April 10, 1945. R. H. BRECHTEL **2,373,162**

MEANS FOR RESHAPING BAGS FILLED WITH FLUENT MATERIAL

Filed Jan. 15, 1944

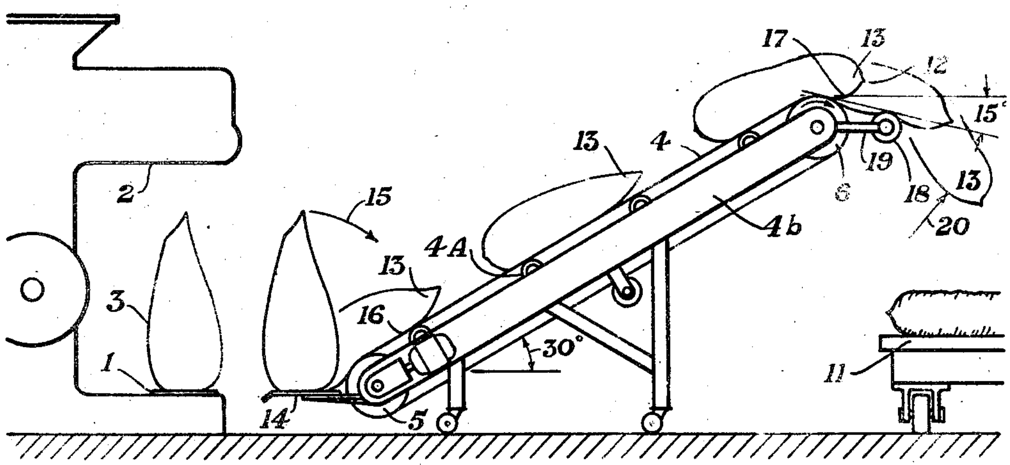

Fig. 1

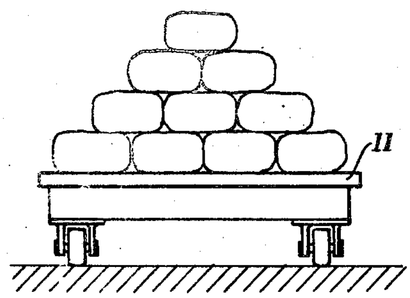

Fig. 2

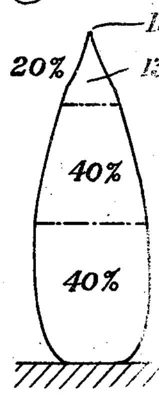

Fig. 3

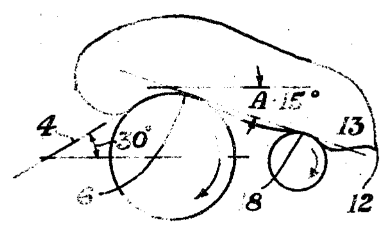

Fig. 4

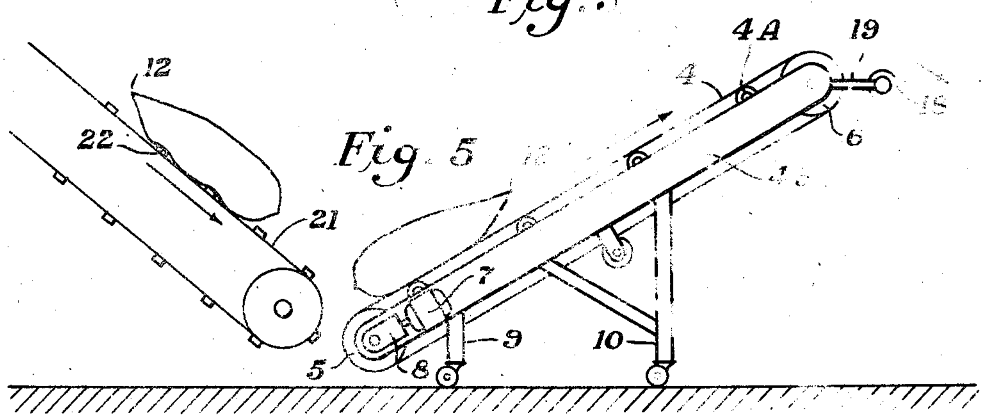

Fig. 5

INVENTOR
ROBERT H. BRECHTEL
BY
George ... Allen
ATTORNEY

Patented Apr. 10, 1945 2,373,162

UNITED STATES PATENT OFFICE

2,373,162

MEANS FOR RESHAPING BAGS FILLED WITH FLUENT MATERIAL

Robert H. Brechtel, Sebewaing, Mich.

Application January 15, 1944, Serial No. 518,473

2 Claims. (Cl. 198—1)

This invention relates to means for smoothing out sacks containing granular material which is so unevenly distributed therein as to give the package an undesirable tapered form.

More specifically, the improvement pertains to automatic means for shaping such sacks to uniform thickness throughout their length, with the side walls of the sack substantially parallel.

For example, granulated sugar as it comes from the mill is usually put up in 100-pound sacks. To fill the sack it is supported on the platform of an automatic weigh scale and the correct weight of sugar is delivered to the sack which is then closed, as by an automatic valve flap in the mouth of the sack. The newly filled sack is not of uniform cross-sectional size, being largest at the bottom and tapered to a ridge at the top.

A storage pile of such tapered sacks ten to twenty feet high is almost sure to be insecure and unstable. But if each sack is of uniform thickness throughout its length the piles can be built up accurately, more securely and with less effort and expense because the stackers are not required to sort or reverse them when piling.

Heretofore, it has been common practice for a workman to correct the tapered shape by jouncing the sack and then by hand casting the top of the sack down onto the floor so as to drive some of the contents from the body portion toward the upper part or mouth portion; thus tending to produce a more nearly uniform cross-sectional shape and size throughout the length of the sack body. However, with 100-pound sacks that method requires hard manual labor and considerable physical endurance.

In addition to the weigh scale attendant a second workman was needed to shape the sacks in the manner above described and put them onto a truck; also, a third man was required to take the truck to the warehouse or stack-room. My improvement releases the second man for other duties and thereby effects a considerable saving of labor.

The principal object is to provide a simple, inexpensive, yet effective means for automatically smoothing out each sack in regular order so the sacks can be stacked more securely and safely and at less expense.

In use, my improved device is adapted to bring each sack to uniform cross-section while it is being transported from one place to another on a belt conveyor. I call this operation "smoothing out" the sack.

The claimed invention is a combination of a belt conveyor and an idler roller, the latter being so situated relatively to the upper end of the apron where it passes around the delivery pulley of the conveyor as to produce the desired reshaping or smoothing effect.

The method or mode of operation is to pass a tapered sack endwise off the belt conveyor, allowing it to dip downwardly by gravity and roll lengthwise over the idler roller in downward direction, causing the material to flow so as to mold the sack into uniform parallel-sided shape.

With the foregoing objects in view, my invention embodied in preferred form, comprises the devices described and claimed and the equivalents thereof.

In the drawing, Fig. 1 is a diagrammatic side view of a conveyor embodying the invention and arranged to transport sacks from a weigh scale platform to a delivery truck;

Fig. 2 is a diagrammatic side view of a truck with sacks piled thereon as delivered from the conveyor;

Fig. 3 is a side view of a filled and closed sack, tapered, as it appears before being smoothed by my device;

Fig. 4 is an enlarged diagrammatic view, showing the arrangement and mode of cooperation of the head pulley and the idler roller in smoothing out a sack; and

Fig. 5 is a diagrammatic side view showing my invention arranged to smooth out-of-shape sacks as they arrive from warehouse on a slatted belt conveyor and to deliver them in desired reworked form to a transport truck.

In the drawing, numeral 1 designates the platform of a conventional automatic weigh scale 2 having thereon a sack 3 to receive the weighed charge. Numeral 4 is the upper run of a conventional conveyor belt supported on rollers 4A. Its top face is preferably smooth and free from projections or cleats. Pulleys 5 and 6 are drive and delivery pulleys, respectively. Pulley 5 is driven by motor 7 and gears in a gear box 8. The conveyor frame, 4b, may be mounted on legs 9, 10, provided with casters. In use, this conveyor is situated with its receiving end near the weigh scale platform 1 and its discharge end near any desired point of delivery as a platform truck 11.

In Fig. 1 the upward angle of inclination of run 4 is less than the normal angle of repose for loaded sacks on the belt, so there shall be no rearward slippage. For some uses the angle may be less, or, the run 4 may be horizontal.

A sack-supporting member is provided adjacent the receiving pulley 5 and lower than the end of run 4. Preferably it comprises a platform 14 fixed to the frame, 4b, of the conveyor and located so that a sack standing on 14 can be easily toppled over onto the belt run in the direction of the arrow at 15, Fig. 1.

Fig. 3 shows a charged sack as it leaves scale platform 1, its mouth 12 being closed. Its upper portion 13 is somewhat tapered and loose, being not completely filled with material. In an upright sugar filled one-hundred pound sack the height of the material to be smoothed out is about eighty per cent of the total height. When the sack has been toppled onto the belt run 4 it advances thereon, as indicated at 16, while lying lengthwise in the direction of travel. The slackly filled mouth portion 13 arrives at the end of run 4 and starts to project or overhang. It also commences to tip or sag downwardly, as at 17.

It is near this place that the contents are automatically smoothed out by my claimed improvement, giving substantially uniform cross-sectional shape to the sack from end to end.

As the free end of the advancing sack begins to bend downwardly by gravity upon leaving the upper periphery of pulley 6, the material nearest the mouth portion commences to flow toward 12. Proceeding, the mouth portion encounters the top rim of a freely rotatable idle roller 18 which is supported in fixed relation with and in advance of the delivery pulley 6. Supports 19 secured to the conveyor frame 4b support the idler 18. As the mouth portion continues to advance the freely rotatable idler commences to turn. Its subsequent progressive rolling action on the under side of the sack, which sags somewhat between 6 and 18, causes some of the material in the body of the sack to be moderately kneaded from beneath and to flow forward. The amount of material already at the mouth portion 12, 13 is thus increased and its greater weight dips the mouth of the sack farther downward and causes a still greater accumulation of material there. When the sack has advanced far enough to approach a condition of balance over idler 18 it will be found that the combined supporting and rolling actions of the pulley 6 and idler 18 will have brought about an approximately even thickness of material in the package from top to bottom.

In use, when the sack is about to arrive at its balancing or tilting point on 18 the truck attendant places his hand under the mouth portion at about the place indicated by the arrow 20. With a very slight lifting effort he steadies the end and as the sack rolls off from idler 18 he guides it so it falls onto the platform of a truck 11. The sacks land in regular order on the truck in fairly flatwise position, building a pile, Fig. 2. The supports 19 for idler 18 can be formed or adjusted to suit the requirements for best operation in any given installation.

The best operating position of idler 18 relative to delivery pulley 6 can be determined by trial to suit any sized sack, or any material possessing individual characteristics of flow etc.

For example, I have found that one-hundred-pound sacks of granulated sugar are smoothed out by this device to give satisfactorily uniform cross-section throughout the length of the sack if pulley 6 is twelve-inches diameter and idler 18 is six-inches, and if the axis of idler 18 is situated parallel with the axis of pulley 6 and about 13-inches beyond it.

Expressed in more general terms, the relative positions of the upper peripheries of said roller and pulley are defined by an assumed or imaginary plane tangent to both. This plane slopes downwardly from the delivery pulley at an acute angle from the horizontal. The distance on that plane between the points of tangency alluded to is equal to substantially half the length of the sack.

If the upward inclination of run 4 is made approximately thirty degrees from horizontal and if the angle A of downward slope of the tangent plane, 6 to 18, is made about half that amount, as shown in Fig. 4, good results will be assured.

When the butt of the sack arrives at the delivery end of run 4 it follows around the periphery of pulley 6 for a short distance. Meanwhile the mouth portion of the sack is being filled by the initial forward and downward flow of material from the main body of the sack, as has been described. The resultant increased sag at the overhanging mouth portion 13, 12, due to the increased weight therein, exerts a greater downward and forward pull on the sack. When the butt has moved away from contact with the belt on pulley 6, the sack is proceeding by its own weight. It goes over the idler 18 where the reworking or kneading of the material results in creating a uniform cross-sectional size and shape from one end of the sack to the other.

It will now be apparent that my device attains the required rolling out or smoothing effect by having run 4, pulley 6, and idler 18 arranged so as to cause progressive kneading and bending actions to be applied to the under side wall of the sack while it is passing over the upper periphery of pulley 6, and again while passing over the upper periphery of idler 18, and finally causing the mouth portion to flex downwardly and fill by gravity flow as soon as it has passed idler 18.

In Fig. 5 I have shown a modified arrangement for my smoothing device. Here the loaded sacks are taken—not from the weigh scale platform described above—but from a high stack of sacks in a warehouse. The downwardly moving run 21 of a conventional warehouse unloading conveyor is provided with slats 22 to keep sacks from sliding. Sacks from the high tiers are placed on run 21 and are carried down to near the warehouse floor. The sacks as they arrive from the downward run 21 are usually out of shape due to the steepness of the run or to warehouse handling, so it is desirable to smooth them before shipment. Therefore, the slat conveyor delivers them onto the upper run 4 of my device. Thence they pass over pulley 6 and idler 18, where they are smoothed out and dropped onto the platform of a truck 11, or other conveyance, as has been described for Fig. 1.

Heretofore, when the sacks came down from the warehouse pile they were usually dropped onto the floor and two men were required to pick them up, jounce and work them into smooth condition, load them onto a truck 11 and transport the truck to a shipping platform.

With my improvement each truck attendant guides each sack by hand in regular order as it drops from idler 18 onto his truck. In this case the labor of two men is saved by using my improved device.

Having thus described by invention, what I claim and desire to secure by Letters Patent is:

1. In a means for smoothing out sacks or bags containing fluent material unevenly distributed and for shaping such sacks to uniform thickness throughout their length, the combination of a framework having thereon a receiving pulley, a

delivery pulley and a belt conveyor presenting a run for sacks of material; an idle roller supported in fixed relation with and in advance of the delivery pulley; the upper peripheries of said delivery pulley and roller being in relative positions defined by an imaginary plane tangent to both, said plane sloping downwardly to the roller from the delivery pulley at an acute angle from horizontal; the distance in such plane between such points of tangency being equal to substantially half the length of the sack.

2. Means operatively associated with an inclined belt-type loading conveyor and adapted to smooth out sacks containing unevenly distributed fluent material and to mold such sacks into a condition of substantially uniform thickness throughout their length, such smoothing and molding means comprising an idle roller supported in advance of a delivery pulley of a conveyor; said roller and pulley being situated relatively to each other with their upper peripheries defined by an assumed plane tangent to both, such plane sloping downwardly from the delivery pulley to the roller at an acute angle from the horizontal; the distance between such points of tangency in said assumed plane being equal to substantially one half the length of the sack.

ROBERT H. BRECHTEL.