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MOLDERS STATION SAND SCREEN

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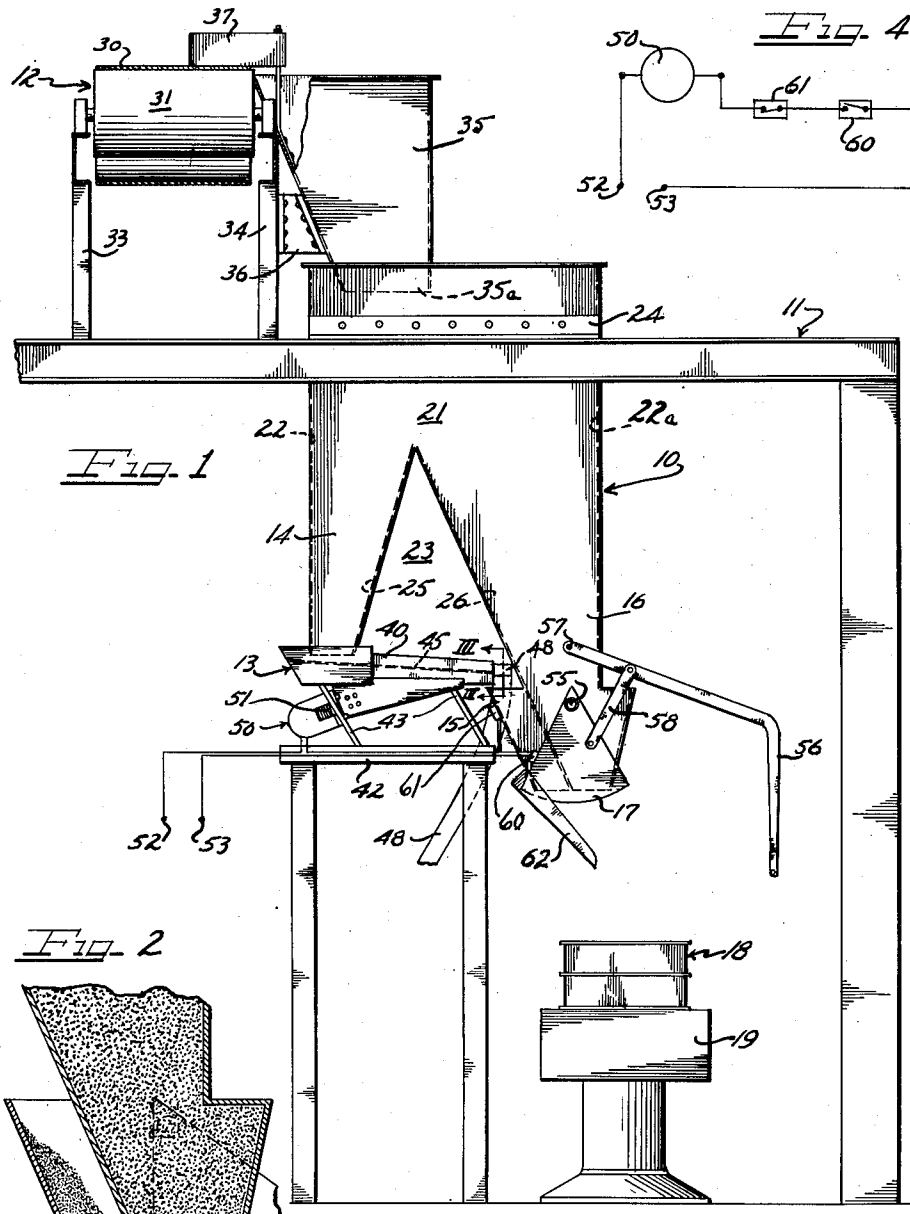
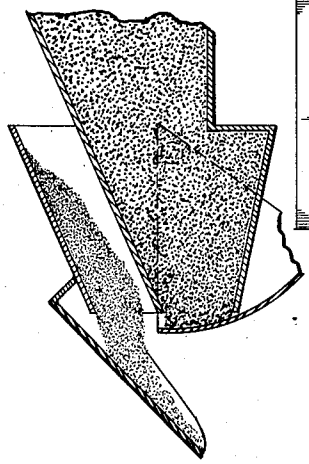


Fig. 1

Fig. 4

Fig. 2



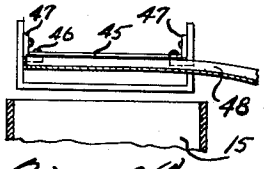


Fig. 3

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MOLDERS STATION SAND SCREEN

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5 Claims. (Cl. 209—240)

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This invention relates to improvements in sand molding apparatus and more particularly to improvements in a device for delivering granular material, such as sand, of varying textures to a molder's station for use by the molder in preparing the mold.

In green sand molding, sand of definite physical characteristics, known as backing sand, is used to make up the greater part of the mold. This backing sand is lumpy in texture and sometimes contains a few pieces of foreign material such as shot iron or small pieces of nails. While this backing sand is satisfactory for the bulk of the mold, the portion of the mold at the joint between the cope and the drag and on either side of the pattern must be made of riddled sand, because at these points uniformity of ramming and venting is of great importance.

Riddled sand is backing sand that has been screened through a sieve to break up and remove the lumps or any foreign material that is present. This sand is deposited at the joint in the mold and next to the pattern to a depth of from a fraction of an inch to several inches depending upon the size of the casting.

Backing sand may conveniently be mixed and prepared at a central work area and delivered to the molder's station by a conveyor system. However, the preparation of riddled sand at a central station and delivery by a conveyor are not justified owing to the relatively small amount of this sand that is used. Heretofore, it has been the usual practice for each molder to keep a supply of sand in a small portable container near his molding machine. This container, known as a riddle, has a wire mesh or sieve bottom. When riddled sand is required the molder shakes the riddle over the mold and deposits finely divided or riddled sand thereon.

It is evident, therefore, that it would be a great convenience if the finely divided riddled sand were automatically delivered to the molder's station in an adequate quantity at a point, such as an overhead chute, from which it could be quickly directed into the mold with a minimum of wasted energy.

Accordingly, it is an important object of the present invention to provide apparatus for conveying riddled sand to a position convenient to the molder's station.

Another object is to provide an apparatus which is arranged to deliver backing sand and riddled sand independently of each other to the molder's station.

A further object is to provide a device which

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is arranged to receive backing sand from a conveyor system and to automatically riddle a predetermined quantity of the backing sand and deliver it to a separate storage chamber for use by the molder.

According to the general features of this invention, there is provided an overhead bin arranged to receive backing sand from a conveyor, directing a portion of it to a backing sand dispensing chute and another portion to a screening device which automatically riddles a predetermined quantity of sand and delivers it to a riddled sand distributing chute.

An important feature of the present invention is the provision of a pivoting discharge gate arranged to be held in a closed position, a partially opened position for delivering riddled sand to the mold or a full open position for discharging backing sand to the mold.

Another feature resides in the provision of a control system which starts the automatic screening device when the discharge door is fully closed and stops it when a predetermined quantity of riddled sand has been delivered to the riddled sand discharge chute.

A further feature of this invention is the provision of an automatic screening device arranged to riddle backing sand as it passes down an inclined screen, delivering riddled sand at its lower end to the riddled sand discharge chute and unriddled sand and foreign matter to an overflow chute.

The novel features which I believe to be characteristic of my invention are set forth in the appended claims. My invention, however, both as to its manner of construction and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings, in which:

Figure 1 is a fragmentary side elevational view, partly in section and partly broken away, of the sand handling and screening apparatus of the present invention.

Figure 2 is a fragmentary enlarged sectional view of the discharge chute of the apparatus of Fig. 1.

Figure 3 is a fragmentary, vertical sectional view taken substantially on line III—III of Fig. 1, and

Figure 4 is a diagrammatic illustration of the control apparatus of the present invention.

As shown on the drawings:

In Fig. 1, reference numeral 10 designates a

bin supported from a frame structure 11 and arranged to receive backing sand from a conveyor 12. A screening device 13 receives sand from one chute 14 of the bin 10 and automatically screens a definite amount of the sand and delivers it to a riddled sand discharge chute 15. A second chute 16 located in the bin 10, which will be referred to as the backing sand discharge chute, is arranged to support the chute 15, both chutes being closed by a pivotal gate 17 and depending above the molder's station in convenient position for directing the sand from either chute into a flask 18 positioned on a molding machine 19.

The bin 10, which may be made of heavy sheet metal, comprises a pair of side plates 21 and 21*a* and a pair of end plates 22 and 22*a*, suitably secured together as by welding at their marginal portions. Each of the side plates 21 and 21*a* has an inverted wedge-shaped cutout portion 23. A pair of closure plates 25 and 26 are disposed between the side plates 21 and 21*a* at the cutout portion 23, plate 25 coacting with the end plate 22 and the side plates 21 and 21*a* to form chute 14 while the closure plate 26 coacts with the end plate 22*a* and the side plates 21 and 21*a* to define chute 16.

The bin 10 may be suitably supported from the upright frame structure 11 by angle bars 24 suitably secured, as by riveting, one on either side of the bin.

The conveyor system 12 comprises a belt 30 disposed over a drum 31, rotatably mounted on upright members 33 and 34 which may conveniently be supported by the frame structure 11. Backing sand, prepared at a central mixing area, is carried on the overhead belt past the bin 10 which is suspended above the molder's station. A chute 35, supported from the upright member 34 by means of a bracket 36, carries a rake 37 arranged to extend a fixed distance out over the surface of the belt 30 in scraping relation therewith. The rake 37 is disposed at an angle to the direction of travel of the sand on the belt so that the sand coming in contact with the rake will be directed off the belt and into the chute 35. The chute 35 has a lower opening 35*a* so disposed that sand leaving the chute 35 will be directed into both the backing sand discharge chute 16 and the chute 14 leading to the screening device 13.

An important feature of the present invention resides in the arrangement and operation of the screening device 13 which device may conveniently comprise an elongated trough 40, the enlarged box-like upper end of which is disposed directly under the chute 14 for receiving sand therefrom and the lower end of which overlies the riddled sand discharge chute 15. This trough 40 which may be made of sheet metal, is resiliently mounted on a suitable support structure 42 by means of a plurality of leg members 43. The leg members 43 are secured at an angle to the top of the support structure 42 and are preferably made of a resilient material such as spring steel.

A screen 45 is disposed longitudinally of the trough 40, being removably secured at its side marginal portions by cap screws 46, Fig. 3, to angle members 47 which are welded to the side walls of the trough. The screen 45 is stretched across the trough at a level substantially half way between the top and bottom thereof. Thus, the screened or riddled sand will work its way through the screen to a lower level of the trough for discharge into the riddled sand discharge chute 15 while the lumps and foreign matter will remain on the screen and work their way down to a chute 48 which is supported close to the lower end of the screen 45, as shown in Figs. 1 and 3. The chute 48 may lead to any suitable container for this unriddled sand.

The bed of the trough 40 and the screen 45 are inclined slightly downwardly toward the chute 15. A vibrating movement is imparted to the resiliently mounted trough by means of a vibrator mechanism such as the electric vibrator 50 comprising electromagnets 51 suitably connected to a source of alternating or interrupted current, as across terminals 52 and 53. When the trough is vibrated, the sand will be discharged from the lower end of the trough into the chute 15.

The flow of sand from the chutes 15 and 16 is controlled by a gate 17 which is substantially a U-shaped sheet metal member having a curved bottom closure portion and is arranged for pivoting on either side of the bin 10 as at 55. A lever 56, which has one end within convenient reach of the molder, is pivotally mounted on the bin at 57 and carries a link 58 which is pivotally connected to both the gate 17 and the lever 56. As the molder swings the lever 56 counterclockwise about the point 57, the gate 17 will be swung about its pivot point 55 thus opening the chutes 15 and 16.

As the riddled sand leaves the chute 15, it enters a guide trough 62, which is secured to the chute, as by welding, for directing the sand into the flask 18.

Thus, by manipulating the lever 56, the molder may consecutively direct riddled sand from the chute 15 and then backing sand from the chute 16 into the flask 18. It is contemplated in this invention that the inertia of the gate 17 pivoting at 55 is such that the gate will remain partially open in any position dictated by the swinging of the lever 56. Thus, after directing riddled sand into the flask, the gate will remain in the position shown in Fig. 2, while the molder manually distributes the riddled sand in the flask. Upon further opening of the gate, the backing sand will be directed into the flask.

The amount of sand that is riddled by the screening device 13 is dependent upon the length of time that the vibrating apparatus 50 is operated. Since it is desirable that a predetermined quantity of riddled sand be stored in the discharge chute 15, control means is provided in the form of a switch 60, which may conveniently be a suitable micro-switch and which is secured on the bin 10 in a position for actuation by the gate 17 as it is swung into closed position. A pressure actuated switch 61, which may be of any standard construction and arranged to be sensitive to the pressure of the sand in the chute, is mounted on the chute 15 at the desired level, having its pressure sensitive member projecting into the chute so as to be actuated by the sand only when the desired height of sand is reached.

In Fig. 4 is shown a diagrammatic sketch of the control system. Assume that the gate 17 is open and the chute 15 is empty. To fill the chute 15, the gate 17 is closed, thereby closing the switch 60 which is normally open. The vibrator 50 begins to actuate the screening device 13 and riddled sand is delivered to the chute 15. When the sand has reached a predetermined height in the chute 15, the switch 61, which is normally

closed, will be opened thus breaking the circuit and stopping the vibrator. Of course, when the gate 17 is opened, the switch 60 will be opened by spring means in the switch and when the level of the sand in the chute recedes the switch 61 will be closed by spring action.

Thus, there is provided in the present invention means for automatically riddling sand and delivering the riddled sand in a predetermined quantity to a discharge chute convenient to the molder's station. The fineness of the riddled sand may be controlled by varying the mesh of screen which is removably secured in a vibrating trough. There is also provided a pivotable gate by which either backing sand or riddled sand may be selectively directed to the molding machine.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention, and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A device for preparing sand for a mold comprising in combination a bin having first and second chutes, means for delivering sand to the first and second chutes of said bin, an auxiliary chute adjacent said second chute, screening means receiving sand from said first chute, said auxiliary chute being disposed below said screening means for receiving sand therefrom and a gate member swingable over said auxiliary chute and said second chute for controlling flow of sand therefrom.

2. A device for preparing sand for a mold comprising in combination a bin having first and second chutes, means for delivering sand to the first and second chutes of said bin, an auxiliary chute adjacent said second chute, screening means receiving sand from said first chute, said auxiliary chute being disposed below said screening means for receiving sand therefrom, a gate member swingable over said auxiliary chute and said second chute for controlling flow of sand therefrom, and control means for regulating the quantity of sand discharged into said auxiliary chute.

3. A device for preparing sand for a mold comprising in combination a bin having a discharge opening, means for delivering sand to said bin, screening means below said bin receiving sand from the discharge opening, a chute below said screening means receiving screened sand therefrom, a gate disposed for controlling flow of sand from said chute and means responsive to the closing of said gate to start operation of said screening means, and means responsive to the height of sand in said chute for stopping the operation of said screening means.

4. In combination a bin having a first and second discharge opening, conveyor means for delivering sand to said bin, screening means in communication with said first discharge opening for receiving sand from said bin, a storage chamber in communication with said screening means and having a discharge opening, a control gate movable over said second discharge opening in said bin and said discharge opening in said storage chamber for selective control of discharge from said storage chamber and said bin.

5. A device for preparing sand for a mold comprising, in combination, a bin having first and second chutes, means for delivering sand to said first and said second chutes, an auxiliary chute adjacent said second chute, and screening means receiving sand from said first chute, said auxiliary chute being disposed below said screening means for receiving sand therefrom, said auxiliary chute and said second chute having adjacent discharge openings for discharge respectively of screened and unscreened sand, and unitary closure means movable to selectively close said auxiliary chute discharge opening and said second chute discharge opening for controlling flow of sand therefrom.

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