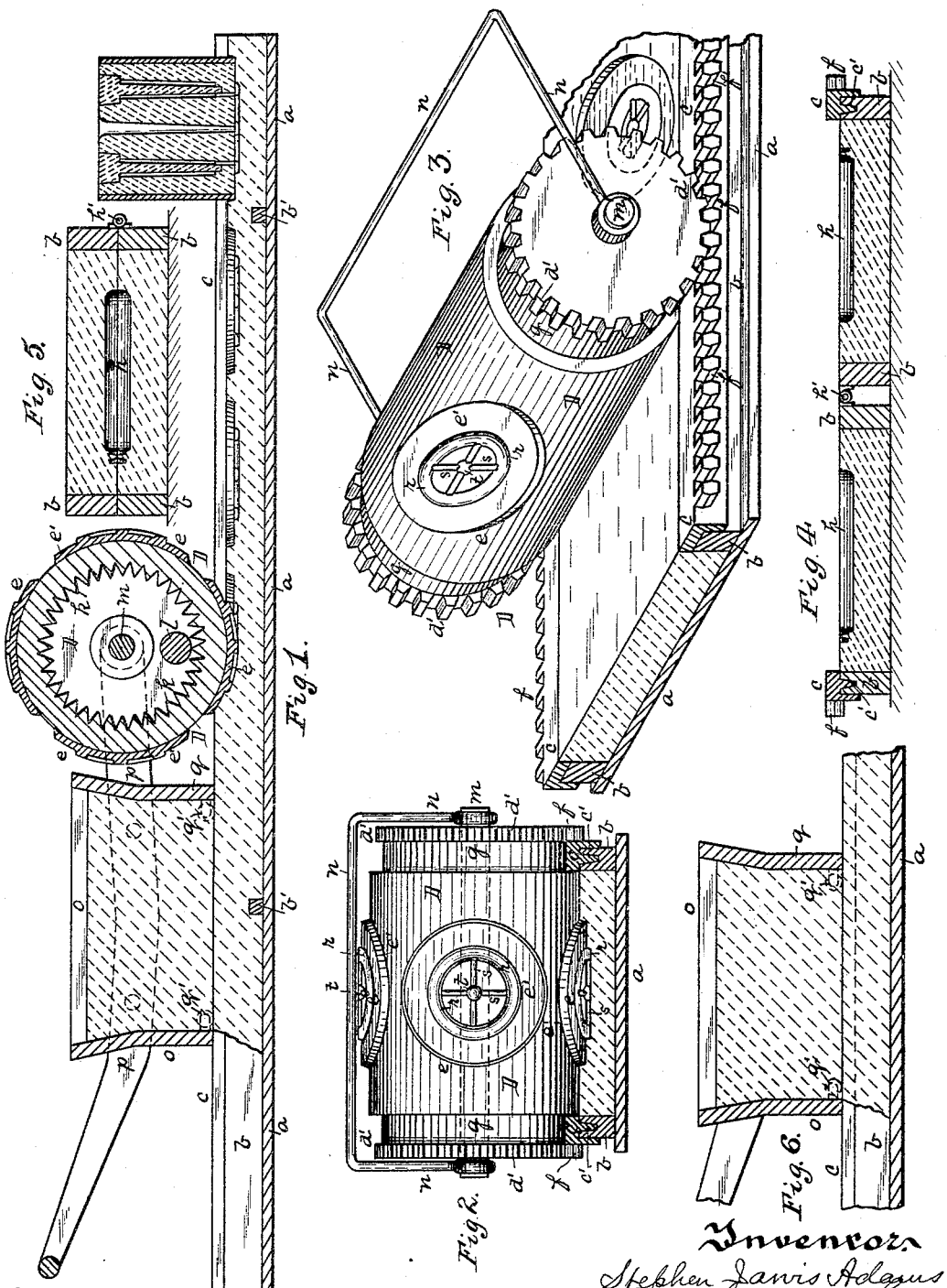
(No Model.)

S. J. ADAMS.

FORMING SAND BEDS FOR MOLDS.

No. 459,102. Patented Sept. 8, 1891.



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UNITED STATES PATENT OFFICE.

STEPHEN JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

FORMING SAND BEDS FOR MOLDS.

SPECIFICATION forming part of Letters Patent No. 459,102, dated September 8, 1891.

Application filed May 19, 1890. Serial No. 352,286. (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 Forming Sand Beds for Molds; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the formation of sand molds; and it has special reference to the formation of shallow molds—such, for example, as sash-weights, wagon-boxes, fencing, house-cresting, and other like articles—and to the formation of beds having seats therein for the reception of molds, such being fully described in an application for patent filed by me January 4, 1890, Serial No. 335,916.

Its object is to provide a method of forming such molds or beds and suitable apparatus by which a series of such molds can be formed continuously.

To these ends my invention consists, generally stated, in forming such molds by passing a roller carrying the necessary patterns over a body of sand, and thereby compacting the body of sand and at the same time forming the desired molds or cavities in the same and forming such molds or cavities continuously or the one after the other in the body of sand as the roller passes over the same.

It also consists in imparting a slight jar to the roller during the formation of the molds in the body of sand, so as to insure the clearing of the body of the roller and the patterns carried thereby from the sand, leaving a clean and perfect mold.

My invention also consists in certain improvements in the apparatus for forming these molds, comprising, generally stated, the roller carrying the patterns and guideways at the side of the body of sand acting to confine the same and acting to hold the roller in proper line, all of which will be hereinafter more particularly described.

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

Figure 1 is a longitudinal section illustrating the same. Fig. 2 is a front view of the roller, showing the sand bed in section. Fig. 3 is a perspective view of the bed ready for the formation of the molds therein and the roller passing over the same. Fig. 4 is a view of the flask suitable for the formation of sash-weight and like shallow molds. Fig. 5 shows the complete mold for the same, and Fig. 6 is a sectional view showing the reservoir for feeding the sand to the bed.

Like letters indicate like parts.

In practicing my invention I prefer to arrange on the foundry-floor, either upon a long platform resting thereon or upon the floor itself, the beds in which the molds are to be formed in accordance with my invention. I also prefer to support the mold as firmly as practicable, so that the sand shall be compacted to the desired density, and if it is desired to bring the two parts of the mold in line a practically even surface will be formed on the molds for the purpose. To these ends I prefer the construction illustrated in the drawings, though any suitable construction suitable for the purpose may be employed.

Resting either on the foundry-floor or upon the platform *a* are the side strips *b*, which confine the sand between them on the platform and form what might be termed the "flask" in the finished mold. These strips may be connected at intervals by cross-strips *b'*, if desired; but this is not necessary, especially where a properly-supported platform is employed. The strips *b* may extend above the upper surface of the finished mold or bed, in which case the distance between the upper edges of the strips and the upper surface of the finished mold would show the amount of compacting of the sand by means of the roller; but I prefer to employ separate guide strips or bars *c*, resting on the flask-strips *b*, these strips corresponding in width to the distance which the sand is to be pressed down by the roller, so that when the guide-bars are removed it will leave the top surface of the finished mold practically even with the top edges of the flask. For the formation of shallow molds such as sash-weights and wagon-boxes, where both parts of the mold are formed by rolling over the surface of the sand, it is necessary to employ these guide-strips, which can be removed, and the two parts of the mold then brought together. These guide-bars *c* rest upon the top edges and against the outer edges of the flask-strips *b*, and they are held in proper line therewith by means of pins *c'* entering into the flask-strips *b*.

As it is desirable to hold the roller carry-

ing the patterns *e* in proper line transversely to the sand bed and to prevent any side motion of the same, I form on the guide-bars *c* the racks *f*, with which the cog-faces *d'* of the roller D engage, the teeth of these racks *f* being either formed of pins which will permit the sand to drop between them or of separate teeth tapering toward their lower ends, as shown at *f'*, between which teeth the sand may drop, so that there will be no collecting or wedging of sand between the teeth of the racks and those of the cog-faces *d*. Extending up into the roller D on each side of the same and just within the cog-faces *d'* are the recesses *g*, into which the guiding-bars *c* enter, the recesses corresponding in depth to the thickness of the guide-bars, so that the face *d* of the roller D will extend between said guide-bars and act to force the entire body of sand to a level corresponding with the top edges of the flask-strips *b*, the roller traveling on the guide-bars *c*. In the body of the roller is formed a series of patterns according to the molds to be formed, these patterns being counterparts of the molds and being preferably secured to the roller by any suitable means, so that they can be changed when desired, though, if preferred, they may be cast directly with the roller.

The patterns *e* (shown in Figs. 1, 2, and 3) are the patterns for forming seats of runners in the sand bed for the reception of the one-part molds or flasks, as described in said application for patent filed January 4, 1890, Serial No. 335,916. A complete mold resting on the sand bed, with the runners formed therein according to my invention, is illustrated at one end of Fig. 1. In the patterns *e* shown in the drawings there is the body *e'*, which extends out beyond the rollers the distance which it is desired to form the seat in the sand bed, and said pattern has also the annular ribs *r*, forming the runners, with cross-ribs *s* for connecting said runners with the central knob *t*, forming the central basin in the bed.

It is evident that any other suitable form of pattern may be secured to the roller, as may be found desirable, according to the different molds in the construction of which the invention is employed. For example, in the formation of sash-weights such as shown in Figs. 4 and 5 the roller has the long patterns corresponding to half of the sash-weight secured to its face, these patterns being connected by suitable runner-patterns, and as preferred by me the patterns for both half-molds being secured to the roller, so that when the roller passes over the two flasks, which are held in proper line with each other by any suitable means, such as by the hinges *h'*, the mold-cavities *h* will be formed in both cope and drag at the same time, and upon the removal of the guiding-bars *c* the cope may be placed upon the drag, thus completing the mold, my invention providing a very simple and rapid means for forming such shallow molds, and one in which a continuous series of molds may be formed for the entire length of the sand bed or flask.

In forming the patterns for the molds I may, if I so desire, form the same of soft metal, which, after having been properly finished, can be bent to conform to the cylindrical surface of the roller and then secured thereto, the use of such soft-metal patterns enabling me to form the same more rapidly and overcoming the necessity of casting the patterns corresponding in shape to the cylindrical surface of the rollers.

It is a well-known principle in the formation of sand molds that to enable them to free themselves properly from the sand it is necessary to impart to the pattern a slight jar, thus acting to free the pattern from the sand. In the ordinary mold this is accomplished by means of a bar inserted into the pattern and given a few light raps; but it is evident that in a roller-pattern and where the molds are formed continuously over a long bed of sand such means could not be employed. I have provided for the jarring of the roller, however, by forming in the interior thereof a series of projections and grooves or like irregularities on the surface, or, as it might be described, providing the interior of the roller with a serrated face *k* and placing within the hollow roller a metal ball or weight *l*, which, as the roller passes over the sand bed, will roll from one tooth to the next of the serrated inner face of the roller and so impart a slight jar to the roller, sufficient to free the roller and the patterns carried thereby from the sand-bed and leave a clean and perfect mold. The roller D is mounted on a suitable shaft *m* and can be forced along over the sand bed by any suitable means, it being generally provided with a handle *n*, which can be grasped by one or more operators, according to its weight, and be rolled over the sand bed.

The sand may be introduced into the space between the guide-bars by simply shoveling it in and subsequently leveling it off; but as the bed to be formed is very shallow for the mass of molds I prefer to introduce it through a reservoir moving in front of the roller, as shown in Fig. 1, or by a reservoir separate from the roller passed over the bed prior to the passage of the roller. This reservoir *o* corresponds in width to the bed and is of the proper length and height to carry sufficient sand to fill the bed. It is generally secured to the arms *p* by which the roller is moved, said arms extending out in front of the roller. The rear board *q* of the reservoir acts as a leveler or "striker-off" to strike off the sand and form an even surface on the bed. In order to reduce friction, I generally employ rollers *q'* at the forward edge of the reservoir to travel on the guide-bars, the reservoir being thus supported by the roller D and the rollers *q'*, while its rear edge *t* travels close to and

strikes off the sand. Like rollers q' may also be employed at the rear end of the reservoir, if desired.

In practicing my invention, after having placed the flask-strips in proper position either on the foundry-floor or on the platform a, and having rigidly secured them in that position, I place upon the same the guide-bars c, and then if the reservoir o is not employed fill in between the flask-strips b and the guide-bars c, leveling the sand between them to about a height even with the top of the guide-bars c. This is all the preparation necessary for the formation of the molds, the roller being then simply passed over the sand bed so formed, and being guided in its course by the guide-bars c and held from canting or turning by the cog-faces d' of the roller engaging with the racks f, while the face d of the roller presses down the interior body of sand to a level with the tops of the flask-strips b, so compacting the sand sufficiently to enable it to hold the weight of any flasks placed upon it and sustain the pressure of the molten metal as it enters the molds, and at the same time, through the patterns e, extending out beyond the face d of the roller forming the necessary mold-cavities in the sand bed, as may be desired. As the roller D passes over the sand bed, it is supported on the guide-bars c, and therefore an even top face to the mold is formed, while the jarring bar or weight l in traveling over the serrated inner face k of the roller imparts a slight jar thereto and frees the roller from the sand, so forming practically perfect molds in the sand bed. If the reservoir o is employed, the previously filling of the bed is unnecessary, the sand being simply filled into the reservoir and fed thereby to the bed. Otherwise the operation is the same. These molds are formed continuously as the roller passes over the surface of the sand bed, and the number formed is limited only by the length of such bed. After the compacting of the sand of the bed and the formation of the molds, as above described, the guide-bars c are removed, leaving the finished molds, and all that is necessary is to place upon the bed the other part of the mold, such as the single flask containing a series of mold-cavities into which the metal is directed by the runners formed in the sand bed, as shown in Fig. 1, or by placing upon the sand bed a flask containing part of the mold-cavity, so as to form therewith a complete mold, the remaining part of the mold-cavity having been formed in the bed, such as in the formation of sash-weights, as above described, or in any other suitable way.

By the invention above described I am enabled to form molds rapidly and at a very slight expense, thus doing away with much of the hand-molding operation and correspondingly cheapening the product.

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

1. The herein-described method of forming sand molds, consisting in passing a roller carrying one or more patterns secured to the face thereof continuously over a bed of sand, and at the same time imparting to said roller a slight jar, and thereby forming the mold-cavities in the bed of the sand and freeing the roller from the sand as it passes over the same, substantially as and for the purposes set forth.

2. In apparatus for forming sand molds, the combination, with the sand bed having parallel guide-bars, of a roller having one or more patterns secured to the face thereof, said roller being provided with annular guideways corresponding to and engaging with said guide-bars for guiding the movement of the roller, substantially as and for the purposes set forth.

3. In apparatus for forming sand molds, the combination, with the sand bed, of guide-bars at each side thereof provided with rack-faces, and a roller carrying a series of patterns secured to the working-face thereof, said roller having a guideway in each side of its working-face engaging with said guide-bars, and cog-faces engaging with said racks, substantially as and for the purposes set forth.

4. In apparatus for forming molds, a roller adapted to be passed over a body of sand and having one or more patterns on the face thereof, in combination with the jarring ball or weight within the roller, substantially as and for the purposes set forth.

5. In apparatus for making molds, a roller adapted to be passed over a bed of sand and carrying a series of patterns on the face thereof, said roller having a serrated or grooved inner surface, in combination with a ball or weight engaging with said serrated inner surface to impart a jar to the roller, substantially as and for the purposes set forth.

6. In apparatus for forming molds, a roller adapted to be passed over a bed of sand, having soft or pliable metal patterns secured to the face thereof, substantially as and for the purposes set forth.

7. In apparatus for forming molds, the combination, with a sand bed having guide-bars, of a reservoir traveling on said guide-bars and having a board on the rear end thereof to strike off or level the sand fed from the reservoir, substantially as and for the purposes set forth.

8. In apparatus for forming molds, the combination, with the sand bed having guide-bars, of a reservoir traveling on said guide-bars and having a rear board to strike off or level the sand fed from the reservoir, and a roller traveling on the guide-bars and carrying one or more patterns, substantially as and for the purposes set forth.

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

STEPHEN JARVIS ADAMS.

Witnesses:

JAMES I. KAY,

J. N. COOKE.