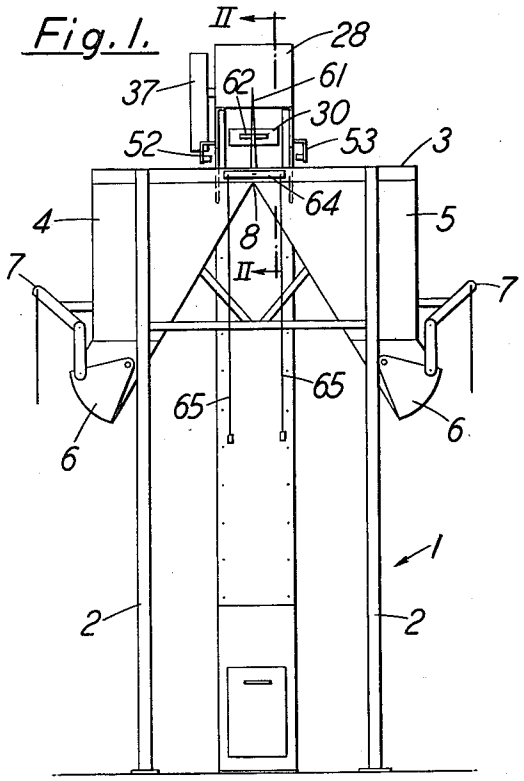
Feb. 3, 1953 M. J. BELL 2,627,356

SAND FLOW CONTROL MECHANISM

Filed March 14, 1951 2 SHEETS—SHEET 1

Fig. 1.



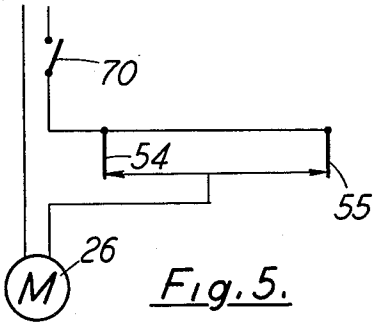


Fig. 5.

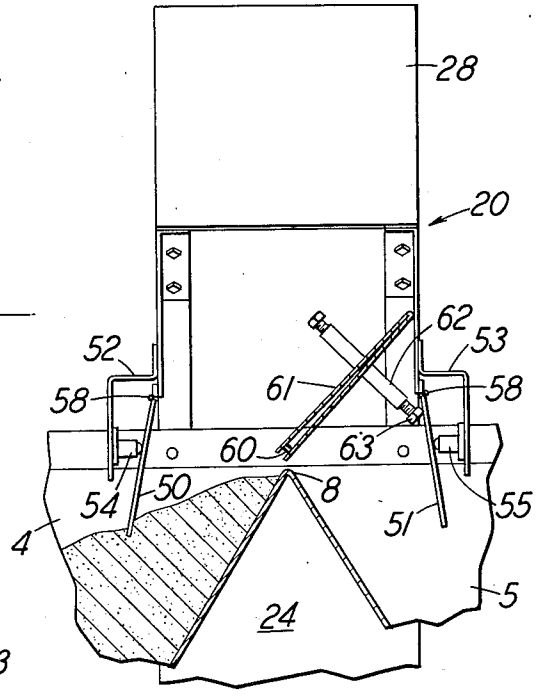
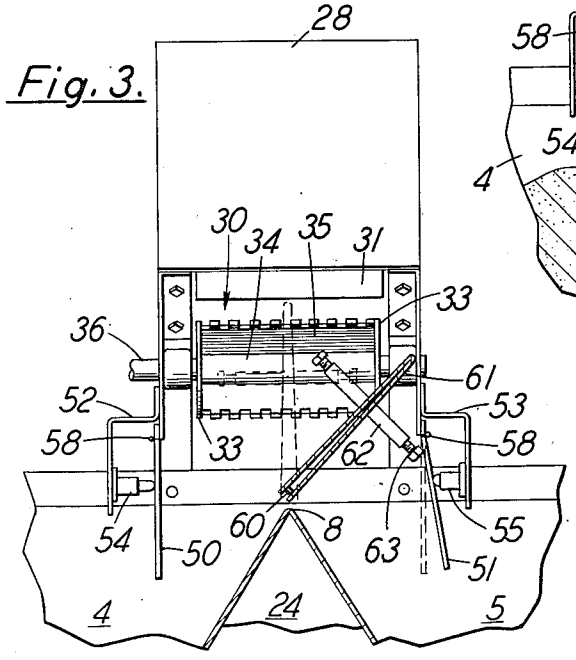


Fig. 4.

Fig. 3.



INVENTOR.
Millard J. Bell
-BY-
Peter P. Price
Attorney

Feb. 3, 1953 M. J. BELL 2,627,356

SAND FLOW CONTROL MECHANISM

Filed March 14, 1951 2 SHEETS--SHEET 2

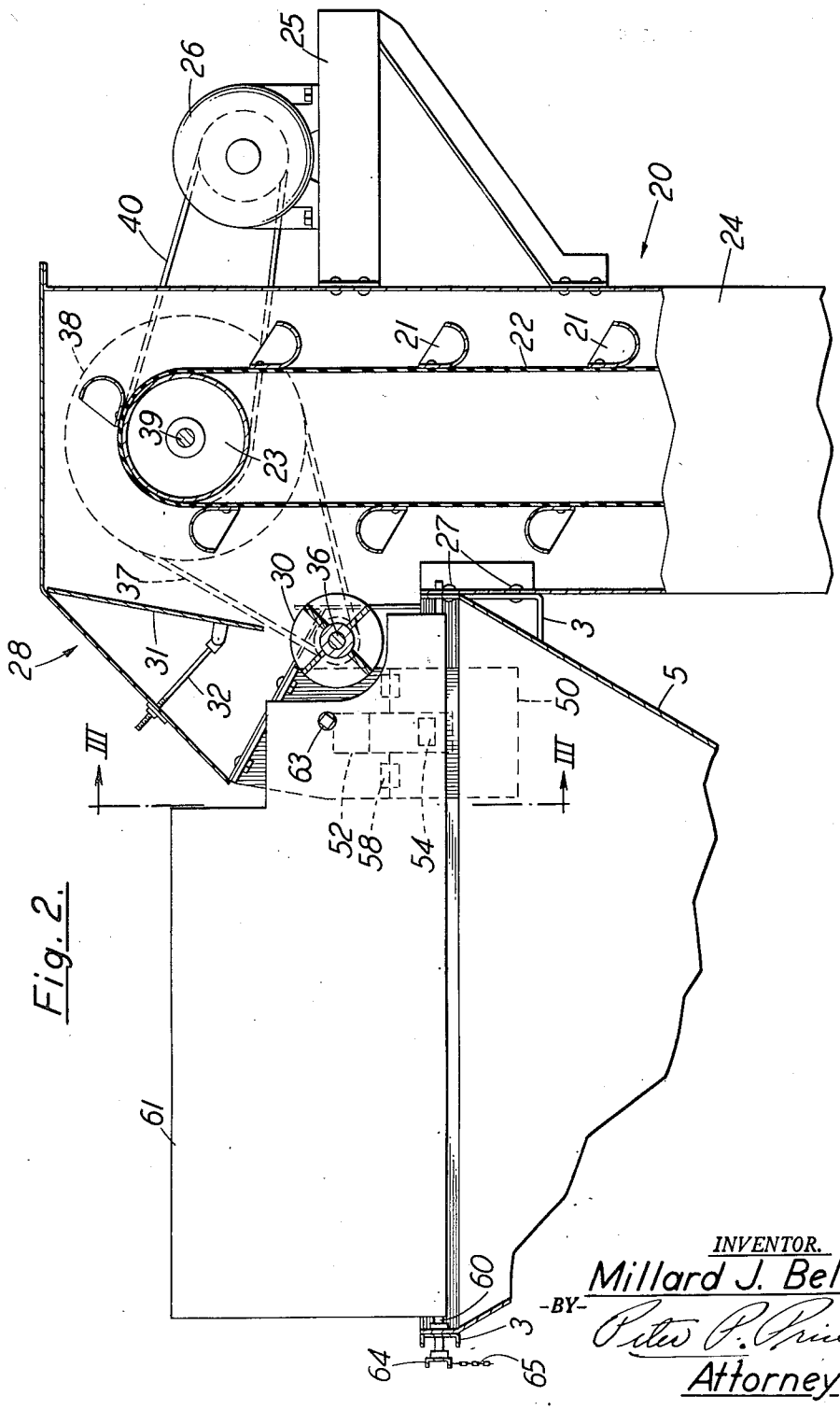


Fig. 2.

INVENTOR.
Millard J. Bell
-BY-
Peter P. Price
Attorney

Patented Feb. 3, 1953 2,627,356

UNITED STATES PATENT OFFICE

2,627,356

SAND FLOW CONTROL MECHANISM

Millard J. Bell, Grand Rapids, Mich., assignor to Newaygo Engineering Company, Newaygo, Mich., a corporation of Michigan

Application March 14, 1951, Serial No. 215,559

3 Claims. (Cl. 214—16)

1

This invention relates to an improvement in foundry sand hopper design and more particularly to a gate for regulating the flow of sand into one of two sand hoppers filled from a common source, whereby neither of the hoppers will be overloaded.

In the making of foundry molds, it is conventional practice to provide a sand hopper above each of the mold making stations, whereby the operator may easily and quickly drop the required quantity of sand directly from the hopper into the empty mold flask. To conserve space and reduce the cost of equipment, it is conventional practice to provide a single sand elevator for filling a pair of hoppers, each of which hoppers serves one mold making station. When such a structure is used, it often happens that the molds are of appreciably different size. Therefore, unequal quantities of sand will be withdrawn from each of the hoppers, causing one hopper to become empty while the other one is substantially full. When this occurs, more sand is supplied to both the hoppers resulting in only partially filling one of the hoppers while the other hopper becomes overfull and spills.

The primary object of my invention is to provide a simple and dependable mechanism for regulating the flow of sand into each of the hoppers, whereby the required amount of sand may be supplied to each of the hoppers in accordance with the rate of use.

It is a further object of my invention to provide a means for automatically halting the flow of sand into a hopper when the hopper becomes full.

It is an additional object of my invention to provide means whereby sand may be supplied to an empty hopper while the other hopper is full.

These and other objects and purposes of my invention will be readily seen by those acquainted with the construction of foundry equipment upon reading the following specification and the accompanying drawings.

In the drawings:

Figure 1 is a front, elevation view of a foundry sand mechanism equipped with a pair of sand hoppers and a sand elevator for supplying both hoppers.

Figure 2 is an enlarged, sectional, elevation view taken along the plane II—II of Figure 1.

Figure 3 is a fragmentary, sectional, elevation view taken along the plane III—III of Figure 2.

Figure 4 is a fragmentary, sectional, elevational view taken along the same plane as Figure 3 but showing one of the hoppers filled with sand.

Figure 5 is a fragmentary wiring diagram of the electrical circuit employed for controlling the motor driving the sand elevator.

In executing the objects and purposes of my

2

invention I have provided a pair of elevated sand hoppers having a common wall along one upper edge. A sand elevator centered about the common wall supplies sand to both of the hoppers. A gate is pivotally mounted at the top of the common wall whereby the sand from the elevator may be diverted into either of the hoppers as needed. Switches are provided for inactivating the sand elevator when the hopper being filled is loaded to capacity.

In the following description the terms "upwardly" and "downwardly" are frequently used and are to be taken as meaning "upwardly" as the invention is normally used and as the invention appears in Figure 1 and "downwardly" away therefrom. The terms "inwardly" and "outwardly" are also frequently used and are to be taken as meaning "inwardly" toward the geometric center of the invention and "outwardly" away therefrom.

Referring now to the drawings in detail, the numeral 1 indicates a vertical frame having legs 2 and a top structural hoop 3. Within the hoop 3 are mounted a pair of hoppers 4 and 5. The hoppers 4 and 5 are anchored to the hoop 3 by suitable means such as bolts, screws or rivets. Each of the hoppers 4 and 5 forms a downwardly narrowing funnel closed at its lower end by a discharge gate 6. Each of the discharge gates 6 is made individually operable by means of a lever and pull chain combination 7. Downwardly, the hoppers 4 and 5 diverge whereby they discharge on opposite sides of the frame 1.

The inward walls of the hoppers 4 and 5 converge upwardly and come to a ridge or apex 8 at the top of the hoppers. On one side of the hoppers 4 and 5 is a vertical, sand elevator 20 centered about the apex 8 whereby it will discharge equally into both of the hoppers. The sand elevator 20 is of conventional design consisting of a plurality of spaced buckets 21 mounted on an endless belt 22. The endless belt travels over a pair of rollers, one at the top of the elevator and one at the bottom. Only the top or driven roller 23 is shown. The entire sand elevator 20 is enclosed within a housing 24 having an external platform 25 for mounting the prime mover 26. The housing 24 is rigidly secured to both the hoop 3 and the hoppers 4 and 5 by means of suitable fasteners such as the rivets 27. The housing 24 has a canopy 28 extending inwardly over the hoppers 4 and 5 through which the sand is discharged into the hoppers from the buckets 21.

Rotatably mounted to the canopy 28, above the apex 8 and substantially below the driven roller 23, is a conditioning drum 30. A baffle 31 mounted within the canopy 28 directs the sand thrown from the buckets 21 onto the drum 30. The baffle 31 extends downwardly from the top

of the housing 24 where the housing 24 and canopy 28 join. The lower end of the baffle 31 is pivotally adjustable, about the baffle's upper end, toward and away from the roller 23. The position of the baffle 31 is controlled by means of the arm 32.

The drum 30 consists of a pair of circular end plates 33 mounted on a tubular core 34 (Figure 3). Four, equally spaced, radially extending fins 35, having scalloped outer edges, are mounted to the core 34 and extended between the end plates 33. The drum 30 is securely mounted to the shaft 36 for rotation therewith. The shaft 36 is driven by means of a belt 37 (Figure 2) passing over the pulley 38 secured to the shaft 39. The shaft 39 is in turn rotated by means of the belt 40 driven by the prime mover 26.

Depending from the lower edge of each of the sides of the canopy 28 is a flap. The flap 50 hangs into the hopper 4 and the flap 51 hangs into the hopper 5. The lower end of each of the flaps is substantially below the apex 8 and the hoop 3. The purpose of this will be explained under "Operation." Each of the flaps 50 and 51 is free to swing inwardly and outwardly about its mounting hinges 58 (Figures 2, 3 and 4). Cooperating with each of the flaps 50 and 51 is an arm 52 and 53 respectively, mounting the electrical switches 54 and 55. Each of the switches 54 and 55 is provided with a central pin resiliently urged inwardly or toward the flaps 50 and 51 to normally close an electrical circuit. The switches 54 and 55 are so mounted on the arms that they may be operated by the flaps 50 and 51 respectively.

Immediately above and extending parallel to the apex 8, a rod 60 is rotatably mounted in the hoop 3. Rigidly secured to the rod 60 is the panel or diverter gate 61. The diverter gate 61 extends substantially the entire length of the ridge 8 and has cutouts to provide clearance for the canopy 28 and the drum 30.

A tube 62 is mounted through the diverter gate 61 beneath the canopy 28 and substantially above the rod 60. The tube 62 is rigidly secured to the diverter gate 61 and is internally threaded on each end to receive the bolts 63. The bolts 63 are made adjustable so that they may properly actuate the flaps 50 and 51. At the end of the rod 60, remote from the sand elevator 20, a cross bar 64 is secured to the rod 60 and mounts a pull chain 65 on each end.

Operation

The sand is supplied to the lower end of the sand elevator 20 from which it is removed by the buckets 21. As the buckets 21 pass over the driven roller 23, the sand is thrown toward the hoppers 4 and 5. The baffle 31 directs the sand onto the rotating drum 30. The drum 30 is rotated rapidly to throw the sand into the hoppers 4 and 5. In so doing, the drum 30 serves the dual purpose of widely distributing the sand in the hoppers 4 and 5 and of conditioning it by aeration as the sand is distributed. Since the apex 8 of the hoppers 4 and 5 is located midway between the ends of the drum 30, the drum normally throws sand simultaneously into both hoppers in substantially equal quantities. This is the case when the diverter gate 61 is in its vertical position (Figure 1). This is a satisfactory arrangement when sand is withdrawn at an equal rate from both of the hoppers 4 and 5. When, however, as frequently occurs, one hopper requires a much greater quantity of sand than the other, one hopper will become filled and spill sand over the side before the other hopper receives sufficient sand.

To avoid this, the operator pulls downwardly on one of the chains 65 to pivot the diverter gate 61 toward the full hopper. The diverter gate 61 pivots until its upper end rests against one side of the canopy 28. All of the sand being delivered from the sand elevator 20 is diverted into the empty hopper. When this hopper becomes full, the diverter gate 61 may be pivoted until it rests against the other side of the canopy 28. All of the sand will then be diverted away from the full hopper into the empty hopper.

When the diverter gate 61 is pivoted into an inclined position one of the bolts 63 will contact one of the flaps 50 or 51 forcing it outwardly (Figure 3). The flap in turn will depress the plunger of the adjacent switch causing it to open the circuit. Since the switches 54 and 55 are arranged in parallel, the opening of the circuit by one of the switches will not inactivate the prime mover 26. The plungers of both switches 54 and 55 must be depressed before the prime mover 26 will be stopped. As the hopper into which the sand is being directed fills, the sand will pile up against the flap depending into this hopper. The weight of the sand will force this flap outwardly (Figure 4) to cause the switch adjacent this flap to interrupt the circuit. Since both of the switches 54 and 55 are now open, the prime mover 26 will be stopped. The stopping of the prime mover 26 stops the discharge of sand into the hoppers because the sand elevator 20 is halted.

As soon as enough sand has been withdrawn from the full hopper to release the flap, the sand elevator 20 will be caused to operate again. The sand elevator can also be caused to operate by pivoting the diverter gate 61 over to the full hopper, thereby closing the switch previously held open by the diverter gate 61. The sand elevator may also be halted by means of the master switch 70.

I have described a simple and effective mechanism for regulating the flow of sand into a pair of sand hoppers, which mechanism is not only capable of directing the flow of sand but also of preventing overloading of either of the hoppers.

Numerous modifications of my invention may be made, each without departing from the principle of my invention. Each of these modifications is to be considered as included in the hereinafter appended claims unless these claims by their language expressly state otherwise.

I claim:

1. In a foundry sand dispenser, a frame and a pair of hoppers mounted thereon, said hoppers arranged in side by side relationship and having at their upper end a common wall, a housing, conveyor means within said housing centered about said common wall for discharging sand into both of said hoppers simultaneously in substantially equal quantities, a prime mover for driving said conveyor means, the improvement in said sand dispenser comprising: an upwardly projecting panel pivotally mounted at its lower end to said frame parallel to and closely adjacent said common wall of said hoppers; a depending flap projecting into each of said hoppers; means for pivotally mounting the upper end of each of said flaps to said housing; an arm extending outwardly from each side of said panel; means for mounting an electrical switch adjacent each of said flaps on the side thereof remote from said

common wall, each of said switches normally closing an electrical circuit; means for alternately pivoting said panel toward each of said flaps and urging one of said flaps against the adjacent of said switches for opening the electrical circuit; the other of said flaps adapted to being urged against the other of said switches when the hopper into which said other flap depends is full; said switches arranged in parallel in the circuit for said prime mover whereby said prime mover will be stopped when both of said switches are open.

2. In a foundry sand dispenser, a frame and a pair of hoppers mounted thereon, said hoppers arranged in side by side relationship and having at their upper end a common wall, a housing, conveyor means within said housing centered about said common wall for discharging sand into both of said hoppers simultaneously in substantially equal quantities, a canopy on said housing surrounding the discharge end of said conveyor means, a portion of said canopy projecting over each of said hoppers, a prime mover for driving said conveyor means, the improvement in said sand dispenser comprising: an upwardly projecting panel pivotally mounted at its lower end to said frame parallel and closely adjacent said common wall of said hoppers, a portion of said panel projecting into said canopy; a depending flap projecting into each of said hoppers; means for pivotally mounting the upper end of each of said flaps to said canopy; an arm extending outwardly from each side of said panel; an electrical circuit operatively connected to said prime mover; means for mounting an electrical switch adjacent each of said flaps on the side thereof remote from said common wall, each of said switches normally closing said electrical circuit; manual means for alternately pivoting said panel toward each of said flaps and urging one of said flaps against the adjacent of said switches for opening said electrical circuit; the other of said flaps adapted to being urged by said material against the other of said switches when the hopper into which said other flap depends is full; said switches arranged in parallel in said electrical circuit whereby said prime mover will be stopped when both of said switches are open.

3. In dispensing means for a finely divided solid material having a frame and a pair of hoppers mounted thereon, said hoppers having a common wall on the upper end and a conveyor means for supplying said material to both of said hoppers simultaneously, the discharge end of said conveyor means being centered about said common wall and being adapted to discharge said material in substantially equal quantities into both of said hoppers simultaneously, a prime mover for driving said conveyor means, the improvement in said dispensing means comprising: a shaft rotatably mounted to said frame parallel to and immediately above said common wall; an upwardly extending panel mounted to said shaft for rotation therewith; means on said shaft for alternately pivoting said panel towards each of said hoppers for directing the sand flowing toward one of said hoppers into the other of said hoppers; a pair of electrical switches mounted to said frame, one on each side of said panel; means on said panel for opening one of said switches when said panel is rotated in one direction and for opening the other of said switches when said panel is rotated in the other direction; said switches being arranged in parallel in the electrical circuit for said prime mover whereby said prime mover will be stopped when both of said switches are opened; swinging elements associated with each of said switches for individually opening each of said switches when the hopper adjacent each said switch is filled with said material.

MILLARD J. BELL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
326,964	Fisk	Sept. 29, 1885
419,401	Baldry	Jan. 14, 1890
925,817	Lorch	June 22, 1909
1,325,602	Albright	Dec. 23, 1919
2,376,304	Anderson	May 15, 1945