Nov. 2, 1954 H. C. DAVIS ET AL 2,693,304

APPARATUS FOR PACKAGING A SOFT RESILIENT BODY

Filed Nov. 18, 1950 2 Sheets-Sheet 1

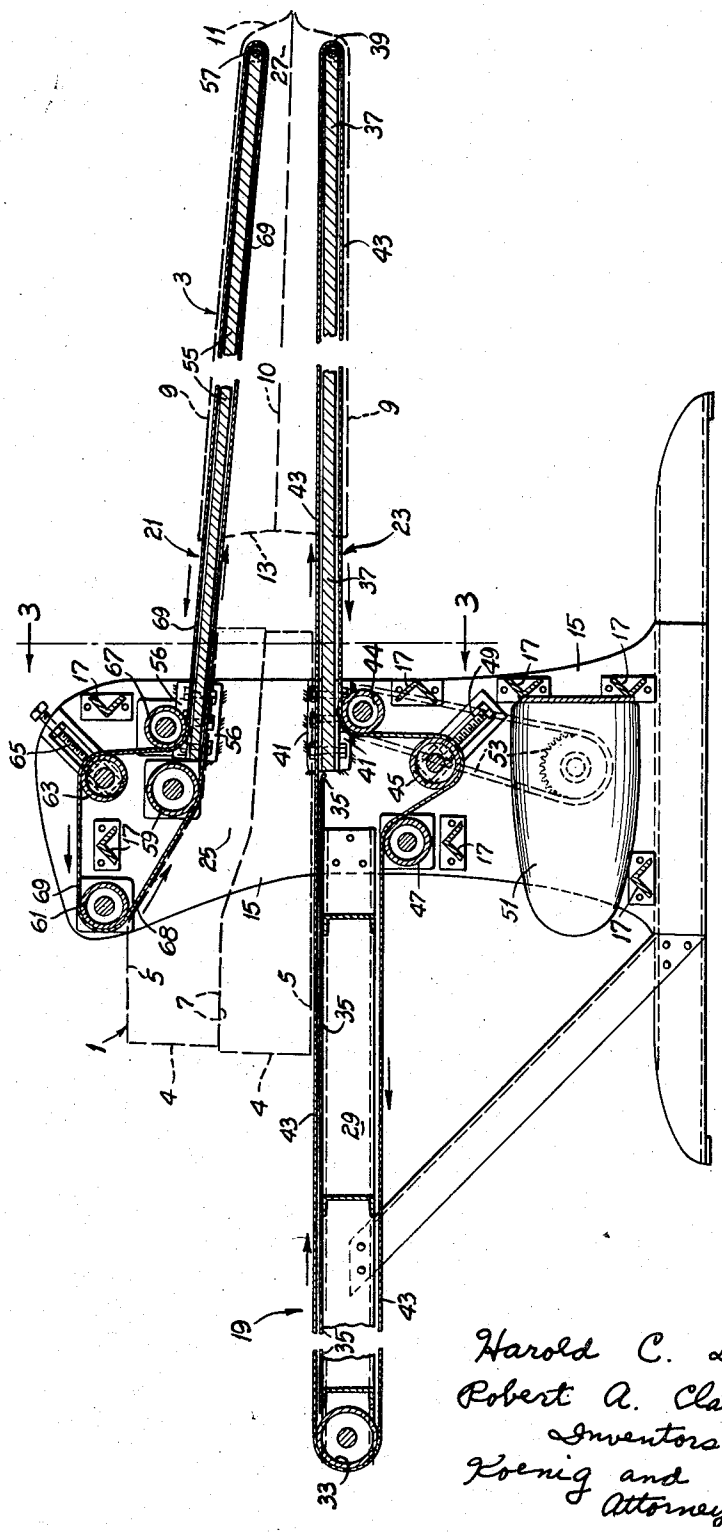

FIG. 1.

Harold C. Davis,
Robert A. Claridge,
Inventors.
Koenig and Pope,
Attorneys.

Nov. 2, 1954 H. C. DAVIS ET AL 2,693,304

APPARATUS FOR PACKAGING A SOFT RESILIENT BODY

Filed Nov. 18, 1950 2 Sheets-Sheet 2

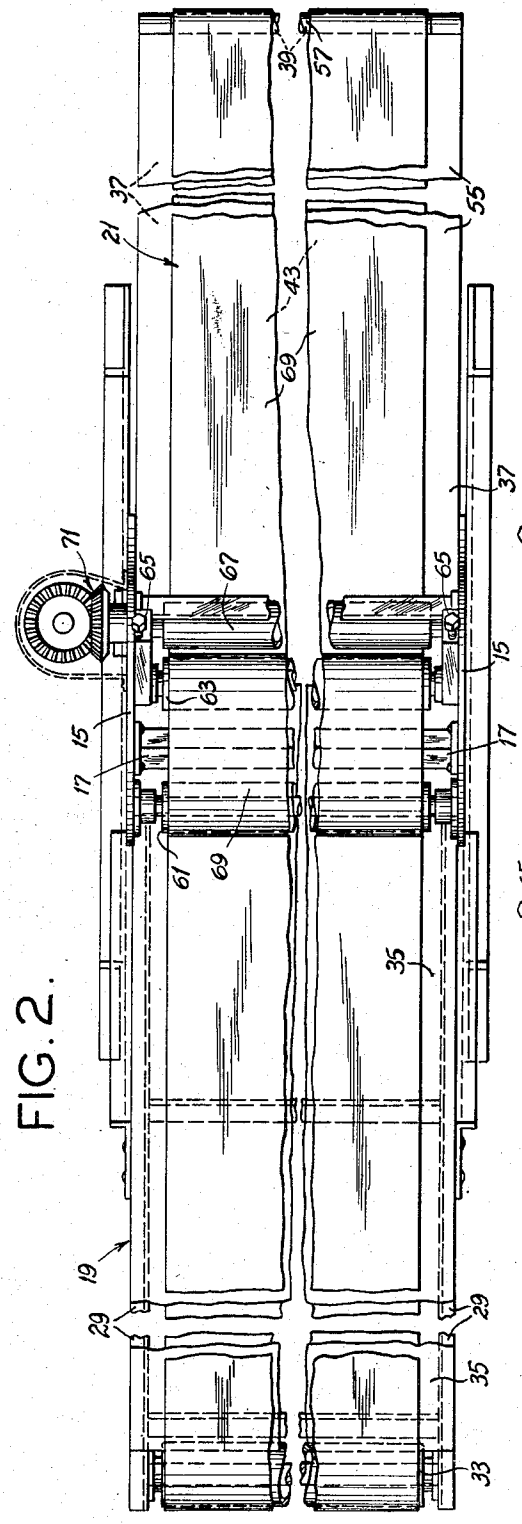

FIG. 2.

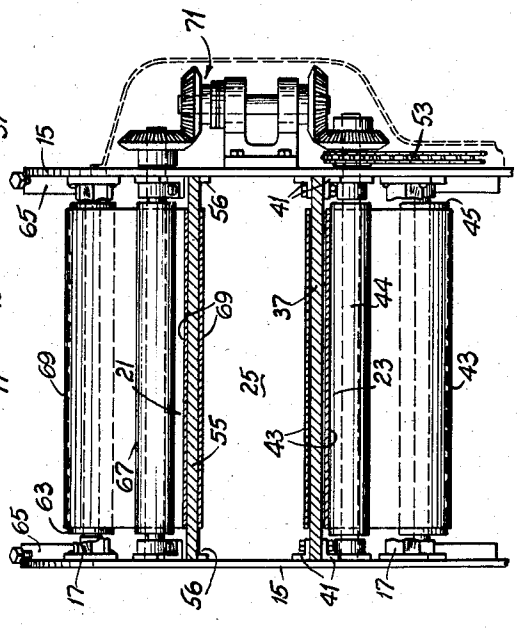

FIG. 3.

Harold C. Davis,
Robert A. Claridge,
Inventors.
Koenig and Pope,
Attorneys.

United States Patent Office 2,693,304 Patented Nov. 2, 1954

2,693,304

APPARATUS FOR PACKAGING A SOFT RESILIENT BODY

Harold C. Davis, Webster Groves, and Robert A. Claridge, Affton, Mo., assignors to Bemis Bro. Bag Company, St. Louis, Mo., a corporation of Missouri

Application November 18, 1950, Serial No. 196,498

2 Claims. (Cl. 226—18)

This invention relates to packaging machines, and more particularly, to machines for packing soft, resilient items in tight-fitting containers.

The object of the invention is the provision of a machine for efficiently packaging bodies of soft, resilient material in tight-fitting containers, so that the material is compressed within the container and the container is tensioned. The invention has particular application to packaging in bags of blocks of sponge or foam rubber, such as are used in upholstering, but it will be understood that the principles of the invention are applicable to the packaging of other soft, resilient materials or articles, such as mattresses, and in types of containers other than bags, as for example in boxes or cartons, paper or fabric tubing, etc.

In general, according to the invention, a soft, resilient body is packaged by compressing the body on opposite sides so as to reduce substantially the cross section or girth of the body, maintaining the body so compressed and inserting it into a container having a cross section larger than the reduced cross-section of the body but less than the normal cross-section of the body, and then removing the pressure on the body to allow it to expand within the container. The apparatus comprises a pair of interior container supports and material constricting guides, the guides converging from a relatively large entrance for the resilient body to a relatively small outlet and carrying on their inner faces conveyor means for moving the resilient material or body from the large entrance through the constricting guides and out of the outlet. In passing through the constricting guides, pressure is applied to opposite faces of the resilient body to compress it in a direction transverse to the direction of movement and substantially to reduce its cross-section, this condition being maintained while the body is being inserted into the container. The container is stripped off the interior supports by the resilient body as it is ejected from the guides, so that support of the container is removed when the compression is released. Other features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction and manipulation, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a longitudinal vertical section of an apparatus of this invention, a resilient body and a container being shown in dotted lines, parts being broken away;

Fig. 2 is a top plan view of the apparatus, parts being broken away; and,

Fig. 3 is a transverse vertical section taken on the line 3—3 of Fig. 1.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

By means of this invention the packaging of soft, resilient material, such as blocks of foam rubber, may be efficiently accomplished in paper bags packed so that the resilient material is under compression and the bag is under tension. When in this condition, the bag container affords the ease of handling of rigid boxes without the added expense, and has improved strength over untensioned loosely packed bags.

Referring to Fig. 1 of the drawing, there is shown an apparatus embodying the invention for packing soft resilient material 1 into a tight-fitting container 3. The resilient material shown comprises a pair of foam rubber cushions 4 stacked with their relatively smooth mold-formed surfaces 5 on the outside and the uneven split surfaces 7 on the inside against one another. The container shown is a gusseted paper bag having bag walls 9, gusseted sides 10, a bottom 11 and a mouth 13.

The machine comprises a frame including a pair of upright side plates 15 rigidly held in spaced relation by a plurality of transverse angle bars 17. Cantilevered rearwardly from the frame is a platform or table 19 for initially receiving the resilient material to be packaged. Fixed in cantilevered relation and extending forward of the frame are cooperating upper and lower material-constricting guides 21 and 23, respectively, these guides also serving as interior container supports. The lower guide 23 is coplanar and continuous with the rear receiving platform 19, while the upper guide 21 converges in a forward direction with respect to the lower guide from a relatively large entrance 25 to a relatively small outlet 27. The arrangement is such that the guides are close enough together at the rear entrance 25 to provide a relatively large amount of compression. The guides are adapted to support and hold open the container as well as guide material into the container.

The rear platform 19 is formed with longitudinal side channel members 29 affixed at one end to the respective frame side members 15. A roll 33 is journalled at the rear end of the platform. A top plate 35 extends from pulley 33 to the rear end of the lower guide 23. The lower guide 23 consists of a relatively wide thin plate 37 and carries a second roll 39 at its forward end. The plate 37 is fixed to the side plates 15 as indicated at 41. An endless belt 43 is trained around the rolls 33 and 39 with upper and lower reaches on opposite sides of the plates 35 and 37. The belt 43 is also trained around a driving roll 44 immediately below the fixed end of the plate 37, around a belt-tensioning roll 45 and around an idler roll 47 immediately below the forward fixed end of the rear platform 19. Rolls, 44, 45 and 47 are all journalled between the frame side plates 15. The belt-tensioning roll 45 has suitable means 49 for adjusting its position to tension the belt. A driving motor 51 is coupled to the driving roll 43 by a chain and sprocket drive generally indicated at 53.

The upper guide 21 is similar to the lower guide 23, consisting of a relatively wide thin plate 55 fixed at one end to the frame side plates 15 as indicated at 56 and carrying a roll 57 at its forward end. Journalled between the frame side plates 15 is an intermediate belt-guiding roll 59 located at the fixed end of the plate 55 and a roll 61 located above and to the rear of the intermediate roll 59. A belt-tensioning roll 63 having adjusting means 65 for belt-tensioning purposes is supported by the side plates 15 and a drive roll 67 is provided immediately above the fixed end of the plate 55. An endless belt 69 is trained around the rolls 57, 59, 61, 63 and 67 so as to have upper and lower reaches on opposite sides of the plate 55 and a lower reach 68 extending between the frame side plates 15 and converging sharply toward the lower belt from the roll 61 toward the guide plate 55. This reach 68 provides for primary compression of resilient material to be packed.

The upper belt 69 is driven by the roll 67, and the roll 67 is in turn driven from the driving roll 44 for the lower belt through gearing indicated at 71 (Fig. 3). The drive and gearing are such that the opposed upper reach of the lower belt and lower reach of the upper belt move in the direction forward toward the free ends of guide plates 37 and 55. As viewed in Fig. 1, the driving roll 44 rotates counterclockwise so that the lower endless belt is moved in a clockwise peripheral direction. The upper driving roll 67 rotates in a clockwise direction so that the upper belt 69 moves in a peripherally counterclockwise direction. Any gearing adapted to cause the rolls 43 and 67 to rotate in opposite directions is satisfactory.

Operation is as follows:

The machine is started by energizing the motor **51** so that the upper and lower endless belts **69** and **43** respectively, are driven with their inwardly facing reaches moving forward toward the free ends of the constricting guides **21** and **23**, and their outwardly facing reaches moving rearwardly away from the free ends of the guides. It will be understood the lower belt **43**, where it is trained around the rear platform, has its upwardly facing reach moving toward the frame. A container **3** is then slipped over the free ends of guides **21** and **23**. In the example shown, a paper bag is opened at its mouth **13** and slipped over the free ends of the two guides. The bag need not be completely placed upon the supports but merely started as the outwardly facing reaches of the endless belts engaging the walls **9** of the bag draw the bag rearward on the guides until the bag bottom **11** engages the free ends of the guides. It will be understood the mouth of the bag is sufficiently large to prevent binding with the rearwardly diverging guides before the bottom of the bag is engaged, and that the belts may slip with respect to the bag walls **9**.

When the bag is in position on the guides, it is supported so as to have a generally rectangular cross section of predetermined dimensions. It is preferred that the girth of the bag be such that it has a relatively close fit with the supports for certain purposes as will be apparent.

A body **1** of soft, resilient material is then placed upon the rear platform **19**. This body of resilient material has a normal girth greater than the girth of the bag and preferably is of generally rectangular cross-sectional shape. One of the cross-sectional dimensions of the body is greater than a corresponding cross-sectional dimension of the supported bag, and the other cross-sectional dimension of the body is less than the other corresponding cross-sectional dimension of the supported bag. For example, the unreduced height or spacing between the surfaces **5** of the body **1** shown in Fig. 1 is greater than the spacing between the bag walls **9** supported in open position on the guide. It will be understood that several small pieces of resilient material, such as the cushions **4**, may be assembled to provide a body of the desired girth and dimensions, or, conversely, that the size of the bag may be selected with the view to the size of the body to be packaged.

The body **1** is immediately carried forward from the rear platform by the lower belt **43** to the entrance **25** of the constricting guides **21** and **23**. The sharply convergent reach **68** of the upper belt reduces the vertical dimension of the resilient body **1** rather quickly as it moves forward through the guide entrance **25**. As the body **1** passes on between the guide plates **37** and **55**, a further reduction occurs but the reduction is less than at the entrance. Eventually, the forward end of the compressed body passes through the outlet **27** and engages the bottom **11** of the bag. As the body exits from the guides, it pushes the bag forward, and the support of the bag is gradually removed and the compression on the body is gradually released.

The resilient body **1** itself is shorter than the bag so that when it has completely passed through the constricting guides a portion of the bag remains extending over these guides. However, since the guides are relatively closely spaced at their forward ends, and since the bag mouth is relatively large, compared to the spacing of the forward ends of the guides, the bag readily falls from the support of the guides. An operator or conveyor may then take the bag to suitable bag-closure apparatus for closing the projecting top part thereof.

It will be noted the resilient body **1** is compressed in a vertical direction normal to the feed of the conveyors, or in the dimension that is greater than the corresponding dimension of the bag. The compression of the resilient body **1** by the wide flat guides prior to its entering the bag **3**, is such that the resilient body assumes a generally rectangular cross section, the dimensions of which are less than the corresponding cross-sectional dimensions of the supported bag. That is, the girth of the resilient body is reduced by compression so that it is less than the girth of the supported bag.

In compressing the resilient body in a vertical direction, a certain amount of transverse horizontal expansion will occur. However, it will be understood that the resilient material is of such a nature that in compressing two opposite sides, a reduction of the cross section is achieved and not merely a change of cross-sectional shape as would occur in applying pressure to opposite sides of a body formed of incompressible but flowable material. It will be understood that the supported bag has a cross section of such width as to accommodate the limited transverse or horizontal expansion of the resilient body under compression without interference.

After the resilient body **1** has been placed in the bag and compression completely released, and the support of the bag removed, the bag is expanded so that the bag walls **9** are moved apart and the gusseted sides **10** are brought tight against the sides of the resilient body. Thus, the bag is tensioned completely around its girth. The amount of bag tension and body compression is of course determined by the relative girths of the bag and unreduced body, hence it is desirable to have the bag closely fit the container supports although this is not necessary.

It will be understood that vertical guides may be placed at the lateral edges of the upper and lower guides if desired. Also, the resilient material **1** and the bag **3** may both be started on the apparatus simultaneously, the bag being drawn rearward over the guides **21** and **23** while the body **1** is being compressed at the entrance **25** to the guides.

This packaging machine is ideally suited to resilient material. Since the compressed body is more resistant than an uncompressed resilient body to punching, both the container and the body are better adapted to resist damage from punching and tearing. If the container is a relatively rigid box or carton, the compressed body helps to protect the box or carton from collapsing under undue outside stress.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above structures without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. Apparatus for packaging a soft, resilient body in a bag, comprising a support having spaced-apart sides, a first plate extending generally horizontally outward as a cantilever from between the sides of the support, a second plate extending outward as a cantilever from between the sides of the support above the first plate and inclined downward toward the free end of the first plate, thereby defining a converging passage between the plates from the support outward to the free ends of the plates, a table at the level of the first plate on the opposite side of the support from the plates, a first endless belt conveyor trained around the table and the first plate, means for guiding the first conveyor to have an upper generally horizontal forward-moving reach travelling over the table and the top of the first plate toward the free end of the first plate, and to have a lower return reach part of which travels along the bottom of first plate away from the free end of the first plate, a second endless belt conveyor trained around the second plate, and means for guiding the second conveyor to have a lower forward-moving reach travelling toward the free end of the second plate along the bottom of the second plate, and to have an upper return reach which travels along the top of the second plate away from the free end of the second plate, whereby a bag may be opened and placed on the free ends of the plates to be drawn rearward by the upper reach of the second conveyor and the lower reach of the first conveyor, and whereby a soft, resilient body may be placed on the first conveyor on the table, carried between the first and second conveyors and thereby vertically compressed, the compressed body being conveyed into the bag and pushing the bag off the plates.

2. Apparatus as set forth in claim 1 wherein the means for guiding the second conveyor includes guides for guiding the second conveyor to have a rearward portion of its forward-moving lower reach to the rear of the rearward end of the second plate and more inclined than the second plate.

(References on following page)

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
656,833	Beal	Aug. 28, 1900
1,069,253	Henebergh	Aug. 5, 1913
1,078,492	Fisher	Nov. 11, 1913
1,228,416	Drolet, Sr.	June 5, 1917
1,687,393	Scott	Oct. 9, 1928
2,380,624	Young	July 31, 1945
2,413,556	Fourness et al.	Dec. 31, 1946