Jan. 16, 1968 W. M. LOCKROW ET AL 3,363,396

APPARATUS FOR PACKAGING COMPRESSIBLE MATERIALS

Filed April 19, 1965 5 Sheets-Sheet 1

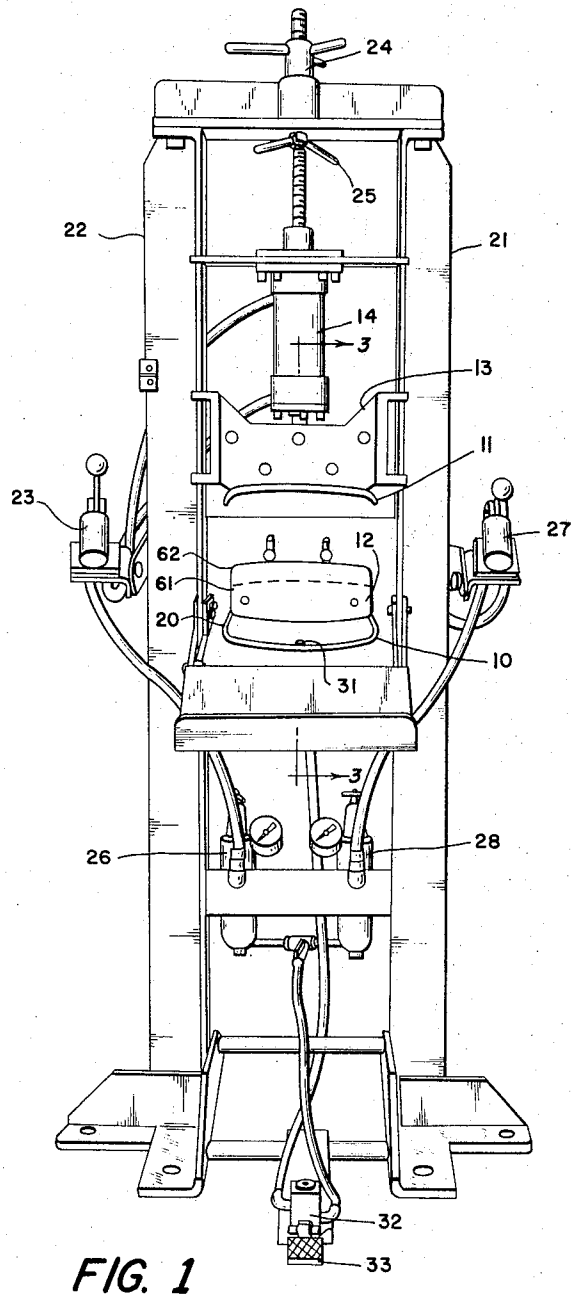

FIG. 1

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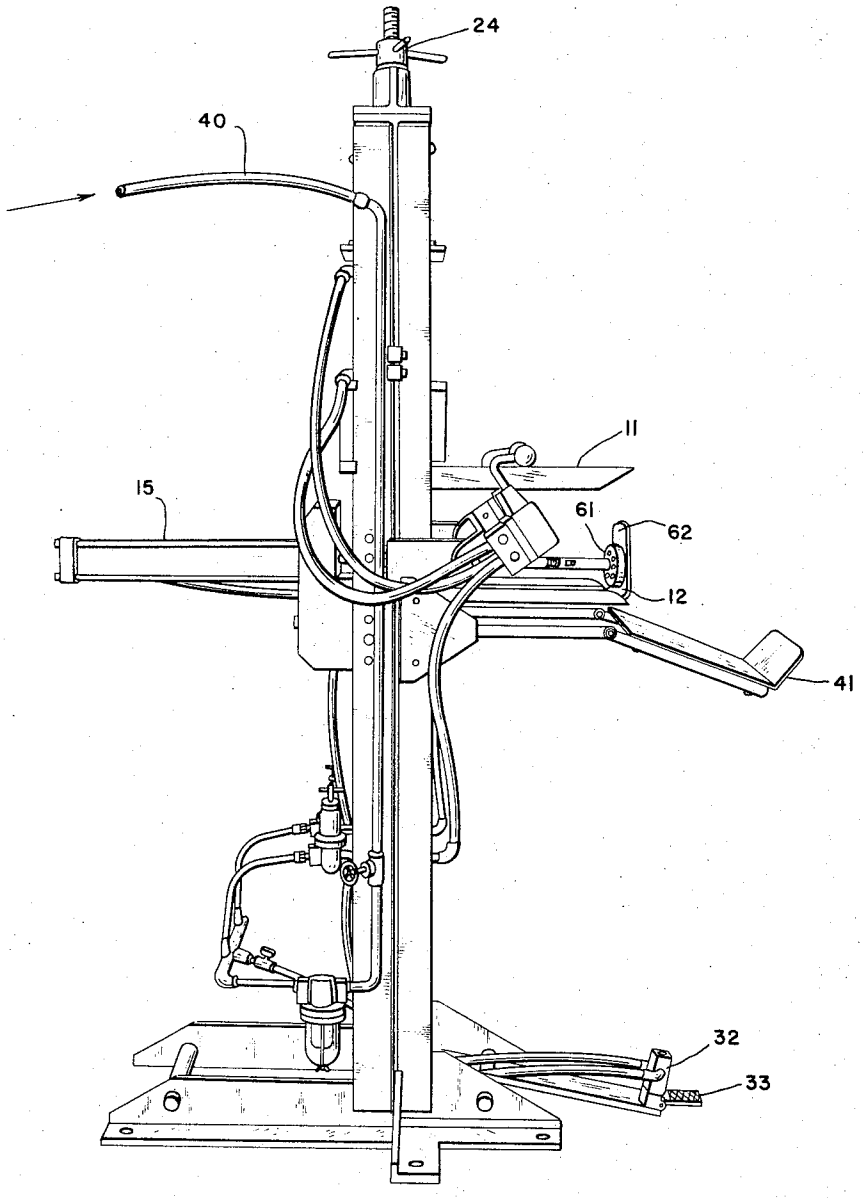

FIG. 2

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APPARATUS FOR PACKAGING COMPRESSIBLE MATERIALS

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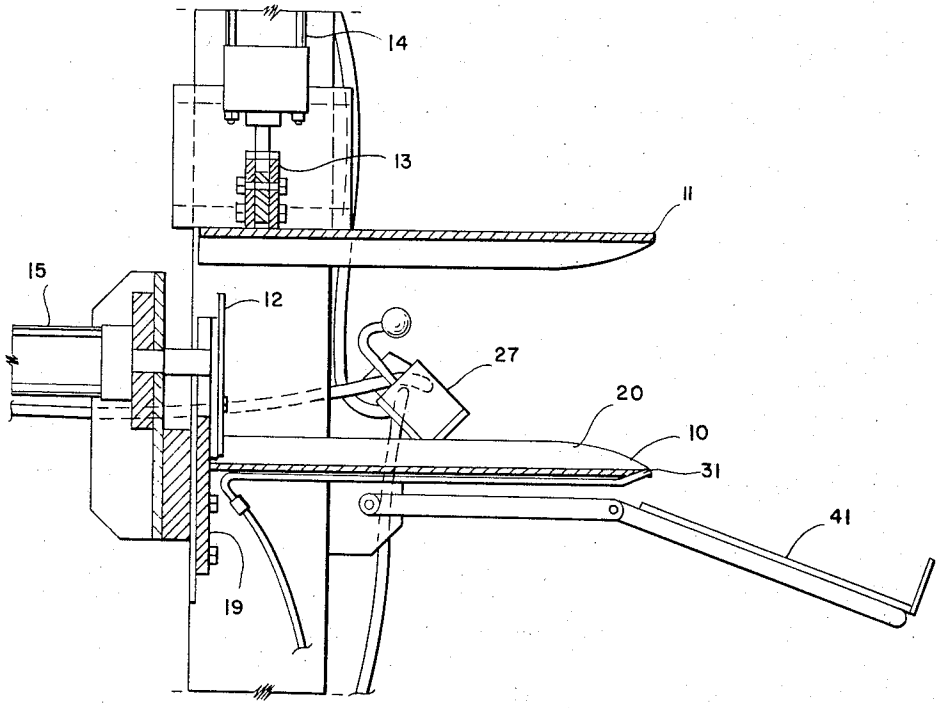

FIG. 3

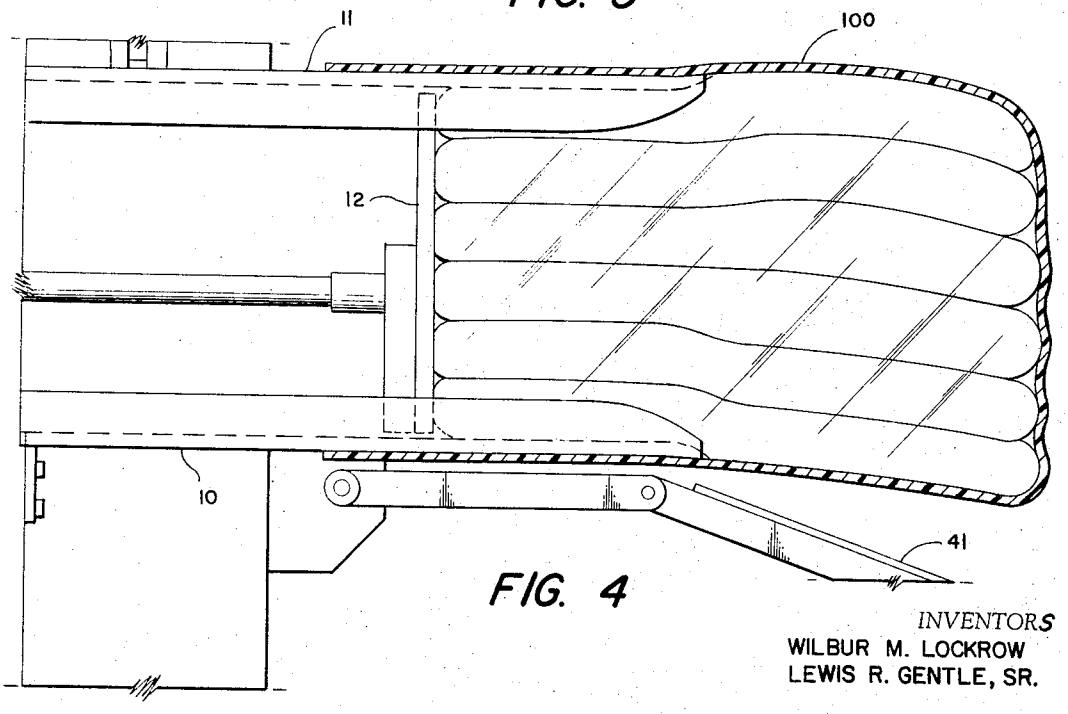

FIG. 4

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APPARATUS FOR PACKAGING COMPRESSIBLE MATERIALS

Filed April 19, 1965 5 Sheets-Sheet 4

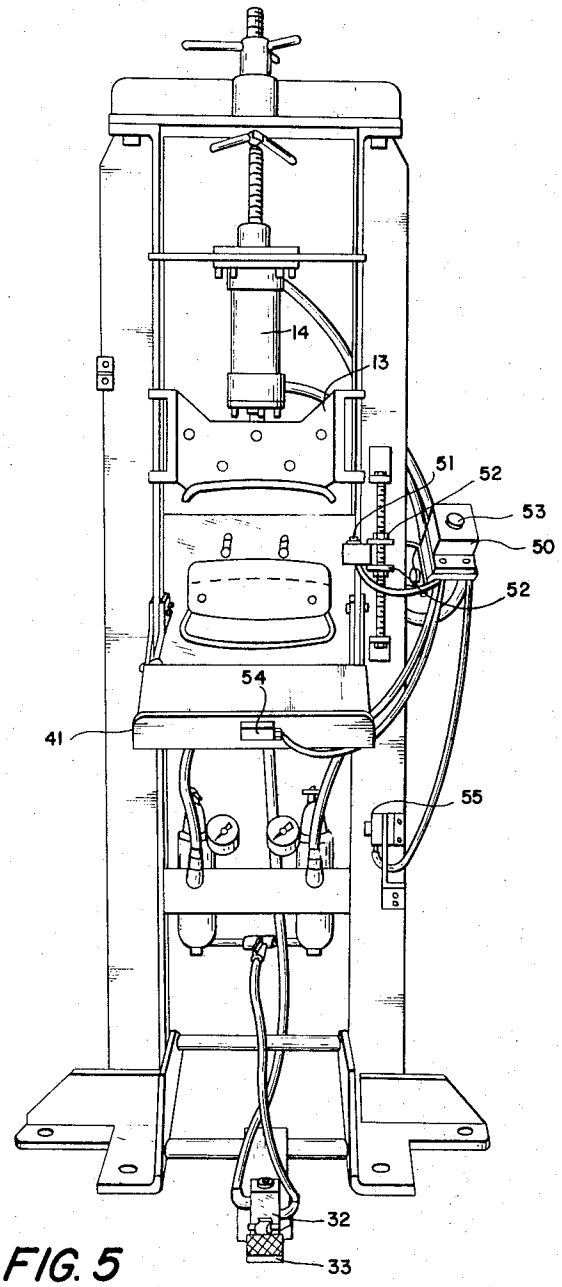

FIG. 5

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APPARATUS FOR PACKAGING COMPRESSIBLE MATERIALS

Filed April 19, 1965 5 Sheets-Sheet 5

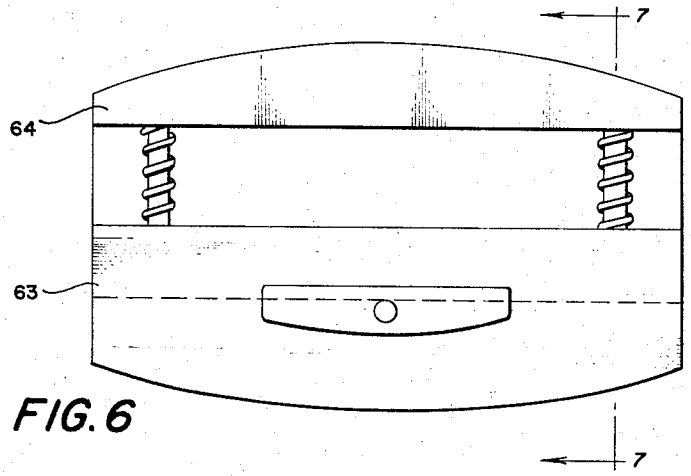


FIG. 6

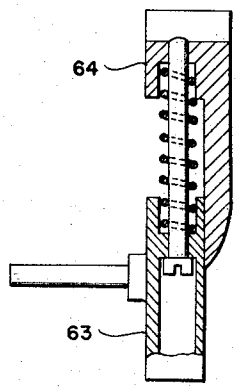


FIG. 7

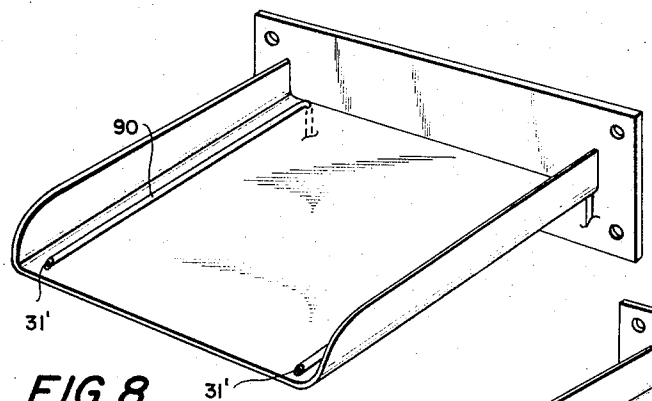


FIG. 8

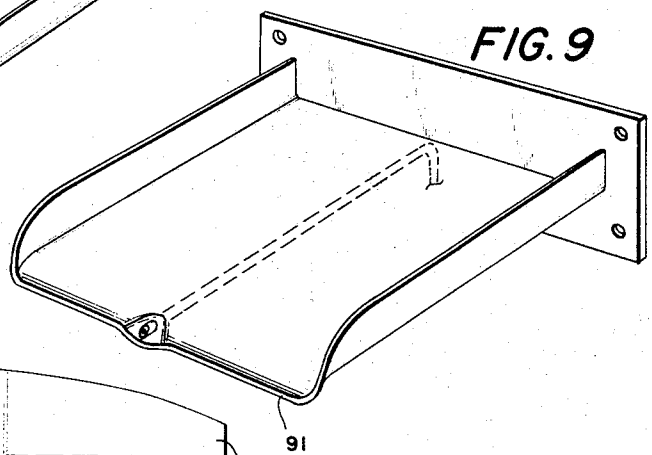
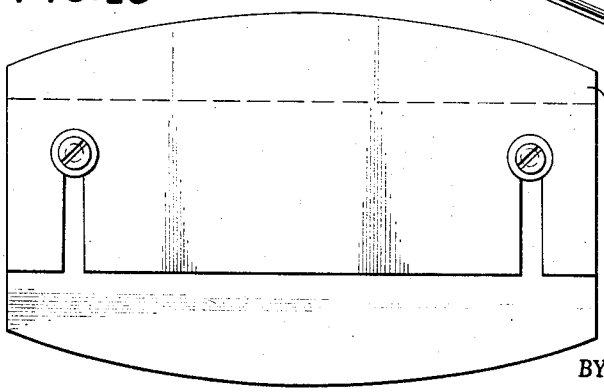


FIG. 9

FIG. 10



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3,363,396

APPARATUS FOR PACKAGING COMPRESSIBLE MATERIALS

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Filed Apr. 19, 1965, Ser. No. 449,006
10 Claims. (Cl. 53—124)

ABSTRACT OF THE DISCLOSURE

A packaging machine for packaging compressible materials in plastic overwrap comprising a vertical frame, a laterally extending stationary platform secured at one end to said frame, a second laterally extending platform, adjustable means movably mounting the second platform to compress the materials, an ejection means for ejecting the compressed material past the unsecured ends of the platforms.

This invention relates to a novel packaging machine. More particularly this invention relates to an inexpensive machine and a relatively simple process for packaging bundles of compressible prepackaged articles in a plastic overwrap whereby the volume of the package is greatly reduced.

It is well known in the prior art to reduce the volume of packages of compressible material by banding the package with a strip of material which has high tensile strength and which material is highly stretched around the package of material.

It is also well known to package compressible materials by stretching a sheet of plastic material around the compressible material and sealing the ends of the sheet of plastic material together to form a continuous binding around the periphery of the material.

The prior art processes are objectionable as the resulting package is not neat in appearance. If plastic overwrap is used in the process, the overwrap is stretched during the compression of the material resulting in distortion of printing on the overwrap and puckering of the film over portions of the package. The heat seal step of most overwrap processes requires elaborate machinery and also requires precautionary measures to avoid charring of the packaged material adjacent the sealed overwrap area.

It is the object of this invention to provide a method and apparatus whereby compressible materials may be reduced in volume and placed in a plastic overwrap without appreciable distortion of the overwrap.

It is also an object of this invention to provide a process and apparatus wherein relatively thin plastic materials may be used to hold the material in a compressed form and simultaneously produce a package which will be attractive in appearance.

It is also an object of this invention to provide an inexpensive machine which can be readily adjusted to accommodate various sizes of packages.

It is likewise an objective of this invention to provide a simple, inexpensive, packaging machine which can be economically used to reduce requisite shipping volume of packages where production of a particular item will not offset the high cost of highly complex packaging machines.

Further objects of this invention will become apparent from the examination of the following description and claims.

The present invention consists of a means to compress a bundle of material and eject the compressed bundle into a plastic bag which contains the material in compressed form. The stack of material or prepackaged material is placed on a supporting platform. A second compressing platform of substantially the same size as the loading platform is actuated by a ram to compress the material between the supporting and compressing platforms. A plastic bag of substantially the same size as the compressed material is positioned over the extending portions of the platforms. An ejection plate located between the two platforms and connected to a second ram is actuated to push the compressed material out of the remaining open end area between the two platforms and simultaneously eject the material into the plastic bag.

More specific details of this invention are set forth in the drawings and the respective portions of the specification.

FIGURE 1 shows a front view of the packaging machine according to this invention.

FIGURE 2 shows a side view of the packaging machine.

FIGURE 3 shows a section view of FIGURE 1 along line 3—3.

FIGURE 4 shows a close-up view of the platforms with compressed prepackaged material being ejected into a preformed plastic bag.

FIGURE 5 shows a semi-automatic packaging machine which may easily be adapted to accommodate packages of various sizes.

FIGURES 6 and 7 show an expandable ejection plate which can be used for packaging various sizes of material without making mechanical changes on the machine.

FIGURES 8 and 9 show supporting plates with air nozzles which inject air in the plastic bag to ease the step of placing the bag over the platforms.

FIGURE 10 is a variation of the ejection plate which can be changed in size by adjustment with a screwdriver.

Referring to the drawings in greater detail, particularly FIGURES, 1, 2 and 3 which show the basic machine assembly, the novel apparatus is constituted by a supporting platform **10** on which the material to be compressed is placed. This platform is slightly contoured with rounded side portions **20** to give the compressed material a smooth contour and avoid high stresses when the material is ejected into the plastic bag. The platform is supported by end portion **19** which is secured to the frame of the machine. The platform is preferably polished stainless steel to reduce friction during the ejection step on the material compressed between the platform and to reduce friction between the platform and the plastic bag. A compressing platform **11** is constructed with a contour similar to platform **10** and is positioned directly above platform **10**. This platform is, likewise, preferably polished stainless steel. This compressing platform **11** is mounted on a frame **13** which is adapted to move vertically between the vertical frames **21** and **22**. The frame **13** and platform **11** are actuated by a ram **14**. This ram is a common two way air operated ram which is actuated by control mechanism **23**. The ram is positioned by screw means **24** and **25** to adjust the position of the compression platform **11** relative to the supporting platform **10**. In this embodiment the control mechanism **23** operates the ram from the loading position when the ram is withdrawn to the compression position when the ram is completely extended. The operating pressure of this ram is controlled by valve **26**. The operating pressure can be adjusted to prevent crushing of the material or it can optionally be controlled at a high pressure to ensure maximum compression of the material. When high pressures are used the ram will extend the full length of its stroke and the size of the package is controlled by the adjustment of screw means **24** and **25**.

When the platforms **10** and **11** are in the compressed position a preformed plastic bag is manually slipped over the platforms until the bottom of the preformed bag abuts the end of the platforms. The positioning of the preformed

bag may be aided by the injection of a blast of air through hole **31** in the supporting platform. Thin gauge plastic bags are often difficult to open and the injection of air will provide considerable aid in permitting the operator to place the bag over the two platforms. The nozzle **31** is connected to a valve **32** which is actuated by foot pedal **33**.

The discharge of the compressed material into the plastic overwrap is best shown in FIGURES 3 and 4. When the platforms **10** and **11** are in the compressed position, shown in FIGURE 4, the plastic overwrap **100** is positioned over the platforms. An ejection plate **12** is then actuated by ram **15** moving the plate from the withdrawn position, shown in FIGURE 3, to gradually force the material into the plastic overwrap as shown in FIGURE 4. Reference is made to FIGURE 2 to show the ejection plate in the fully extended position.

A platform **41** is located at the end of the platforms to provide a discharge receptacle for the compressed package. When the package is ejected by the plate **12** the package drops onto the platform **41**. The open end of the bag can be twisted and bound by any conventional clip or tape used for this purpose.

The novel process of packaging prepackaged materials can be carried out with the machine of FIGURES 1 and 2 or can within the scope of this invention be carried out by other machines which will compact and overwrap the prepackaged material according to the process.

In particular detail the process comprises a series of steps which may be carried out automatically or as described herein by manual operation. The stack of prepackaged material, for example pajamas individually wrapped in plastic overwrap, are placed on the supporting platform. The compression platform, which has been adjusted via means **24**, **25** and the operating pressure controlled by **26**, is actuated to compress the stack of prepackaged material, thus reducing the bulk volume of the material. In the preferred embodiment shown in FIGURES 1–4 the amount of compression is controlled by adjusting **24** and **25** and using sufficient pressure, normally 10–80 p.s.i. depending on the effective area of the ram, to extend the ram **14** the full length of the stroke. A preformed plastic bag **100** which fits closely over the periphery of the compressed platforms is slipped over the extending portion of the platforms. This step may be assisted by injecting a blast of air through opening **31** to inflate the preformed bag. The injection of air is controlled via valve **32** and foot pedal **33**. By inflating the bag the friction encountered in the positioning of the bag is greatly reduced and a bag which closely fits the peripheral measurements of the compressed plates can be used. After the bag is positioned the ejection ram **15** connected to ejection plate **12** is actuated discharging the compressed contents into the overlapping bag. As the material is pushed beyond the end of the compression platforms the material will expand slightly until restrained by the plastic bag. The plastic bag is, thus, subjected to a uniform pressure over the entire area adjacent the compressed material. The open end of the bag can then be twisted and banded by tape, wire fasteners or other conventional tying means.

This process offers many advantages over the prior art packaging processes. Most important is the method by which the compressed material is injected into a bag without subjectting the plastic overwrap to high tensile stresses in localized areas. In this process the expansion forces of the compressed material are evenly distributed over the entire package adjacent the material.

This feature allows the use of relatively thin gauge plastic preformed bags for restraining materials under high compression. The use of thin gauge plastic offers a substantial overwrap material cost savings. The reduction in shipping size is a definite objective in ths process to reduce necessary cargo area and storage area of the materal.

This process produces a package with thin gauge plastic overwrap which is substantially free of distortion. Thus, the appearance of the packages is greatly improved. Since the plastic bags are often preprinted with advertising or instructions to the wholesaler, it is essential that the overwrap remain free of distortion. Also, since the overwrap fits closely to the material the package has improved handling characteristics and is less prone to ripping during shipping.

The machine for this process can be constructed to be semi-automatic as shown in FIGURE 5. This embodiment shows an arrangement which can be easily adapted to various package sizes by use of a micro-switch arrangement. The micro-switch **51** can be readily adjusted via adjusting means **52**. The switch **51** is positioned to contact frame **13** at the position which will give the desired package size and desired degree of compression. The machine operator after placing the stack of material on the supporting platform presses micro-switch **53**. This positions a multiple position valve in control means **50** to actuate ram **14** thereby compressing the material. When the frame **13** contacts switch **51** the multiple position valve is again actuated. This holds the compression platform in contact with switch **51**. The preformed bag is manually slipped over the platforms and switch **53** is again actuated to move the valve to a position whereby the ejection ram and ejection plate discharge the material into the plastic bag. A micro-switch **54** is located in the receiving tray **41** which is triggered when the package drops into the tray. This switch rotates the control valve to the next position whereby the ejection ram is withdrawn and the compression platform is raised. The machine is then ready to start a new cycle by actuating the control **53**.

The operator of the machine can, alternatively, actuate switch **55** with his knee instead of switch **53**. Switch **55** rotates the valve in the same manner as switch **53**, but the knee switch allows the operator free use of his hands for positioning the material and preformed bag during the packaging operation.

The ejection plate **12** as shown in FIGURES 1–4 is a rigid plate **61** with an attached plate **62** which is of adequate height to provide a close clearance between the compression and supporting platforms. The lower edge of plate **61** is designed to conform to the contour of the platform **10** and the upper edge of the attached plate **62** is designed with a curvature to conform to platform **11**. When the screw means **24** and **25** are adjusted to accommodate a larger compressed package, plate **62** is removed from plate **61** and replaced with a larger plate to provide a close clearance between the compression and supporting platforms. A variation of the ejection plate **12** is shown in FIGURES 6 and 7. The backing plate **64** is mounted on spring loaded bolts whereby the ejection plate will vary in size to accommodate various sizes of packages without any manual adjustment. This type of ejection plate is especially suited for the semi-automatic machine shown in FIGURE 5. The ejection plate of FIGURE 10 shows another alternate arrangement of this plate whereby the height of the plate **65** may be easily adjusted by screwdriver adjustment. The alternate ejection plates are especially useful where various size materials are frequently packaged and pressure over the entire end area of the compressed material is necessary to insure uniform ejection of the material from between the platforms.

Two additional embodiments of the supporting platform are shown in FIGURES 8 and 9. The platform of FIGURE 8 shows an arrangement wherein the air nozzle **31'** and air tubes **90** are located inside the curved edge of the platform. This provision permits the operator to use a plastic bag which more closely fits the compressed platforms. This embodiment is also advantageous where very thin plastic preformed bags are used. The bag will not be subjected to any uneven forces on the bottom of the platform and also a lower air pressure can be used to inflate the bag as there are two nozzles in the tray.

The tray of FIGURE 9 has the air nozzle located in a

downward extending lip **91** on the tray. This allows the operator to grip one edge of the bag under the lip before injecting the air blast into the bag.

The machine according to this invention preferably utilizes an air system to power the compression and ejection rams. However, an oil system or other fluid could be incorporated within the spirit of this invention.

Although the invention has been described in considerable detail with reference to certain preferred embodiments thereof, it will be understood that variations and modifications can be effected without departing from the spirit and scope of the invention as described hereinabove or in the appended claims.

We claim:

1. A simple, inexpensive packaging machine for packaging compressible materials in plastic overwrap comprising a frame, a laterally extending platform secured at one end to said frame and having an extending lip at the unsecured end, a second laterally extending platform disposed parallel to said first platform, means movably supporting said second platform for movement perpendicular to the parallel plane of said platforms, said platforms having contoured and rounded sides whereby a plastic bag may be slipped over the platforms without localized high stress, an ejection plate mounted between said platforms to eject the compressed material past an end of the platforms whereby the material is retained in an overwrap surrounding the platforms, a gas nozzle connected to a gas supply, and means mounting said nozzle on the upper surface of the unsecured end of said first platform between the sides thereof whereby a jet of gas may be used to inflate a plastic bag before placing the bag around the platforms in their compressed position.

2. The packaging machine of claim **1** wherein said means movably supporting the second platform includes a ram which is secured at one end to the frame and at the other end to said second platform to provide the movement and compression for reducing the bulk volume of the material to be packaged.

3. The packaging machine of claim **1** including means for moving the ejection plate, said means comprising a ram secured at one end to the frame, said ram having a piston secured to the ejection plate.

4. A packaging machine as claimed in claim **1** wherein said means movably mounting said second platform includes an air ram and said means for moving the ejection plate includes a second air ram.

5. A packaging machine as claimed in claim **1** wherein the means to move said second platform perpendicular to said first platform comprises an air ram secured at a first end to said frame by screw-threaded means and secured at a second end to the platform, said securing means on said first end of said ram being adjustable to vary the range of movement of said second platform.

6. A packaging machine as claimed in claim **1** wherein said ejection plate comprises a first section and a second section connected by spring-loaded, screw-threaded means, said first section being mounted in adjustably expandable relationship with said second section whereby the ejection plate will expand or contract to engage both said first platform and said second platform irrespective of the position of said second platform with respect to the first platform.

7. A packaging machine as claimed in claim **1** wherein at least two air tubes are located on the inner side of one of said first platform, said air tubes disposed parallel to the plane of said platform and forming nozzles near the unsecured end of said platform.

8. A packaging machine as claimed in claim **1** including a microswitch control means connected to a valve means whereby the rams may be successively operated by actuating the microswitch.

9. A packaging machine as claimed in claim **8** wherein a second microswitch is positioned to be actuated by the support means when said support means is moved to the compressed position whereby the compressed packaged size is determined by the position of the second microswitch.

10. A packaging machine as claimed in claim **9** wherein a third microswitch is positioned to be actuated by the knee whereby the first ram and second ram can be actuated through the control valve by pressing the third microswitch.

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