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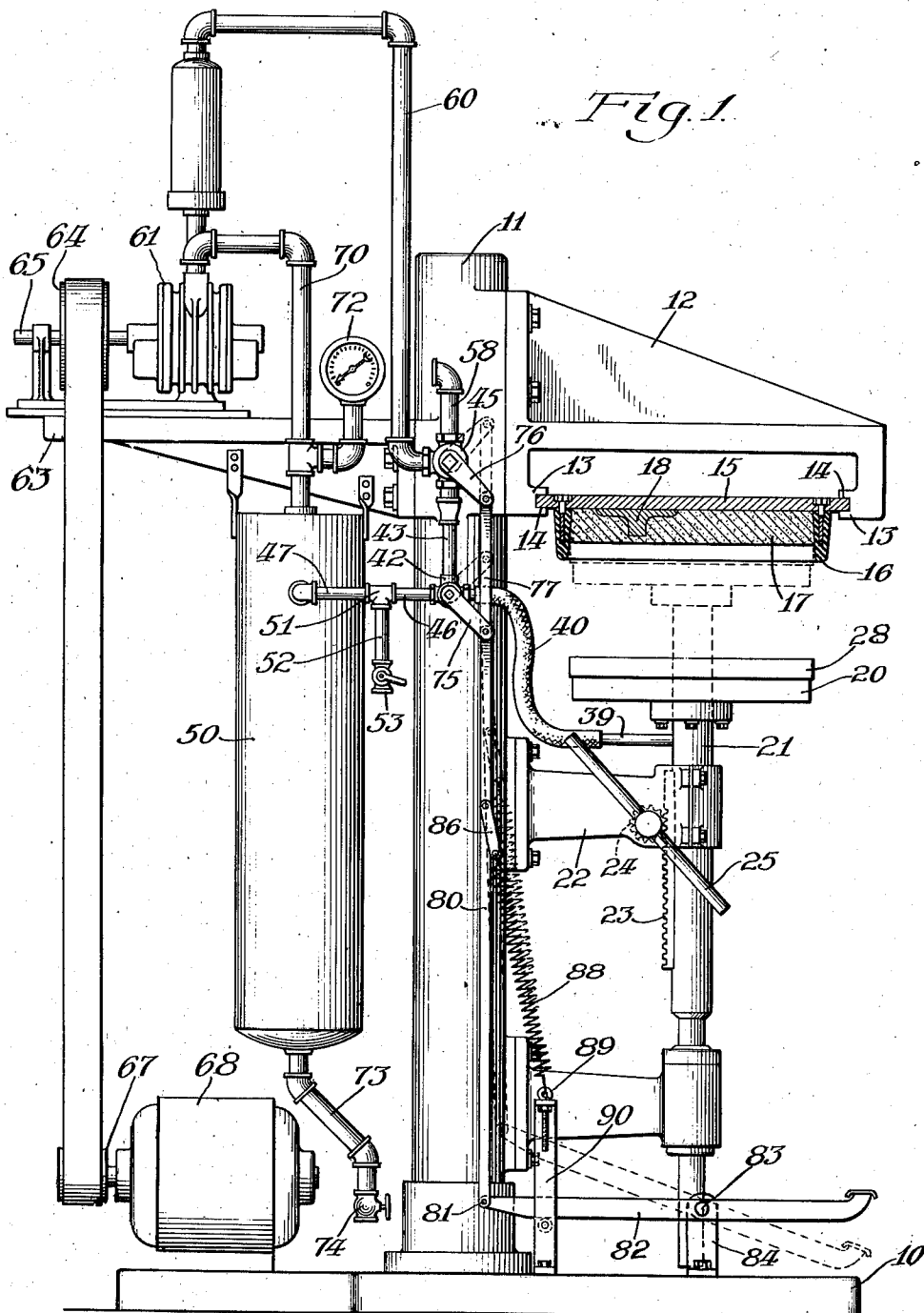
H. F. HAGEMEYER

2,101,677

APPARATUS FOR PRODUCING MOLDS

Filed June 29, 1936

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

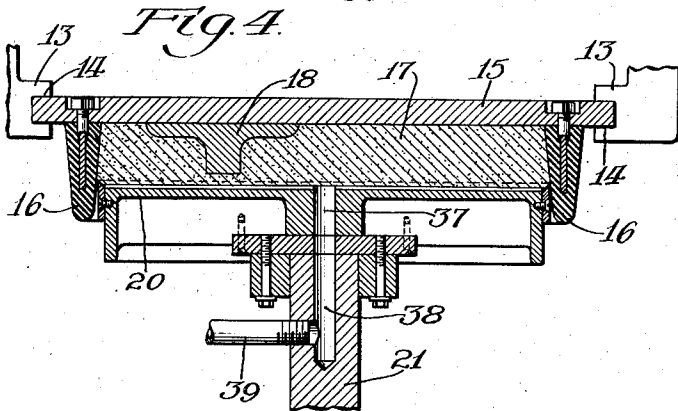
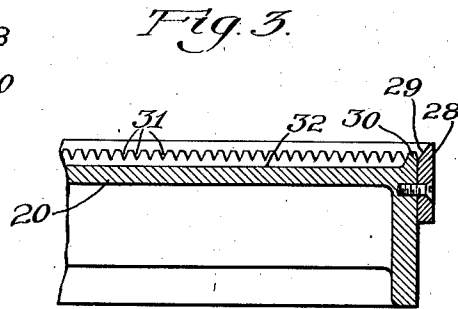
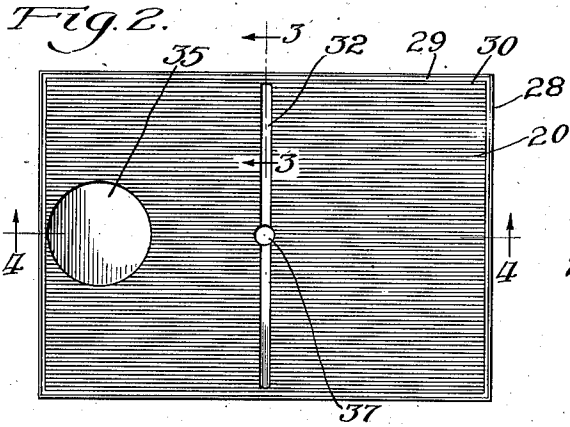


Fig. 6.

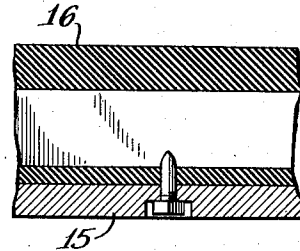


Fig. 5.

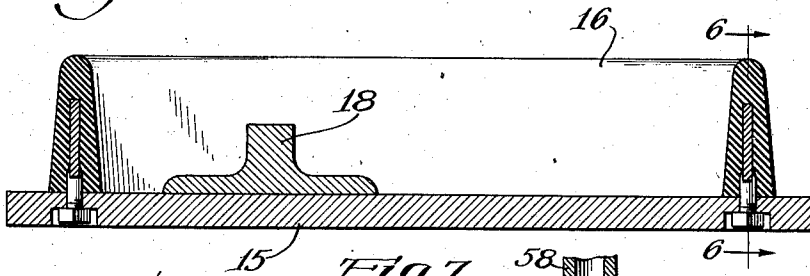


Fig. 7.

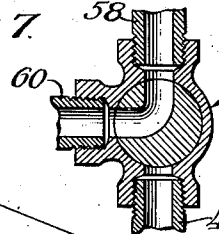


Fig. 8.

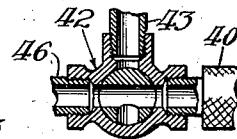
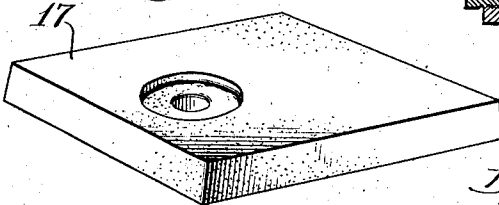


Fig. 9.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR PRODUCING MOLDS

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Application June 29, 1936, Serial No. 87,923

REISSUED

4 Claims. (Cl. 22-190)

The invention relates to molding apparatus and is particularly adapted to be embodied in apparatus for producing molds comprising calcined gypsum and asbestos pulp.

In the production of molds of the kind described, a flask of improved construction is preferably placed upon a match plate on which the pattern is formed or secured. The material from which the mold is formed may be of any suitable proportions. It has been found that excellent results may be obtained by employing one hundred parts of molding material and one hundred and sixty parts of water, these proportions being computed by weight. The molding material preferably comprises eighty percent (80%) by weight of calcined gypsum and twenty percent (20%) of asbestos pulp. After the water and molding material are placed in the flask it is necessary to agitate the molding material and the water violently so that a homogeneous mixture will be obtained. The agitation must be such that the mixture is churned and impacted against the match plate and the pattern. After the molding mixture has been violently agitated in the manner described, the molding material is permitted to set. The mold is then withdrawn from the flask by means embodying the present invention, the mold being then subjected to a drying operation before any molten metal is poured into it. Fused metal at relatively high temperatures may be poured in the molds and the resulting castings will be found to be extremely perfect in configuration. It may be mentioned that the gases attending the pouring operation vent through the molding material which is extremely porous when dry.

As indicated above, the present invention relates to apparatus for withdrawing the molds from the flask. The apparatus, in its preferred form, includes means for subjecting one side of the mold to a partial vacuum so that the differential in pressures on two sides of the mold cause it to be displaced relative to the flask and the match plate. This method of withdrawing the mold from the flask is exceedingly advantageous as the molds are not broken or otherwise deformed.

Other objects and advantages of the present invention will appear as the following detailed description progresses, reference being had to the accompanying drawings, wherein

Fig. 1 is a side elevation of apparatus embodying the invention, a match plate, a flask and a mold being shown in cross section to illustrate the operation of the apparatus.

Fig. 2 is a top plan view of a suction plate which is utilized to subject one side of a mold to a partial vacuum.

Fig. 3 is an enlarged fragmentary section taken on line 3-3 of Fig. 2.

Fig. 4 is a section taken on line 4-4 of Fig. 2, a mold, a flask and a match plate being shown in connection with the suction plate.

Fig. 5 is a vertical section taken through an improved flask and match plate.

Fig. 6 is a section taken on line 6-6 of Fig. 5.

Fig. 7 is a section taken through a valve which forms part of the improved apparatus.

Fig. 8 is a section taken through another valve which also forms part of the improved apparatus, and

Fig. 9 is a perspective view of a mold which has been withdrawn from the improved flask.

Referring to the drawings wherein a preferred embodiment of the invention is illustrated, the reference character 10 designates a base plate adapted to rest upon any suitable support such as the floor of a factory (Fig. 1). Projecting upwardly from the base plate 10 and secured thereto is a post 11 to which a bracket 12 is bolted. The bracket 12 is provided with lugs 13 having grooves 14 adapted to receive the ends of a match plate 15. Detachably secured to the match plate 15 is a flask 16 and disposed within the match plate 15 is a mold 17 abutting against the bottom surface of the match plate 15. It will be noted that the match plate 15 is provided with a pattern 18. The construction of the match plate 15 and the flask 16 is described in detail in my co-pending application, Serial No. 87,922, filed June 22, 1936.

Disposed beneath the bracket 12 and aligned with the mold 17 is a suction plate 20 secured to the upper end of a vertically disposed rod or plunger 21 which is slidably journaled in a bearing 22 secured to the post 11. A rack 23 fixed to the plunger 21 meshes with a pinion 24 which may be rotated manually through the medium of a handle 25. It will be readily understood that if the handle 25 is rotated in a clockwise direction (Fig. 1) the suction plate 20 and the plunger 21 will be lowered and that if the handle 25 is rotated in the opposite direction, the suction plate 20 and the plunger 21 will be elevated. Obviously, the suction plate 20 may be elevated until its upper surface abuts against the bottom surface of the mold 17.

As best shown in Figs. 2, 3 and 4, the suction plate 20 has a rectangular member 26 disposed around it, the rectangular member 26 having a

bevelled surface 29 at its upper edge. The suction plate 20 is provided with an integral rib 30 extending around it, the rib 30 being adjacent the bevelled surface 29 of the member 28.

5 Extending lengthwise of the suction plate 20 are a plurality of grooves 31 which open into a deeper groove 32 cut into the upper face of the suction plate 20. It will be noted that the grooves 32 extend substantially the entire distance between oppositely disposed parts of the rib 30. 10 The upper surface of the suction plate 20 is preferably provided with a recess or depression 35 which is preferably deeper than the groove 31. The groove 32 opens into a bore 37 in the suction plate 20. The bore 37 communicates with a bore 38 in the upper end of the plunger 21 and the bore 38 communicates, in turn, through a pipe 39 with one end of a flexible hose 40. The other end of the flexible hose 40 communicates 20 with one opening of a three-way valve 42. Another opening of the valve 42 communicates through a pipe 43 with an opening in a three-way valve 45. The remaining opening of the valve 42 communicates through pipes 46 and 47 25 to a tank 50. Disposed between the pipes 46 and 47 and forming a passage from one to the other is a T-fitting 51 from which a pipe 52 extends downwardly. At the lower end of the pipe 52, a valve 53 is provided. The purpose of this construction will presently appear. 30

As stated above, one opening of the valve 45 communicates with the pipe 43. A second opening of the valve 45 communicates with the atmosphere through a pipe 58. The third opening of the valve 45 communicates through pipe 60 with the discharge port of a vacuum pump 61 which is mounted on a bracket 63 secured to the post 11. The vacuum pump 61 is driven by means comprising a pulley 64 fixed on a shaft 65 which forms 40 part of the vacuum pump. A belt trained over the pulley is also trained over a pulley 67 mounted on the shaft of an electric motor 68 which is mounted on the base plate 10. The inlet port of the vacuum pump 61 is connected through pipe 45 70 with the tank 50. A vacuum gauge 72 communicates with the pipe 70 and indicates the pressure obtaining within the tank 50. Pipe 73 which communicates with the tank 50 at its lower end is provided with a valve 74 which may be opened so that any liquid in the tank 50 may be drained therefrom. The three-way valves 42 and 45 are provided with valve handles 75 and 76, respectively, the free ends of the handles 75 and 76 being pivotally connected to a link 77. 55 Pivoted to the free end of the valve lever 75 is a second link 80 which is also pivotally connected by a pivot pin 81 to one end of a foot treadle 82 which is pivoted intermediate its ends on a pin 83 projecting from a bracket 84. The bracket 84 is fixed to the base 10. Pivoted to the link 80 intermediate its ends is a small link 86 which has one end of a tension spring 88 secured to it, the other end of the tension spring 88 being secured to an eye bolt 89 which is screw-threaded in a bracket 90 mounted on the base 10. The spring 88 normally holds the valve levers or handles 75 and 76, the link 77, the link 80 and the foot treadle 82 in the positions wherein they are shown in full lines in Fig. 1. However, if the operator steps upon the outer end of the foot treadle 82 and displaces it into the position wherein it is shown in dotted lines in Fig. 1, the links 77 and 80 will co-operate to displace the valve handles 75 and 76 into the positions wherein they are 75

shown in dotted lines in Fig. 1. This displacement is against the action of the spring 88.

The operation of the above described apparatus is substantially as follows: It is assumed that the mold 17 has been formed by practicing the method described in my co-pending application, Serial No. 87,922, filed June 29, 1936 and that it has not been subjected to the drying operation described in my co-pending application, Serial No. 91,897, filed July 22, 1936. However, 10 the mold has been permitted to set and the match plate 15 has been inserted in the grooves 14 as illustrated in Figs. 1 and 4. The foot treadle 82 and the valve handles 75 and 76 are in the positions wherein they are shown in full line in Fig. 1. 15 The pipe 60 then communicates with the atmosphere through the valve 45 and the pipe 58 but is adjusted so that the pipes 60 and 58 do not communicate with the pipe 43. The tank 50 communicates with the flexible hose 40 through the pipes 47 and 46, the T-fitting 51 and the valve 42. The valve 42 is then adjusted so that the pipe 46 and the flexible hose 40 do not communicate with the pipe 43. The valve 53 has been adjusted so that some air may flow through it and the pipes 52 and 47 to the tank 50. It should be understood that the valve 53 may be adjusted to control the minimum pressure that will obtain in the tank 50 when the vacuum pump 61 is in operation. 20 30

Assuming that the vacuum pump 61 is in operation and that the mold 17 is in the position wherein it is shown in full lines in Fig. 1, the operator manipulates the handle 25 to bring the suction plate 20 into contact with the mold 17 (Fig. 4). A partial vacuum will be established immediately between the upper surface of the suction plate 20 and the adjacent surface of the mold 17. The entire bottom surface of the mold 17 will be subjected to this partial vacuum as air will be exhausted through the grooves 31 and 32 and the bore 37. The operator will then manipulate the handle 25 to lower the suction plate 20 and the mold 17 will follow the suction plate as a result of the differentials in pressures obtaining between the upper and lower surfaces of the mold. As soon as the suction plate 20 has been lowered sufficiently to permit the operator to handle the mold without bringing it into contact with the flask 16, the operator steps upon the foot treadle 82 so that the valve handles 75 and 76 move into the positions wherein they are shown in dotted lines in Fig. 1. The pipe 60 then communicates with the pipe 43 and the flexible hose 40 through the valves 45 and 42 but the valve 45 is then adjusted so that the pipe 60 does not communicate with the pipe 58. The valve 42 is then adjusted so that the pipe 46 does not communicate with the pipe 43 or the flexible hose 40. Obviously, the exhaust opening from the vacuum pump 61 is then connected to the bore 37 and the grooves 31 and 32 through the pipe 60, the valve 45, the pipe 43, the valve 42, the flexible hose 40, the pipe 39 and the bore 38 so that the partial vacuum between the suction plate 20 and the mold 17 is broken and a pressure above atmospheric pressure is obtained. The operator may then remove the mold 17 from the suction plate 20 with little effort and place it in the drying apparatus. Meanwhile, the operator has released the foot treadle 82 to restore the apparatus to its original condition so that the above described cycle of operations may be repeated. 45 50 55 60 65 70

During the operation of subjecting the mold 17 to a partial vacuum through the medium of 75

the suction plate 20, some water is withdrawn from the mold 17. This water passes into the tank 50 through the flexible hose 40, the valve 42 and the pipes 46 and 47. After an undesirable amount of water has collected in the tank 50, it may be drained therefrom by opening the valve 74.

I claim:

1. Apparatus for withdrawing a mold from a match plate and a flask, which apparatus comprises means for supporting the match plate and the flask, a plate having a surface with a plurality of grooves therein, said grooved surface being engageable with a surface of the mold, means for creating a partial vacuum in said grooves whereby said mold will adhere to said grooved plate when said grooved plate and said match plate are displaced relative to each other, and means for causing relative displacement between said grooved plate and said match plate.

2. Apparatus for withdrawing a mold from a match plate and a flask, which apparatus comprises means for supporting the match plate and the flask in a position wherein said mold will have a surface exposed from below, a plate below said supporting means and having a surface with a plurality of grooves therein, said grooved surface being engageable with said exposed surface of said molding, means for creating a partial vacuum in said grooves whereby said mold will adhere to said grooved plate when said grooved plate and said match plate are displaced relative

to each other, and means for causing relative displacement between said grooved plate and said match plate.

3. An apparatus for withdrawing a mold from a match plate and a flask, which apparatus comprises means for supporting the match plate and the flask, a second plate having a surface bounded by a rib extending around said plate, said rib being engageable with a surface of said mold, means for creating a partial vacuum between said surface of said second plate and said surface of said mold whereby said mold will adhere to said second plate when said second plate and said match plate are displaced relative to each other, and means for causing relative displacement between said match plate and said second plate.

4. An apparatus for withdrawing a mold from a match plate and a flask, which apparatus comprises means for supporting the match plate and the flask, a second plate having a grooved surface bounded by a rib extending around said plate, said rib being engageable with a surface of said mold, means for creating a partial vacuum in said grooves between said surface of said second plate and said surface of said mold, whereby said mold will adhere to said second plate when said second plate and said match plate are displaced relative to each other, and means for causing relative displacement between said match plate and said second plate.

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