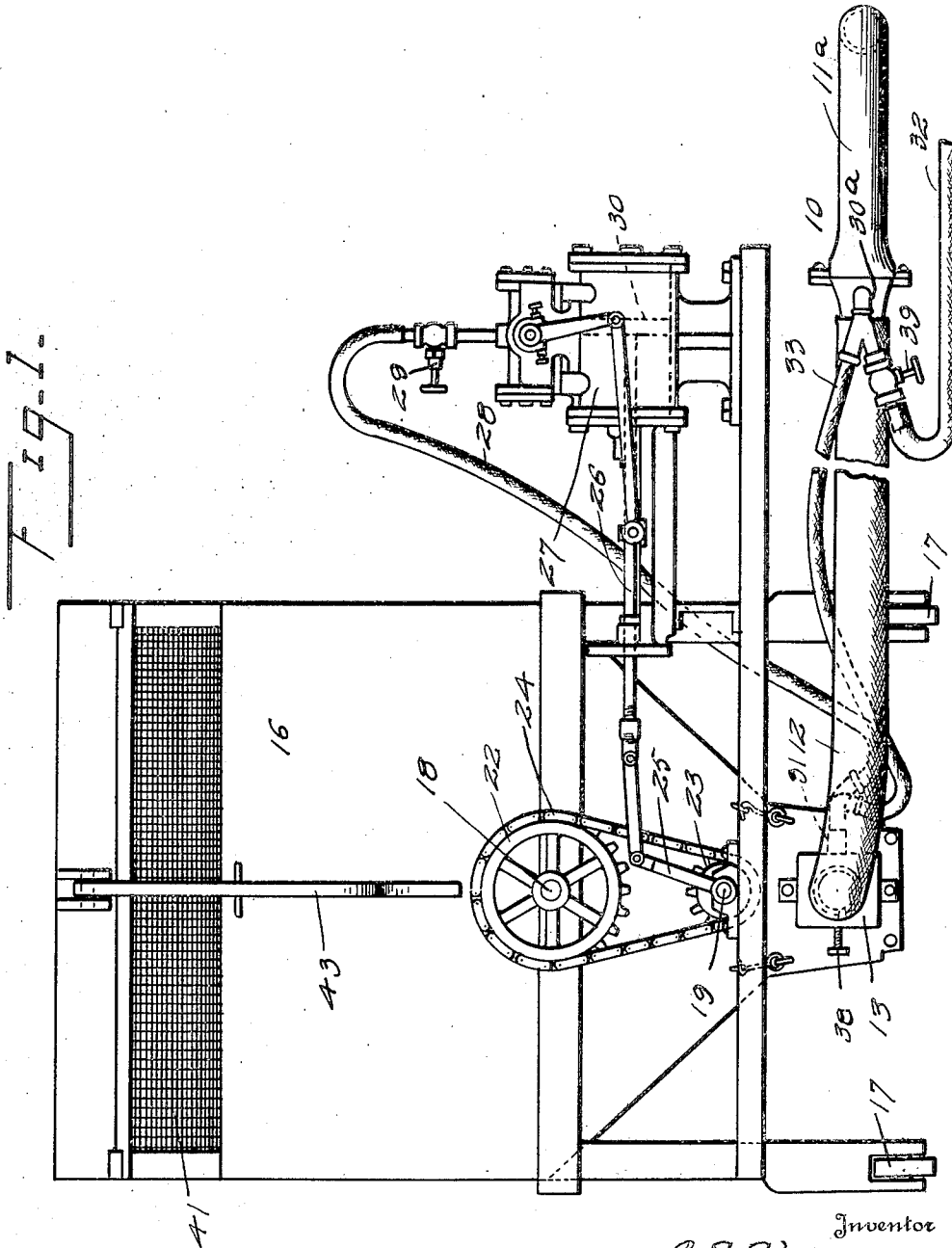


A. S. SHIMON.  
MOLD FORMING APPARATUS.  
APPLICATION FILED JAN. 27, 1921.

1,434,508.

Patented Nov. 7, 1922.

4 SHEETS—SHEET 1.



Inventor

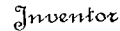
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1,434,508.

4 SHEETS--SHEET 3.



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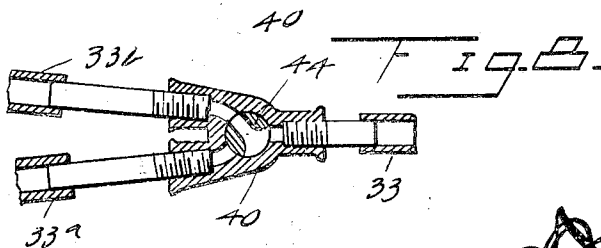
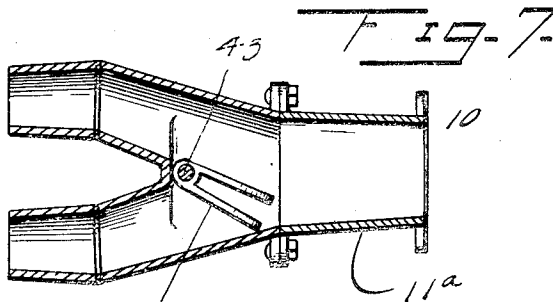
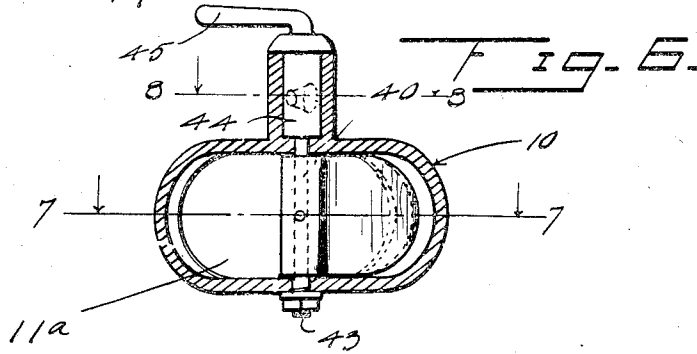
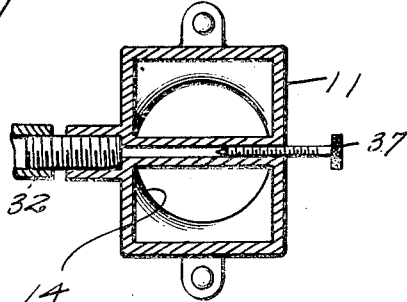
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4 SHEETS—SHEET 4.

Fig. 5.



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## UNITED STATES PATENT OFFICE.

ALBERT S. SHIMON, OF CHARDON, OHIO.

## MOLD-FORMING APPARATUS.

Application filed January 27, 1921. Serial No. 440,410.

*To all whom it may concern:*

Be it known that I, ALBERT S. SHIMON, a citizen of the United States, residing at Chardon, in the county of Geauga and State of Ohio, have invented certain new and useful Improvements in a Mold-Forming Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of the invention is to provide mechanism for accurately positioning sand and mold facing material in the formation of molds to produce the necessary hardness or compactness thereof without being too hard, regardless of the irregularities or complexities of the outline of the pattern, without involving the work, time and skill necessary in the ramming of the mold under the present approved practice, so that the formation of the mold may be accomplished by unskilled labor with an accuracy which is unattainable except under the most favorable conditions even by skilled labor in accordance with the present methods, owing to the fact that the sand is introduced into the mold box under such conditions as to find its way into each angle, crevice and corner of the pattern and is compacted as it is introduced under a uniform pressure so that the mass of the mold when completed is of uniform consistency; and with these objects in view the invention consists in a construction and combination of parts of which a preferred embodiment is shown in the drawings, wherein:

Figure 1 is a general view of the apparatus.

Figure 2 is a vertical sectional view of the sand box showing the cover thereof in an inclined or screening position.

Figure 3 is an enlarged view partly in section of the sand conveyor and related parts.

Figure 4 is a similar view of a modified form of the conveyor branched to provide for depositing sand and facing material alternatively in the mold box.

Figure 5 is a detail transverse section on the plane indicated by the line 5—5 of Figure 3.

Figure 6 is a sectional view on the plane indicated by the line 6—6 of Figure 4.

Figures 7 and 8 are detail sectional views respectively on the planes indicated by the lines 7—7 and 8—8 of Figure 6.

Figures 9 and 10 are sections on the lines 9—9 and 10—10 of Figure 2, respectively.

The apparatus consists essentially of a conveyor 10, having a delivery nozzle 11, preferably of elbow or curved form as indicated connected by a flexible section 12 of hose or like material with a feed nozzle 13, the flexible section being jointed or coupled as indicated at 14 and 15 respectively with the delivery and feed nozzles, and the feed nozzle being in communication with the supply box or reservoir 16 for sand or similar molding material, it being understood that when the device is in the form suggested in Figure 4 where sand and facing material may be supplied alternatively, a similar supply box or hopper for the facing material may be employed, but as the construction thereof preferably is the same as that embodied in the sand box, the detailed illustration of the latter will suffice.

The sand box which for convenience in moving the same from place to place may be provided with supporting wheels 17, it being obvious that the apparatus may be employed either for heavy floor molding or light floor molding or for bench molding, is reduced at its bottom to form an outlet in communication with the feed nozzle 13, and mounted in the box are upper and lower agitators consisting in the construction illustrated of the shafts 18 and 19 carrying arms 20 and 21 designed to loosen the contents of the box and insure the free feeding thereof to the conveyor. The ends of these agitator shafts are provided with sprocket wheels 22 and 23 traversed by a chain 24, and one of the shafts, preferably that of the lower agitator as shown in the drawing is provided with a crank arm 25 connected with the piston rod 26 of a cylinder 27 to which air or other motive agent under pressure may be admitted through the feed pipe 28 controlled by valve 29, to the end that when pressure is supplied the piston 30 in said cylinder will be reciprocated to oscillate the agitators and thus loosen the contents of the box.

Located in the delivery and feed nozzles 11 and 13 are injector nozzles 30 and 31. A Y-shaped coupling 30<sup>a</sup> communicates with the nozzle 30, and a similar coupling 31<sup>a</sup>

communicates with the nozzle 31, as clearly shown in Figures 1 and 3 of the drawings. A conductor 32, which is preferably of the flexible type, is adapted to be detachably  
 5 connected to any one of the feed valves 32<sup>a</sup> of a pipe 32<sup>b</sup> forming a part of a compressed air supply system of that type to be found in the average foundry. This conductor 32 is connected to one of the branches of the  
 10 coupling 30<sup>a</sup> to supply the nozzle 30 with compressed air, and a similar conductor 33 leads from the other branch of this coupling to one of the branches of the coupling 31<sup>a</sup> to supply the nozzle 31 with compressed  
 15 air. The conductor 28 which supplies the motor with compressed air is connected to the other branch of the coupling 31<sup>a</sup>. Needle valves 37 and 38 are disposed to regulate the discharge through the injector nozzles which  
 20 respectively serve to drive the sand or other material through the nozzles and hence through the portion of the conveyor represented by the flexible section 12, the latter being employed to permit of the free move-  
 25 ment of the delivery nozzle in applying the sand to the mold box or to the surface of the pattern located therein. A regulating and cut off valve 39 is employed in connection with the pressure supply pipe 36 to  
 30 regulate the supply of pressure to the conductor members 32 and 33, and obviously by the adjustment of the needle valves 37 and 38 an effective discharge through the injector nozzles may be provided to insure  
 35 the proper progress of the material from the reservoir through the conveyor and from the latter through the delivery nozzle to the mold box. The force with which the sand is projected from the delivery nozzle causes  
 40 it to search out and deposit in the smaller angles and crevices of the pattern and inasmuch as this force can be regulated it is possible to pack the sand as it is thus delivered to the mold box so that when the  
 45 latter has become filled there is a uniformity of compactness of material constituting the mold which is conducive to the preparation of satisfactory castings which truthfully represent the pattern.  
 50 As indicated in Figure 4, the conveyor may be branched, as indicated at 12<sup>a</sup> and 12<sup>b</sup>, a common delivery nozzle 11<sup>a</sup> being employed and the feed nozzle being similarly duplicated as indicated at 13<sup>a</sup> and 13<sup>b</sup> with  
 55 the related parts constructed and arranged substantially as above described except that the pressure conductor 33 is similarly branched as shown at 33<sup>a</sup> and 33<sup>b</sup> and are connected with the supply by means of a  
 60 switch valve 40 which is of the two-way variety adapted to supply pressure to either of the ejector nozzles of the feed nozzles 13<sup>a</sup> and 13<sup>b</sup>, the branches 33<sup>a</sup> and 33<sup>b</sup> having bypass connections 28<sup>a</sup> and 28<sup>b</sup> for supplying  
 65 pressure medium respectively to the cylin-

ders which serve to operate the agitators respectively of the sand and facing material boxes or reservoirs.

The sand box is preferably provided with a screen cover 41 adapted to be arranged in  
 70 an inclined position to permit of screening the sand as it is shoveled thereinto, and for this purpose being provided with a rack 43 by which it may be held at the desired in-  
 75 clination.

From the above description it will be obvious that by means of the apparatus it is possible to convey the sand or molding material from the place of supply to the mold box and to uniformly deposit the same  
 80 with reference to the pattern located in the box under conditions insuring a proper formation of the mold without effort upon the part of the operator and without the loss of time incident to the ramming or com-  
 85 pacting of the mold as in accordance with the present method, and that furthermore as the sand or other material is deposited a uniform compacting thereof is effected so as to insure a uniformity of solidity in the  
 90 mold when completed which is ordinarily unattainable when the sand is packed as in the ordinary way. Moreover in the event that a variation in the firmness of the mold is desired it can be secured merely by a  
 95 modification in the adjustment of the injector valves, as for example when it is desired to provide a relatively harder surface for the mold than the body portion thereof or vice versa.  
 100

In the preferred embodiment of the invention the pressure supply pipe 32 is primarily connected with the injector nozzle 30 in the delivery nozzle, and pressure is then  
 105 communicated to the injector nozzle 31 in the feed nozzle through a branch 33, so that a more or less reduced pressure is applied to the second named nozzle, not particularly for the purpose of reducing the pressure so far  
 110 as the feed nozzle is concerned but especially to insure the maximum pressure at the delivery nozzle to provide for conducting the material through the delivery pipe under such conditions as to avoid clogging or in other  
 115 words to provide for the delivery of the material at least as rapidly as it can be supplied by the injector mechanism of the feed nozzle, and adjacent to the feed nozzle the supply pipe for the air pressure is further  
 120 branched as indicated at 28 to supply the motor by which the agitators are operated, a still further reduced pressure being sufficient for this purpose and permitting of the effective use of a common means of communicating pressure from the source of supply to  
 125 the mechanism. Thus in practice the pressure from the source of supply is presented in a relatively graduated degree respectively to the delivery and feed nozzle and to the motor, with the maximum pressure applied  
 130

to the injector nozzle in the delivery nozzle. Moreover as will be noted the pressure in the supply pipe is directed toward the injector nozzle in the delivery nozzle while the branch pipe 33 in effect receives the back pressure incident to any resistance which may be offered to the column of air in its discharge from the nozzle 30, and to increase the relative pressure of the feed nozzle it is only necessary to increase the resistance at the injector 30 by the adjustment of the needle valve 37. Thus a relative application of pressure at the two nozzles to secure an effective joint operation thereof may be readily attained to provide an effective supply of the material to the mold box.

In the form of the device illustrated in Figures 4, 6, 7 and 8 the switch valve or gate 40 is preferably of a split or double winged type as indicated clearly in Figure 7 and the stem or spindle 43 thereof preferably carries a two way valve 44 which controls the flow of air pressure respectively through the branch pipes 33<sup>a</sup> and 33<sup>b</sup> by which said pressure is conveyed alternately to the injector nozzles in the feed nozzles 13<sup>a</sup> and 13<sup>b</sup> of the double form of apparatus. Thus by the adjustment of the switch valve or gate by means of the handle 45 connected with said stem 43, the two way valve 44 is simultaneously adjusted to switch the pressure from the air supply to the proper feed nozzle as the gate is reversed. The double or winged form of gate adapted to effectively close the branches of the conveyor as and by a motion sufficient to reverse the position of the valve 44. Thus a single operation is sufficient to bring the parts into position to supply either sand or facing material.

Having thus described the invention, what I claim is:—

1. An apparatus for the purpose described having a reservoir for molding material, a conveyor having a feed nozzle in communication with the reservoir and a delivery nozzle in communication through an intermediate flexible section with the feed nozzle, injector nozzles arranged respectively in said feed and delivery nozzles and in communica-

tion with a source of fluid under pressure, said injector nozzles being provided with regulating valves, and means for delivering the material from the reservoir to said feed nozzle, and consisting of agitators and pressure controlled means for actuating the same.

2. A mold forming apparatus having a feed box, a conveyor in communication with the feed box and provided with a delivery nozzle, an injector nozzle located in the delivery nozzle and provided with a regulating valve, a conductor in communication with said injector nozzle and leading from a source of fluid under pressure, agitators arranged in said feed box, a pump cylinder having its piston operatively connected with said agitators and a valve connection between said cylinder and the conductor which supplies the injector nozzle.

3. A mold forming apparatus having a reservoir for molding material, a conveyor having feed and delivery nozzles of which the former is in communication with the reservoir, an agitator in the reservoir, a motor for actuating said agitator, injector nozzles respectively in said feed and delivery nozzles, and a pressure supply conductor in communication with a source of supply and in direct communication with the delivery injector nozzle, a branch conductor extending from said supply conductor adjacent to the delivery injector nozzle to the feed injector nozzle and a second branch extending from the first named branch, at a point near the feed injector nozzle to the motor.

4. In an apparatus of the class described a reservoir, spaced feed and delivery nozzles, a flexible tubular conductor joining said nozzles, agitators in said reservoir, a fluid pressure motor for actuating said agitators, injectors for each of said nozzles, and a source of fluid under pressure common to the injectors and the motor.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT S. SHIMON.

Witnesses:

W. G. SAMPSON,  
CHAS. DE HENNING.