(No Model.)

S. J. ADAMS.

SAND MOLD.

No. 521,452. Patented June 19, 1894.

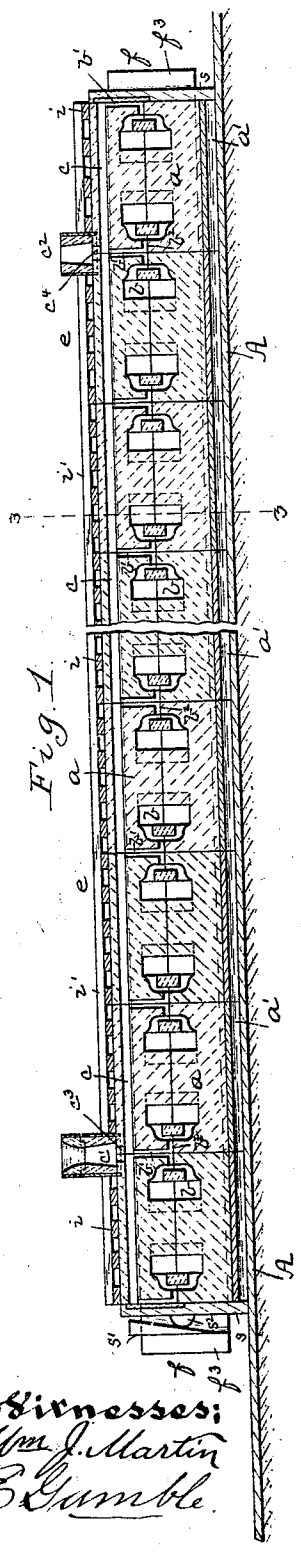

Fig. 1.

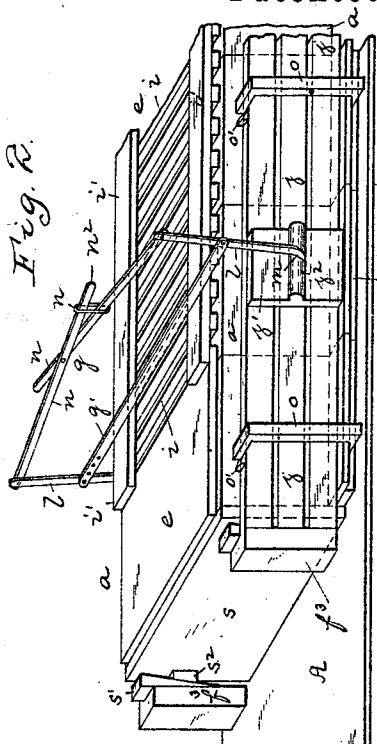

Fig. 2.

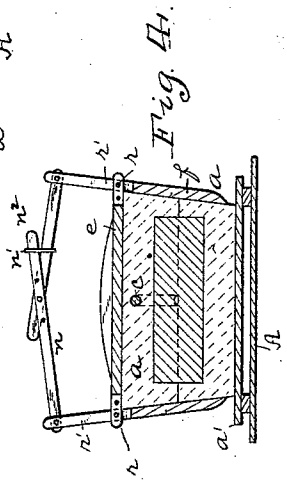

Fig. 4.

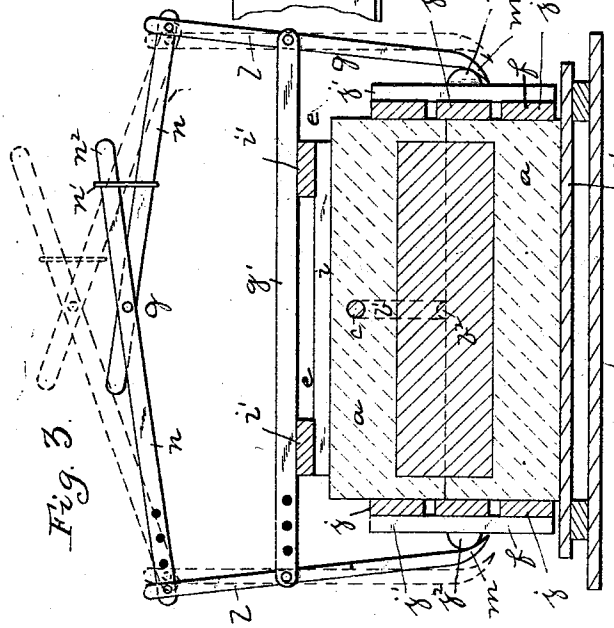

Fig. 3.

Witnesses:
Wm. J. Martin
E. Gumble.

Inventor.
Stephen Jarvis Adams.
By Kay, Totten & Cooke,
Attorneys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

STEPHEN JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

SAND MOLD.

SPECIFICATION forming part of Letters Patent No. 521,452, dated June 19, 1894.

Application filed October 24, 1892. Serial No. 449,907. (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 Sand Molds; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to sand molds, and has special reference to that class of sand molds in which a series of sand molds are placed in line and in contact with each other, so that the metal may be fed to the mold cavities in the different molds from a continuous runner to which the metal is fed and from which it passes by channels into the mold cavities, as is more fully described in the application filed by me of even date herewith, Serial No. 449,905.

The present invention relates, among other things, to the supporting or confining of sand molds during the pouring or casting of the metal, so that the several molds may be employed without the flasks and yet sufficiently confined to prevent the bursting out of the metal.

According to the present invention, I employ in combination with a series of sand molds placed in line and in contact with each other, top and side plates, extending over and along the top and sides, and confining the sand in the series of molds, the plates embracing two or more molds so that they are confined together.

It also comprises the formation of such supporting or confining plates pliable or yielding, so as to conform to the bodies of the molds.

It also consists in certain improvements in the means for clamping the top and side plates upon the series of molds; as well as certain improvements in the arrangement of the molds for the purpose of feeding the metal to the continuous inclosed runner within the series of molds; and to other improvements, all of which will be hereinafter more particularly described 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 longitudinal section showing a series of molds with my invention applied thereto. Fig. 2 is a perspective view of the set or series of molds having confining top and side plates or covers applied thereto. Fig. 3 is a cross section on the line 3—3, Fig. 1, showing the preferred form of clamping mechanism in the open and closed positions thereof; and Fig. 4 is a like cross section illustrating other clamping mechanism.

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

The present invention is illustrated in connection with a set or series of molds having a continuous runner inclosed within and extending through the body of the mold, as more particularly shown in Fig. 1; the construction and arrangement of said molds, however, are more particularly described in application of even date herewith, Serial No. 449,905, and will not be described at length in the present application. A set or series of molds a is supported upon the bed plate A which is arranged, as shown, on a slight incline, the molds as they are formed on their supports or bottom boards a' being placed upon the bed plate A and the molds shown having each two mold cavities b each of which is fed by means of a down-take channel b' and cross gate b^2 from the continuous runner c which continuous runner extends through each mold of the series, except, possibly, the end molds thereof in the construction shown, and as the molds are arranged upon the bed plate the sections of the continuous runner formed in the several molds are brought into line, while as the faces of the molds come together they close the down-take channels or runners which are formed between the faces of the molds as described in said application, Serial No. 449,905.

Another point of difference between the invention described in said application and the present is that the openings leading from the reservoirs c' c^2 to the continuous runner are formed between the faces of the two molds, as at c^3 c^4, being formed in such position that they can easily be cut in with any suitable tool after the completion of the mold otherwise, so that special mechanism for forming them in the end molds of the series is not required. The reservoirs c' c^2 then rest upon the two end molds of the series at their point of junction, and the metal is fed thence di-

rectly into the runner. It will be noticed that the molds are set upon an inclined bed and therefore that all the molds are placed upon a slight incline. The reason for so supporting them is that the metal may flow upwardly through the inclined continuous runner, while at the same time it has a regular continuous or straight course through the series of molds. The metal will therefore enter at the lowest point of the continuous runner and, after filling the mold cavities directly beneath the entrance, the metal will flow at an upward incline through the first section of the continuous runner being carried into that mold cavity, any metal which may flow ahead into the next section of the mold cavity remaining there acting as a head to force the metal into the mold cavity so that there is generally a filling of one mold cavity at a time, and the flow of any portion of the metal through the continuous runner for such a distance as to chill it and clog or close such runner is prevented. On account of such inclined position of the series of molds, it will be noticed that the pouring reservoir c' is of greater length than the receiving reservoir c^2 at the other end of the continuous runner, this being desirable in order to maintain the metal at about the same level in the said reservoirs. It will be noticed that the series of molds have no flasks, and that their faces are set in contact with each other, and as they all rest upon an even bed plate they are all brought approximately into line so that they all may be supported by a suitable mold cover which extends along the same for a greater distance than a single mold, each mold cover preferably covering quite a number of molds in the series as shown.

In an application of even date herewith, Serial No. 449,906, I have described the mold cover where the side plates or portions are rigid with the top plate. In the present application the side plates are formed movable with relation to the top plate, being either connected so as to swing with relation thereto, as in Fig. 4, or, as preferred by me, being entirely separate therefrom and only connected therewith at the time of clamping the parts together. In the latter case, I employ the top plate or cover e which is arranged to extend for any desired distance over the top of the molds, and which rests thereon, while the side plates or side covers f rest against the sides of the series of molds and both are clamped in place, such, for example as by the clamps g which are formed separate from both the top plate e and side plates f. In the formation of these top and side plates confining a number of molds, there are two features which are found desirable, one that they shall be pliable so as to conform more readily and give support to the sand molds even though they may not be exactly in line, and, second, that they shall give free escape to the gases and steam at the time of casting the metal. I obtain both results by constructing the plates of a series of strips united to supporting strips or cleats which give space between them for the escape of steam and, if formed of rather light wood work, are sufficiently pliable to conform to the series of molds when clamped thereon. For the top plate I generally employ the cross strips or boards i united by the longitudinal supporting strips i'; and for the side plates I generally employ the longitudinal strips or boards j united by the cross strips j'. In either case the open work necessary for the escape of the gases and steam and the necessary pliability to permit slight movement to conform to the sand molds is obtained. In order to hold these parts in place, so that they will act as sand retainers or covers, any suitable clamping device may, of course, be employed. The preferred construction of clamping devices is shown in the drawings, a cross bar g' resting on the top plate e, such, for example, as on the longitudinal strips i', and having the vertical arms or levers l pivoted at the ends thereof, said levers being adapted to press against the side plates f, the upper ends of said levers being connected by the toggle arms n, one of which extends past the other in such position that the device may be locked by means of the link n' slipping on one of the toggle arms and along the extension n^2 of the other toggle arm to hold them in place. Practical use of such device has proven that even with a light board construction such device clamps the parts sufficiently to sustain the pressure of the metal during casting. It will be noticed that the lower or free ends m of the arms l are bent or curved inwardly, and that the cleats j' have the lugs j^2 formed thereon so that said inwardly extending base portions m may engage under the lugs j^2. The result of such construction is that when the clamp is forced into engagement with the top and side plates, as the arms are clamped together they will naturally draw down the cross bar g' and force the side plates f against the sides of the mold, so obtaining a downward pressure for the top plate e and a slight upward pressure for the side plates, binding firmly the several molds over which the plates extend. This clamping device with the hinged arms may, of course, engage with any other portion of the supports or clamps below the top plate, such, for example, as the bottom boards, and when so used will serve to hold down the top plate. The side plates, and with them the top plate, may also be secured to the bottom boards or support for the molds by means of clamps, such as shown at o, which engage with a loose wedge on, or a wedge secured on the edge of the side plate, as shown at o'.

It is evident that other clamping devices may be employed, and it is also evident that the top plate and side plates while movable with relation to each other, may, if desired, be permanently connected to the clamping device, both of which are included within my

invention. The latter construction is shown in Fig. 4, in which the top plate *e* has the side plates *f* pivoted thereto, as at *r*, the side plates being provided with levers *r'* which extend above the top plate and are operated by any suitable clamping mechanism to draw the side plates in contact with the mold bodies. The device shown in said figure for clamping is the same as that above described.

It is, of course, evident that the end portions of the series of molds must be confined as well as the sides and tops thereof. For this purpose any suitable abutment or means of confining the end portions may be employed, but I prefer to employ the end plates *s* held in place by the side retainers or plates *f*, the side retainers or plates having the inwardly extending ribs f^3 at the ends thereof and the end retainer *s* being of sufficient width to fit within said ribs, that is, being practically the same width as the mold so that it may be dropped into place and secured by any suitable wedge which bears against the ribs f^3, such wedges being shown at *s'* bearing against the ribs and against the lug s^2 on the end retainer *s*. Any other suitable connection between the end retainer and the side plates may, of course, be employed, the main requirement being that such end retainers are held in place by the mold retaining plates instead of being clamped to or resting upon the bed plates.

In the use of the invention, the molds are formed by any suitable molding apparatus, or by hand, and as the molds are made they are placed in position upon the bed plate A, the end molds having the opening through the top thereof to provide for communication between the reservoirs c' c^2 and the continuous runner *c*. Any suitable number of molds arranged in this way may be employed, the only limit found in the practice being the length of the foundry floor, as it is found that the metal will flow when confined within the runner for practically any distance desired. When the molds are placed upon the bed plate, the mold retainers or covers are secured in place, the top plate *e* being placed upon the series of molds, and if it does not fit snugly thereto, being moved slightly in such way as to bring it to a bearing, and the same being done with the side plates, and the covers and side plates are clamped upon the series of molds as above described, it generally requiring that two or more lengths of such plates be employed with the series of molds arranged together. The end retainers *s* are then dropped down between the side retainers along the end of the mold, and the wedges driven in between the ribs on the side retainers and the end retainers so closing and confining the ends of the molds. As these parts are clamped in place, in case of any slight irregularity in the mold surfaces, as they are formed pliable as above described, they will conform to the set or series of molds and give proper support thereto. The metal is then poured from any suitable ladle into the reservoir at the lower end of the series of molds, and flows through the same in the manner above described, continuing to fill each mold cavity and then to pass along the runner to the next mold cavity until it reaches the end of the series and rises within the reservoir c^2, when the pouring ceases, the advantages from this method of pouring having been fully described in said application Serial No. 449,905. As soon as the metal is set, by releasing the clamp *g* and withdrawing the wedges *s'* the covers can be quickly removed from that set or series of molds and applied to another set, it requiring only a few minutes to so prepare the second set for casting. As the mold supporting devices are movable with relation to each other, it is evident that they can be applied to different sizes of molds and conform thereto so that the necessity of said covers being of particular size is overcome. The devices are also light in weight, simple in construction and easy of use, and as they are clamped together give all the support necessary for the molds during the casting operation.

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

1. In sand molds, the combination with a series of molds arranged in line with each other and each resting on a common horizontal support, of side retaining plates extending along two or more of said molds and clamps for holding the plates to the molds, substantially as and for the purposes set forth.

2. In sand molding apparatus, the combination with a series of molds set in line with each other and each resting on a horizontal support extending under the series, of a top retaining plate and side retaining plates extending along two or more molds in said series and clamps holding said plates in place upon the molds, substantially as and for the purposes set forth.

3. The combination of a series of sand molds set in line with each other, of a pliable mold retaining plate extending along two or more of the molds in said series and a clamp for holding it in place, substantially as and for the purposes set forth.

4. The combination with a series of sand molds set in line with each other and each resting on a common horizontal support, of a mold retaining plate adapted to extend along the series of molds and give support thereto, such plate being formed of a series of strips and of supports therefor connected to the strips and extending at an angle thereto so forming an open retaining plate, substantially as and for the purposes set forth.

5. The combination with a series of sand molds set in line with each other and each resting on a common horizontal support, of a top retaining plate, side retaining plates and a clamp bearing on the top plate and engaging the side plates, substantially as and for the purposes set forth.

6. The combination with a series of sand molds set in line with each other, and resting on a common horizontal bed, of detachable side retaining plates and a detachable end retaining plate held in place by the side retaining plates, substantially as and for the purposes set forth.

7. The combination with a series of sand molds set in line with each other, of a top retaining plate, side retaining plates, and a clamping device resting upon the top plate and having movable arms engaging with the side plates, substantially as and for the purposes set forth.

8. The combination with a series of sand molds set in line with each other, of a top retaining plate, side retaining plates, and a clamping device resting upon the top plate and having movable arms engaging with the side plates, said arms having inwardly extending lower ends, substantially as and for the purposes set forth.

9. The combination with a series of sand molds set in line with each other, of a top retaining plate, side retaining plates having the cleats j' provided with lugs j^2, and the clamp having arms provided with inwardly extending lower ends, said clamp bearing on the top plate and the free lower ends of its arms engaging with the lugs on the cleats of the side plates, substantially as and for the purposes set forth.

10. The combination with a series of sand molds set in line with each other, of a top retaining plate, side retaining plates, the clamp g having the bar g' bearing on the top plate, the side arms l, toggle arms n, and link n', substantially as and for the purposes set forth.

11. The combination with a series of sand molds set in line with each other, of the side retaining plates having the ribs f^3 at the ends thereof, the end retaining plate s, and tightening devices between said end retaining plate and said ribs, substantially as and for the purposes set forth.

12. The combination with a series of sand molds set in line with each other, of a top retaining plate and side retaining plates extending along the same, said side retaining plates being movable with relation to the top retaining plate, and clamping mechanism engaging with both said top plate and said side plates and holding said plates in place, substantially as set forth.

13. The combination with a series of sand molds set in line and in contact with each other, of a top retaining plate, side retaining plates, clamping mechanism for holding the same in place, and clamps securing the side retaining plates to the mold support, substantially as and for the purposes set forth.

14. The combination of a series of sand molds set in line with each other, and having a continuous runner extending through said series of molds, and channels or runners leading to the mold cavities therein, an inclined bed plate supporting said molds at an incline, and a feeding reservoir or basin communicating with the lower end of the inclined runner, substantially as and for the purposes set forth.

15. The combination of a series of sand molds set in line and in contact with each other, and having a continuous runner extending through said series of molds, and channels or runners leading to the mold cavities therein, an inclined bed plate supporting said molds at an incline, a feeding reservoir or basin communicating with the lower end of the inclined runner, and a reservoir communicating with the upper end of said inclined continuous runner, 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.