March 18, 1941. D. BELCHER ET AL 2,234,953

MACHINE FOR COMPACTING MATERIAL IN CONTAINERS

Filed May 22, 1939 3 Sheets-Sheet 1

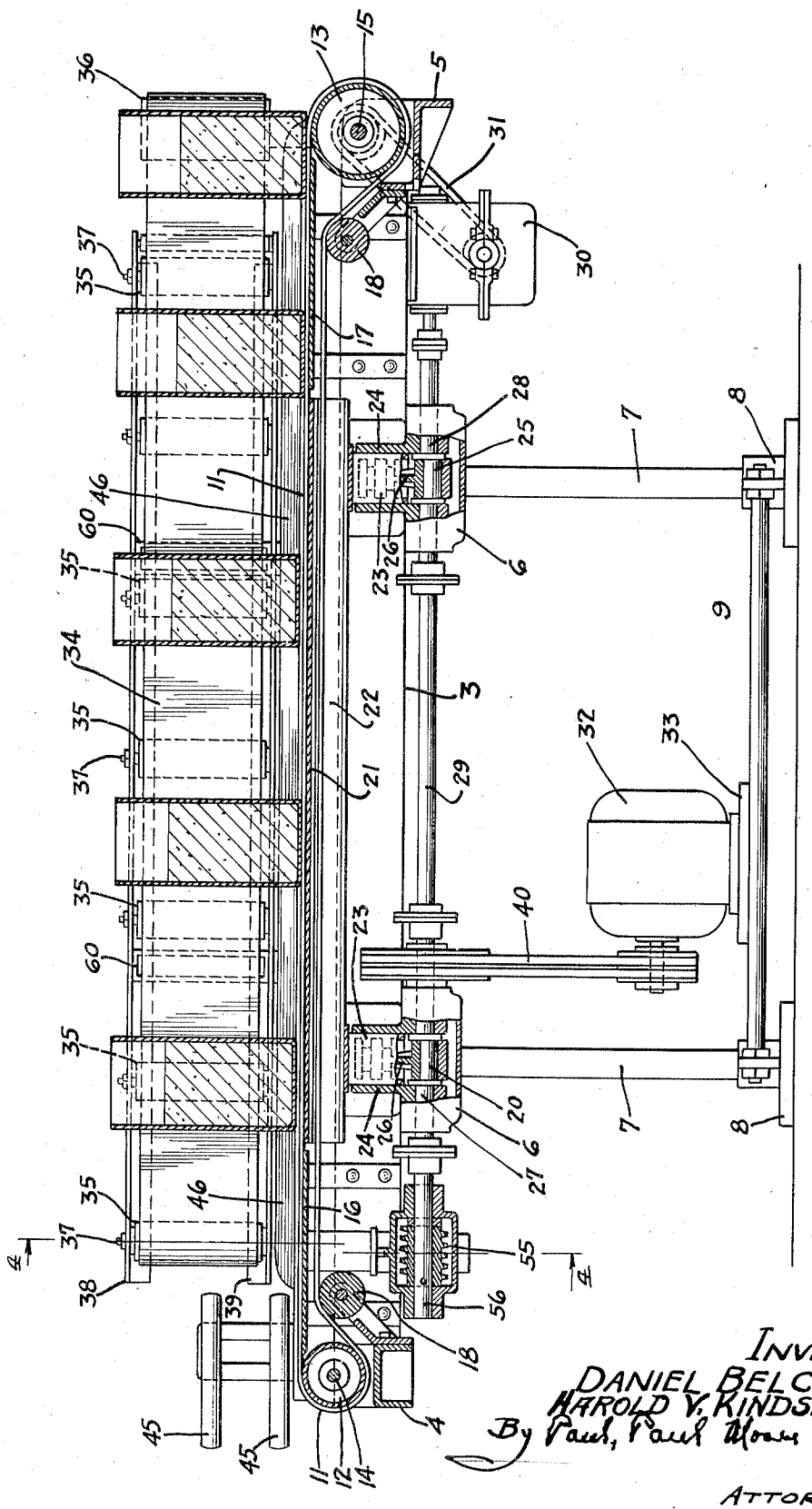


FIG. 1

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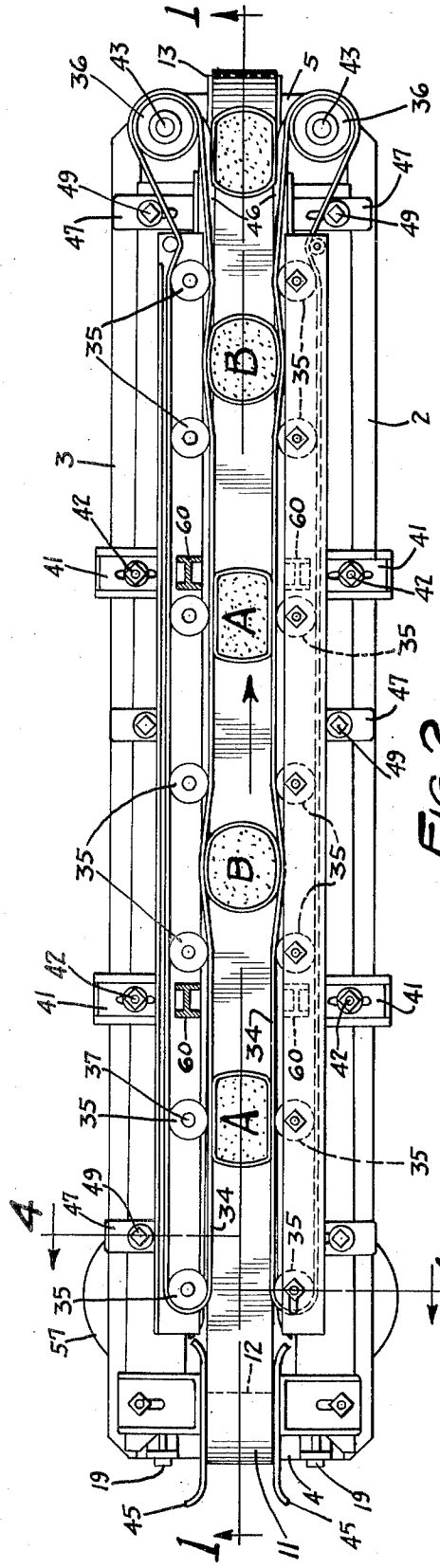


FIG. 2

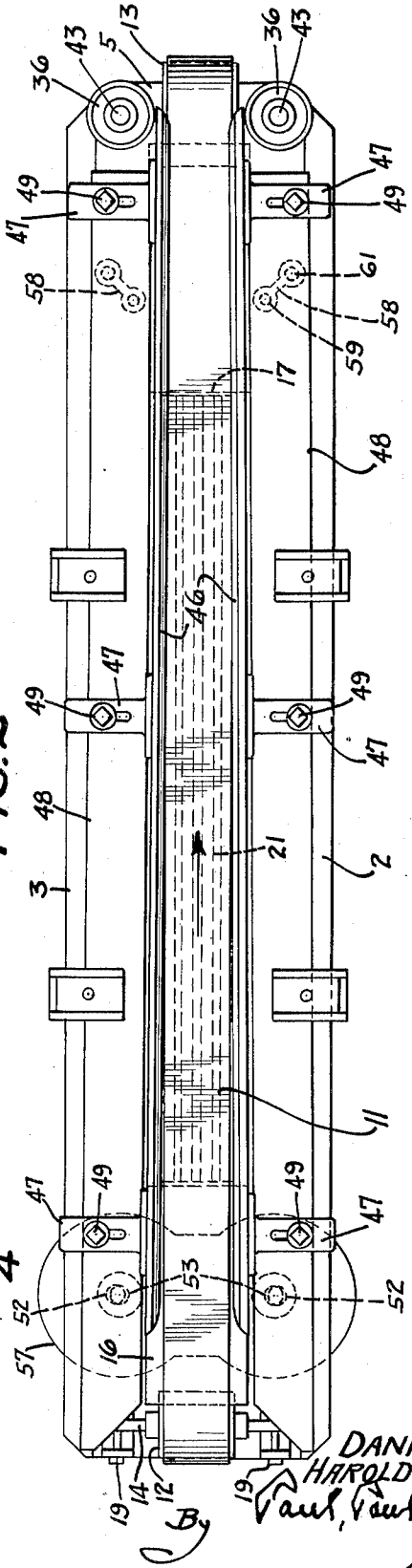


FIG. 3

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Filed May 22, 1939 3 Sheets-Sheet 3

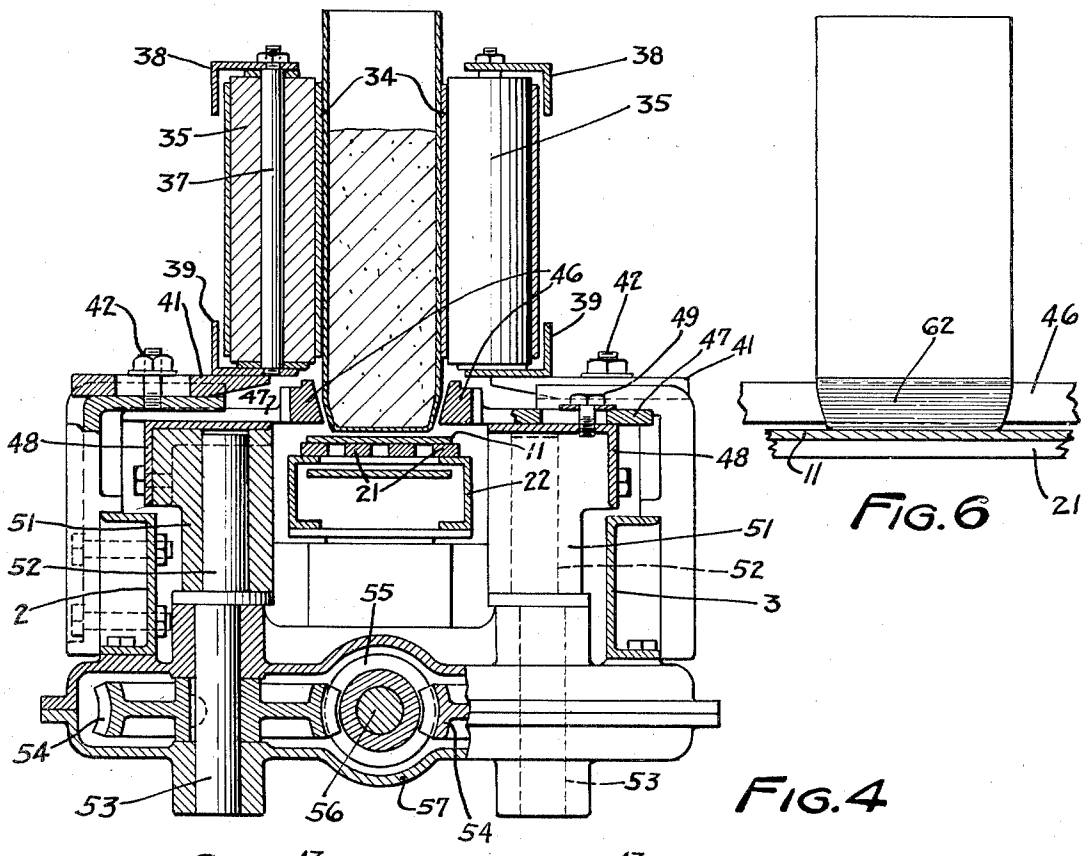


FIG. 4

FIG. 6

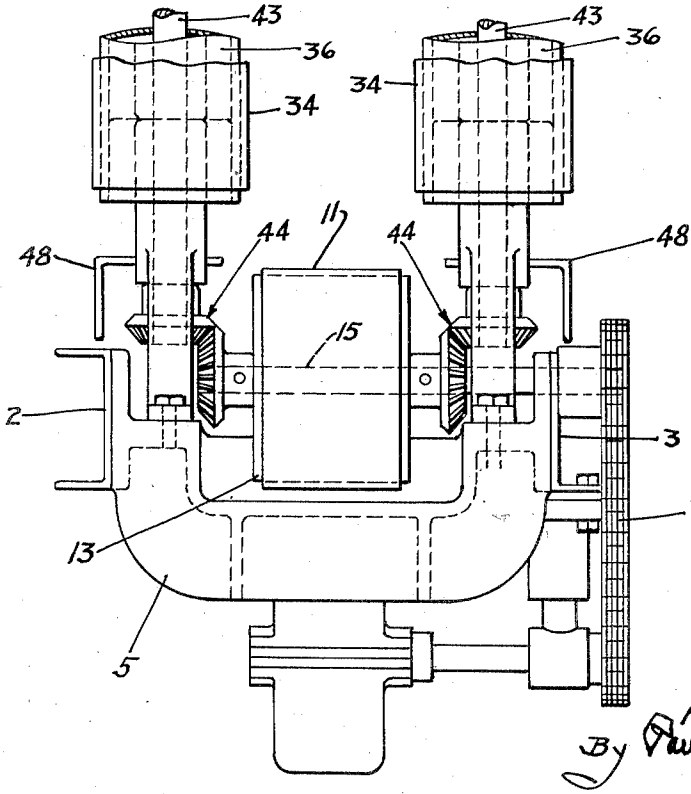


FIG. 5

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UNITED STATES PATENT OFFICE

2,234,953

MACHINE FOR COMPACTING MATERIAL IN CONTAINERS

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Application May 22, 1939, Serial No. 274,875

9 Claims. (Cl. 259—72)

This invention relates to new and useful improvements in machines for settling and compacting material, such as sugar, coffee, cocoa, flour, and various other comminuted materials, in flexible containers or paper bags. The present machine, in some respects, is similar to the one shown and described in Patent No. 1,995,271, granted to Daniel Belcher and Bradford R. Stetson on March 19, 1935.

An object of the present invention is to provide a machine of the character disclosed comprising a conveyer belt having means for vibrating a section thereof to settle the contents of the containers or bags, and vertically disposed belts being arranged at each side of the conveyer belt having their inner runs adapted to engage the walls of the bag bodies and cooperating with the conveyer belt to feed the bags through the machine in an upright position.

A further object is to provide a machine for settling the contents of a bag, comprising a conveyer belt and oppositely disposed side belts having vertically disposed rollers arranged in spaced relation along the sides of the conveyer belt and operating to hold the inner runs of the side belts against the bag bodies, said rollers being arranged in oppositely disposed pairs, whereby each time a bag passes between a pair of said rollers, an increased pressure is exerted on the bag bodies, whereby the vibratory motion imparted to the bags by the conveyer belt, may be temporarily interrupted, and whereby the bags may be subjected to a series of vibrating and squeezing actions, as they travel through the machine, thereby to thoroughly settle and compact the contents thereof.

A further object is to provide a machine for settling and compacting the contents of paper bags, comprising a conveyer belt, and spaced side belts through the inner runs of which the bags are conveyed through the machine, and a pair of longitudinally extending guide members being disposed between the lower edges of the inner runs of the side belt and the conveyer belt having inclined faces adapted to engage the lower portion of the bag body at opposite sides thereof, thereby to guide the bags through the machine whereby they are not likely to relatively rotate on the conveyer.

A further object is to provide a machine of the character described, comprising a horizontally disposed conveyer belt having means for imparting a vibratory motion to a section thereof, a pair of side belts supported on oppositely disposed pairs of rollers, and a pair of guide members having means for constantly imparting a lateral motion thereto, whereby they intermittently engage the bag bodies to prevent the bags from rotating on the conveyer belt, and all of said parts cooperating to so manipulate the bag bodies, as the bags travel through the machine, that the contents of the bags will become firmly settled and compacted, before the bags are discharged from the machine.

A further object resides in the novel arrangement of the various parts of the machine, whereby it may readily be adjusted for handling bags of different sizes, and in the simple and inexpensive construction of the apparatus.

Other objects of the invention will appear from the following description and accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a longitudinal sectional view substantially on the line 1—1 of Figure 2, showing the general construction of the machine;

Figure 2 is a plan view of Figure 1;

Figure 3 is a view similar to Figure 2 with the side belts removed from the machine;

Figure 4 is an enlarged detail sectional view substantially on the line 4—4 of Figure 1, showing the means for operating the guide strips disposed over the conveyer belt;

Figure 5 is an end view of the machine with some of the parts omitted, showing the drive for the side belts; and

Figure 6 is a view showing the flat faces provided at the lower portion of the bag body adapted to be engaged by the guide strips to prevent turning of the bags.

Supporting frame

The supporting frame of the machine herein disclosed is quite similar to the one shown in the patent hereinbefore mentioned, and comprises a pair of suitable side rails 2 and 3, preferably of channel cross-section, and having their ends connected together at each end of the machine by suitable cross members 4 and 5, as best shown in Figure 1. The intermediate portions of the side rails are connected together by suitable castings 6 having sockets therein, not

shown, for receiving the upper ends of spaced legs 7, the lower ends of which are secured to suitable base members 8 having tie rods 9 securing them together, as shown in Figure 1.

Conveyer means

The means for conveying the bags through the machine comprises a horizontal belt 11 mounted on rollers 12 and 13. The roller 12 is rotatably mounted on a suitable shaft 14, and the roller 13 is secured to a shaft 15 mounted in suitable bearings provided in the cross member 5.

The upper run of the conveyer belt 11 is supported at the ends of the conveyer by suitable plates 16 and 17, which are fixedly secured to the frame. Idler pulleys 18 engage the lower run of the conveyer belt, as shown in Figure 1. Suitable means, indicated at 19 in Figure 3, is provided for tensioning the conveyer belt 11.

Vibrating mechanism

To settle and compact the material in the bags, a vibrating mechanism is provided which, in the present instance, comprises a plurality of longitudinally extending strips 21, interposed between the plates 16 and 17. The strips 21 are adapted to engage the upper run of the belt 11 and are secured to a frame 22 having depending cylindrical portions 23 received in suitable guides 24 provided in the castings 6, thereby to vertically guide the strips 21 in their up and down movement.

Vibratory motion is imparted to the strips 21 by cranks 20 and 25 having pitmans 26 connecting them to the frame 22 by the vibrating mechanism, whereby when the cranks are operated, a vibratory motion is imparted to the strips 21, whereby a similar motion is imparted to the upper run of the belt 11.

The cranks 20 and 25 may be integrally formed with shafts 27 and 28, respectively, mounted in suitable bearings in the castings 6 and coupled together by a shaft 29. The shaft 28 has one end connected to a suitable driving mechanism, generally indicated by the numeral 20, having a belt 31 operatively connecting it to the shaft 15 of the conveyer belt, whereby the conveyer belt is driven when the shaft 29 is rotated. The shaft 29 is driven from a motor 32, by a belt 40. The motor 32 is shown mounted on a platform 33 which may be supported upon the tie rods 9 of the main supporting frame.

Side belts

A pair of side belts 34 are arranged along the sides of the conveyer belt 11 and are supported by a plurality of vertically disposed guide rollers 35 and a drive roller 36. The guide rollers 35 are mounted on upright shafts 37 having their ends secured in vertically disposed frame members 38 and 39, secured together by suitable spacers 60. The lower frame members 39 are secured to brackets 41 mounted for lateral adjustment on the machine frame by suitable studs 42, whereby the side belts may be laterally adjusted to vary the spacing between the inner runs thereof, and whereby the apparatus is adapted for handling bags of different sizes. The drive rollers 36 are mounted on shafts 43, driven from suitable bevel drive gears 44—44, from the cross shaft 15 of the conveyer pulley 13, as clearly illustrated in Figure 5. The spacing between the upright shafts 43 of the drive rollers 36 of the side belts is preferably considerably greater than the spacing between the guide rollers 35, whereby the shafts 43 need not be mounted for lateral adjustment with respect to the conveyer belt. In other words, the shafts 43 are so spaced apart that the largest size bags to be handled in the machine, may pass between the drive rollers 36.

The guide rollers 35 are arranged in pairs crosswise of the conveyer, as shown in Figure 2, whereby as the bags travel through the machine, each time they pass between a pair of guide rollers 35, as shown, for example, at A in Figure 2, increased pressure is exerted on the bag body by the action of said rollers. The frictional engagement of the side belts 34 with the walls of the bag bodies, is preferably such that as each bag passes between a pair of said rollers, the vibratory motion imparted thereto by the vibrating mechanism may be temporarily interrupted, because of the side belts, backed by the rollers 35, gripping the bag bodies with sufficient firmness to prevent them from moving up and down with the conveyer belt 11. When the bag reaches a position between adjacent pairs of rollers, as shown at B in Figure 2, the belts will yield sufficiently to allow the bags to again settle downwardly on the conveyer belt, whereby a vibratory motion is imparted thereto by the vibrating action imparted to the upper run of the conveyer belt by the strips 21. It will thus be seen that as the bags travel through the machine, they will be alternately vibrated and squeezed, whereby the contents thereof is sufficiently agitated to cause it to firmly settle into the bag by the time the bag reaches the discharge end of the machine. The inner runs of the conveyer belts may be disposed in parallel relation or, if desired, they may be spaced at a slight angle with respect to each other. Under ordinary operating conditions, they are usually disposed in parallel relation to each other. Suitable guides 45 are provided at the receiving end of the machine for guiding the bags between the side belts 34.

Guide members

A pair of guide members, generally indicated by the numeral 46, are interposed between the lower edges of the inner runs of the side belts 34 and the conveyer belt 11, as best shown in Figure 4. The guide members 46 are shown secured to brackets 47, adjustably secured to side rails 48 by suitable screws 49. The side rails 48 are shown provided with suitable hubs 51 having cranks 52 received in bores provided therein. The cranks 52 are provided at the upper ends of a pair of vertical shafts 53, having worm gears 54 secured thereto and driven from a worm wheel 55 secured to a shaft 56, shown coupled to one end of the shaft 27, best shown in Figure 1. The worm gears 54 and worm wheel 55 are preferably mounted in a suitable oil tight casing, generally indicated by the numeral 57.

The cranks 52 are provided at one end of the machine only, the opposite ends of the side rails 48 being supported by links 58, each having one end pivotally connected to the rails 48, as shown at 59, and having their opposite ends pivoted to the machine frame, as indicated at 61.

The guide members 46 constantly move towards and away from one another, whereby they intermittently engage the lower inclined faces 62 of the bag bodies, thefeby to shape the lower portion of the bag bodies at the same time, and preventing the bags from rotating on the conveyer belt 11, as they travel through the machine.

Operation

The machine herein disclosed, may be interposed between a bag filling machine and a bag closing and sealing machine, and serves to thoroughly and firmly compact the contents of the bag before its top is closed and sealed. By alternately vibrating and squeezing the bag bodies, as hereinbefore stated, the material will be firmly settled and compacted in the bags, by the time the bags reach the discharge end of the machine. As the result of the material being thus firmly settled in the bags before the open tops thereof are closed and sealed, the sealed bags will not become loose and unshapely because of handling, as is more or less common and well known, if the contents of the bags are not firmly settled in the bags before closing and sealing the open tops thereof.

All of the parts of the machine are so constructed that the machine may be quickly adjusted from one size bag to another. The degree of pressure exerted on the sides of the bag bodies may also be varied by adjustment of the side belts **34**. With some materials, it may be desirable to so adjust the side belts that the squeezing action imparted against the sides of the bag body is not sufficient to interrupt the vibratory motion imparted to the bag by the vibrating mechanism. In such cases, the bags would be constantly vibrated as they pass through the length of the machine. In other cases, it may be found more desirable to so adjust the side belts that each pair of guide rollers will exert sufficient pressure against the bag bodies to interrupt the vibrating motion imparted thereto, each time the bag passes from one pair of guide rollers **35** to the next, as shown at A in Figure 2.

The guide members **46** are important in that they constantly move into and out of engagement with the lower portion of the bag body, whereby they shape the lower portion of the bag body and, at the same time, prevent the bag from relatively rotating on the conveyer **11**.

We claim as our invention:

1. In a machine for settling and compacting material in flexible containers, a conveyer belt for the containers, means for vibrating a section of said belt to settle the contents in the containers, oppositely disposed side belts between which the containers are fed, longitudinally disposed guide members, and means for imparting opposed horizontal movement to said guide members, whereby they will simultaneously periodically engage the lower portions of the container bodies to prevent them from relatively rotating on the conveyer belt.

2. In a machine for settling and compacting material in flexible containers, a conveyer belt for the containers, means for vibrating a section of said belt to settle the contents in the containers, oppositely disposed side belts between which the containers are fed, rollers engaging and supporting the inner runs of said vertical belts at spaced points along said side belts and arranged in pairs, said pairs of rollers being adapted to laterally compress the filled container bodies, and longitudinally disposed guide members arranged adjacent to the conveyer belt and adapted to intermittently engage the lower portions of the container bodies to prevent them from relatively rotating on the conveyer belt.

3. In a machine for settling and compacting material in flexible bags, a horizontal conveyer belt for the bags, vertically disposed belts at opposite sides of the conveyer belt adapted to engage the side walls of the bags, spaced rollers supporting the inner runs of the side belts adapted to exert increased pressure on the bag bodies, as the bags travel therepast, guide means below said vertical belts, and means for imparting opposed horizontal motion to said guide means, whereby they simultaneously periodically engage the bag bodies to shape them and prevent the bags from rotating on the conveyer belt.

4. In a machine for settling and compacting material in paper bags, a conveyer belt for the bags, means for vibrating a section of said belt to settle the contents in the bags, vertically disposed belts at opposite sides of the conveyer belt having their inner runs adapted to engage the bag bodies, rollers supporting the inner runs of said vertical belts at a plurality of spaced points along their length, whereby the bag bodies are subjected to a series of squeezing operations, as the bags advance through the machine, and longitudinally disposed guide members adjustably mounted below said vertical belts and having outwardly inclined faces adapted to engage the lower portions of the bag bodies to shape them and prevent the bags from relatively rotating on the conveyer.

5. In a machine for settling and compacting material in paper bags, a conveyer belt for the bags, means for vibrating a section of said belt to settle the contents in the bags, vertically disposed belts at opposite sides of the conveyer belt having their inner runs adapted to engage the bag bodies, rollers supporting the inner runs of said vertical belts at spaced points along their length adapted to exert increased pressure on the bag bodies, a pair of oppositely disposed guide members adjustably mounted below said vertical belts and having inner inclined faces adapted to engage the lower portions of the bag bodies, and means for moving said guide members in a horizontal plane, whereby they intermittently engage the bag body to shape it.

6. In a machine for settling and compacting material in paper bags, a main frame, a conveyer belt for the bags, vertically disposed belts at opposite sides of the conveyer belt, a plurality of spaced rollers for holding the side belts in position to cause the inner runs thereof to intermittently compress the bag bodies, as the bags are fed through the machine, an independent frame for supporting each side belt and its supporting means whereby said parts may be assembled as a unit, independently of the main frame, and means for adjustably securing said side belt units to the machine frame, whereby the intermittent squeezing actions imparted to the bag bodies by said belts may be controlled.

7. In a machine for settling and compacting the contents of a paper bag, a conveyer belt, means for imparting a vibratory motion to a portion of the conveyer belt, a vertically disposed guide belt at each side of the conveyer having their adjacent runs engaging the bag bodies, means for driving the guide belts, a plurality of rollers for supporting the adjacent runs of said belts, said rollers being oppositely disposed with respect to the conveyer belt to form a plurality of pairs of rollers, spaced apart lengthwise of the conveyer, the spacing between adjacent pairs of rollers being greater than the dimension of the bag body in a direction lengthwise of the conveyer, said pairs of rollers cooperating with said guide belts to successively squeeze and release the bag bodies, as the bags travel through

the machine, whereby the vibratory and alternate squeezing and releasing operations imparted to the bag bodies will cause the contents of the bags to become firmly settled therein.

8. In a machine for settling and compacting material in a flexible walled container, a conveyer, means for imparting a vibratory motion to the container, a guide belt at each side of the conveyer, a plurality of spaced rollers supporting said belts and cooperating therewith to impart a series of squeezing operations to the container body, at spaced intervals along the conveyer, simultaneously as the container body is vibrated, whereby the contents of the container will become firmly settled therein, and longitudinally disposed guide members adapted to intermittently engage the lower portion of the container body to prevent it from relatively rotating on the conveyer.

9. In a machine for settling and compacting material in a flexible walled container, a conveyer, means for imparting a vibratory motion to the container, a pair of guide belts having runs disposed at each side of the conveyer adapted to guide the container along the conveyer and a plurality of rollers arranged in spaced relation lengthwise of the conveyer for supporting said belt runs at spaced intervals, whereby the container bodies are squeezed intermittently as they travel through the machine, said vibrating and squeezing actions causing the contents of the containers to become firmly settled therein.

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