

Jan. 17, 1939.

L. A. CUNDALL

2,144,046

APPARATUS FOR PACKAGING MATERIAL

Filed Feb. 25, 1937

2 Sheets-Sheet 1

Fig. 1.

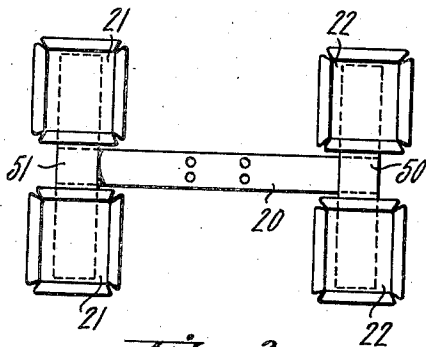
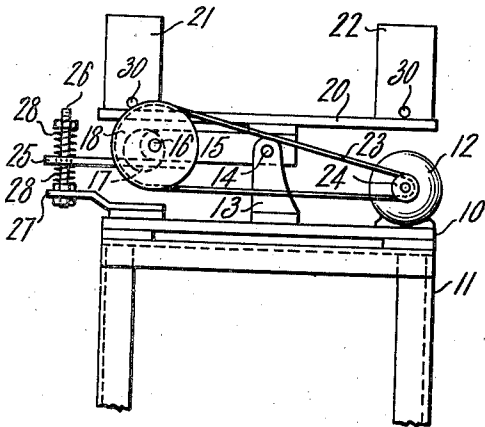


Fig. 3.

Fig. 2.

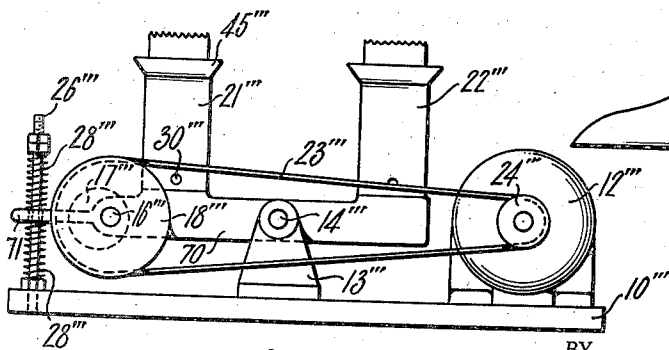
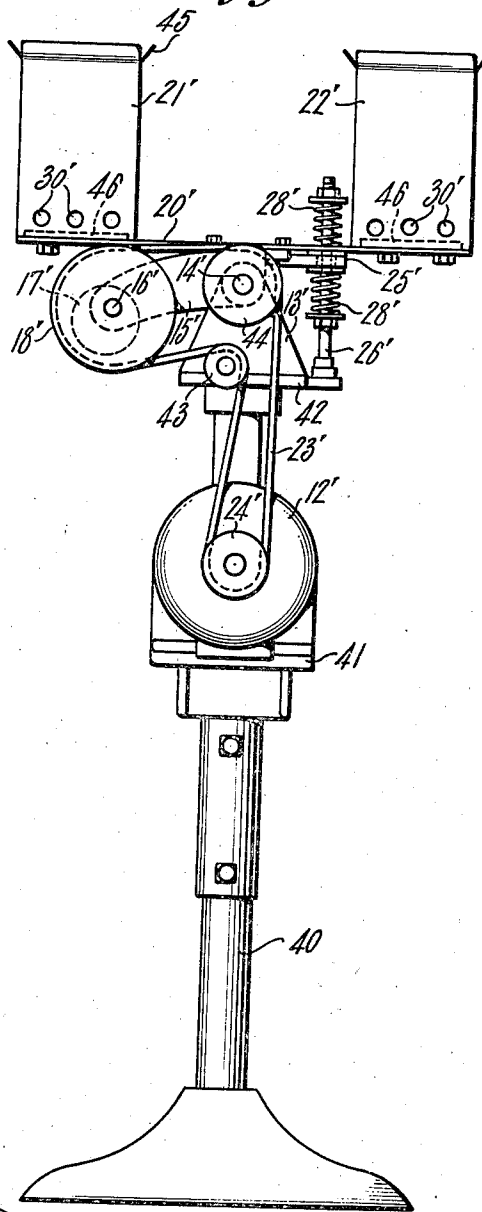


Fig. 7.

INVENTOR.
LINCOLN A. CUNDALL

BY *Ross Cheney*
ATTORNEY.

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L. A. CUNDALL

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2 Sheets-Sheet 2

Fig. 4.

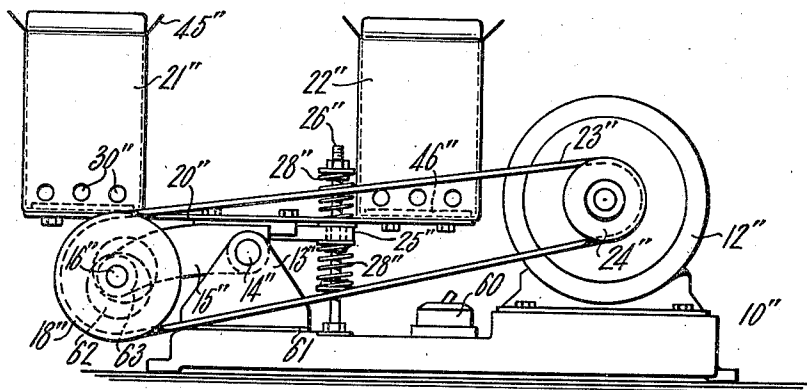


Fig. 6.

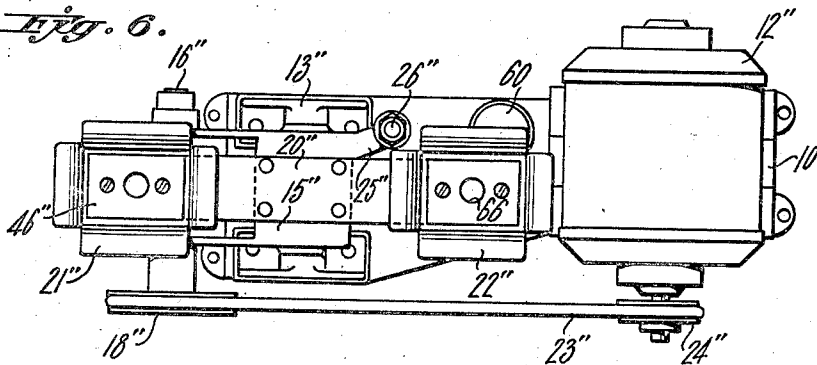
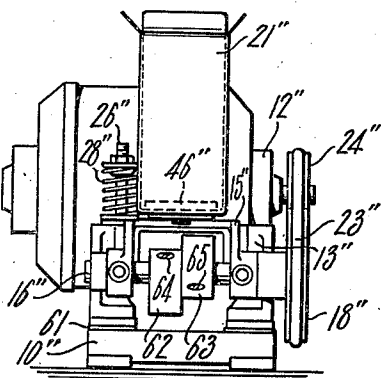


Fig. 5.



INVENTOR.
LINCOLN A. CUNDALL
BY *Ross Murray*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,144,046

APPARATUS FOR PACKAGING MATERIAL

Lincoln A. Cundall, Buffalo, N. Y., assignor to
Consolidated Packaging Machinery Corporation,
Buffalo, N. Y., a corporation of New York

Application February 25, 1937, Serial No. 127,682

6 Claims. (Cl. 259—54)

The present invention relates to an apparatus for compacting granular or powdered materials in containers, particularly flexible-walled containers such as paper bags. The present apparatus is designed to be used as a supplement to bag filling and closing equipment not provided with compacting means, its operation being intermittent and its control being manual. Many packaging plants have not sufficient capacity to warrant the expense of automatic, continuously operating equipment, and the present invention is designed to meet the needs of such plants.

In particular, the present invention comprises portable mechanism which may be placed convenient to the operator of packaging equipment, the mechanism being provided with pockets of the size and shape of the container in use for the purpose of shaping the sides of the container and being provided with mechanism to vibrate said pockets in a certain manner in order to settle the contents thereof.

Referring to the accompanying drawings wherein like numerals refer to like parts throughout, there are disclosed several forms of the invention, each embodying the major new improvement whereby rapid settling is accomplished. In the drawings

Fig. 1 is a side elevation of a simple form of the invention;

Fig. 2 is a side elevation of a modified form of the invention designed to meet particular means;

Fig. 3 is a plan view of an arrangement whereby the capacity of the machine may be increased over its normal capacity;

Fig. 4 is a side elevation of a preferred embodiment of the invention;

Fig. 5 is an end elevation of the form shown in Fig. 4;

Fig. 6 is a plan view of the form shown in Fig. 4; and

Fig. 7 is a side elevation of a further modification showing simplification of certain details.

Referring to Fig. 1, there is disclosed a form of the invention suitably adapted to be mounted upon a table in the production line. The invention comprises a bed 10 mounted upon a table 11 and carrying a motor 12 and other parts as will appear. The mechanism comprises a fulcrum 13 carrying a pivot 14 which pivotally supports a lever 15. The free end of lever 15 carries a shaft 16 to which is fixed an eccentric weight 17 and a pulley 18. The shaft may be dynamically unbalanced by an integral projection 17 or by a separate part 17 fixed to a separate shaft 16. Fixed to lever 15 at a point directly above the pivot 14 is

a bar 20 extending substantially horizontal and parallel to the lever 15. At the free end of the bar 20 are pockets 21 and 22 of a shape and size to conform to the package being operated upon. A belt 23 passes about the drive pulley 24 of motor 12 and the pulley 18 fixed to shaft 16. As the shaft 16 is rotated at a relatively high speed the eccentric weight 17 causes the lever 15 to oscillate about the pivot 14, thereby imparting an oscillatory movement to the bar 20. The amplitude of movement of the free ends of bar 20 is slight and can be controlled by varying the speed of the motor and weight of the eccentric 17.

The resulting movement of the pockets 21 and 22 is vibratory, and consists of reversals of movement in a vertical plane a great number of times per second accompanied by a similar number of reversals of movement in a horizontal plane. The material in a bag placed in either pocket will be thrown toward the outer wall of the pocket on the movement in one direction and toward the inner wall of the pocket on the movement in the opposite direction. The rapid movements impart vibratory oscillations to the particles of the material, which frees entrapped air and causes the particles more closely to contact each other. This compacting action is accompanied by a shaping of the walls of the container whereby a sharply defined, flat-sided package of rectangular cross-section is formed.

After an empty bag is filled with material the walls of the bag bulge to a certain extent and the compacting of material is accompanied by a shaping of the package accomplished by having the pockets of a size closely to accommodate the desired finished package. As the material is compacted the bag settles into the pocket, thereby forcing its corners into the corners of the pocket and otherwise shaping the package. It usually occurs that the filled bag cannot be forced into the pocket due to the bulging walls, but the walls are progressively shaped from the region of the bottom of the bag toward the top as the bag slides downward into the pocket as a result of the vibrations. With most materials by the time the bag has reached the bottom of the pocket the material is well compacted. In this final position the bottom of the bag rests upon the bottom of the pocket and the entire peripheral surface of the bag comprising the side walls of the same is supported by the side wall of the pocket.

In order that the extent of vibration may be adjustably controlled and in order to balance the machine, particularly when only one of the pockets is in use, there is provided an extension

from the free end of vibrating lever 15. A bolt 26 fixed to the bed, in this instance to an extension 27 of the bed, passes through an opening in the end of extension 25 and retains a pair of compression springs 28 located one at each side of the extension 25. The springs are compressed to the same extent and support the vibrating lever 15 in substantially horizontal position. As the rotating weight throws the lever to one side the spring at said side is compressed and the compression of the other spring is slightly reduced, thereby dampening the vibrations. The spring 28 may be adjustably compressed by a nut on bolt 26, thereby affording a ready means of adjusting the extent of vibration without changing the weight 17 in order that the best possible conditions may be found for each material.

In order to permit the bag to slide into the pockets the pockets are preferably provided with openings 36 adjacent the bottom thereof in order that the filled package may not be arrested by the trapped air in the pockets, and the sides of the pockets are preferably tapered outward from bottom to top to a slight extent so that a compacted package may be easily removed.

Fig. 2 discloses a modified form which may be desirable in instances where a table may not be used. This form comprises an upright standard 40, having a shelf 41 which supports a motor 12' provided with a pulley 24'. An extension of the standard 40 carries a shelf 42 upon which is mounted a fulcrum 13' carrying a pivot 14' pivotally supporting a vibrating lever 15'. The free end of the lever 15' carries a shaft 16' provided with an eccentric weight 17' and a pulley 18'. Idler pulleys 43 and 44 guide a belt 23' extending from the pulley 24' to pulley 18', the change in direction being desirable in order that the legs of the belt extending from pulley 18' may be substantially parallel to the lever 15' and normal to the direction of oscillation as in the first instance. Fixed to lever 15' at a point above pivot 14' is a bar 20' carrying pockets 21' and 22' at its free ends, the pockets being provided with openings 36', as previously set forth. An extension 25' of the lever 15' is provided with an opening through which passes a bolt 26' adjustably supporting compression springs 28', as previously described. The pockets 21' and 22' are preferably provided with flaring mouths 45 in order that a bulging package may be suitably guided into the pocket. The operation of this form of the invention is identical with that of the other form with the exception that bar 20' is preferably resilient in order that the oscillatory action imparted thereto may be accentuated. At each change in direction of movement of the bar, inertia causes the bar to be flexed so that the vibrating lever has reversed its direction of movement before the bar begins to reverse. The result is that each movement of the pockets is commenced with a whip-like jerk, which immensely increases the speed of operation. A flat weight 46 may be placed in each pocket in order to increase this effect. As the body of the bag settles into a pocket 21' or 22', the distance between the axis 14' and the center of gravity of the bag will progressively decrease. There will be, therefore, a progressive decrease in the amplitude of flexure of the bar 20' and in the amplitude of oscillations imparted to the bag as the material therein approaches a well compacted condition.

Fig. 3 discloses a modification in arrangement which may be applied to any form of the invention, comprising a group of four pockets rather

than two in order that longer settling may be accomplished, or that two or more operators may use the same machine. In this form the bar 20 is provided with cross-bars 50 and 51 upon which pockets 21, 22, etc., may be placed in the manner shown.

Referring to Figs. 4, 5 and 6, there is disclosed a developed form of the invention comprising improved details. This form is particularly adapted to be mounted on a table top, although it is obvious that a standard may be used, such as in Fig. 2. The modification comprises a bed 10' upon which is mounted a motor 12'' provided with a pulley 24'' driving a belt 23'' passing about a pulley 18'' fixed to a shaft 16'' carried at the free end of a vibrating lever 15'' pivotally supported by pivot 14'' on fulcrum 13''. The vibrating lever supports a bar 20'' (preferably resilient) carried in pockets 21'' 22'', as previously described, the pockets preferably being provided with openings 30'', flaring mouths 45'', weights 46'' and tapering side walls. An extension 25'' of the vibrating lever 15'' bears against compression springs 28'' adjustably supported by bolt 26'' for the purpose previously described.

In the present modification, the arrangement is compact, there being provided a control switch 60 convenient to the operator, and other details are incorporated, such as resilient pads between various parts in order to reduce vibrating noises, there being a pad 61 between bracket 13'' and pad 10'', and other resilient pads as desired. A further feature of this modified form comprises the provision of a plurality of eccentric weights in place of the one weight 17, preferably two such weights 62 and 63 being provided, the weights being fastened to shaft 16'' by set screws 64 and 65, respectively. A wide range of adjustment is thereby made possible since movement of the weights angularly with respect to each other results in variations in the total eccentricity of the weights. When weight 62 is made to coincide with weight 63, the greatest amplitude of movement is brought about, and when the two weights are exactly opposed the least movement is brought about. In addition, the springs 28'', being equal in strength and size, are equally adjusted by turning the nut at the upper end of bolt 26'' so as to provide a means of finely adjusting the amplitude of movement of the resilient bar 20''. Openings 66 may be provided in the bottoms of the pockets to aid in removing spilled materials.

Fig. 7 discloses further modifications in details, the present embodiment comprising a bed 10''' upon which is mounted a motor 12''' and a fulcrum 13'''. The pivot 14''' carries a lever 70, in this instance the lever being an integral casting upon which the pockets 21''' and 22''' are mounted, the pockets being provided with openings 30''' and flaring mouths 45''' for the purpose previously described. The lever 70 carries a shaft 16''' provided with an eccentric weight 17''' and a pulley 18''' connected by a belt 23''' to a pulley 24''' on the motor in the manner and for the purpose previously described. An integral extension 71 of the lever 70 is engaged by springs 28''' surrounding a bolt 26''' as previously described. In this modification the motor shaft, the pivot and the dynamically unbalanced shaft are more directly in line and the bottoms of the pockets are more nearly in line with the pivot so that the lateral component of movement of the pockets is much greater at the top of the pockets than at the bottom of the pockets. As a container

slides into a pocket the horizontal components of movement of each particle of the material at the bottom of the container progressively decrease without there being any effect upon the vertical components of movement. As a result, entrapped air is worked out of the material to a greater extent.

Having described and illustrated various forms of my invention, it will be obvious to those skilled in the art that various other modifications in arrangement and detail may be made without departing from the spirit of my invention which is to be determined by the following claims.

I claim:

1. In a device for compacting pulverulent material in containers, the combination which comprises a rigid casing adapted to receive a filled container and to guide the same into a position where the casing supports the bottom and the entire peripheral surface of the container, means for mounting said casing for oscillation about a fixed axis, means to cause rapid small amplitude oscillations of said casing about said axis, said oscillations causing progressive compacting of the material within said container and progressive settling of the container into said casing whereby the center of gravity of said container is shifted relative to said axis, said casing mounting means being so constructed and arranged that the shifting of said center of gravity relative to said axis causes a compensatory change in the amplitude of oscillations of said casing.

2. A device for compacting material in a container comprising a pivoted lever, a dynamically unbalanced shaft journaled in the free end of said lever, means for rotating said shaft at a relatively high speed, the rotation of said shaft imparting oscillations to said lever, and means to hold a filled container on said lever whereby to subject the material therein to rapid vibrations having vertical and horizontal components of small amplitude.

3. A device for compacting material in a container comprising a pivoted lever, a dynamically unbalanced shaft journaled in the free end of said lever, means for rotating said shaft at a relatively high speed, the rotation of said shaft im-

parting oscillations to said lever, a resilient bar fixed to said lever adjacent the fulcrum therefor and freely extending therefrom, and means to hold a filled container on the free end of said bar whereby to subject the material therein to rapid whipping vibrations having vertical and horizontal components of small amplitude.

4. A device for compacting material in a container comprising a lever oscillatable about a fixed pivot, a dynamically unbalanced shaft journaled in the free end of said lever, means for rotating said shaft at a relatively high speed, the rotation of said shaft imparting oscillations to said lever, a resilient bar fixed to said lever adjacent the fulcrum therefor and freely extending therefrom, and means to hold a filled container on each end of said bar whereby to subject the material therein to rapid whipping vibrations having vertical and horizontal components of small amplitude.

5. A device for compacting material in a container comprising a pivoted lever, a dynamically unbalanced shaft journaled in the free end of said lever, means for rotating said shaft at a relatively high speed, the rotation of said shaft imparting oscillations to said lever, a resilient bar fixed to said lever adjacent the fulcrum therefor and freely extending therefrom, means to hold a filled container on each end of said bar whereby to subject the material therein to rapid whipping vibrations having vertical and horizontal components of small amplitude, and means to vary the amplitude of such vibrations.

6. In a device for compacting pulverulent material in containers, the combination which comprises a casing adapted to receive a filled container and to guide the same into a position where the casing supports the bottom and substantially the entire peripheral surface of the container, means to cause rapid small amplitude vibrations of said casing, said vibrations causing progressive compacting of the material within said container and progressive settling of the container into said casing, and said casing being constructed and arranged to permit escape of air displaced by said container as the same settles into said casing.

LINCOLN A. CUNDALL.