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F. G. DAVIS ET AL

3,468,349

SACK FILLING

Filed Jan. 24, 1967

3 Sheets-Sheet 1

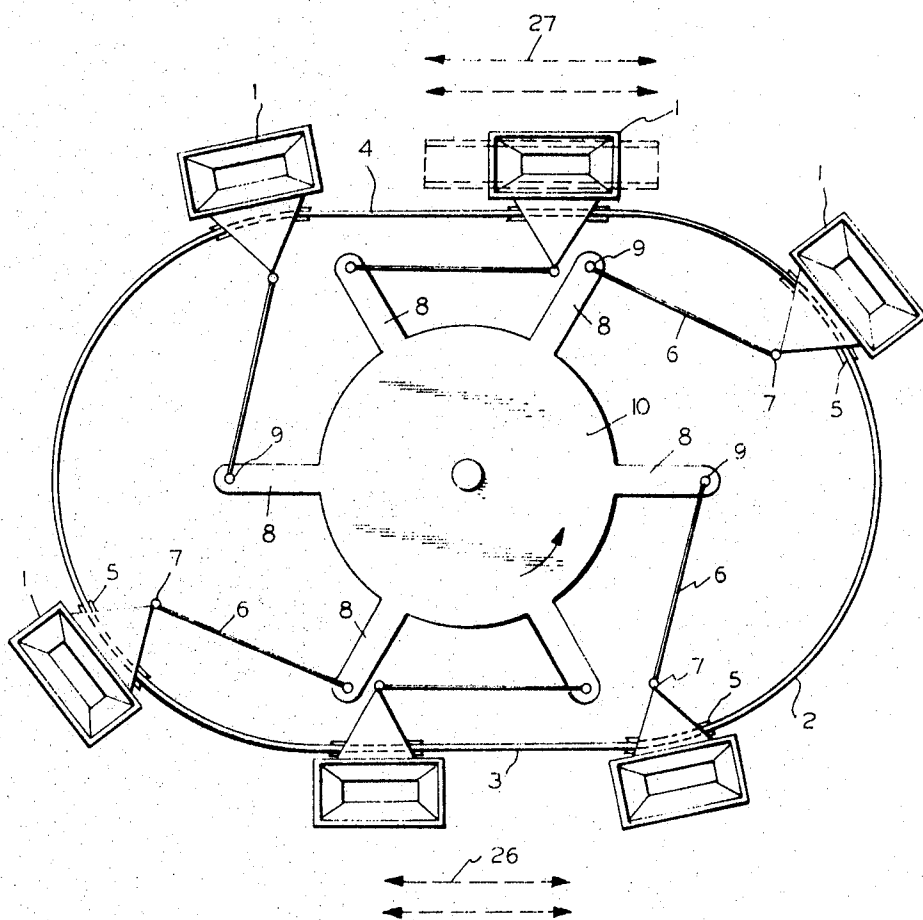


FIG. 1

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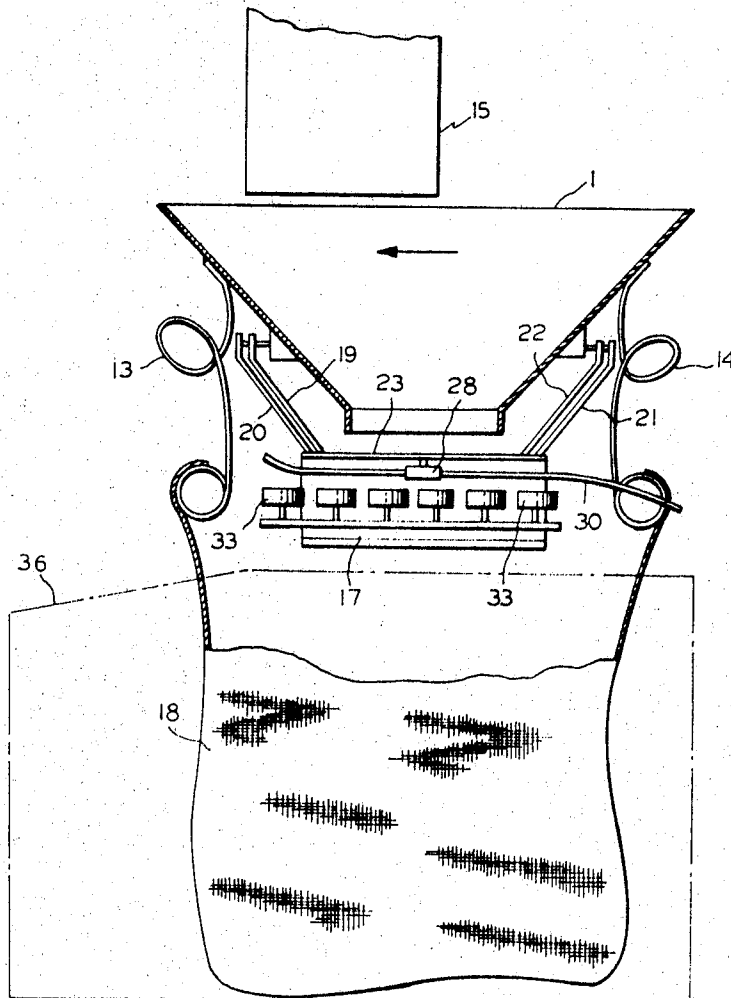


FIG. 2

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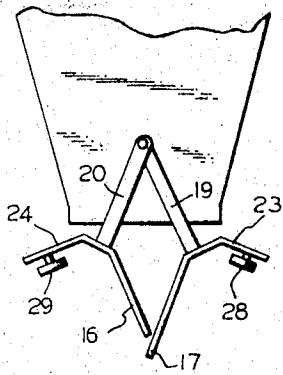


FIG. 3

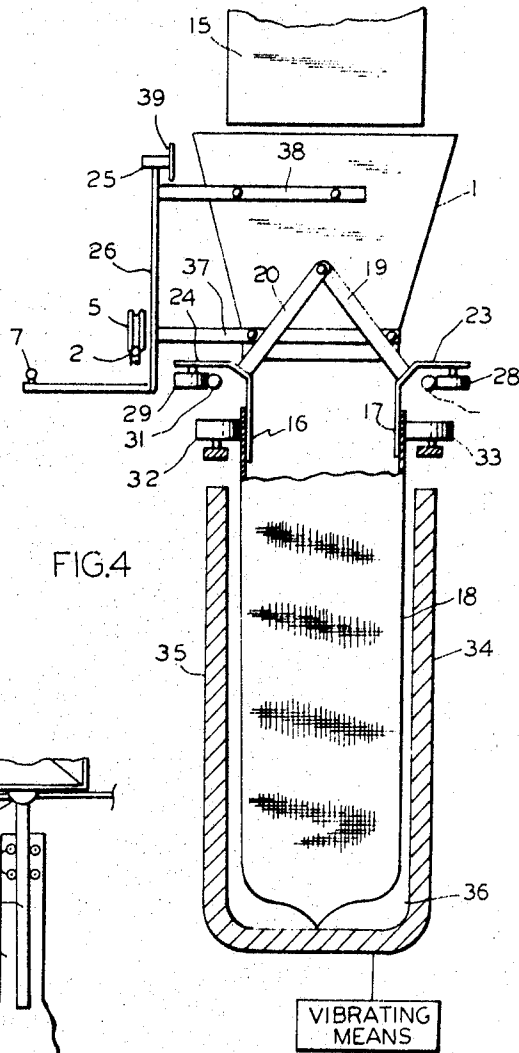


FIG. 4

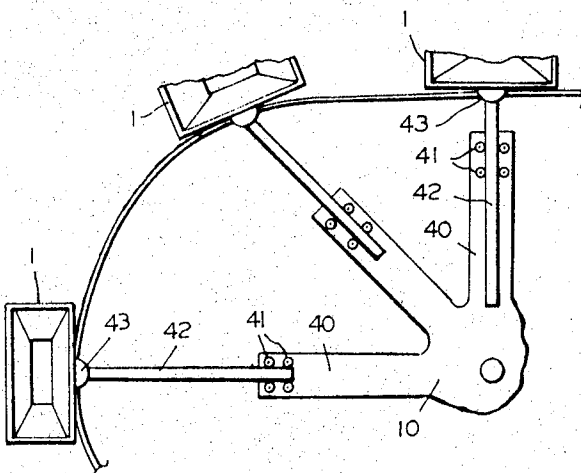


FIG. 5

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1

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SACK FILLING

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Claims priority, application Great Britain, Jan. 28, 1966, 3,863/66; Apr. 21, 1966, 17,435/66

Int. Cl. B65b 1/22, 1/28, 3/18

U.S. Cl. 141—75

7 Claims

ABSTRACT OF THE DISCLOSURE

An arrangement for filling sacks wherein the sacks are attached to a movable hopper remote from the filling station and the hopper with attached sack is transported to the sack filling station. Special means are provided for opening the mouth of the sack at the sack filling station.

Background of the invention

Present methods for filling sacks require an operator to attach a sack to the outlet of a weigh hopper and then wait for the sack to fill before detaching it and attaching the next sack. The operator's work is therefore interspersed with periods of inactivity thereby reducing his efficiency. The present invention provides a method and machine which enables the operator to work continuously without waiting for the sack to fill.

Summary of the invention

Accordingly the present invention provides a method of filling sacks which comprises moving a plurality of hoppers in a circuit past two stations on the circuit, empty sacks being attached to the outlet of the moving hoppers at the first station and the sacks being filled and the filled sacks being removed at the second station, the filling operation being achieved by the synchronised discharge of a weigh hopper provided at the second station into each of the moving hoppers and thence into the sacks.

The present invention also provides a sack filling machine which comprises a plurality of movable hoppers, a circuitous track along which the hoppers are caused to move, a first station on the track at which sacks are attached to the outlets of the hoppers, a second station on the track situated at which is located a weigh hopper and means for disengaging filled sacks from the movable hoppers, said weigh hopper being adapted to discharge a weighed amount of material into the movable hoppers and thence into the sacks.

Brief description of the drawings

The present invention is illustrated in the accompanying drawings in which:

FIGURE I is a plan view of the machine according to the present invention,

FIGURE II is a side view of a movable hopper at the sack filling station,

FIGURE III is an end view of a movable hopper illustrating the means for widening the opening of the sack,

FIGURE IV is an end view on FIGURE II and

FIGURE V is a part plan view illustrating an alterna-

2

tive arrangement for connecting the hoppers to the centrally driven member.

Referring to FIGURE I there is illustrated a single track disposed as two semicircles 2 joined by parallel lines 3 and 4 along which movable hoppers 1 travel on double flange wheels. The movable hoppers 1 are towed by means of a linkage 6 which is pivotally connected to the hopper at 7 and to a radial arm 8 and 9, the radial arm 8 extending from a central member 10 which is rotatably driven. The connection between pivot 7 and hopper 1 is also illustrated in FIGURE IV. From this it is seen that pivot 7 is connected to a bracket 26 on which is mounted wheel 5 and a roller 25. The bracket is attached to the hopper 1 by means of members such as 37 and 38. Roller 25 runs on a guide 39 which serves to maintain the hopper upright.

As central member 10 rotates it causes radial arms 8 to pull on linkages 6 and therefore to pull movable hoppers 1. Although the central member 10 rotates at a constant speed, the speed of movable hoppers 1 varies and they travel comparatively quickly on the curved sections of track 2 and comparatively slowly on the straight sections 3 and 4 of the track.

A station 26 is provided on line 3 of the circuit at which the sacks are attached to the hoppers 1. Another station 27 is provided on line 4 of the circuit at which the sacks are filled and detached. The hoppers travel comparatively slowly at stations 26 and 27 thereby allowing adequate time to perform the necessary operations.

The method of attaching the sacks to the movable hoppers is illustrated in FIGURE II. It is seen that a sack 18 is attached to hopper 1 by being stretched between vertical spring members or fingers 13 and 14 both of which are connected to hopper 1. This is accomplished by passing a corner of the opening of the sack round one of the spring members and then drawing this to the other spring member so that the other corner can be passed over the spring.

Referring to FIGURES II to IV there is illustrated the means whereby the opening to the sack is widened prior to filling. In these figures there is illustrated hopper 1 which is fed with material from a weigh hopper 15 which is automatically operated upon a signal from a switch operated by the centrally driven member. A pair of flaps 16 and 17 are located between fingers or springs 13 and 14 and fall within the opening of the sack 18. These flaps are pivotally attached to hopper 1 by means of members 19, 20, 21 and 22. Also attached to the flaps are extensions 23 and 24 which carry rollers 28 and 29.

At station 27 there is provided roller guides 30 and 31 which upon the approach of hopper 1 to station 27 engages with rollers 28 and 29.

The guides are so positioned that rollers 28 and 29 force extensions 23 and 24 and flaps 16 and 17 from the position illustrated in FIGURE III to the position illustrated in FIGURE IV. It is seen therefore that the flaps force the sack open. Moreover by providing pressure rollers 32 and 33 at station 27 the walls of the sack are gripped between flap 16 and roller 32 and between flap 17 and roller 33 thereby providing a firm grip on the sack.

The sack is contained between walls 34 and 35 of a vibratory conveyor 36. Shaking takes place during filling

thereby consolidating the material in the sack and forming a well-shaped sack. It is important that the linear speed of the sack should be approximately the same as that of conveyor 36. It is also important that hopper 1 moves in a path parallel and vertical to conveyor 36.

As the hopper 1 with the filled sack leaves filling station 27 roller guides 30 and 31 are curved so as to allow flaps 16 and 17 on the sides of the opening of the sack thus permitting its easy removal from fingers or springs 13 and 14. After the pressure on the flaps 16 and 17 has been released the movable hopper rises on an inclined portion of the track 4 to allow flaps 16 and 17, springs 13 and 14 to rise clear of the sack opening.

Using the machine of the present invention a high rate of sack filling can be achieved.

An alternative method of linking the centrally driven member 10 with hoppers 1 is illustrated in FIGURE V. The arms linking the central driven member 10 with the hoppers 1 consist of hollow tube-like members 40 in which, running on rollers 41, are longitudinal members 42 pivotally connected to hoppers 1 at 43. It can be seen that as the distance between hoppers 1 and centrally driven member 10 increases the amount by which longitudinal member 42 projects from tube-like member 40 increases.

Using the machine of the present invention a high rate of sack filling can be achieved.

Description of the preferred embodiments

Desirably the hoppers are arranged to travel at a slow rate at the sack attaching station and at the sack filling and detaching station and at a quick rate between these two stations. This is preferably achieved by arranging the movable hoppers to travel along a circuit disposed as two parallel lines the ends of which are joined by U shaped curves, such as semicircular curves, the hoppers being attached to and driven by arms extending from a common driven member centrally disposed within the circuit and the sack attaching station being positioned along one of the parallel lines and the sack filling and detaching station being positioned along the other. The speed of the hoppers at either of the stations will be less than the speed of the hoppers or the curved sections of the circuit due to the decreased distance of the hoppers from the centrally disposed driven member at the stations.

The arms extending from the centrally driven member to each of the hoppers necessarily have to be constructed so as to accommodate the variation in distance between the centrally driven member and the hoppers. In one embodiment of the invention each arm comprises a radial arm extending from the centrally driven member and a linking arm connecting the radial arm to the hopper, the linking arm being pivotally connected to the radial arm and to the hopper.

In another embodiment of the invention each arm comprises a radial member extending from the centrally driven member, the radial member being provided with a longitudinal member which is movable along the length of the radial member whereby, together, the radial member and the longitudinal member provide a radial arm which is variable in length, said longitudinal member being pivotally connected to the hopper.

The circuit along which the movable hoppers travel is preferably constructed of one track or a pair of tracks on which wheels attached to the hoppers travel.

In order to consolidate the material in the sack after filling it is desirable to provide means for vibrating the sack during and/or after the filling operation.

Sacks may be attached to a hopper by passing the sack opening around two or more fingers attached to the hopper. At least one of the fingers should be resilient so that upon being forced towards the other fingers it will, after attachment of a sack and release of the resilient finger or

fingers, bear against the sack wall and thereby attach the sack to the fingers.

Unless the sack is held open by the attaching operation it is necessary to provide means to adjust the width of the opening of the sack prior to the filling operation. Such a means may comprise a pair of flaps between the fingers the flaps being adapted to locate within the opening of the sack and means being provided to force the flaps apart prior to the filling operation. The means for forcing the flaps apart may comprise extensions to the flaps the position of which may be controlled by guides alongside the circuit, the guides being so positioned as to move the extensions, and thereby the flaps, to adjust the width of the opening of the sack.

We claim:

1. A sack filling machine comprising in combination
 - (a) a plurality of mechanically driveable track-mounted hoppers each having an open top filling side and a lower, outlet side;
 - (b) a circuitous track along which the hoppers are adapted to be driven, said track including two spaced generally parallel lines, and U-shaped or semi-circular track sections joining the respective opposed ends of the two line portions to form a generally oval shaped endless track;
 - (c) a sack-attaching station on one side of said track, including means upon and in conjunction with said hoppers for attaching sacks to the outlet sides of said hoppers,
 - (d) another station on the opposite side of said track having means thereon for filling said sacks, including weigh hopper means disposed above and in vertical alignment with the track and track-mounted hoppers which pass therebeneath, said weigh-hopper means including means to periodically discharge a pre-weighed amount of material into the progressively movable hoppers and thence into the sacks carried therebelow; and
 - (e) means for power driving the hoppers around said tracks; said means including:
 - (1) a common drive member having radial portions, said member disposed centrally within the track and operably connected at its center with a power source to rotatably drive said drive member, and
 - (2) a plurality of radially extending, composite, hopper-attaching arms connected at one end to each of said hoppers and at the other end to a radial portion of the common drive member.
2. A machine as claimed in claim 1 wherein each composite arm comprises a radial arm extending from the centrally driven member and a linking arm connecting the radial arm to the hopper, the linking arm being pivotally connected to the radial arm and to the hopper.
3. A machine as claimed in claim 1 wherein each composite arm comprises a radial member extending from the centrally driven member, the radial member being provided with a longitudinal member which is movable along the radial length of the radial member whereby, together, the radial member and the longitudinal member compositely provide a radial arm which is variable in length, said longitudinal member being pivotally connected to the hopper.
4. A machine as claimed in claim 1 further including means for vibrating the sack at the filling station and during the filling operation.
5. A machine as claimed in claim 1 wherein the hoppers are provided with at least two oppositely disposed, sack-suspending resilient fingers around which the mouth of the sack can be passed.
6. A machine as claimed in claim 1 wherein means are provided to automatically adjust the width of the opening of the sack prior to the filling operation.
7. A machine as claimed in claim 6 wherein said latter means comprises a pair of flaps, the flaps being adapted to locate within the opening of the sack and means being

5

provided to force the flaps apart prior to the filling operation, said means for forcing the flaps apart comprising extensions to the flaps, guides alongside the track, said flap extensions cooperably engageable with said guides to timely control said flap positions, the guides being so positioned as to move the extensions, and thereby the flaps, to adjust the width of the opening of the sack.

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141—78, 315, 232; 177—160