June 11, 1935. W. F. PIPER 2,004,293

METHOD OF SHAKING OUT FLASKS

Filed Jan. 20, 1934

Fig. 1

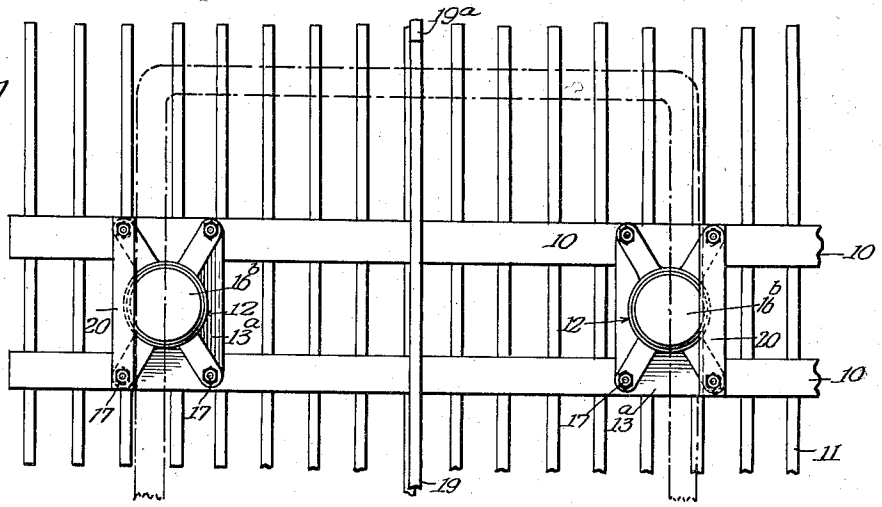


Fig. 2

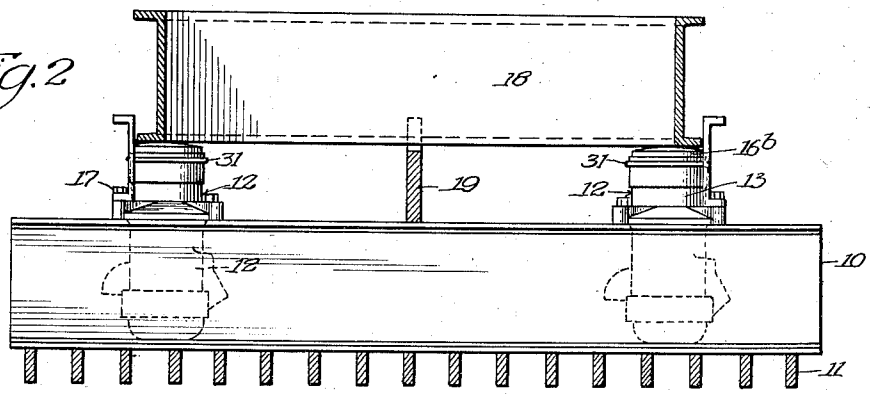


Fig. 3.

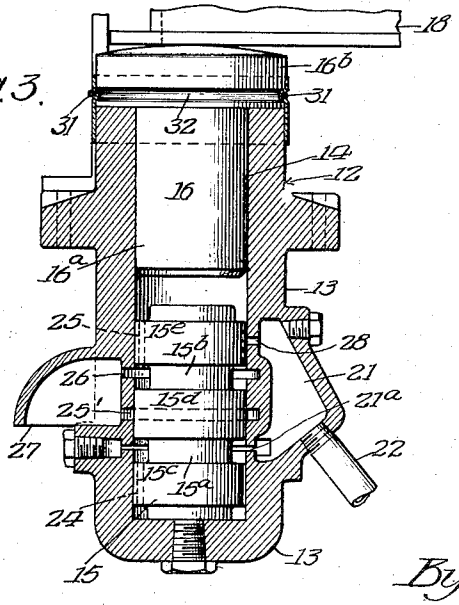
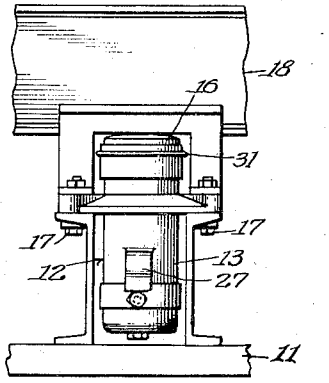


Fig. 4



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METHOD OF SHAKING OUT FLASKS

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3 Claims. (Cl. 22—190)

The invention relates to shaking the sand out of foundry flasks after the molding operation has been completed and when the sand is in a hardened and packed condition around the castings and is difficult to remove for prompt re-use of the flasks.

Heretofore it has been customary to shake out flasks by imparting vibrations thereto through a fixed or spring-mounted flask support usually containing a cylinder and piston adapted to be reciprocated by fluid under pressure to impart hammer blows to the flask support.

In practice, it has been found that with such a shake out method or arrangement the cylinder and the flask support carried by the cylinder are short-lived on account of the sharp and powerful hammer blows which are transmitted therethrough to the flasks.

The primary object of the present invention is to provide an improved method of shaking out flasks in which the flasks are supported on, and in contact with, a reciprocable hammer which is carried usually by a cylinder and to which hammer blows are imparted by a rapidly reciprocating element such as a piston, so that the vibrations will be transmitted directly from the piston to the hammer, and thence directly to the flask without impact or blows against the cylinder. In practice, it has been found that this method results in an acceleration of the shake-out operation and in expediting discharge of the sand from the flasks, and also avoids the necessity of frequently replacing the cylinder of the apparatus on account of disintegration and wear.

With this object in view, the invention consists in the method which is hereinafter set forth, and is more particularly defined by claims at the conclusion.

In the drawing which accompanies and forms a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Fig. 1 is a plan view of an apparatus used in carrying out the improved method;

Fig. 2 is a side elevation;

Fig. 3 is a section of one of the vibrating devices, and

Fig. 4 is an end view of the apparatus.

The method which forms the subject matter of the method contemplates the shaking out of a flask 18 and is adapted to be carried out in an apparatus of the type and character shown in the drawing. This apparatus comprises a pair of channel beams 10 which are adapted to underlie the flask and are secured on the top of a grating 11 through which the sand discharged from the flask 18 will fall into a pit or onto the floor. A pair of vibrating devices 12 of like construction are secured on top of and between the channel beams 10, and are positioned to underlie opposite side-rails of the flask 18. Each vibrating device comprises a casing 13 which is formed with a vertical cylinder 14 adapted to receive air under pressure; a piston 15 vertically slidable in the cylinder; and a hammer 16 provided with a stem 16^a slidably fitted in the upper end of the cylinder 14 and adapted to be impacted or struck by the piston 15, and an enlarged head 16^b positioned above the casing and outside of the cylinder. The casing 13 of each device is provided with integral lugs for bolts 17 which secure the casing in fixed position on the beams 10.

The sides of flask 18, from which the sand or castings are to be removed rest directly on the tops of the heads 16^b of the hammers 16 of the devices. These heads lap over the tops of the cylinders 14 and normally rest thereon. This construction makes it possible to rest the flask on, and directly to support it by, the hammers, so that the blows imparted to the hammers will be transmitted directly to the flask without having the hammers impact against the cylinders. The top face of each head 16^b is convexed to permit the rocking of the flask by the hammers respectively. A bar 19 with upstanding lugs 19^a at its ends is welded to the beams 10 and extends transversely of the beams 10 and under the flask a sufficient distance to prevent the flask from tilting transversely off the heads of the hammers. The flask is confined against displacement longitudinally of the beams 10 by vertical guide plates 20 which are secured to the casings 13 respectively by bolts 17.

Each vibrating device is operable by fluid under pressure, preferably air, which is delivered into an inlet chamber 21 in the casing 13 through a pipe 22 which is suitably connected, usually by a flexible hose, to a source of compressed air supply. Piston 15 is provided with two circumferential grooves 15^a and 15^b, which form, in effect, three piston-sections or members 15^c, 15^d and 15^e. The upper end of the piston is adapted to impact against the lower end of the stem 16^a of the hammer 16, to impart blows in rapid succession to the hammer. Ports 24 extend axially through the piston-section 15^c and ports 25 extend axially through the

piston-section 15e. An annular inlet channel 21a, formed in the casing around the cylinder 14 is in communication with the inlet-chamber 21. Annular exhaust-channels 25¹ and 26 are formed in the cylinder wall and lead to an exhaust-chamber 27.

Assuming the piston to be in its position shown in Fig. 3, air under pressure will flow from channel 21a into the groove 15a in the piston and through ports 24 to exert a pressure upon the piston to impart an upward stroke to the piston and a blow to the lower end of the hammer-stem 16a. The full force of the blows to the piston will be transmitted through the hammer directly to the flask, because the hammer is free to move upwardly, and restrained only by the weight of the flask and its contents. The air which has imparted the upward stroke to the piston will escape from the lower end of the cylinder through the ports 24 in the piston, groove 15a in the piston, and channel 25¹ in the casing, while the piston-section 15c closes the annular inlet channel 21a. As the piston approaches its upper limit, compressed air, in limited volume, will pass to the top of the piston through port 28, groove 15b in the piston and ports 25, to insure the downward stroke of the piston. Before the piston reaches the limit of its down stroke, port 28 is closed by piston-section 15e, and piston-section 15c will uncover the inlet groove 21a to exert air pressure under the piston and this cushions its down stroke to avoid severe impact of the piston against the casing. This movement of the piston and blows to the hammer are continuously repeated in rapid succession to impart vibrations and sharp strokes to the flask.

A sheath 29 of flexible material, such as asbestos belting, is fitted around the periphery of the head 16b of each hammer and depends around the outside of the upper portion of the wall of the cylinder, to prevent sand from passing into the cylinder. This sheath is secured to the head of the hammer by a binding wire 31 which ties the sheath in an annular groove 32 in the head of the hammer.

In carrying out the improved method, the flask containing the sand and castings is lowered into position shown in Fig. 1, so its sides will contact with, and rest directly and loosely on, heads 16b of the hammers, which are reciprocably held in the cylinder casings 13. Substantially, the entire weight of the flask and its contents will be borne by the hammers which are supported in the cylinders, so that their upward movement is retarded only by the flasks, and will not produce any impact of the hammers against the casings. Next, compressed air is supplied to the cylinders of the vibrating devices which will cause the pistons 15 to rapidly reciprocate and impart a succession of upward blows to the hammers. The strokes will be transmitted directly from the hammers to the flask resting thereon, and as a result, sharp blows and short lifting strokes in rapid succession will be imparted to the flask, which will quickly dislodge the sand and cause it to be discharged from the flask. This operation will be continued until the flask is empty.

In this method of shaking out flasks, the hammer blows and strokes are transmitted directly from the hammers to the flask without passing through the cylinder casings or support. This avoids the wear and tear on the vibrators which cause their rapid destruction which occurs when the blows are transmitted through the casing or support. The method makes it possible to dispense with cushioning devices which have heretofore been provided for the purpose of reducing wear. The retractile strokes of the hammer and flask avoid any severe impact on the casings because the retractile strokes of the pistons are cushioned. In this method the direct action of the hammer against the flask reduces the time required to dislodge sand from the flask, or to shake out the mold over known methods, effectively dislodges baked sand, and avoids severe wear and tear of the vibrating devices so that the frequent replacement heretofore required is not necessary.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. That improvement in shaking out flasks which consists in supporting a flask so its bottom is open to discharge sand and so that a portion of its wall contacts directly with the outer end of a hammer which has its inner end slidably mounted in a cylinder, and then actuating a piston in the lower part of the cylinder by fluid under pressure to impart, in rapid succession, blows to the hammer which will be transmitted directly to the flask to loosen the sand and discharge it from the flask.

2. That improvement in shaking out flasks which consists in positioning a flask so that its bottom is open to discharge sand and a portion of the side wall thereof rests directly on the upper end of a vertical hammer which has its lower end slidably mounted, in a cylinder, and then actuating a piston in the cylinder to impart, in rapid succession, upward blows to the hammer which will be transmitted directly to the flask to loosen the sand and discharge it from the flask.

3. That improvement in shaking out flasks which consists in supporting a flask so that its bottom is open to discharge sand therefrom and portions of the side wall thereof rest loosely but directly upon, the upper ends of a plurality of vertical hammers which have the lower ends thereof vertically and independently reciprocable in cylinders respectively, and then actuating pistons in the cylinders to impart blows, in rapid succession, to the hammers which will be transmitted directly to the flask to loosen and discharge the sand.

WALTER F. PIPER.