(No Model.)

S. J. ADAMS.

APPARATUS FOR FORMING SAND MOLDS.

No. 523,502. Patented July 24, 1894.

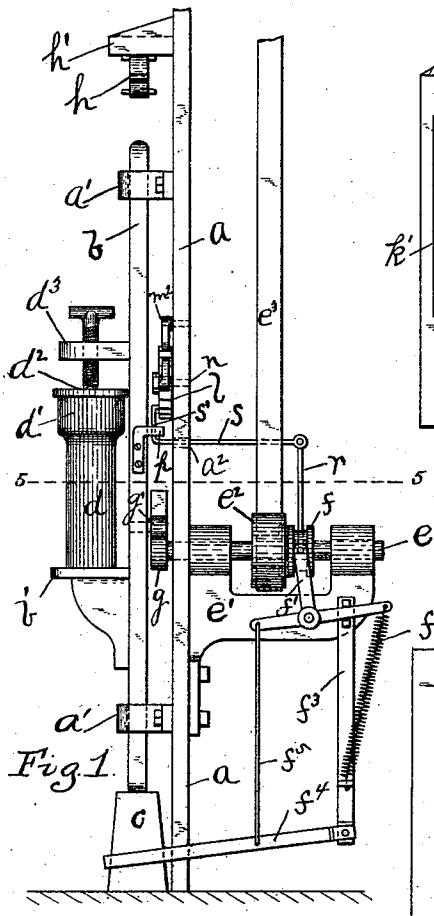


Fig. 1.

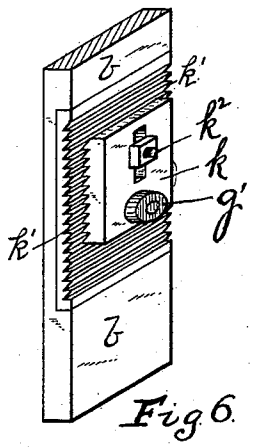


Fig. 6.

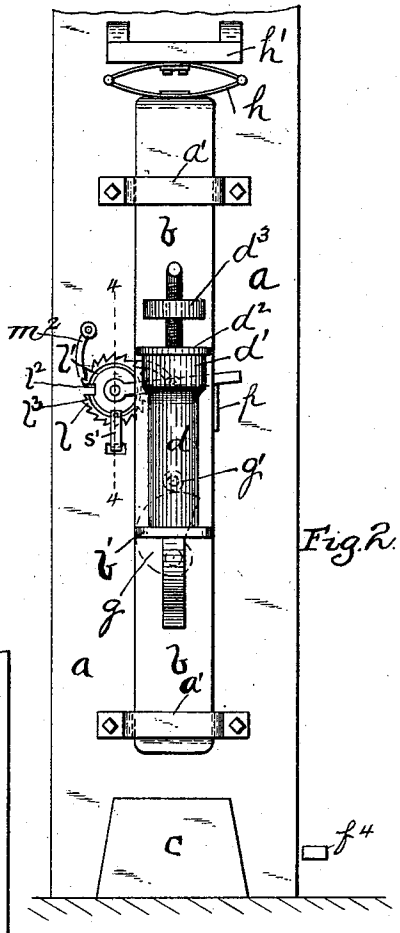


Fig. 2.

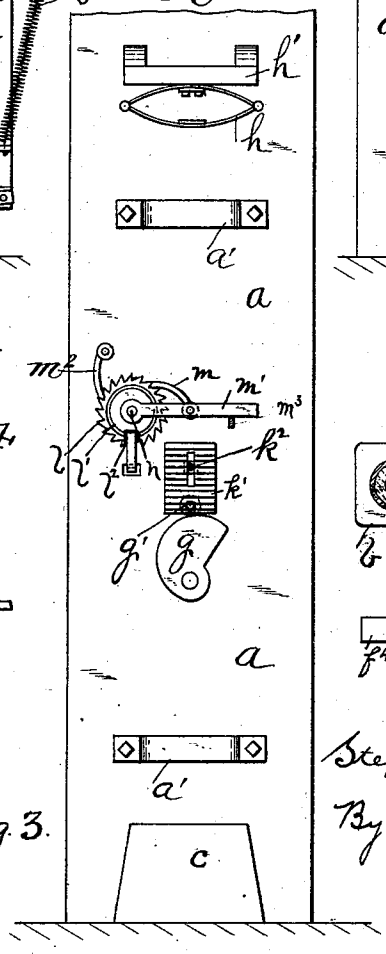


Fig. 3.

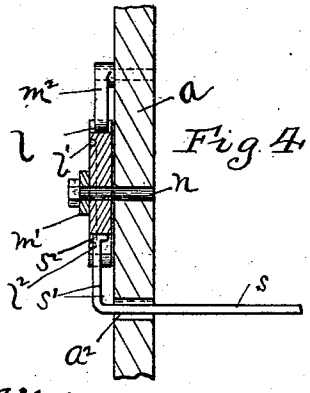


Fig. 4.

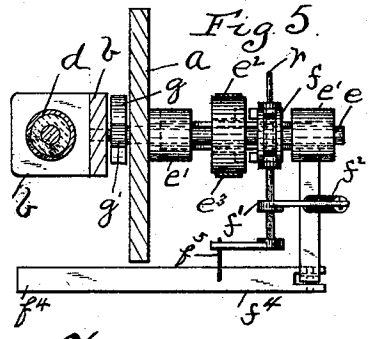


Fig. 5.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

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APPARATUS FOR FORMING SAND MOLDS.

SPECIFICATION forming part of Letters Patent No. 523,502, dated July 24, 1894.

Application filed June 6, 1893. Serial No. 476,741. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN JARVIS ADAMS, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Forming Sand Molds; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for forming sand molds, and particularly to the method of forming sand molds by means of what is known as the jarring process, that process consisting in raising a flask or core box containing the sand and a reservoir resting upon the same and containing a surplus body of sand, and dropping it upon a block or like solid body so as to impart a jar to the sand, compact it within the flask, and cause it to conform to the pattern, the sand being fed from the reservoir into the flask, and the sand within the reservoir acting as a weight to assist in the packing of the sand and insure the formation of a solid mold or core. In the practical working of said method, it is found that the solidity or compactness of the sand depends upon the height and the number of jars to which the flask is subjected, and that in case the same does not receive the necessary number of jars, the sand is not sufficiently packed so that the metal in entering the mold will force out the sand and increase the size of the article cast, either by pressure upon the body of the mold or upon the core within the mold, while if the flask receives a larger number of jars than desired, the sand is so compacted that the metal will not lie against the same, which leads to imperfections in the casting, such as the blowing of the metal, as the gas cannot find a proper escape through the sand. The principle objection is found in connection with the pressure of the metal upon the sand, which, if the sand is not sufficiently compacted, will often lead to the enlargement of the casting to the extent of one-hundredth part of an inch or more, and even this apparently small irregularity in the size of the casting is of great importance, especially in the making of pipe welding balls, wagon boxes, and like cylindrical articles, where it is desired that the castings shall be of exact size, the variation of the one-hundredth part of an inch being objectionable.

The principle object of the present invention is to provide an apparatus by which after the jarring mechanism is once started in motion, the mold will receive a certain specified number of jars, such, for example, as ten to twenty, as found desirable, and that as soon as that number of jars has been imparted to the mold, the apparatus will be automatically disconnected from the driving mechanism and the jarring cease, so that all the duties of the operator are to place the flask or core box in the proper position, fill in the sand, and start the machine, when the desired number of jars will be imparted to the same, and the jarring apparatus will then be automatically stopped.

To these ends my invention consists, generally stated, in the combination of a jarring apparatus for compacting the sand within the flask or core box, and a registering device to regulate the number of jars, and connections therefrom to the driving mechanism for operating the jarring apparatus, acting to disengage such driving mechanism when the desired number of strokes has been imparted to the flask or core box.

It also consists in combining with the jarring apparatus, of a registering dial having a ratchet face, a pawl mechanism for moving the same, and a lever or arm engaging with the dial and operated thereby when the desired number of strokes are imparted to the jarring apparatus, and it freeing the clutch from the power mechanism.

It also consists in certain other improvements, which will be hereinafter more particularly set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view of the apparatus embodying the invention. Fig. 2 is a face view thereof. Fig. 3 is a face view, the jarring platform having been removed to show the apparatus. Fig. 4 is a cross section on the line 4—4, Fig. 2. Fig. 5 is a cross section on the line 5—5, Fig. 1. Fig. 6 is a detail view illustrating the adjusting device for the roller engaging the cam.

Like letters of reference indicate like parts in each of the views.

The most simple form of jarring apparatus consists of a suitable stand or standard a in which is mounted the jarring platform b, the same sliding in bearings a' in the standard, the lower end of the platform normally resting upon the jarring block c, and the platform, after it is raised, dropping upon the said jarring block. It is to be understood, of course, that the jarring platform may be mounted in any suitable way, the one illustrated being simply a desirable form which illustrates the invention desired now to be covered. The platform b has extending out therefrom the shelf b' on which the flask or core box d rests, and in connection with said jarring platform, in order to hold the flask or core box in place, I prefer to employ a suitable clamp d^2. At the upper end of the flask or core box d I prefer to employ the reservoir d' through which the sand is fed into the flask or core box, and the clamp d^2, which is supported in a suitable brace or bracket d^3, presses upon this reservoir d'.

It will be understood that the term "flask," as hereinafter used, includes the core box, which is practically a flask.

The flask may, of course, be connected to the platform in any other suitable way, and for some classes of molds it does not need to be secured thereto. Any suitable connections may be made between this jarring platform and the driving apparatus, that illustrated being a simple form which has been found desirable on account of its compactness. I will describe the same so that it may be more fully understood.

Secured within the bracket or bearing e' is the power shaft e on which a suitable pulley e^2 is mounted to run loosely, said pulley being driven from a suitable over-head shaft by the belt e^3, said pulley having a clutch face with which a clutch f having a sliding connection to the shaft e engages. The clutch f has connected to it the lever f' mounted on the bearing e' which is shown as a T-crank lever, one arm being connected to the spring f^2, the other end of which is connected to the bar f^3 extending down from the bracket e, and the spring being so arranged as to hold the clutch normally out of engagement with the pulley e^2. The other arm of the lever f' is connected to the treadle f^4 by a rod f^5 so that when necessary the clutch may be advanced into engagement with the pulley. The shaft e carries the cam g which engages with the pin or roller g' which extends out from the rear face of the platform b in the course of the cam so that as the cam forces up the roller g' it lifts the platform, and as soon as said roller passes over the highest point of the cam, as the cam face is cut away, permits the platform to drop upon the jarring block c so imparting the jar to the flask.

It will be noticed that above the jarring platform b is the spring h. This spring is employed to increase the jarring stroke, and it is located in the course of the platform b, being supported by the bracket h' extending out from the standard a. The spring may either be connected directly to the platform b, or be located in the course thereof, so that as the platform is raised by the cam g it will be pressed thereby against the spring, and as soon as the roller g' passes the highest point of the cam, the spring will act upon the jarring platform to force it downwardly upon the jarring block, the spring thus acting with the force of gravity to give additional force to the jarring stroke to compact the sand within the flask. It will be noticed that the roller g' is carried on a slide k mounted in the guides k' on the platform, as shown in the detail view, Fig. 6, and that such slide k has a screw k^2 or other proper means for clamping the same firmly in place, the slide thus providing for the adjustment of the roller g' at any particular position with relation to the cam g, the advantage being that by means of the adjustment of said roller g' the length of jarring stroke can be regulated, it being desired for some molds that a shorter stroke and larger number of jars shall be employed, while for others the long stroke and fewer number of jars are found to give the desired compactness to the sand. It will, of course, be understood that where the roller g' is adjusted so as to impart only a short stroke to the platform, it will not compress the spring h to so great an extent, and, consequently, the force of such spring will be regulated thereby.

Mounted on the standard a is the register dial wheel l, which is one form of registering device adapted for the purpose and illustrates the invention, though it is to be understood that any registering device suitable for the purpose may be employed. Said dial wheel has the annular groove l' on the face thereof, and the recess l^2 extending from the periphery inwardly to the inner edge of the groove l'. The dial wheel is also formed ratchet faced, as shown at l^3, and engages with the pawl m and the detent m^2, the pawl m operating to turn the dial wheel while the detent holds the same from backward movement. Said pawl m is carried by the lever m', which, as shown, is mounted upon the shaft n carrying the dial wheel, and the lever m' extends out in a practically horizontal direction within the course of the arm p on the jarring platform b, so that as the platform is raised by the cam g, this arm p will raise the lever m' and through the pawl m turn the dial wheel for the length of one of its ratchet teeth, and as the platform drops, the detent m^2 will hold the dial plate in that position, while the lever m' drops so as to engage the next tooth on the dial wheel. The lever is held at a suitable point of rest by any desired stop m^3. Connected to the arm f' carrying the clutch f is the rod r which is shown as extending upwardly and connecting with the rod s, which rod extends through a seat a^2 formed for the same in the standard a and carries the crank

or finger s' which extends up into the course of the dial wheel l, said finger s' having at the end thereof the teat s^2 which is adapted to enter the annular groove l' and travel therein, being held in the groove by said teat s^2. As above stated, the clutch f is held normally out of engagement with the pulley, and when the rod s engages with the dial wheel by means of its teat s^2 it is held therein until the dial is turned so as to bring the recess l^2 in line with the teat s^2 on the rod s, when the teat s^2 will pass out of the groove l' and the finger s' will enter within the recess l^2, so permitting the spring f^2 to draw the clutch out of engagement with the pulley e^2 and break the connection between the driving pulley and the power shaft p. Instead of the clutch a pulley tight on the shaft may be employed and the rod s act to shift the belt.

It is, of course, to be understood that the register may be located at any suitable point and may be operated by any suitable device which will impart a step-by-step movement to the same at each stroke or drop of the jarring platform, and that power connections may be located at any desired place above or below the point indicated in the drawings, and may be connected to the jarring platform in any suitable way.

In forming molds or cores with the said apparatus as illustrated in the drawings, the operation is practically as follows:—The flask d is placed upon the platform and the reservoir d' placed thereon, and the sand filled within the flask and reservoir, and where desired the flask and reservoir are secured by suitable devices or clamps to the platform. The recess l^2 of the dial wheel is held in line with the finger s' of the rod s, as shown in Fig. 4, and as soon as the operator desires the machine to start, he places his foot upon the treadle f^4 which draws the clutch f into engagement with the pulley e^2 and through the bar r^2 and rod s forces the finger s' of the rod s out of the recess l^2 of the dial wheel. As soon as the shaft e is thus turned, through the medium of the pulley e^2 and the power transmitted to it by the belt e^3 the cam g raises the jarring platform and in its first upward stroke causes the finger p to raise the lever m' and through the pawl m turn the dial wheel, when the dial finger s' engages with the dial and rides on the surface thereof, and in this way the clutch f is held in engagement with the pulley e^2. At each stroke of the jarring platform the lever m' is caused to move the dial wheel for the length of one tooth, and as the lever recedes the detent m^2 holds it in that position, and the parts necessarily operate until the dial wheel has been turned the desired number of strokes according to the number of teeth on the face thereof, the dial finger being held by the dial until the dial is turned so as to bring the recess l^2 in line with the dial finger s'. As soon as this occurs, the dial finger s' passes into such recess, being drawn into the same by the spring f^2 and the movement being sufficient to free the clutch f from the driving pulley and so stop the machine. The number of strokes for each jarring operation may be arranged by means of different dial wheels having a different number of ratchet teeth thereon according to the desired number of strokes desired, and in connection with the same the stroke of the lever m' may be properly adjusted by means of its stop m^3 so as to give the necessary stroke for the turning of the dial wheel, whether eight, ten, fifteen, or more strokes are desired. To change the dial wheels the nut holding the one in use in place may be removed, that wheel slipped off and another slipped in its place, it requiring but a minute to make the necessary change.

It is thus apparent that by providing a registering device and combining the same with the jarring apparatus, so as to register each stroke of the jarring machine, each mold can have the proper number of jars imparted to it so as to compact the sand evenly and regularly throughout and bring the sand to exactly the desired solidity or compactness required, so that it will form the casting to the exact shape and size, and all fear of blow holes, or like imperfections, in the casting will be overcome.

The invention has another distinctive advantage, in the fact that after the machine is started it continues until the desired number of jars are imparted to the sand within the flask, when it is automatically stopped, and therefore that all the work needed for the formation of the molds is the proper adjustment of the flask, the filling of the sand and securing of the same upon the jarring table, and while one mold is being compacted, the operator can either be arranging for the forming of the mold on another platform, or can be finishing the mold last formed, and need pay no attention to the operation of the machine, knowing that the mold will be made of the desired compactness. This is also a great advantage to the manufacturer, as some workmen would be liable to reduce the number of jars and so form imperfect castings in order to turn out a larger amount of work. By combining with the jarring platform the spring operating downwardly upon the same, the jars may be so increased as to very materially lessen the time requisite for forming the mold, and by forming the roller g' of the jarring platform adjustable thereon the length of stroke of the platform, as well as the force exerted by the spring h, may be accurately adjusted, the condition of the mold when finished being thus brought within the power of the operator who knows that if he properly fills the flask and its reservoir and regulates the kind of jar, whether long or short, and the number of jars according to the registering

device employed, he can compact the molds uniformly and evenly, and that practically perfect castings will be insured.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a jarring apparatus for compacting sand within a flask or core box, of a registering device to regulate the number of jars, and connections therefrom to the power mechanism for operating the jarring apparatus, substantially as set forth.

2. The combination with a jarring apparatus, and power connections for operating the same, of a registering device operated by the movement of the jarring apparatus to register the jars, and connections from said registering device to the driving mechanism for operating the jarring apparatus, substantially as set forth.

3. The combination of a jarring apparatus, power connections for operating the same, a registering dial turned by the movement of the jarring apparatus, and connections from such registering dial to the driving mechanism for operating the jarring apparatus, substantially as set forth.

4. The combination of a jarring apparatus, power connections for operating the same, a registering dial, and a dial finger engaging with said dial and connected to the driving mechanism for operating the jarring apparatus, substantially as set forth.

5. The combination of a jarring platform, a registering device carried by the machine frame, a lever adapted to move the registering device, an arm on the jarring platform engaging with said lever, and connections from the registering device to the driving mechanism for operating the jarring platform, substantially as set forth.

6. The combination of a jarring platform, a registering dial mounted on the machine frame and having a ratchet face, a lever having a pawl engaging with the ratchet face, an arm on the jarring platform moving said lever, clutch driving mechanism, and connections from the dial to the clutch driving mechanism for operating the platform, substantially as set forth.

7. The combination of a jarring apparatus, power connections for driving the same, a registering dial having a recess at one point in the periphery thereof, means for turning the dial wheel, and a dial finger engaging with the dial and connected to the driving mechanism for operating the jarring apparatus, substantially as set forth.

8. The combination of a jarring apparatus, power connections for driving the same, a registering dial having an irregularity at one point in the periphery thereof, means for turning the dial, and a dial finger engaging with the dial and connected to the driving mechanism for operating the jarring apparatus, substantially as set forth.

9. The combination of a jarring platform, a flask carried thereby and holding the sand to be molded, power mechanism for raising the jarring platform, and a spring in the course of the jarring platform to assist in imparting the downward movement thereto, substantially as set forth.

10. The combination of a jarring platform, a power driven shaft carrying a cam, a vertically adjustable pin on the jarring platform with which the cam engages and by which the stroke of the platform is regulated, and a registering device for regulating the number of jars, substantially as set forth.

11. The combination of a jarring platform, a flask carried thereby and holding the sand to be molded, a power driven shaft carrying a cam, a vertically adjustable pin on the jarring platform with which the cam engages and by which the stroke of the platform is regulated, and a spring in the course of the jarring platform for assisting in imparting the jarring stroke thereto, substantially as set forth.

12. The combination of a jarring platform, a power driven shaft carrying a cam, a vertically adjustable pin on the jarring platform with which the cam engages and by which the stroke of the platform is regulated, a spring in the course of the jarring platform for assisting in imparting the downward stroke thereto, and a registering device operated in correspondence with the movement of the jarring platform and controlling a clutch connecting said cam to the power driven apparatus, substantially as set forth.

13. The combination of a jarring apparatus, a registering dial having an irregularity, a dial finger engaging with the dial and adapted to engage with such irregularity, a power shaft operating the jarring apparatus, a clutch or like device on said shaft engaging with the power apparatus and connected to the dial finger, and a spring for holding the clutch out of engagement, substantially as set forth.

In testimony whereof I, the said STEPHEN JARVIS ADAMS, have hereunto set my hand.

STEPHEN JARVIS ADAMS.

Witnesses:

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JAMES I. KAY.