

April 26, 1932.

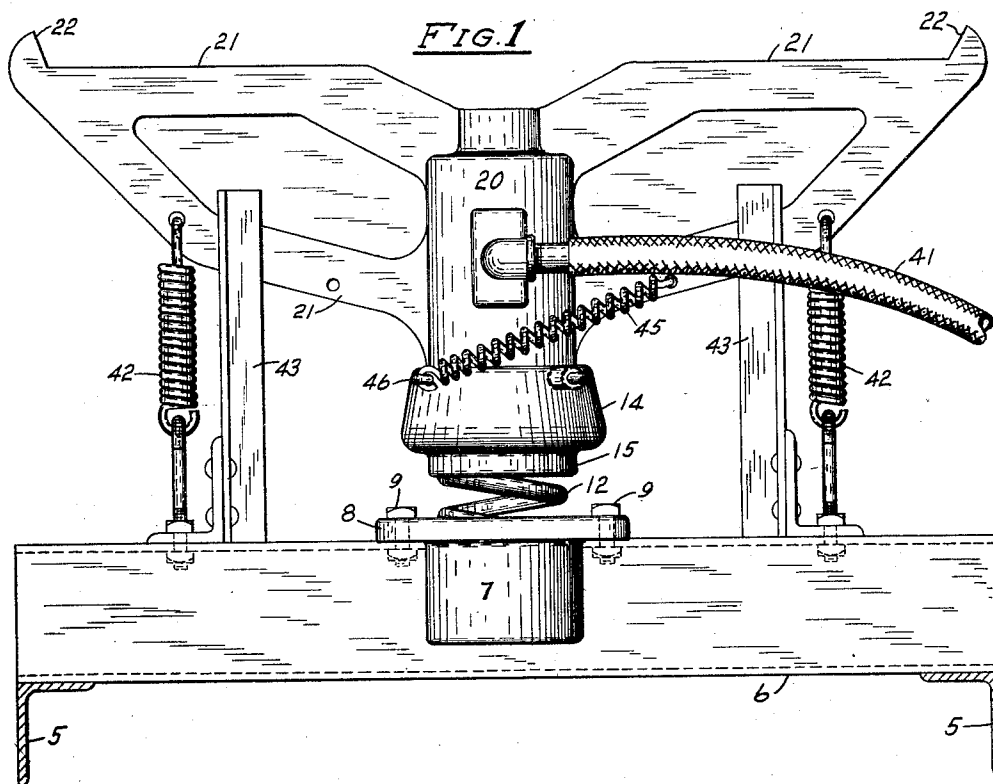
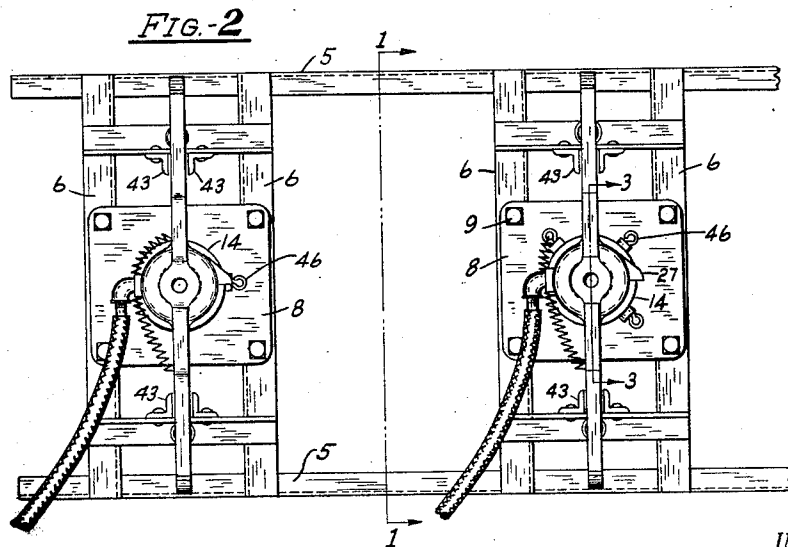
J. F. CRAWFORD

1,855,474

FLASK SHAKE-OUT

Filed Dec. 5, 1930

2 Sheets-Sheet 1



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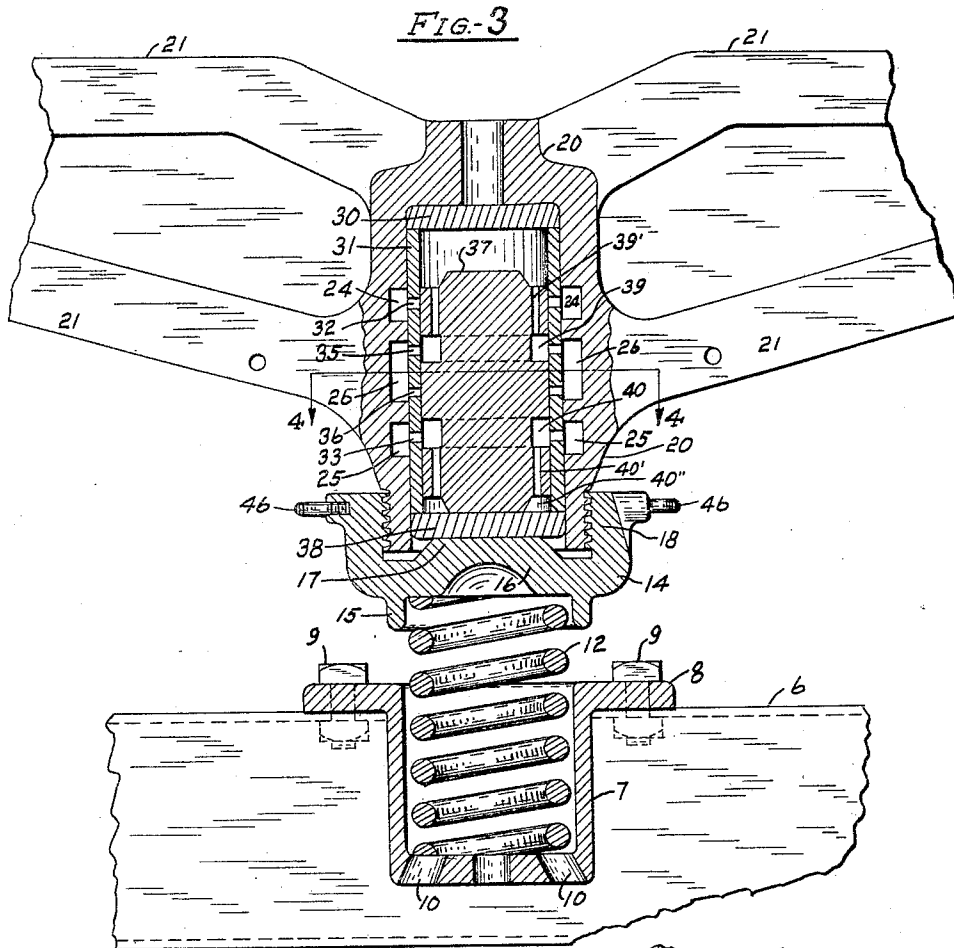
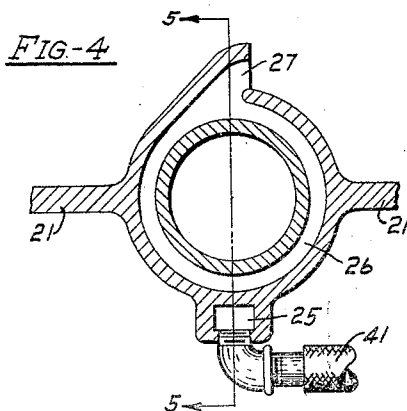
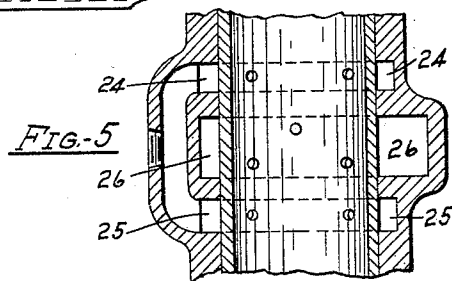
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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FLASK SHAKE-OUT

Application filed December 5, 1930. Serial No. 500,255.

My invention relates to apparatus for shaking the sand out of foundry flasks after the molding operation has been completed, which leaves the baked sand in hardened and packed condition about the castings and difficult of removal for promptly reusing the flask. Improved foundry methods have developed machines and devices whereby the various steps in molding are continuously and quickly performed step by step, and it is of material importance that none of these operations shall be interrupted from the filling of the flask until the time that it is shaken out. After the casting has been poured the flask is deposited upon a shake-out subject to rapid vibratory motion, by which means the sand, which has been baked and hardened by the hot metal, becomes shattered and disintegrated and falls through the flask into a suitable receptacle to be reused. As loaded flasks are extremely heavy, some weighing fifteen hundred or more pounds, it will be apparent that the shaking operation imparts severe strain upon parts of the shake-out structure, necessitating frequent adjusting and repairing and consequent cessation of the work, which incidents retard the molding operations as a whole, as the return of the empty flasks to the initial or sanding position must continue without interruption if the maximum results in molding are to be attained. It is the object of my invention to improve flask shake-outs to avoid the difficulties indicated, and to so construct and operate the same that the parts will be relieved of the unusual jarring and straining and consequently longer lived than other devices of the character of which I am aware, as will further appear from the following description.

In the accompanying drawings, forming part hereof, Figure 1 is an elevation of an agitator and associated parts which I employ, taken on the dotted line 1—1 in Fig. 2; Fig. 2, a top plan view of the flask shake-out; Fig. 3, a transverse vertical sectional view on the dotted line 3—3 in Fig. 2; Fig. 4, a detail sectional view of the exhaust forming part of my improvements, taken on the dotted line 4—4 in Fig. 3; and Fig. 5 is a

detail section through the inlets and exhaust outlet on the dotted line 5—5 in Fig. 4.

In said drawings the numeral 5 indicates frame members of any suitable character for supporting the shake-out units, two of which are shown in Fig. 2, but any number may be employed according to requirements. Suitable cross-members 6 are connected to the frame 5, which support a receptacle 7 embodying a retaining plate or flange 8 secured by bolts 9 or otherwise, one or more sand outlets 10 being embodied in the bottom of the receptacle. In said receptacle a heavy coil spring 12 is seated the upper portion of which enters and is positioned in an agitator head 14 having a depending flange 15 for the reception of the spring 12, the bottom 16 of the head being conoidal in form, as at 17, for a purpose to appear. Said head 14 also embodies an upwardly extending internally threaded flange 18 into which is screwed the lower end of the agitator 20 which preferably has integrally formed therewith the flask supporting arms 21 extending laterally from the agitator, the outer ends thereof embodying guards 22 for retaining a flask (not shown). Said agitator 20 includes circumferential air inlets 24, 25, and a similar exhaust outlet 26 terminating in an exposed nozzle 27, as indicated in Figs. 2 and 4. In assembling the agitator an anvil 30 is inserted in the upper end of the agitator body, as shown in Fig. 3, against which a cylinder or sleeve 31 is placed, said cylinder being provided with ports 32, 33, registering with said inlets respectively. A plunger 37 is placed in the cylinder, embodying tapered heads as indicated, and the agitator assemblage is then equipped with the lower anvil 38 and secured to the head 14 by the screw-threaded engagement indicated in Fig. 3. The plunger 37 embodies the upper and lower circumferential air passages 39, 40, respectively, having vertical air passages 39' and 40' leading therefrom to the upper and lower ends of the plunger respectively. These passages 39, 40, are designed to communicate with the inlets 24, 25, and the outlet 26, through the various registering cylinder ports, air under pressure being conveyed to said inlets by the

pipe 41 from any suitable source of supply. As indicated in Fig. 3, the sleeve 31 is securely clamped between the upper and lower anvils 30 and 38 whereby an air-tight chamber is provided, and which sleeve is therefore maintained in positive communication with the inlet and exhaust passages of the vibrator body. It will be noted that the agitator 20 and associated parts are sustained by the spring 12, and in order to insure the stability and balance of the structure I connect the arms 21 to the support 6 by springs 42, while at each side of the arms 21 standards 43 are secured to the support 6 and which constitute guides between which said arms vertically reciprocate during the operation of the throw-out. As indicated in Fig. 2, the agitators and associated parts are duplicates, and it will therefore be understood that the description and reference numerals relating to one of the units apply to the other. As indicated in Fig. 1, the complete agitator or vibrator unit is of comparatively small mass confined as far as possible to a vertical plane for the purpose of obtaining the maximum activity of the unit when the plunger is in motion, and in action appreciable internal strain results. In practice, one of the portions subjected to the most strain is the threaded head 14 which backs up the anvil 38, and as a means of reaction against some of such strain the spring 12 is installed directly under said head. With this construction it will be seen that by placing a flask of say fifteen hundred pounds weight on the arms 21 there will be immediately a reaction against head 14 equal to the weight of the flask bearing on said arms, and with such reacting pressure against the head any blow transmitted to anvil 38 will to a considerable extent cushion against the supporting spring 12 which will therefore absorb substantially that much strain from the agitator unit.

In operation, the flask to be shaken is placed upon the arms 21 and compressed air introduced through the pipe 41 into the agitator which, as it passes through the inlet 25 and down through the passages 40, 40', expands into the enlarged circumferential opening 40'' produced by the tapered formation of the plunger, and forces the plunger upwardly, whereupon the upper circumferential passages 39 will register with the inlet 24, at which moment the lower passage 40 registers with the outlet 26, so that as the air enters said outlet 26 and discharges through its nozzle 27 the incoming air passing upwardly through passages 39, 39', and expanding as described drives the plunger 37 downwardly whereupon the upper passageway registers with said outlet, as indicated in Fig. 3, and the air becomes exhausted in the manner stated. Therefore, there is a constant and rapid reciprocation of the plunger, producing violent percussive action against the up-

per and lower anvils 30, 38, with the result that the great speed of the reciprocating plunger imparts a highly vibratory action to the agitator and flask thereon, causing the packed sand in the latter to become thoroughly shattered and disintegrated so that it will readily fall through the flask and the spaces about the agitator, as well as sand which may accumulate in the receptacle 7, and thence into a receptacle placed beneath said parts. In mounting and controlling a unit in the manner explained and as indicated in Fig. 3 it will be readily apparent that the coil spring 12 will be highly responsive to the percussive action of the plunger so that an intense vibratory motion will be imparted to a flask mounted on the units in the manner stated and that the arms 21 will be so guided in their vertical movements and steadied by the springs 42 that the flask will be maintained in substantially level position during the shake-out operation. It will also be understood that by yieldingly anchoring the arms and frame with said springs the arms not only will be held in balanced position but also will be subjected to a quivering motion during the hammering of the piston in the agitator, so that a vibrating and trembling motion will be imparted to the flask and which will be conducive to the disintegration and discharge of the sand therein. A structure of this kind is subjected to violent shock and distortion from the rapid action and impact of the plunger with the anvils and some of its parts quickly wear and require laborious and expensive repair and replacement, and this applies particularly to the anvils and the ends of the heavy plunger (which plunger reciprocates at the rate of about four hundred times per minute) which become misshapen and loose so that air escapes therefrom without effectively functioning, and this situation is obviated by maintaining the cylinder 31 and the anvils therein tightly connected by driving home the screw-threaded head 14 as frequently as desired; and I further provide for maintaining the head and agitator body and other parts in close fitting relation by the torque spring 45 which is connected to an arm 21 or other part of the apparatus and the opposite end of which may be secured to the head at various points by the hooks 46, so that said spring may be adjusted according to the tightness of fit between the head and agitator, and the head is thus constantly prevented from creeping or becoming unduly loose. In extensive practical operation I have found my improved flask shake-out to be highly efficient and durable, and the many difficulties incident to the use of such an apparatus are avoided, such as the dismantling thereof for frequent repairs and its reassemblage, which is a common occurrence in the use of such devices to the best of my knowledge.

I claim as my invention:

1. In a flask shake-out, an agitator comprising a chamber embodying air inlet and outlet passages, a cylinder within the chamber having ports registering with said passages, a plunger in the chamber having air passages adapted to communicate with said ports, an anvil at the upper and lower ends of the chamber, resilient means in alignment with the plunger for supporting the agitator, and means for supplying air under pressure to said chamber and plunger whereby the latter will be reciprocated and impart hammer blows to said anvils.

2. In a flask shake-out, an agitator comprising a body having internal circumferential air inlet and outlet passages, a cylinder within the body having ports registering with said passages, a plunger in the cylinder having circumferential air passages adapted to communicate with said ports and also having vertical passages leading from the inlet and outlet passages whereby air will be forced into said inlet passages alternately and thence through the exhaust passage, yielding means in alignment with the plunger for supporting the agitator, and means for supplying air to said passages for actuating the plunger.

3. In a flask throw-out, an agitator body, an anvil in the body, a plunger in the body, means for supplying fluid under pressure to the plunger for imparting hammer blows to the anvil, a head detachably secured to the body for removably enclosing the plunger therein, resilient means in alignment with the plunger for engaging and supporting the body, and means associated with the head for automatically tightening the same on the agitator body.

4. In a flask throw-out, an agitator having means associated therewith for supporting a flask, reciprocatory blow communicating means enclosed within the agitator and adapted to communicate a hammer blow thereto, a head on the agitator for enclosing the blow communicating means, and means associated with the head for automatically maintaining the same in tight fitting relation to the agitator body.

5. In a flask throw-out, an agitator having means associated therewith for supporting a flask, blow communicating means enclosed within the agitator and adapted to communicate hammer blows thereto, a head on the agitator for enclosing the blow communicating means, means associated with the head for maintaining the same in tight fitting relation to the agitator body, and resilient means upon which the agitator is mounted for cushioning the latter when vibrated by the blow communicating means.

6. In a flask throw-out, an agitator having means associated therewith for supporting a flask, blow communicating means within the agitator for imparting hammer blows there-

to, an adjustable head on the agitator for enclosing the blow communicating means, means for maintaining the head and agitator in tight relation, resilient means beneath the head for supporting the agitator, and means for guiding the flask supporting means in its vibratory movements.

7. In a flask shake-out, an agitator embodying a support for sustaining and vibrating a flask, means in the agitator for pneumatically imparting vibratory motion thereto, cushioning means in direct alignment with and supporting the agitator for absorbing shock incident to its vibration, and yielding means anchoring the flask support whereby a trembling motion is imparted thereto simultaneously with its vibratory motion.

8. In a flask shake-out, a frame, a receptacle supported by the frame and having a sand discharging outlet, a spring positioned in a receptacle, a flask supporting vibrator mounted on the spring, means for guiding the vibrator in its vertical reciprocatory movements, and yielding means for anchoring the vibrator to the frame whereby a trembling motion may be imparted to the vibrator.

9. In a flask shake-out, an agitator body having flask supporting means associated therewith, a plunger in the body, means for actuating the latter, a head adjustably connected to the body for enclosing the plunger, means for automatically tightening the head, and resilient means in alignment with the head for supporting the shake-out.

10. A flask shake-out embodying an agitator body having air inlet and outlet passages, a cylinder in the agitator embodying ports registering with said passages, a plunger in the cylinder having air passages adapted to register with said ports, an anvil at the upper end of the cylinder, an anvil at the lower end of the cylinder, and an adjustable head on the agitator for clamping the anvils and cylinder together within the agitator body.

In testimony whereof I affix my signature.
JOHN F. CRAWFORD.