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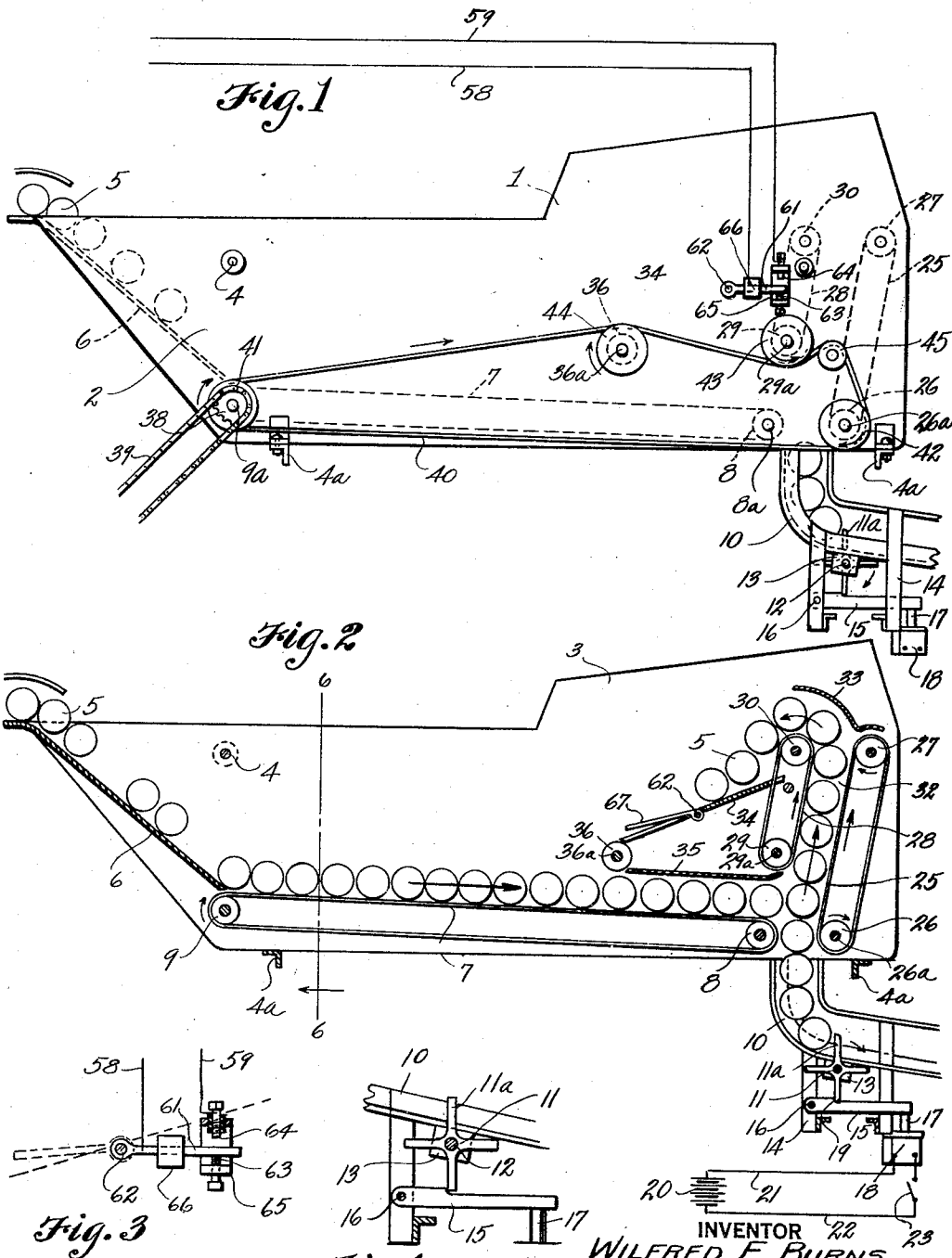
W. E. BURNS

1,822,336

CAN HOPPER

Filed Oct. 16, 1929

2 Sheets-Sheet 1



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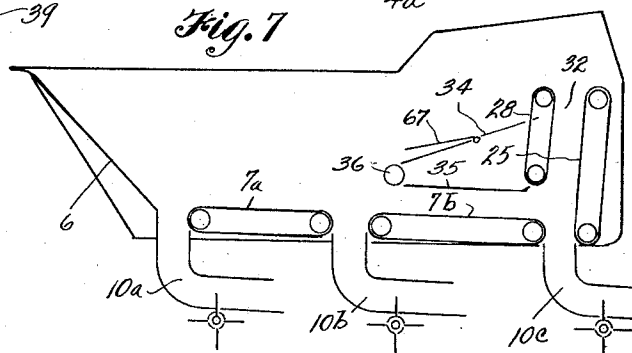
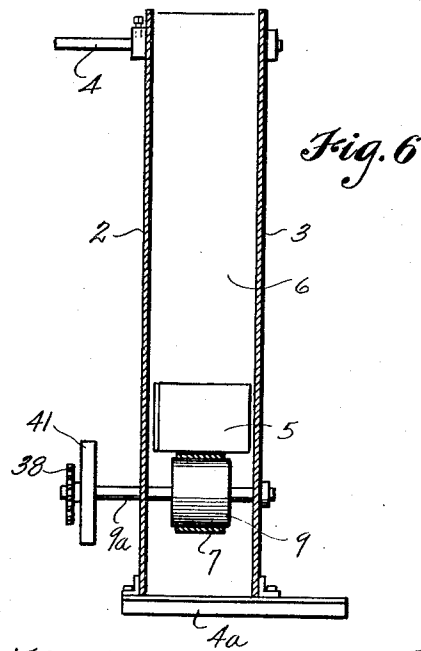
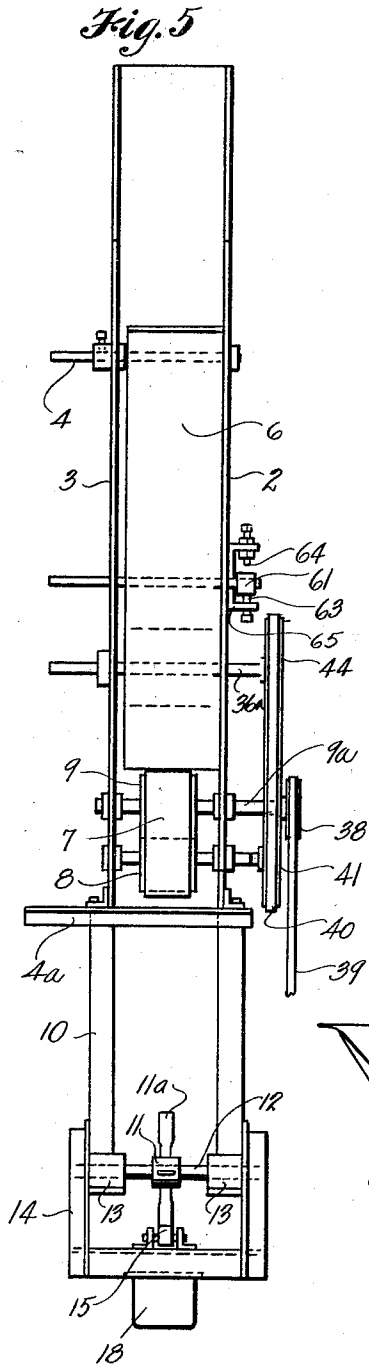
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CAN HOPPER

Application filed October 16, 1929. Serial No. 399,983.

This invention relates to improvements in can storage and feed hoppers and it has reference in particular to hoppers designed for use in a line of can making machinery and which also are of a type of construction designed to accommodate a progressive stop system with full automatic control.

Explanatory to the invention it will here be stated that in a line of can making machinery there are several different machines employed, each for doing a certain specific part of the work. For instance, the line may employ a body forming machine which forms the can bodies from the flat tin blanks, a flanger which flanges the ends of the bodies preparatory to receiving the ends, a seamer which applies the ends and seams them to the body flanges and a tester which tests the finished cans for leaks; it is to be understood of course that other and more machines may be employed in the line.

These several machines in the line are connected by conveyers by means of which the cans are advanced progressively from one machine to the next and, as a rule, an operator is stationed at each machine to watch the operation and to stop the delivery of cans thereto in the event that a jam should occur. With the usual conveyer connection for carrying the cans from one machine to the next in line, difficulty often arises due to the fact that, should it become necessary or desirable to temporarily shut off the delivery of cans to any one of the machines, there will be a piling up of the cans in the conveyer leading to that machine and this is apt to result in a serious jam and consequent damage to the cans with a resultant loss of time for clearing.

The desirability for keeping the various machines throughout the line in motion, whether receiving cans or not, is to eliminate spoilage as much as possible, to increase production and to prevent crowding of the conveyer runways. Spoilage would occur in the body machine if it should be stopped with cans directly over the solder station. Likewise, spoilage would occur in the tester if cans were retained in the testing position. There are also various other reasons quite

well known to those familiar with the can making industry why it is desirable to keep all machines running and for not depending on an operator to start and to stop the machines at the proper times.

In view of the above, it has been the object of this invention to provide can hoppers of novel construction that may be placed in the can line wherever needed, each for receiving the cans from the next preceding machine and for a controlled delivery of cans to the following machine; each hopper being designed to serve as a storage reservoir for cans accumulating during any interval that the machine which it supplies may be temporarily shut off or the feeding of cans thereto be stopped for any reason. It is also an object to equip the hoppers with means operable incident to the accumulation of a predetermined number of cans therein to automatically shut off the source of supply.

More specifically stated, the invention resides in the provision of a hopper to be included in a can line, to receive cans from one machine for delivery to the next machine and wherein there is a novel arrangement of moving belts whereby the can bodies are advanced to a discharge outlet and whereby the cans, accumulated in the hopper by reason of the outlet being temporarily closed, will be carried back as a means of preventing clogging or congestion occurring that might interfere with a ready delivery when the outlet was again opened.

The invention further resides in the provision of an automatic stop device within the hopper, operable by weight of can bodies thereon, to open an electric circuit to stop the delivery of cans from the source of supply.

Other objects reside in the various details of construction and in the combination of parts and in their mode of operation as will hereinafter be described.

In accomplishing these objects I have provided the improved details of construction the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a side elevation of a hopper embodied by the present invention.

Fig. 2 is a longitudinal, vertical section of the same.

Fig. 3 is a detail view of the automatic stop device.

Fig. 4 is a detail of the star wheel and stop lever.

Fig. 5 is an end view of the hopper.

Fig. 6 is a cross section taken on line 6—6 in Fig. 2.

Fig. 7 is a view diagrammatically illustrating an alternative arrangement.

Referring more in detail to the several views of the drawings—

1 designates in its entirety, a storage and feed hopper embodied by the present invention and comprising opposite side walls 2 and 3 supported vertically and in parallel relation by a plurality of connecting rods 4 and supporting bars 4a which have ends fixed to one of the plates and their opposite ends slidably and adjustably connected with the other plate in order to permit of an adjustment of the spacing of the plates to accommodate can bodies of different lengths.

At the receiving end of the hopper, the can bodies, designated by reference numeral 5, are delivered onto a downwardly inclined end plate 6 down which they slide or roll onto the top run of a feed belt 7 which extends forwardly toward the opposite end of the hopper in a downwardly inclined manner. This belt is drawn taut about driving and supporting pulleys 8 and 9 and it is driven in a direction which carries the bodies forwardly for delivery from the belt into a discharge chute 10 which leads downwardly from the hopper at a point adjacent the forward belt pulley.

It will be here stated that in some instances, it may be desirable to equip the hopper with a plurality of outlets and, in this event, the arrangement as in Fig. 7 might be employed. In this particular arrangement, the cans pass from the plate 6 directly into a discharge chute 10a. When this is filled, by reason of the outlet being closed, the cans pass from the plate 6 onto the belt 7a and are carried forwardly into a second chute 10b. When this latter chute becomes filled the cans are delivered by the belt 7b to the forward discharge chute 10c. However, since the operation of this alternative construction is substantially identical to the device as shown in Fig. 2, it will not be described in detail.

Cans passing from the belt 7, Fig. 2, into the discharge chute 10 successively engage with the upwardly projecting arms 11a of a star wheel 11; each can rotating the wheel through a definite arc. This wheel is mounted rotatably by a shaft 12 supported at its ends in bearings 13 that are fixed in a framework 14 suspended from the discharge chute. Mounted within this frame and below the wheel, is a stop lever 15 pivotally supported at one end by a cross pin 16 and

disposed with its other end upon the upper end of a core bar 17 of a solenoid 18 which operates, when energized, to lift the bar 17 to thereby raise the lever to a position at which a shoulder or stop 19 thereon engages with an arm of the star wheel to prevent rotation of the latter and to thereby stop the outflow of can bodies from the hopper. The electric circuit for the solenoid, as diagrammatically shown in Fig. 2, may consist of a battery 20 and circuit wires 21 and 22. This circuit is under control of a switch 23 interposed in the circuit wire 22, and the switch preferably would be located closely adjacent the machine which the discharge chute supplies so that, in the event that it should be necessary or desirable to shut off the feeding of cans to the machine, it is conveniently accessible to the operator for this purpose.

Leading upwardly from just back of the discharge chute 10, is a belt 25 operating about pulleys 26 and 27. Parallel with this belt but forwardly thereof, is another belt 28 operating about pulleys 29 and 30. These two belts 25 and 28, are so driven that their adjacent portions travel upwardly and they are so spaced apart that can bodies may be held between them and carried upwardly thereby. The guideway or passage 32 formed between these two belts terminates within the hopper just below a forwardly directed can guide wall 33, and the can bodies that are carried upwardly by the belts are caused to be deflected forwardly by this guide and delivered onto a forwardly and downwardly inclined wall 34 on which they will roll toward the forward end of the hopper. A plate 35 overlies the can path in parallel, spaced relation above the belt 7, and leads up to the entrance above the feed chute 10 so that the cans delivered onto the belt 7 will not be permitted to stack up below the wall 34 and thus interrupt flow or movement to the discharge chute. There is also provided a revolubly driven roller 36 at the forward end of the plates 34 and 35 which is revolubly driven in the direction of the arrow thereon to prevent congestion at this point when cans are stacked up in the hopper.

The various belts 7, 25 and 28 and the roller 36 may be driven in any suitable manner in the directions indicated by the arrows placed thereon or adjacent thereto, as in Fig. 2. In Fig. 1 I have shown the supporting and driving shaft 9a of pulley 9 as being equipped at one end with a sprocket wheel 38 over which a driving chain belt 39 extends, and a belt 40 extends about wheels or pulleys 41, 42, 43 and 44 that are fixed respectively on the supporting shafts 9a, 26a, 29a, and 36a of the belt wheels 9, 26, 29 and 36. An idler pulley 45 is mounted on the side plate of the hopper to bear against the belt 40 to keep it taut and in operative engagement with the wheel 29a. It is to be understood of

course, that any other suitable driving connection could be employed so long as the belts were driven in the proper direction and at the required speeds.

5 The present hopper mechanism is placed in the can line to receive the cans from any one of the machines. This might be the flanger or it might be the body machine, not shown, operating under control of an electric stop mechanism to which current passes through the wires 58 and 59 as shown in Fig. 3. It sometimes happens that, in the event the delivery of cans from the hopper to the machine supplied thereby is stopped for too long a time, it becomes necessary to shut off the delivery from the source of supply in order that the hopper may not overflow. In order that this may be done automatically and not require the constant attention of the operator, I have provided an automatic switch in the control circuit operable by weight of cans within the hopper. The switch device consists of a switch lever 61 that is fixed to the outer end of a cross shaft 62 mounted rotatably in the plane of the plate 34; the end of the lever 61 being adapted to swing between spaced contacts 63 and 64 mounted in an insulated bracket 65 fastened to the outer side wall 2 of the hopper. A weight 66 on the lever normally holds it down against the contact or stop 63. Also fixed to the shaft 62 within the hopper, is an arm 67 see Fig. 2, which extends downwardly along the surface of the plate 34 and which, normally, projects slightly above the surface of the plate so that the cans delivered from between the upper ends of the belts 25 and 28 may roll downwardly and across the lever. The circuit wires are connected to the lever 61 and contact 64 so that the circuit to the stop device which controls the starting and stopping of the supply machine will be open so long as the lever 61 rests against the contact 63 but will be closed when it moves up against the contact 64; closing of the circuit in this instance, causing a certain operation to take place which will effect the stopping of the machine supplying the hopper.

With the parts of the hopper so constructed and arranged, it is quite apparent that cans delivered into the hopper will pass down the inclined wall 6 and onto the forwardly driven top run of the belt 7 and will be delivered thereby into the discharge chute 10, and in passing through the chute will engage with the arms of the star wheel 11 and cause the latter to rotate. Should it be desired at any time to stop the delivery of cans to the machine served by the hopper the operator simply closes the switch 23 and this causes the solenoid 18 to be energized and the stop lever to be raised upwardly to a position for stopping the wheel to thereby stop delivery of cans through the chute 10. The cans carried for-

wardly by the belt 7 in the hopper will then be carried from the end of the belt upwardly between the two moving belts 25 and 28 and will be delivered onto the plate 34 and forwardly within the hopper. As the can supply within the hopper accumulates, and when sufficient weight is placed thereby on the lever arm 67, it will be swung downwardly, thereby lifting the weighted lever arm 61 from the contact 63 against the contact 64 and will thereby close the control circuit to actuate the stop device which stops the supply machine and thus check any further delivery of cans to the hopper. On again releasing the star wheel, the delivery of cans through the chute 10 will be resumed and finally the hopper will be cleared so that weight is removed from the lever 67 and the lever 61 will be permitted to drop from the contact 64 to open the control circuit to again start the supply machine. The belt 7 operates, in this instance, to feed the cans toward the chute 10 and the belts 25 and 28 and roller 36 operate to effect a circulation that keeps the outlet cleared and prevents the hopper from being clogged or the can bodies from becoming wedged within the hopper.

The special advantages to be gained by use of a hopper of this character are: The provision of a reservoir for storage of excess cans that accumulate by reason of the machine served being temporarily stopped or the flow of cans thereto being stopped; the provision of a system of moving belts within the hopper whereby the cans are positively delivered to the outlet and whereby a circulation is maintained that keeps the hopper free of jams and congestion; the provision of a hopper that is adjustable to accommodate cans of different size; the provision of a remote control whereby outflow may be checked or started as desired; the provision of an automatic stop switch for the control circuit of the supply machine, to start and to stop the latter in accordance with the supply of cans within the hopper.

It is quite apparent that can hoppers of this character may be made to accommodate one or more discharge chutes and it, is apparent also that the hopper may be used in connection with various machines of the can line. Hoppers of the present character might well be used for various other purposes, such as the delivery of filled cans to labeling machines, or the like, and it is not intended that it be limited to any one use in particular.

Having thus described my invention, what I claim as new therein and desire to secure by Letters-Patent is:

1. In a hopper of the character described having a discharge outlet, a conveyer operable within the hopper to feed cans to the said outlet, and other means operable to receive the overflow cans when flow through

the outlet is checked and to return them for storage in the hopper and subsequent delivery by the conveyer to the discharge outlet.

2. In a hopper of the character described having a discharge chute leading therefrom, a conveyer operable along the base of the hopper for feeding cans to the discharge chute, a plate fixed within the hopper in a forwardly inclined position and conveyer devices operable to take up cans from the end of the first conveyer when the discharge chute is filled and to deliver these cans onto the said inclined plate for return thereon forwardly within the hopper and again to the conveyer.

3. In a hopper of the character described having a discharge chute leading therefrom at one end, a conveyer operating along the base of the hopper and on which cans are delivered to the said discharge chute, a plate overlying the belt and forming a can passage leading up to the discharge end of the conveyer belt, a second plate fixed in the hopper in a forwardly inclined position and conveyer means operable to take up cans from the end of the feed belt when the discharge is filled and to deliver these cans upwardly and onto the said inclined plate for delivery by the plate forwardly within the hopper and again to the feed belt.

4. In a hopper of the character described having an outlet and means operable to stop the outflow through said outlet, a belt operating to deliver cans received within the hopper to said outlet and means for transferring the overflow cans away from the outlet when the latter is closed and for delivering them to a storage position for gravity flow again to the belt.

5. A hopper of the character described adapted to receive cans at one end and having an outlet at the other end, means for stopping outflow of cans through the outlet, a conveyer belt operating in the hopper for feeding cans received thereon at one end to the said outlet and belts operating to carry the cans from the delivery end of the feed belt, when the outlet is closed, upwardly then forwardly within the hopper for storage and subsequent delivery by the belt to the outlet.

6. A hopper having a discharge chute at one end, a conveyer belt operating along the base of the hopper to feed cans to the said discharge chute, means for stopping outflow of cans through the discharge chute and a pair of belts operating in parallel relation to take up the cans from the feed belt, when the discharge chute is closed, and to carry them away from the chute upwardly and to deliver them forwardly within the hopper.

7. A hopper of the character described adapted to receive cans thereinto at one end, and having a discharge chute leading from its opposite end, means in the chute for

checking outflow therethrough, a conveyer belt operating within the base of the hopper to deliver the can bodies received by the hopper to said discharge chute, a pair of upwardly moving conveyer belts forming a conveyer for receiving overflow from the discharge chute when the latter is closed and for carrying the overflow of cans upwardly and for delivering them forwardly within the hopper for gravity flow again to the feed belt.

8. A hopper of the character described adapted to receive cans from a supplying machine, and having a discharge chute, means for checking outflow through the chute, a conveyer belt operable in the hopper to deliver cans to the discharge chute, means operable to take up the overflow of cans from the chute when the latter is closed and to deliver the cans into a storage position in the hopper away from the outlet and a control device for the can supplying machine operable under weight of the overflow to stop the supply machine.

9. A hopper of the character described adapted to receive cans at one end from a supplying machine, a discharge chute leading from the opposite end of the hopper, a conveyer belt operating along the base of the hopper to deliver the cans to the chute, means in the chute for checking the outflow, a remote control for said means, a pair of upwardly directed, parallel belts operable to receive the overflow of cans from the chute when the latter is closed to deliver them upwardly in the hopper, an inclined plate in the hopper for receiving the cans from said belts, a control switch for the supply machine, a shaft for actuating said switch, extended within the hopper, and a lever fixed to said shaft and operable by weight of cans thereon delivered across said plate to actuate the switch to stop the supply machine.

10. A hopper of the character described having a discharge outlet, means within the hopper for feeding cans to the outlet and means for diverting cans from the outlet, when delivery therethrough is checked, to storage in the hopper for subsequent delivery to the outlet.

Signed at San Francisco, California, this 31st day of July, 1929.

WILFRED E. BURNS.