

Oct. 9, 1951

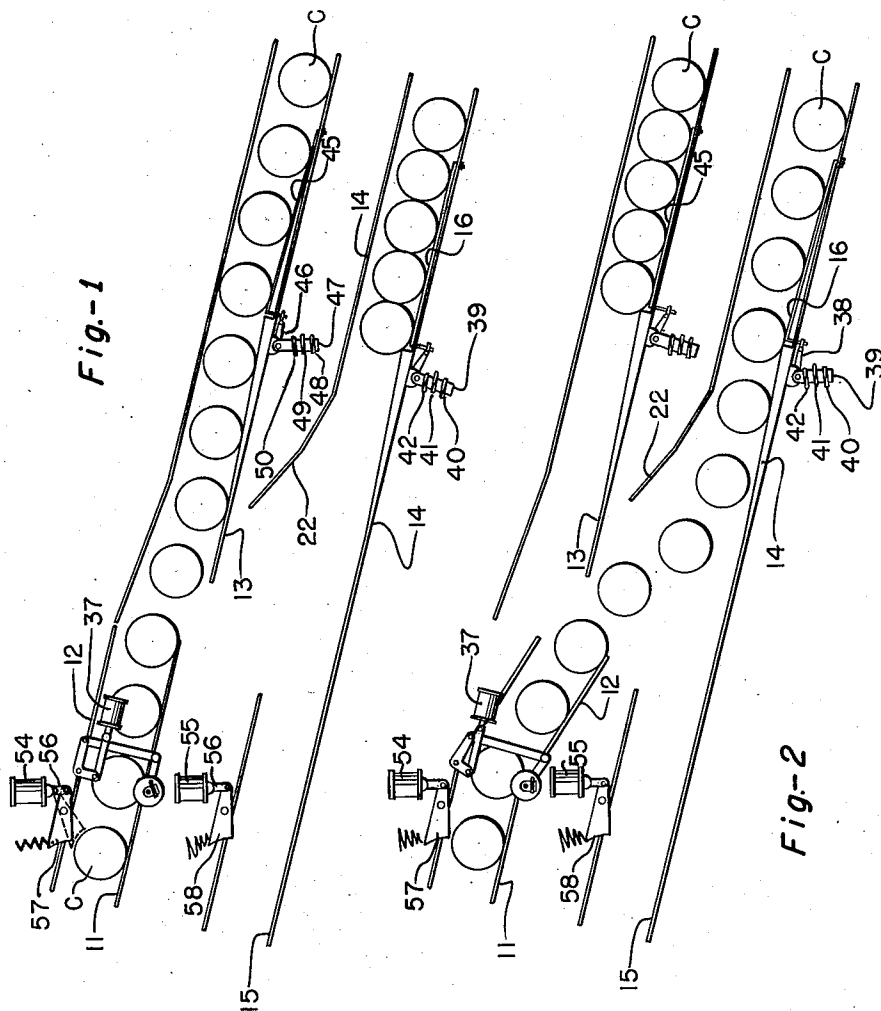
T. C. DODGE

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DISTRIBUTOR FOR GRAVITY RUNWAYS

Filed Aug. 29, 1946

3 Sheets-Sheet 1



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INVENTOR.

by *Mason, Porter, Miller & Stewart*

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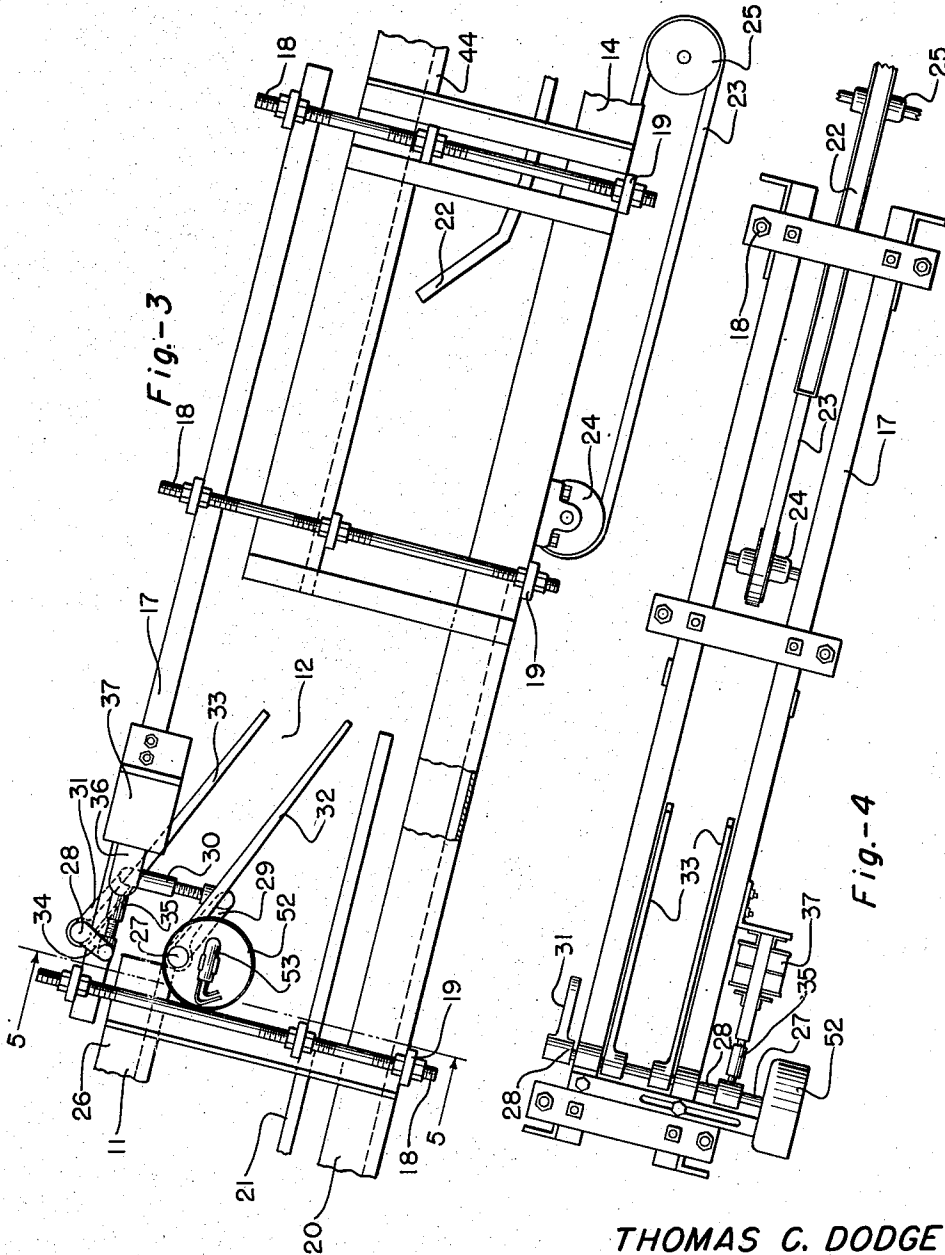
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Fig. 5

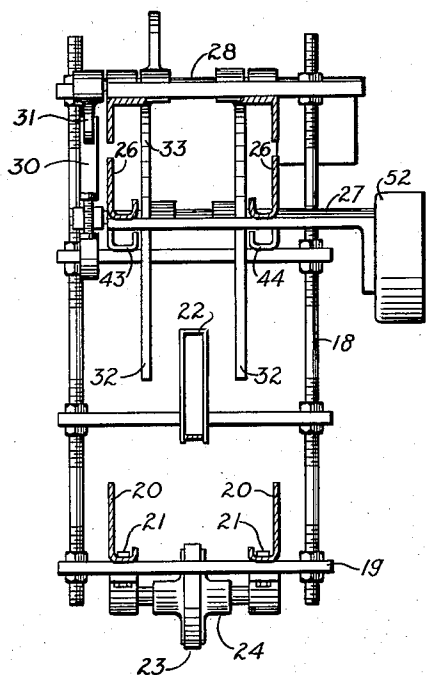
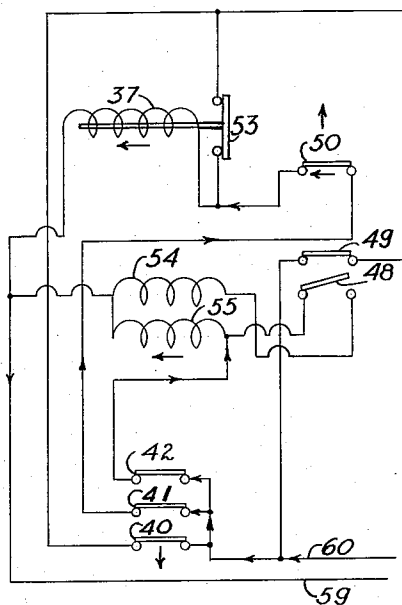


Fig. 6



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UNITED STATES PATENT OFFICE

2,570,923

DISTRIBUTOR FOR GRAVITY RUNWAYS

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Application August 29, 1946, Serial No. 693,702

2 Claims. (Cl. 193—39)

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The following specification relates to an improved can distributor for gravity runways for the purpose of dividing a moving stream of articles such as cans into two or more streams. It is particularly adapted for use in food canning factories. Here canning machines or the like have limited capacities and are fed from a source, or sources, the aggregate capacity of which may be in excess of what the machines can take. Under such circumstances it is important to be able to control the delivery of articles such as empty cans so that the machines receiving them can be supplied at full capacity but at the same time excess supply may be withheld or diverted.

The invention is applicable as well to supplying or feeding cans at definite capacities from a plurality of sources aggregating greater capacity than the capacity of the discharge receiving chutes.

One of the objects of my invention is to supply two or more gravity chutes with cans in accordance with their individual demands and from one or more sources having a total capacity generally equal to or exceeding the combined capacity of the chutes. For example, if there are two machines or lines of machines each requiring 300 cans per minute and the cans are supplied from a single runway delivering 600 cans per minute, this supply will be distributed or divided in accordance with the individual demands of the machines. Again, where the said two lines of machines are supplied from two sources supplying 400 and 200 cans per minute respectively, the distribution is made accordingly.

More specifically, it is a purpose of my invention to deliver cans from the main source to one gravity chute up to its limit or capacity and thereafter divert the cans to a second gravity chute until the latter is fully loaded.

It is a further object of my invention to resume delivery of articles in whichever of the two gravity chutes the supply can then be received.

A still further object of my invention is to arrest flow of cans to the lower gravity chute from the lower feed chute when that chute is filled and to arrest the flow of cans from the upper feed chute when both discharge chutes are fully loaded.

I have shown in the accompanying drawings a diagrammatic representation of my improved distributor and also the mechanical arrangements and electrical circuits preferred. Thus in the drawings:

Fig. 1 is a schematic side elevation of my im-

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proved distributor in position for delivering cans to the upper discharge chute;

Fig. 2 is a similar view of the same when delivering cans to a lower chute;

Fig. 3 is a side elevation with parts removed, of the gate mechanism in the position illustrated in Fig. 2;

Fig. 4 is a plan view of the gate mechanism;

Fig. 5 is a vertical transverse section on the line 5—5 of Fig. 3, and

Fig. 6 is a diagram of the electric control circuits when the gate is lowered and both discharge chutes can receive cans.

By way of example, I have shown in the drawings two feed runways. This is on the assumption that the lower runway supplies cans in quantities less than the capacity of the corresponding lower discharge chute and that the additional number required to fill the lower discharge chute to capacity is to be supplied from a second or upper runway.

Broadly speaking, however, the invention can be carried out when both discharge chutes are supplied up to their respective capacities from a single supply runway, in this case the upper one.

The primary feed runway 11, is a gravity conveyor terminating in pivoted gate 12. The end of this gate 12, is parallel with, but above, the upper discharge chute 13, receiving rolling cans C when the gate is in the upper position as shown in Figure 1.

Chute 13 overlies a lower chute 14 in line with a second feed runway 15. Normally, the lower discharge chute 14 receives the supply from the upper runway 11. Providing the supply of cans is no more than the capacity of the discharge chute 14 and its related machines, there is no change in the feed.

The same is true when the second feed runway 15 is also supplying cans and the aggregate of cans supplied by both 11 and 15 is no greater than can be received and disposed of by the lower discharge chute 14 during normal operation.

As soon, however, as cans accumulate in the lower discharge chute 14, the treadle or trap switch 16 in the lower discharge chute drops by the weight of the accumulated cans and sets in motion the lifting of gate 12 from the position shown in Fig. 2 to that illustrated in Fig. 1.

The feed from the supply runway 11 is, thereafter, entirely delivered to upper discharge chute 13 as long as the supply does not exceed the capacity of the latter to dispose of.

If, during this period, there is an independent

supply over the lower feed runway 15, they will continue to deliver over the lower discharge chute 14, supplying a part of the demand of the latter for cans.

The particular mechanism associated with the gate 12 includes a frame having a top 17 and side posts 18. Suitably supported by the side posts 18 are a series of lower cross bars 19, 19. These sustain channel bars 20, 20. The channel bars 20 have upturned flanges 21, 21 forming tracks along which the cans C roll. The channel bars 20, 20 together constitute the lower feed runway 15 as shown in Figs. 1 and 2.

A cover plate 21 overlies the runway 15 through the upper part of the switching area, that is beneath the gate 12. The lower extension of the channel bars 20, 20 forms the lower discharge chute 14. The discharge chute 14 has an upturned guard plate 22 which prevents the cans from piling up and forces them to travel in single file.

If desired, the upper portion of chute 14 may include the conveyor belt 23, mounted on pulleys 24 and 25, which, when driven, will prevent cans from accumulating in that portion of the discharge.

Suitably supported on the structure are similar channel bars 26, 26 forming the upper feed runway 11.

The end of the runway 11 terminates with a pivoted shaft 27. A similar transverse pivoted shaft 28 is loosely journaled on the top member 17 above shaft 27. The lower shaft 27 has an arm 29. This arm has a link 30 connected to a similar arm 31 on the upper transverse shaft 28. In this way shafts 27 and 28 oscillate together. Lower shaft 27 has a pair of parallel bars 32 which form an extension of the track members 26, 26. A pair of similar bars 33 is mounted on upper shaft 28 in position to move parallel with bars 32. In their raised position, bars 32 form a continuation of feed runway 11 and partially bridge the gap to the upper discharge chute 13. There is, however, sufficient gap to permit cans to fall through while the gate is moving and thus not block the gate.

One end of the shaft 28 has a crank arm 34 to which is connected a link 35. This, in turn, is connected to an armature or plunger 36 which is loosely carried axially of the electro-magnet or solenoid 37. When the solenoid is deenergized, the weight of the gate 12 and the cans passing over it, is sufficient to bring the gate into the lower position shown in Fig. 2.

Suitably spaced beyond the front section of the discharge chute 14 there is a vertically movable treadle 16 of conventional and well-known design. This treadle, pivoted at its right end as shown in Figs. 1 and 2 is connected at its free end to a bell crank 38. This bell crank is loosely pivoted below the chute 14 and carries a dependent bar 39.

The bar 39 has a series of electric switches operated by change in inclination. I have illustrated these as being mercury switches 40, 41 and 42. When the treadle 16 is in its upper position, switches 40, 41 and 42 are open. Treadle 16 is designed to sustain the weight of the normal stream of cans but to be depressed when the cans accumulate as shown in Fig. 1. When the treadle is down under the weight of the accumulated cans, switches 40, 41 and 42 are all closed.

The upper discharge chute 13 is formed by a part of the channel bars 43, 44 (Fig. 5). These are slightly below the level of the track members

26, 26 of the upper feed runway 11, but are designed to catch the cans as they roll off the bars 32, 32 (Fig. 1).

Suitably spaced beyond the front part of the discharge chute 13, there is a second treadle 45 similar in design and function to treadle 16. A bell crank lever 46 pivoted below chute 13 is operated by treadle 45. The lever 46 has a dependent arm 47 holding three electric switches 48, 49, 50. These are also shown, by way of example, as mercury switches. They are so arranged that when treadle 45 is in the upper position, switches 49 and 50 are closed, 48 is open (Fig. 6) and when the treadle is lowered by the weight of accumulated cans as in Fig. 2, then switch 48 is closed but the others are open.

Suitably held on one end of shaft 27 is a casing 52 which contains a mercury switch 53. This switch 53 is arranged to be open in the position shown in Fig. 3 with the gate 12 lowered. However, when the armature or core 36 is drawn in by the solenoid 37, the linkage oscillates shaft 27 counter-clockwise and serves to close switch 53.

Slightly in advance of gate 12, there is an electro-magnet 54 arranged above the feed runway 11. A similar electro-magnet 55 is also arranged above runway 15. Each magnet has a core 56. These cores are connected to pivoted stops 57, 58 respectively. Currents in the magnets 54, and 55, will force the stops, 57 and 58, into the path of cans and stop the flow. When the magnets are de-energized, a spring will return the cores and the stops to the normal position, allowing the cans to flow.

The solenoids 37, 54 and 55 are electro-magnets having reciprocating cores or armatures magnetically drawn in one direction and restored to original position by gravity, counterweights or springs.

Normal operation with a single supply of cans from the feed runway 11 only, is represented in its initial stage by Fig. 2. Here the gate 12 is down and the stream of cans from the upper feed runway 11 is dropped on to the lower discharge chute 14. If a minor supply of cans is fed through runway 15, both streams merge and are held into a single line by the guard 22.

The cans pass through the discharge chute 14 as they are used or disposed of. Either the feed from the upper feed runway 11 alone or that supplementing the feed from the lower runway 15 will be more than sufficient for the demand through the discharge chute 14. As a result, cans will accumulate in 14 as shown in Fig. 1 and the weight will depress treadle 16 throwing switches 40, 41 and 42 into the position indicated in Fig. 6.

In Fig. 6 I have indicated by the vertical arrows the positions of the treadles and associated switches. Thus treadle 45 is up and treadle 16 is depressed (as shown on Fig. 1). The circuits are adapted to be fed with either alternate or direct current through the conductors 59 and 60. When using direct current, 59 is assumed to be positive. When alternating current is used, feed line 60 should be the grounded side.

Briefly speaking, the switches are arranged to provide alternate, parallel or shunt circuits to the several solenoids. Thus lead 59 is connected directly to solenoids 37, 54 and 55, and the solenoids are individually connected to the opposite lead 60 through appropriate switches.

With the treadle 16 down, switches 40, 41 and 42 are all closed. Switch 42 energizes solenoid 55 resulting in forcing the stop 58 down to arrest

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further delivery of cans from the lower source 15. Switches 40 and 41 lead to the terminals of armature 53 and switch 50 respectively so that those circuits will be closed while the treadle 45 is up.

With the treadle 45 up, switch 50 is closed so that 37 is energized and the gate 12 lifted to direct the cans in upper runway 11 to upper discharge 13.

At the same time current through closed switch 49 passes to solenoid 37 and holds it energized even though the treadle 16 should rise and break the circuit through 41.

Switch 48 acts on depression of treadle 45 to energize the stop solenoid 54. When this occurs the gate 12 is dropped due to break in the circuits at 49 and 50.

It will be clear that the circuits operate variously dependent upon whether one or both treadles are depressed.

In the several conditions wherein one or the other discharge chutes can receive articles, the stop in the upper feed runway is inoperative. Thus when the lower discharge chute is receiving cans, the supply comes from the upper feed runway supplemented if desired by the supply from the lower feed runway. When the lower discharge chute is filled to capacity the supply from the upper runway is diverted to the upper discharge chute and the can stop in the lower chute operates until this chute again requires cans.

On loading the upper discharge chute, the gate drops to deliver cans to the lower discharge chute if the latter is able to receive them. If not, the gate remains up and both circuits to the solenoids 54, 55 will then be closed and the supply from both sources cut off.

By the arrangements outlined above, a flexible yet simple and efficient means is provided to distribute articles such as cans from either one or two sources between two discharge chutes according to their respective capacities. In the example first stated, it is possible to make an even distribution from a single source or from two unequal sources and to arrest delivery when capacity is reached. The same facilities are suitable to carrying out the purpose when a different number of supply sources or discharge chutes are needed.

Changes in arrangement, specific description of the several operating units and other minor structural or operative details are, of course, pos-

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sible within the scope of the invention as defined in the following claims.

What I claim is:

1. A distributor for gravity runways comprising a feed runway, a pair of superimposed discharge chutes, a gate pivoted to the feed runway and oscillatable between the discharge chutes, a solenoid and an armature therefor, means operated by said armature when the solenoid is energized, for lifting and holding the gate in an inclined raised position for delivery of articles from the feed runway to the upper discharge chute, a switch operated by an accumulation of articles in the lower discharge chute for energizing the solenoid, a second switch operated by an accumulation of articles in the upper discharge chute for de-energizing the solenoid and a third switch operated by upward movement of the gate to bypass current to the solenoid around said second switch.

2. A distributor for gravity runways comprising a pair of superimposed feed runways, a pair of superimposed discharge chutes, the lower runway delivering direct to the lower discharge chute, a gate pivoted to the upper feed runway and in its lowered position delivering articles from said upper feed runway to the lower discharge runway, a solenoid and an armature therefor, means operated by said armature when the solenoid is energized, for lifting and holding the gate in an inclined raised position for delivery of articles from the upper feed runway to the upper discharge chute, a treadle in the lower discharge chute having a switch for energizing the solenoid, a treadle in the upper discharge chute having a switch for de-energizing the solenoid, an electro-magnetically operated stop in each feed runway, and a switch on each treadle, said switches connected in series to close the circuits through the stop electro-magnets when both treadles are depressed.

THOMAS C. DODGE.

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