

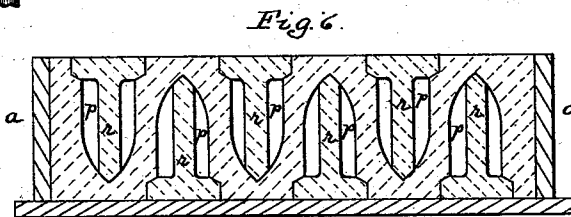
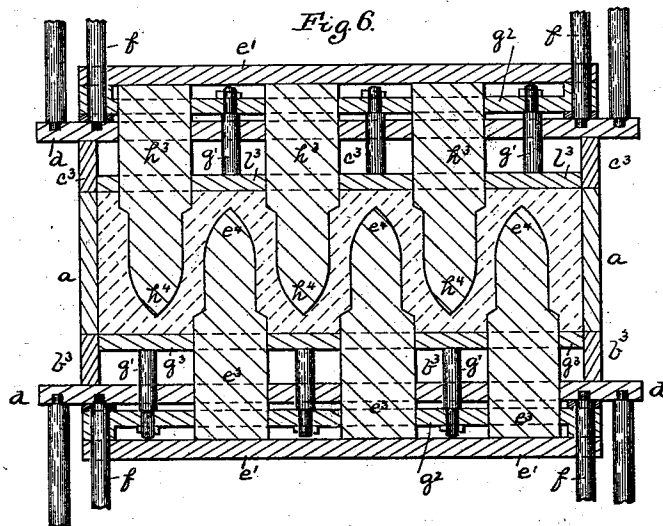
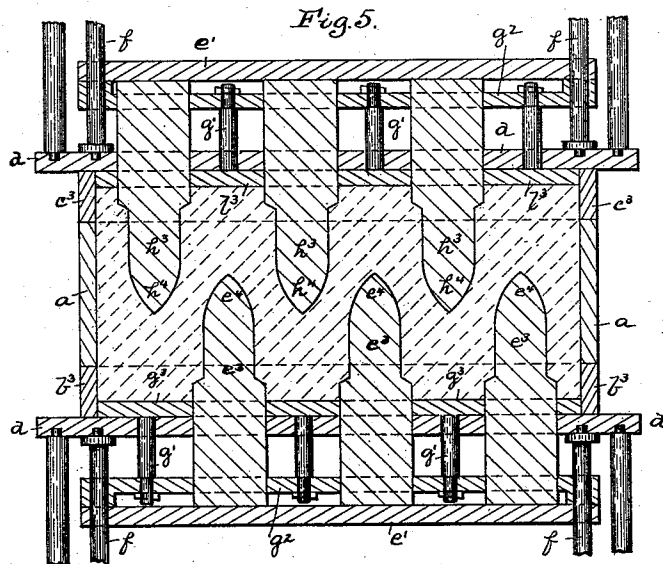
(No Model.)

2 Sheets—Sheet 2.

S. J. ADAMS.
MOLDING APPARATUS.

No. 531,429.

Patented Dec. 25, 1894.



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UNITED STATES PATENT OFFICE.

STEPHEN JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

MOLDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 531,429, dated December 25, 1894.

Application filed July 23, 1891. Serial No. 400,455. (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 Molding Apparatus; 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 especially to apparatus for forming what are known as tubular molds, that is, molds for forming tubular castings; one of its objects being to provide apparatus suitable for pressing molds of substantially such form as shown in Letters Patent No. 377,009, granted to me January 31, 1888, these molds being of greater diameter at the upper and lower ends than in the center.

The present invention is also included in an application for patent filed by me of even date herewith, Serial No. 400,454, relating to the pressing of tubular sand molds generally, and the description of the present invention will include to some extent the description of the invention set forth in said application.

The invention set forth in said application comprises, generally stated, molding apparatus having a sand reservoir at each end thereof, and a pressing plate or plunger adapted to press the sand contained in said reservoirs from each end thereof into the main flask and so compact the same around the pattern within the flask, and on account of the forcing of the sand from each side reservoir into the flask, while the pattern is contained therein, obtaining a more perfect and even packing of the sand around the pattern and the formation of a more perfect mold.

The present invention comprises, generally stated, a method of forming molds included in the above statement; that is, it consists in mounting the two patterns adapted to longitudinal movement with relation to each other, and as one step in the formation of the mold pressing the sand longitudinally from each end into the flask, while the patterns are contained therein, and as another step forcing the two patterns toward each other so as to compact the sand in contact therewith, such operation enabling me to properly compact all the sand within the flask and form an

evenly packed mold by the movement both of the packers or plungers and of the two patterns.

It also consists in the apparatus employed for practicing the invention, as 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 60 drawings, in which—

Figure 1 is a longitudinal central section of the apparatus showing the sand contained within the flask and reservoirs before any compressing action has taken place. Fig. 2 65 is a like view showing a position of the apparatus when the pressers have forced the sand from the reservoir into the main body of the flask. Fig. 3 is a like view of the apparatus showing the position of the same on completion of the mold. Fig. 4 is a view of the completed mold. Figs. 5 and 6 are like views of a modification of my invention, and Fig. 7 shows the mold formed thereby.

Like letters of reference indicate like parts 75 in each of the figures.

The apparatus illustrated in Figs. 1 to 3 shows the main flask *a*, the bottom reservoir *b* and the top reservoir *c*, the bottom reservoir *b* forming part of or resting upon a table *d*, 80 while the flask *a* rests upon the bottom reservoir, and the top reservoir *c* rests upon the flask. The main pattern *e* extends up at its lower end from the guide plate *e'* moving in the guides *f*, secured between the platform *d* 85 and the cross bar *d'* of the table, and so providing for the longitudinal movement of the pattern *e* within the flask. Any suitable connection for operating the guide plate *e'* can be made. In like manner fitting within the 90 reservoir *b* and around the pattern *e* is the pressing plate *g*, this pressing plate *g* fitting neatly within the reservoir and around the pattern, and being connected to the bars *g'* and through them to the guide plate *g''*, which 95 also fits upon the guide bars *f*, the guide plate *g''* being connected to any suitable pressing bar so that longitudinal movement may be imparted to it, as desired.

At the upper end of the apparatus and extending down from any suitable pressing devices are the parts for applying the pressure 100

to the upper part of the mold. In the construction shown, the top or auxiliary pattern is secured to and extends down from a pressing bar *k*, to which longitudinal movement may be imparted by any suitable mechanism, the pattern *h* fitting around the upper end *e*³ of the pattern *e*, which enters within the guide way *h'* of the pattern *h*. For the formation of molds having enlargements at each end, the bottom pattern *e* will of course form the enlargement at the lower end of the mold, while the top pattern *h* will form the enlargement at the upper end thereof, and though my invention is not limited specially to the formation of that class of molds, its utility for such purpose will be manifest. Fitting around the pattern *h* is the top pressing plate *l*, which enters within the upper end of the reservoir *c* and which is operated upon by any suitable pressing mechanism, for example, by a sleeve *m* fitting around the pressing bar *k* as shown, such sleeve operating to press down the pressing plate around the pattern *h* and within the reservoir *c*, around and within which parts it fits neatly. The top pressing plate *l* has preferably the stops *l'* formed thereon, which will limit its downward movement by coming in contact with the top surface of the reservoir *c*.

In order to lift the pressing plate *l* it has a suitable arm *n* which has an inwardly extending lip *n'*, which may engage with a lug upon the bar *k*, and act to lift the said pressing plate when the mold is completed. Pressing mechanism engaging with the top pressing plate *l*, may, however, work outside of and independent from the pressing bar *k* and in such case, said lifting arm *n* may engage with a lug or shoulder on the bar *k*, such as illustrated in Fig. 2. The several longitudinally movable parts of the apparatus may be operated by suitable levers, cranks or cams, or any other mechanism for imparting motion to the same, as desired.

In practicing the invention, in the apparatus above described, the top pattern *h* and pressing plate *l* are supported a sufficient distance above the table *d* to permit of the placing of the flask *a* upon the reservoir *b*, and the reservoir *c* upon the flask. The bottom pattern *e* preferably extends entirely through the flask and the reservoir, so that when the sand is filled within the flask and reservoir, it will extend to the top of the top reservoir. The operator then lowers the top pattern *h* and top pressing plate *l*, so that the top pattern will fit around the upper end *e*³ of the bottom pattern, which enters within the guide way *h'* of the top pattern, the pattern descending until the top pressing plate *l* rests upon the sand within the top reservoir *c*. The parts of the apparatus being then ready for the operation, he forces the top pressing plate *l* downwardly, and the bottom pressing plate *g* upwardly, and these two pressing plates force the sand contained within the reservoirs *c* and *b*, respectively, into the main flask *a*, compressing the sand around the patterns *e* and

h, and so compacting the sand within the flask by a movement, which as it occurs at both ends of the body of sand acts to pack the sand evenly within such longitudinal flasks as those employed for forming tubular castings, as described in said application of even date herewith. During this operation the sand will of course be compacted around the patterns, but as it is desirable to obtain a special packing of the sand close to the body of the patterns, especially in molds having enlargements at each end, and the upper pattern to a certain extent prevents the downward pressure from acting to compact the sand against the body of the main or lower pattern; in order to obtain a proper packing around the patterns, the operator then forces downwardly the upper pattern *h* and forces upwardly the main or lower pattern *e*, the guide portions of said patterns telescoping, that is, the guide portion *e*² entering within the guide way *h'* and by such movement, he forces the sand around the patterns outwardly against the main body of sand, and so properly compacts the same, the tapering walls of the lower pattern causing an upward packing of the sand on lines diagonal therefrom, while the upper pattern acts in a downward direction in practically the same way, the result being a properly and evenly compacted mold, formed within the main flask *a*. While I have described the preferable operation in which the pressing plates *g* and *l* have motion imparted to them first, it is evident that practically the same result may be obtained by first imparting the longitudinal movement to the upper and lower pressing plates, and this is included within my invention. Upon the completion of the mold, the upper and lower patterns are first preferably withdrawn, this being desirable, as in such cases the pressing plates *g* and *l* can act as stripping plates and properly support the sand within the flask while the patterns are withdrawn. The pressing plates *g* and *h* are then withdrawn, the upper pressing plate and pattern being lifted high enough to leave room for the removal of the empty upper reservoir *c* and the lifting of the finished mold from the empty lower reservoir *b*; and when this is done another flask may be placed upon the reservoir *b*, then the reservoir *c* placed thereon, the sand filled within the same and the operation repeated.

In Fig. 4 is shown the completed mold, the mold having the mold cavity *p* with the enlargement *p'* at the lower end thereof, and having the main core *r* which is centered at its lower end within the ring core *s*, which fits within a seat *s'* formed therefor in the body of the sand.

In Figs. 5, 6 and 7, I have illustrated my invention as to the making of sand molds in which the upper and lower patterns instead or telescoping with each other and being employed to form the same mold cavity, are placed out of line with each other, such for example, as for forming separate molds en-

tering the flask from opposite ends, the mold shown being for forming what are known as pipe welding balls. In forming these molds, the principle is practically the same, the apparatus having the two reservoirs $b^3 c^3$, the lower pressing plate g^3 , the upper pressing plate l^3 , the lower patterns e^3 and the upper patterns h^3 , these several patterns and pressing plates being connected to suitable mechanism for imparting the proper longitudinal movement to them. The ends of the several patterns e^3 and h^3 are made tapering toward a point as at e^4 and h^4 , to facilitate the passage of the patterns through the sand and spread the sand out toward the patterns entering in the opposite direction, and so cause the more uniform packing of the same within the mold, especially where so large a number of mold cavities are formed in the same flask.

The operation of making the molds is practically the same as that above described, the upper patterns and pressing plate being supported sufficiently above the table to permit of the entrance of the sand, or if desired, the upper patterns being lowered within the flask into the position shown in Fig. 5, and the sand being then filled around the same, and the pressing plate h^3 being then lowered to the position shown in Fig. 5. The pressing plates may then be forced toward each other to force the sand from the reservoirs into the main flask and the patterns then forced toward each other to pack the sand between the several patterns, it being evident from an examination of the drawings, that one pattern will force the sand toward the other pattern adjacent thereto or surrounding the same, and that in this way, a comparatively even packed mold may be obtained.

After the mold is formed, the upper and lower pressing plates and patterns may be withdrawn, the upper reservoir lifted off, the cores inserted within the upper mold cavities formed, a bottom board applied and the flask containing the molds turned over on the same, and the cores placed in the molds formed by the lower patterns. Suitable runners may of course be formed in any suitable way by cutting or pressing.

By such an apparatus a large number of molds may be formed in the same flask, as the mold cavities entering from one side may fit between those entering from the other side, and almost double the number of mold cavities to be formed in the same size of flask.

The operation can be rapidly and easily accomplished and practically perfect long tubular and like molds may be formed, the work being done by unskilled labor, and so materially reducing the cost thereof.

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

1. The herein described method of forming molds, consisting in compacting the sand

within a flask by forcing the same in opposite directions into the flask around the patterns, and by an independent movement compacting the sand by forcing the two patterns longitudinally toward each other within the body of sand, substantially as and for the purposes set forth.

2. In apparatus for forming molds, the combination of a flask, two patterns entering within each flask from opposite ends, and adapted to be forced longitudinally toward each other within the same so as to compact the sand while approaching each other, and two pressing plates separate from and fitting around the patterns at the top and bottom of the flask respectively, and adapted to be forced toward each other so as to compact the sand around the patterns, substantially as and for the purposes set forth.

3. In apparatus for forming molds, the combination of a flask, two patterns entering within the flask and adapted to be forced longitudinally toward each other within the same so as to compact the sand while approaching each other, two pressing plates separate from and fitting around the patterns at the top and bottom of the flask respectively, and adapted to be forced toward each other so as to compress the sand around the patterns, and two sand reservoirs at the top and bottom of the flask respectively, within which said pressing plates enter, substantially as and for the purposes set forth.

4. In apparatus for forming sand molds, the combination of a flask, two sets of separate patterns entering within the flask from opposite directions and out of line with each other, the patterns entering in one direction, being adapted to enter the spaces between the patterns entering in the opposite direction, and pressing plates separate from and fitting around the two sets of patterns and adapted to be forced toward each other, substantially as and for the purposes set forth.

5. In apparatus for forming sand molds, the combination of a flask, two sets of separate patterns entering within the flask from opposite directions and out of line with each other, the patterns entering in one direction, being adapted to enter the spaces between the patterns entering in the opposite direction, the ends of said patterns being tapering toward a point to spread the sand as they pass into the same, and pressing plates separate from and fitting around the two sets of patterns and adapted to be forced toward each other, 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.