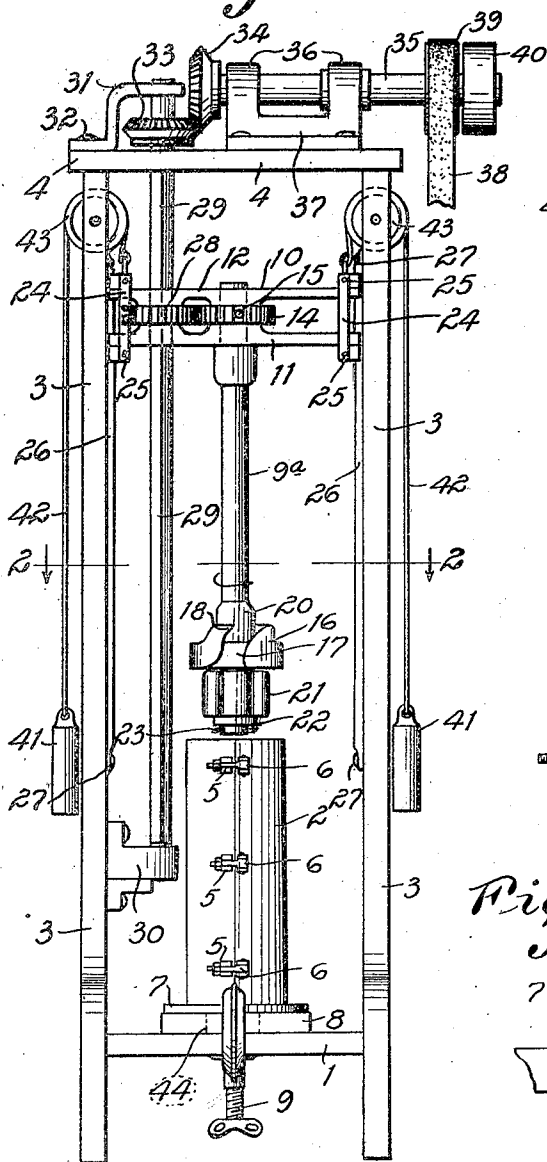


Fig. 2.

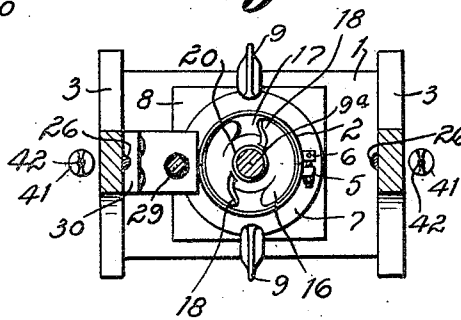


Fig. 3.

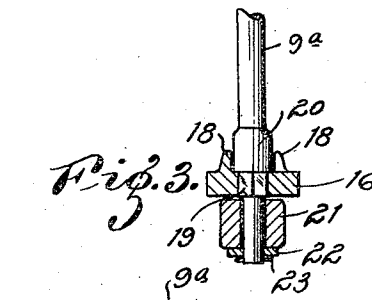
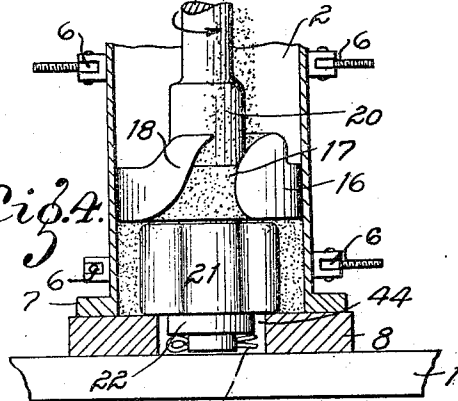


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR FORMING REFRACTORY MOLDS.

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To all whom it may concern:

Be it known that I, PATRICK COOKE, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Machines for Forming Refractory Molds, of which the following is a specification containing a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention consists in the novel construction and combination of parts, and in the new process, hereinafter particularly described and distinctly claimed.

The object of my invention is to provide an improved machine for forming refractory molds in which steel, iron, or other material may be cast, whereby much handwork may be done away with, and the refractory molds may be turned out rapidly in large or small numbers, as desired.

In the drawings,

Fig. 1 is a front-elevation of a machine that is constructed in accordance with my invention, and which may be used in practicing my process.

Fig. 2 is a horizontal section of the said machine, taken on the line 2—2 of Fig. 1.

Fig. 3 is a detail view of the lower end of the vertical revoluble packing-head shaft, with the packing-head and the die or core, which are carried by said shaft, shown in section, and

Fig. 4 is a detail enlarged vertical section of the lower end of the detachable flask or container, in which the packing-head and die operate; the view showing the location of said parts at the beginning of the process of filling the flask or container with packed sand, clay, or other material which can be used in making a mold, or in molding plastic material.

The numeral 1 designates a horizontal table or platform, upon which the flask or container 2 is detachably held and supported during the making of a mold, or in molding; said table being (in the present instance) secured to and supported a distance above the floor or ground by opposite vertical side-frames 3, of the machine.

Said side-frames 3 are spaced apart at the lower ends by the said horizontal member 1, and at their upper ends by a horizontal cross-bar 4, which is secured to the upper

ends of said side-frames; said last-mentioned members being wide at their lower ends, to provide a sufficient support for the machine, and enable same to stand alone on said wide lower ends; but said side-frames are narrowed at a point slightly above the said table 1, and from there upwardly to their upper ends, to lighten same, as well as to save material. The narrowed side-frames are clearly shown in Fig. 2.

Said flask or detachable container 2 is preferably in cylindrical form, but of course may be rectangular, or of any other desired shape in cross-section.

Its function is to contain the packed sand, clay, or other material, and to act as a flask in supporting the packed material until the latter is ready to be removed from the flask.

To facilitate the removal of said flask or container 2 from the packed material within it, after a mold or casting has been made, I form said flask in detachable sections, and detachably connect them by means of common perforated clamping-ears through the perforations of which ordinary bolts or screws 6 are passed.

Said flask 2, or the sections thereof, (in case it is made in two semi-cylindrical sections) have a horizontal marginal flange at the lower end thereof, which rests upon a removable base 8 that is placed upon the upper surface of the said table 1.

Screw-clamps 9 are used in the present case to engage the flange 7 of said flask, the table 1, and to securely clamp the said removable base 8 and said flange to the said table. See Figs. 1 and 2.

Said flask 2 may be made of any desired material, and of any suitable diameter and length, to turn out casts or molds of any size and length.

A vertical packing-head shaft 9^a has its upper portion mounted to revolve in aligned bearings formed in the upper section 10 and the lower section 11 of a cross-head 12.

But the said packing-head shaft 9^a is fixed against axial movement in its bearings, by a gear-wheel 14 which is fixed upon said shaft by means of a pin 15 or other fastening device, in the space between the said upper and lower sections of said cross-head.

Fixed against rotation upon the said packing-head shaft 9^a, at a point near the

lower end thereof, is a packing-head 16 having the openings 17 through which the sand or clay passes during the making of a cast or mold, and also having the auger-
 5 like or cam-shaped diametrically-opposite inclined arms or members 18, which press upon and pack the material in the said flask beneath said packing-head, and make a strong and firm cast or sand-mold when
 10 said head is rotated in the direction of the arrow, and moist sand or other material is fed into the said openings 17 of said head.

Said packing-head 16 is mounted upon a rectangular or non-circular portion 19 of
 15 the said packing-head shaft, to fix said head on said shaft and to cause it to rotate when said shaft is revolved.

Axial or vertical movement of the said packing-head on said packing-head shaft is
 20 prevented by an enlargement or shoulder 20 on the shaft above said head, and by a die or core 21 that is mounted on said shaft directly beneath said head.

Said die or core 21 is loosely mounted
 25 upon a cylindrical extension of said packing-head shaft 9^a directly beneath said packing-head 16, so that said die or core will not revolve in the packed sand or other material.

30 A washer 22 is mounted on said packing-head shaft extension, directly beneath said die or core, to support the weight and pull thereof, when the said shaft, packing-head, and die or core are gradually moved up-
 35 ward, in making a mold or cast.

A cotter-pin 23 is passed through a lateral hole in said shaft at a point below said washer 22, to prevent the latter from being forced off the end of said shaft.

40 Said upper section 10 of the said cross-head 12 is bound to the lower section 11 thereof by means of short vertical binding-bars or strips 24, which are attached to both of said sections near the ends thereof,
 45 by means of pins or bolts 25, so that said sections extend parallel with each other, and are practically one piece. In fact, they can be cast or otherwise made in a single piece.

50 The ends of said cross-head sections 10 and 11 engage vertical guide-strips 26, which are fastened to the inner faces of the said side-frames 3 by means of screws or rivets 27, whereby the said cross-head may
 55 move up and down, but will be prevented from rotating.

Another gear-wheel or pinion 28 is located in the space between the upper and lower sections of said cross-head 12, and its teeth
 60 are always in mesh with the teeth of said first-mentioned gear-wheel 14, but said gear-wheel or pinion 28 has a non-circular hole at its center, through which loosely passes a vertical drive-shaft 29, the greater
 65 part of the length of which is non-circular

in cross-section, so that as said shaft 29 revolves it will drive said gear-wheel or pinion 28, and at the same time permit the latter to move vertically upon said shaft, as the cross-head and packing-head, as well
 70 as the die or core, are moved up and down.

Said drive-shaft 29 has journals at its ends, and its lower journal is mounted in a bearing formed in a bracket 30 which is se-
 75 cured to the inner face of one of said side-frames 3, while the upper journal of said shaft is mounted in a bracket 31 that is secured to the said cross-bar 4 by means of fastenings 32.

A bevel-gear 33 is fixed upon the upper
 80 portion of said vertical drive-shaft 29, and is engaged by the teeth of another bevel-gear 34 that is carried by the adjacent end of a horizontal drive-shaft 35 mounted in
 85 bearings 36 carried by a bracket 37 resting upon the said cross-bar 4, at the upper end of the machine.

For imparting motion to the drive-shaft 35, suitable motive-power may be used; but in the present case I have shown a common
 90 belt 38 arranged to engage tight and loose pulleys on said shaft.

The numeral 39 designates the tight pulley, and 40 designates the loose pulley.

Counter-weights 41 are suspended by
 95 ropes or cables 42 which run over grooved rollers or pulleys 43 mounted upon pintles or pins at the upper portion of the frame of the machine, and the ends of said ropes or cables which are opposite those to which
 100 said weights are connected are attached to said cross-head 12 by means of common hooks, eyes, staples, or other fastenings, so that the weight of the cross-head and all parts carried thereby will be balanced by
 105 said weights; whereby said cross-head and the parts carried thereby will remain at any desired vertical adjustment on the side-frames of the machine, until intentionally moved up or down.

110 A recess 44 is formed in the said removable base 8, to permit the lower end of the said packing-head shaft 9^a and the washer 22 and cotter-pin 23 to pass below the plane of the upper surface of said base, and to
 115 enter said recess, while the lower end of said die or core 21 rests upon said base, at the beginning of the packing operation. Fig. 4.

The operation.

120 In practicing my invention, the packing-head 16 and the die or core 21 are lowered to the lower portion of the said flask or container 2, with the lower end of the said die or core resting in contact with the upper sur-
 125 face of said base 8.

Then a quantity of moist sand or other material out of which it is desired to make a mold, is thrown into the upper end of said
 130 flask or container 2, and said material will

gravitate to the bottom of said flask, passing through the said sand openings or passages 17 in said packing-head 16, and filling the annular space between said die or core 21 and the adjacent inner surface of said flask, as shown in Fig. 4.

Then the machine should be started, by applying the motive power in the manner previously described, and the said packing-head 16 will be rotated toward the left-hand, as indicated by the arrows in Figs. 1 and 4, and the sand beneath said head will be firmly packed in said space between said die or core and said flask; but said die or core will not rotate, as it will be held against rotation by the initial charge of material.

As the rotation of the said packing-head continues, and as supplies of material are added to the open upper end of said flask, the space between said die or core 21 and the inner walls of said flask will be gradually and rapidly filled with firmly packed material, forming a mold whose interior has the shape of the outer periphery of the said die or core, from end to end of said mold, or part of the way, as desired.

As before stated, the said die or core does not rotate, but is dragged upwardly as fast as the mold is filled with packed material, thereby making a straight and smooth passage upon the interior of the mold, having a cross-section corresponding to the cross-section of the exterior of said die or core.

For instance, if the core or die has an external periphery that is fluted or ribbed, as herein shown, the internal walls of the mold will be of corresponding form.

In making clay sewer-pipe, or in making a mold in which steel or iron pipe is to be cast, the said core or die 21 should, of course, have a smooth cylindrical exterior.

The flasks are filled and packed rapidly, and large numbers of the finished molds may

be made in a short time, ready for use, as required.

If the mold is to be used in casting steel, iron, or other metal, the mold is poured while the flask or container 2 is around it, in order to support the mold while in contact with the molten metal; and after the latter has cooled, said flask may be quickly removed by releasing the clamping-bolts 6 from the said clamping-ears 5, whereupon the packed sand may be knocked or scraped off of the casting, as usual.

I claim:—

A machine of the class described, comprising vertical side-frames; a horizontal platform secured to and supported by the said vertical side-frames; a flask or container detachably secured to and supported by said horizontal platform; a cross-head loosely mounted to slide axially between said vertical side-frames; gear-wheels mounted to revolve between the upper and lower sections of said cross-head; a vertical non-circular shaft for driving said gear-wheels; a vertical packing-head shaft having its upper portion mounted to revolve in aligned bearings formed in the upper and lower sections of said cross-head; a packing-head mounted upon the lower portion of said packing-head shaft, to pack the sand or other material in said flask or container; and a non-rotating die or core arranged to be dragged after said packing-head out of the packed sand or other packed material as the mold is gradually packed.

In testimony whereof, I have signed my name to this specification in presence of two subscribing witnesses.

PATRICK COOKE.

Witnesses:

JOHN C. HIGDON,
HENRY L. HIGDON.