

Jan. 25, 1955

P. E. CLAUS

2,700,328

DEVICE FOR APPLYING CLOSURES TO CONTAINERS

Filed July 23, 1951

3 Sheets-Sheet 1

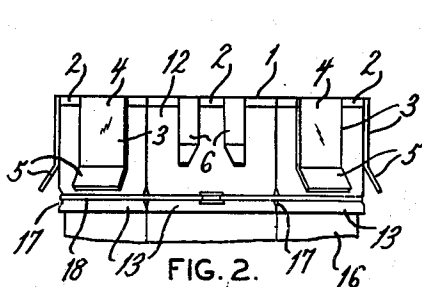


FIG. 2.

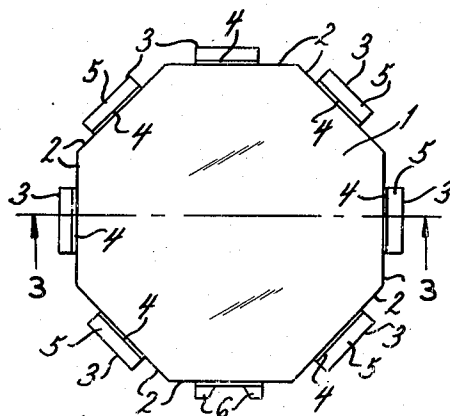


FIG. 1.

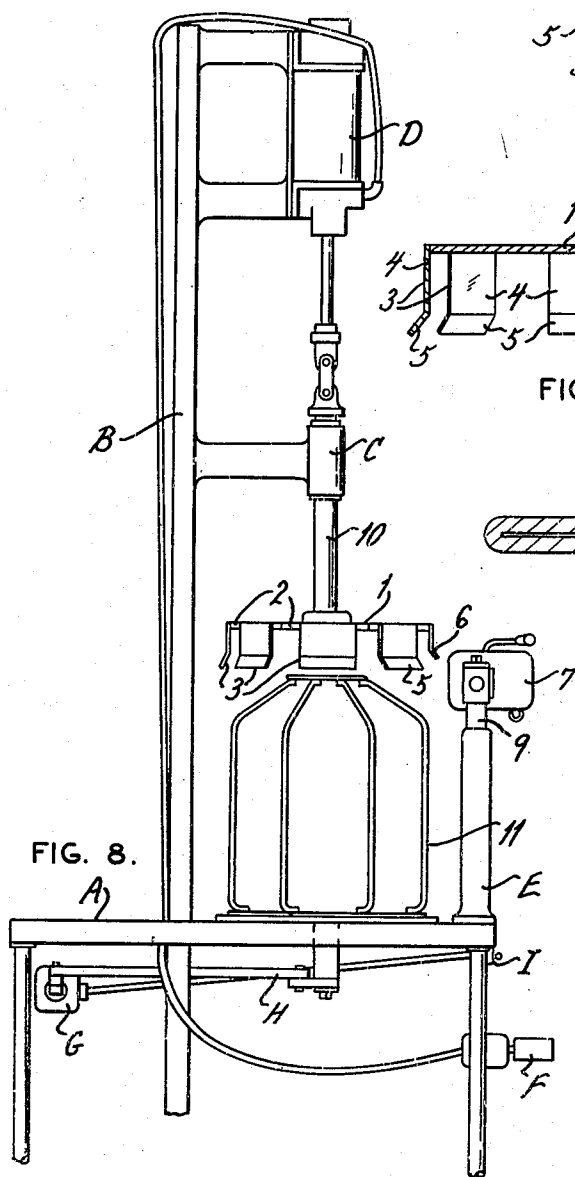


FIG. 8.

A)

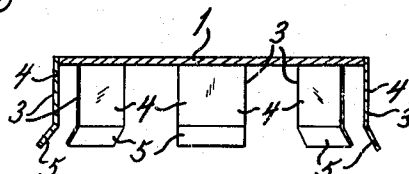


FIG. 3.

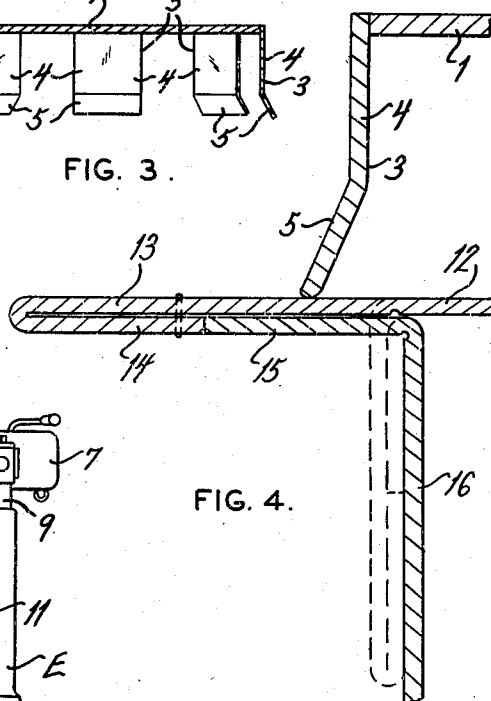


FIG. 4.

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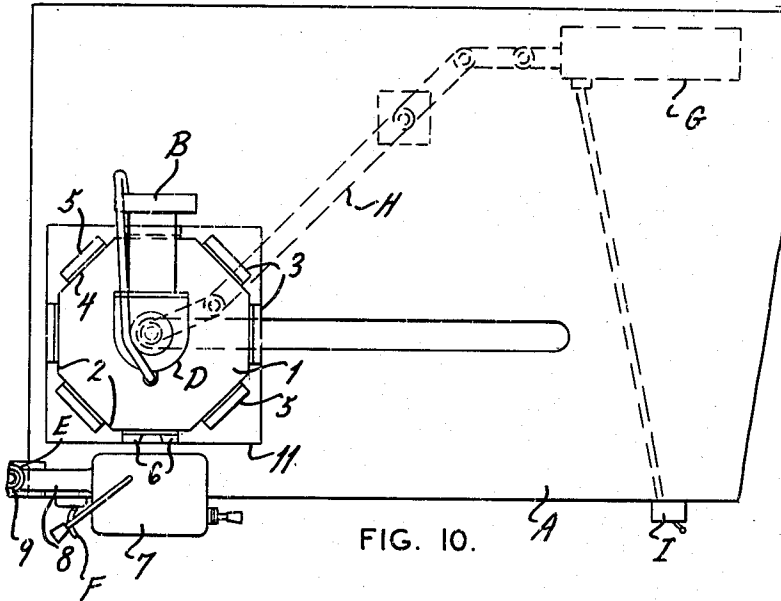


FIG. 10.

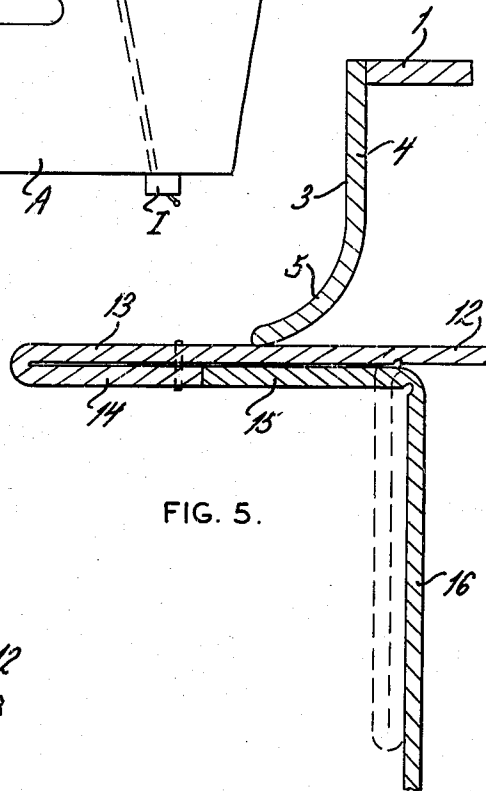


FIG. 5.

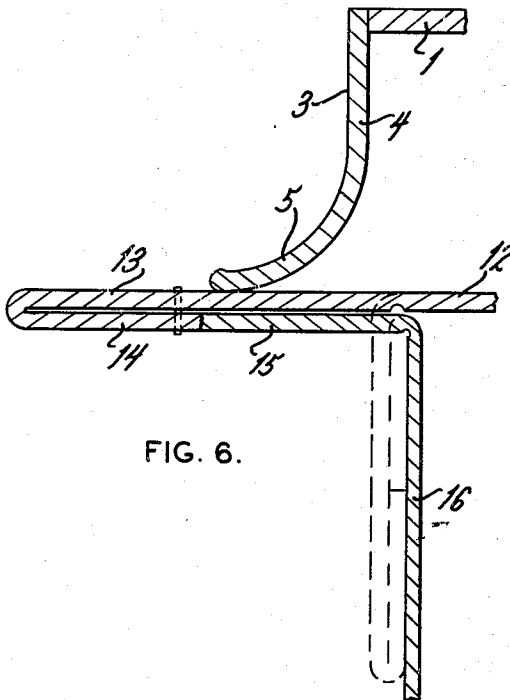


FIG. 6.

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FIG. 7.

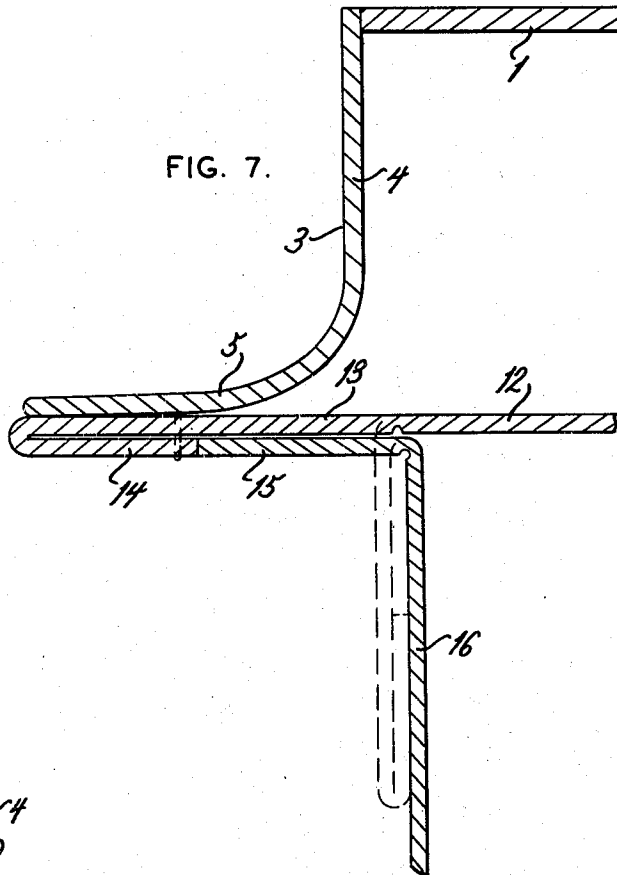
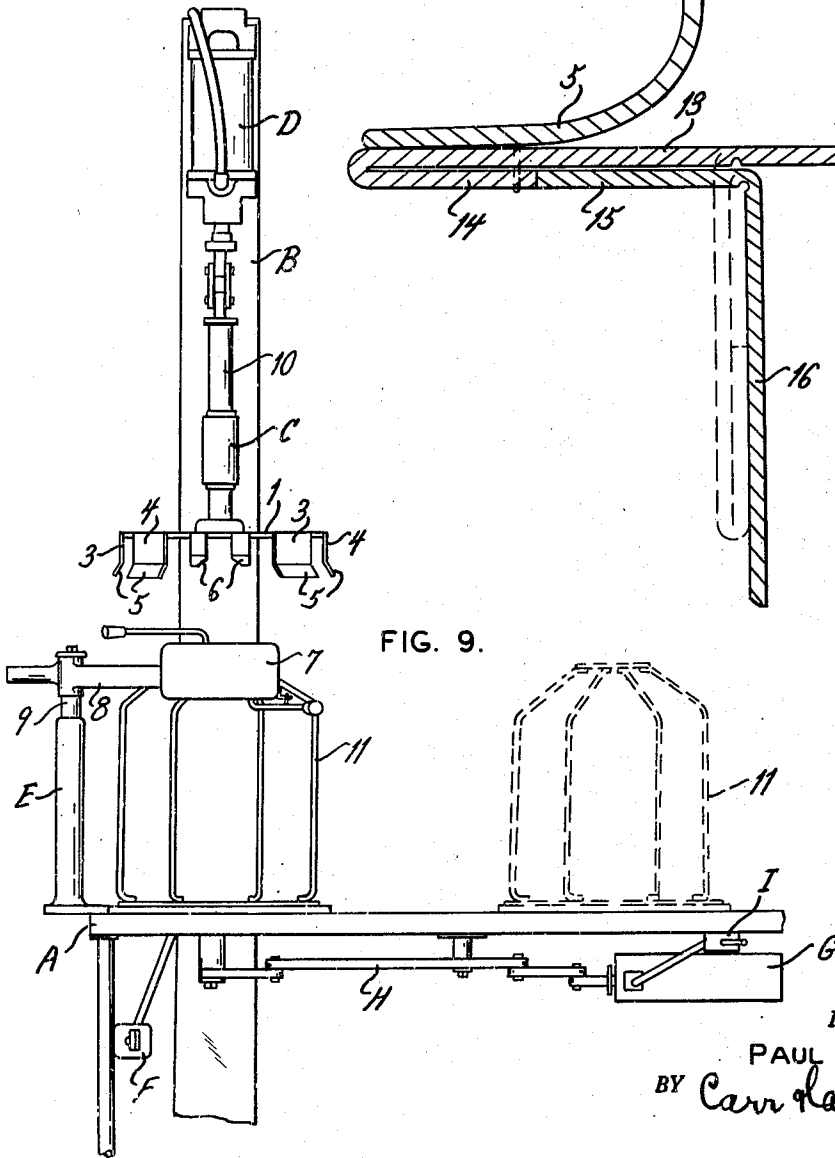


FIG. 9.



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2,700,328

DEVICE FOR APPLYING CLOSURES TO CONTAINERS

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Application July 23, 1951, Serial No. 238,181

10 Claims. (Cl. 93—39.1)

This invention appertains to a novel device for applying a novel closure member to a container body and more particularly to novel means for bringing a cover member into secured permanent engagement with a container body.

A closing device embodying this invention provides means for rapidly attaching a closure member to a large, heavy duty shipping container. This closing device is especially adapted to be used on fibreboard containers having interlocking cover and body flaps which are designed to carry a wide variety of lading including heavy, bulky articles. Such containers must of necessity be constructed of relatively heavy, highly resilient material such as corrugated fibreboard. It is important that a closing device for such a container should be adaptable for high speed continuous operation. Such a device should also secure the closure to the container body so as to make it pilfer-proof and non-removable. Examples of a container suitable to be used with the novel closing device of this invention are illustrated in applications of Walter C. George, Serial No. 175,909, filed July 26, 1950, now abandoned, and one being filed concurrently with this application, and now Patent 2,620,119, issued December 2, 1952, to Walter C. George. The polygonal containers described in these applications are provided with a closure member having a plurality of marginal flanges with locking flaps or stop means secured on the underface thereof; the body portion is also provided with marginal flaps on the upper and lower edges. The marginal body flaps are interengaged or interlocked by the abutment or stop means on the underface of the flanges of the closure member when the closure member is in the secured position, the dimensional relationship between the closure flanges, the abutment or stop means thereon and the body flaps being such that the length of each body flap is invariably slightly greater than the distance between the fold line of each cover flange and the stop means on the under face thereof. The closures shown in these applications are permanently secured by flat straps or bands which hold the closure flanges and abutment or stop means in interengaged or interlocked relation with the flaps on the container body. With a container closure of this type, it is obvious that two hands of a single worker would be unable to simultaneously manipulate the plurality of closure flanges, stop means and body flaps into interlocked or interengaged relation and at the same time attach the strap fastening means.

Examples of suitable strap fastening means are shown in the W. C. Childress patents having Numbers 2,097,443 and 2,375,769 assigned to the Acme Steel Corporation and 2,497,313 issued to J. H. Leslie II and assigned to the Signode Steel Strapping Company. Other similar strap fastening means may also be used.

One of the principal objects of this invention is to provide a power operated head for closing a container, said head being moved to simultaneously force a plurality of closure flanges and flaps into secured engagement with a container body having marginal flaps.

Another object of this invention is to provide a container closing head having a plurality of spaced depending marginal flanges secured thereto, each flange being adapted to simultaneously engage in a single stroke and move a container closure member flange having an abutment or stop means thereon and a matching body flap into interlocking or interengagement and positioning said

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elements into substantially parallel relation with the side wall of the container body.

Another object of this invention is to provide a closing head with depending marginal closing flanges attached thereto, the lower portion of the depending marginal flanges being flared to provide clearance for the application of strap or band fasteners to the lower portion of the closure flanges when the latter have been moved into parallel relation with the side walls of the container.

Another object is to provide a power driven closing head with depending marginal closing flanges attached thereto adapted to cooperate with means for tightening and fastening a flat strap or band in a manner to hold the closure flanges and flaps in fixed parallel relation with the container body wall.

A still further object is to provide means for swingably mounting, for intermittent engagement with a container closure, a device for tightening and fastening a closure band or strap thereto.

Another object is to provide means for vertically and reciprocatingly mounting a device for tightening and fastening a strap or band so that the device may be easily released thereafter from the band or strap.

Another further object of this invention is to provide a power cylinder actuating means for intermittently imparting a reciprocating motion to the closing head to move it into engagement with the container closure and container body and to disengage it therefrom.

Another object of this invention is to provide a mandrel support in spaced vertical alignment with the power operated head, the mandrel being adapted to properly position a container body therebeneath for the application of the closure member.

Another object of this invention is to provide a power operated container closing machine adapted for high speed continuous operation and requiring a minimum of the manual aid in its operation.

A still further object of this invention is to provide a closing device particularly adapted for large size, heavy duty containers.

This invention comprises a high speed closing device for permanently securing a closure having a plurality of individual, spaced integral marginal flanges with abutment or stop means on the underface thereof to a container having a matching plurality of walls with individual, integral flaps thereon, said closing device having a closing plate with depending marginal closing flanges which fold and force the closure flanges and body flaps into interengaged or interlocked relation to a position parallel with the body walls, the lower portion of the marginal closing flanges of the device being flared to admit a flat strap or band fastening means, at least one depending marginal closing flange of said device being adapted to provide access for means for tightening and fastening said band or strap securing means around the lower margin of said closure flanges and flaps in parallel relation to the walls of the container.

The invention also consists in the parts and in the arrangements and combinations of parts hereinafter described and claimed. In the accompanying drawings which form part of this specification and wherein like numerals and symbols refer to like parts wherever they occur:

Fig. 1 is a top plan view of a preferred embodiment of the closing head,

Fig. 2 is a side elevational view of the embodiment shown in Fig. 1 showing the position of the head on a fragmentary side view of a typical container closure, upon the completion of the closing operation,

Fig. 3 is a vertical cross sectional view of the closing head taken along the line 3—3 in Fig. 1.

Fig. 4 is a fragmentary cross sectional view of a preferred embodiment of a depending marginal closing flange shown contacting the upper face of a horizontally disposed depending marginal flange of a container closure,

Fig. 5 is a fragmentary cross sectional view of a modification of a depending marginal closing flange in the same position as Fig. 4, the flange being especially adapted for high speed machine operation,

Fig. 6 is a fragmentary cross sectional view of a margi-

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nal depending closing flange in the same position as Fig. 4, the flange being especially adapted for hand operation.

Fig. 7 is a fragmentary cross sectional view of a still further modification of a depending marginal closing flange in the same position as Fig. 4, the flange being of a design especially adapted for ease of closing in hand operation.

Fig. 8 is a side elevational view of a machine incorporating the preferred embodiment of the closing head shown in Fig. 4, in combination with a strap closing tool, a container mandrel and power means for actuating the closing head.

Fig. 9 is a front elevational view of the machine shown in Fig. 8; the dashed line representation of the mandrel indicates a preferred loading and unloading position for the mandrel, and

Fig. 10 is a plan view of the machine shown in Fig. 8 with the closing head and power actuating means illustrated.

Referring now to Fig. 1 wherein a preferred embodiment of the invention is illustrated, the closing head comprises a flat closing panel 1 having flat upper and lower surfaces provided with a plurality of straight sides or edges 2 corresponding to the outer marginal edges of the container closure to be described hereinafter. The sides 2 of the closing panel 1 are positioned substantially above and parallel to each corresponding upper marginal edge of the closure or cover member. Rigidly connected to the sides 2 in substantially right angular relation to the panel 1, are depending marginal closing flanges 3, best shown in Fig. 2. The closing flanges 3 can be conveniently divided into a vertical portion 4 and an outwardly flared portion 5. Each vertical portion 4 is rigidly connected at its upper margin to a side 2 of the flat closing panel 1. As shown, the width of the flanges 3 is preferably about two-thirds the length of each side 2, however, any other convenient effective flange width may be used. The lower marginal portion of the flange 3 is shaped to form the outwardly flared portion 5.

As shown in Figs. 4 to 7, the shape of the outwardly flared portion 5 may be varied considerably and still fall within the operable limits of the invention. The evenly curved flared portion 5 shown in Fig. 7 is defined for optimum ease in closing and for an optimum leverage on a cover flange 13 throughout the closing operation. The amount of force required to drive the closing device over the closure member varies with the position at which the closing flange 3 contacts the cover flange 13. The farther from the body wall that the closing flange 3 contacts the cover flange 13, the longer will be the moment arm and hence the greater the ease of closing.

The flared portion 5 shown in Fig. 6 is a modified form of the flared portion 5 shown in Fig. 5 and is especially adapted for ease of hand operation. The flared portion 5 shown in Fig. 5 while similar to that shown in Fig. 6, contacts the cover flange 13 considerably closer to the fold line than the portion 5 shown in Fig. 6. The flared portion 5 shown in Fig. 5 is more especially adapted to be operated with machine actuation. Illustrated in Fig. 4 is an embodiment of the flared portion 5 consisting of a straight uncurved portion, the lower edge of which contacts the closure flap very near the container wall of a body 16. This embodiment is simple and inexpensive to manufacture and is especially adaptable to high speed machine use where there is ample closing power available.

At least one of the depending flanges connected to a side 2 of the flat closing panel 1 is shortened and divided to provide a tool receiving flange 6, shown in Fig. 2. The dimensions of the tool receiving flange 6 may be varied to receive any standard strap tightening and fastening tool similar to the tools disclosed in the patents referred to hereinbefore. The tool receiving flange 6, being shorter in length than the other depending closing flanges 3, will of course not hold the cover flanges 13 as tightly and in as nearly parallel relation to the body walls as the flanges 3, but when the tightening and closing tool 7 as shown in Figure 8 is brought into cooperating flatwise relation with the tool receiving flange 6, the tool 7 itself will automatically force the flange therebeneath into the proper parallel relation with the container wall. As shown in Figs. 8 and 9, the tool 7 is rigidly mounted on an arm 8 which in turn is rotatably and slidably mounted on a shaft 9. The shaft 9 permits the arm 8 to be rotated on a fixed vertical shaft in a horizontal plane. The bearing also per-

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mits vertical up and down motion of the tool, parallel to the axis of the shaft. The shaft 9 is preferably mounted on a support E which in turn is rigidly attached to a base A. The closing head may be manually operated or as shown in Figs. 8, 9 and 10 it may be connected to a reciprocating, power driven shaft 10.

A base or stand A is provided to support the components of the closing device. A rigid vertical member B for support is attached to the base A. The member B is of such height as to provide space for mounting the closing head and parts auxiliary thereto. The power driven shaft 10 is actuated by an air cylinder D or any other suitable means. It is vertically and slidably held by a bearing C which is mounted on the vertical support B. Locked in spaced vertical relation above the shaft 10 is an air cylinder D which is also mounted on the vertical support B. The air cylinder is designed to impart a vertical reciprocating motion to the power driven closing head. The air cylinder D is externally connected to any suitable air supply means. The air supply is controlled by valve means F.

In the embodiment illustrated, the valve means F is adapted to be controlled by movement of the leg of the operator of the machine. Illustrated in Figs. 8, 9 and 10 is a mandrel 11 designed to fit snugly inside the empty container body 16. The purpose of the mandrel 11 is to properly position the empty container body 16 beneath the closing head for the speedy and proper application of the closure member. The container body 16 may be placed on the mandrel by hand or machine means. In the embodiment shown in Fig. 9 the mandrel is moved to the position indicated by the dashed lines to facilitate easy removal of the container body 16. The mandrel 11 is operatively connected to an air cylinder G by a linkage H in this embodiment of the machine. The air cylinder G is controlled by a valve means I. In the embodiment shown, any manual air cylinder control valve will be suitable. Obviously, the mandrel 11 is optional and may be omitted if desired. The strapping tool 7 may be of any conventional style similar to the models disclosed in the patents previously referred to.

In the embodiment shown the closing head is of octagonal outline adaptable for closing eight-sided containers. However, the head may be modified by adding or subtracting sides so as to adapt it for closing any suitable polygonal type of container. The depending marginal closing flanges are illustrated as having flat vertical portions with outwardly flared lower margins. The lower margins of the depending marginal closing flanges may be modified to flare outwardly in any suitable manner such as a flat angular displacement or a curved portion of greater or lesser radius than the preferred embodiment. Any reasonable modification of the preferred embodiment is satisfactory, the only difference being the amount of force required to force the closing head over the container closure.

The operation of the embodiment of the closure head illustrated in Figs. 1, 2, 3, 4, 8, 9, and 10 is described since the operational characteristics are representative of all the embodiments illustrated. For purposes of illustration an octagonally shaped container body and closure will be used. To allow the container body 16 to be properly placed on the mandrel as well as to allow the closing head to properly descend at the proper time, the tool 7 for tightening and fastening the band or strap is swung away from the mandrel 11 in a horizontal plane about the shaft 9 as shown in Figs. 8 and 9. First an octagonally shaped container body having outwardly and upwardly disposed end flaps 15 is placed directly beneath a matching octagonally shaped closing head so that the upper end of the body is in parallel relation to the flat closing panel 1 of the closing head. In the preferred embodiment of the invention shown in Figs. 8, 9 and 10 the container body 16 may be positioned on the mandrel 11 to accurately position the body beneath the closing head. The container body end flaps 15 are positioned upwardly and outwardly and then, an octagonal matching closure cover 12 having depending outwardly projecting marginal flanges 13 each with a stop means 14 on the underface thereof, is placed upon the upper end of the container body structure and is oriented so the depending closure flanges are in sliding register with the end marginal body wall flaps 15. With the tightening and closing tool 7 positioned away from

the closing head, the closing head is brought downwardly until the lower edge of the flared portion 5 contacts the upper plane surface of the depending marginal closure or cover flanges 13 as shown in Fig. 4. As illustrated in the various embodiments of the depending marginal closing flanges 3 shown in Figs. 5, 6 and 7, the position of the point of original contact may vary from the outermost extremity of the depending marginal closure flange 13 as in Fig. 7 to a position closely adjacent the fold between the marginal closure flange and the closure panel as shown in Fig. 4. This variation modifies the force required to operate the closing head. As the closing head progresses downwardly the cover flanges 13 are gradually forced inwardly and downwardly by the depending marginal closing head flanges 3. In the embodiment illustrated in Fig. 4 the depending cover flange 12, the stop means and the cover flap 14 are folded inwardly and downwardly at an even rate until they are in substantially parallel relation with the inner face of the flat, flared portion 5 of the depending marginal closing head flange 3. As the closing head continues downwardly the cover flange 13 and its stop means 14 are snapped quickly and tightly to a position against the container wall along with the container flap 15. This forces the cover member into a tight seal with the container body. The closing head reaches the end of its downward stroke as the flat closing panel 1 contacts the flat closure panel 12 of the cover member in flatwise relation forcing it even more tightly against the upper end edge of the container body 16.

With the closing head in this downward position, the container is ready for the application of the strap securing means. A length of steel fastening strap 18 or similar means suitable to gird the lower portion of the cover flanges 13 is fed in flatwise position with the lower margins thereof. In one preferred style cover closure, notches 17 are provided in the lower marginal end portions of the cover flange to accurately position the steel strap means. Underneath the flared portion 5 of the depending marginal closing head flanges 3, all of the eight depending cover flanges 13 are in substantially flatwise relation with the body wall with the exception of the cover flange 13 held by the tool receiving flange 6. Due to the shortness and split construction of the flange 6, the cover flange held thereby will be slightly angularly displaced from a flatwise position parallel to the body wall because of the resiliency of the material. By manual or other means, the strap tightening and closing tool 7, which is mounted on the arm 8 pivotably connected to the bearing 9, is brought against the tool receiving flange 6 into a position flatwise with the depending marginal cover flange 13 therebeneath.

This operation forces the depending marginal cover flange 13 positioned beneath the tool receiving flange 6 into the proper parallel position to the body wall. At the same time the remainder of the cover flanges being beneath the standard closing flanges are already so positioned. The strap 18 is inserted into the tightening and fastening tool 7 and snugly secured thereby. As the strap 18 is tightened and secured into the positioning notches 17 in the cover flanges 13, it immovably holds the depending marginal cover flanges 13 into locked position parallel with the container body 16. The tightening and fastening tool 7 is moved vertically downwardly to disengage the mechanical portions thereof from the secured steel strap. The tool 7 is swung out about the bearing 9 in a plane at right angles to the tool receiving flange 6. The closing head is raised, releasing the closure which is now permanently secured to one end of the container body. The mandrel 11 is moved to one side of the closing head, and the body with closure on one end thereof, is removed therefrom.

It is to be understood that the embodiments herein described are illustrative and not restrictive, and it is also to be understood that the invention may be susceptible of embodiment in other modified forms, and that all such modifications which are similar or equivalent hereto come equally within the scope of the claims next appearing.

What I claim is:

1. A closing device for an octagonal container having an eight-sided closure member, each side being provided with a depending marginal closure flange, said marginal closure flanges being provided with locking flaps on the inner face thereof and a matching eight-sided body member having marginal locking flaps foldably connected to

the end edges thereof, said marginal body flaps adapted to cooperate in locking engagement with the locking flaps on said closure member flanges, said closing device comprising a horizontal base with a vertical supporting member thereon, a power actuated closing head with a vertical shaft rigidly connected to the upper portion thereof, said vertical shaft being slidably supported by bearing means attached to said vertical support, said power actuating closing head having a horizontal flat closing plate with eight marginal side edges matching in length and position the side edges of said closure member, said edges being provided with vertically depending marginal flanges attached thereto, said marginal closing flanges being rigidly disposed at substantially right angles to the flat surfaces of said closing plate, said marginal closing flanges being of a width substantially less than the length of said side edges of said flat closing plate, the lower portion of said marginal closing flanges being flared angularly outwardly to admit strapping means for the lower portion of said closure flanges, one of said closing flanges being shortened in length and divided in width to form two narrower flanges adapted to receive a tool for applying said strapping means to the lower portion of said closure flanges, said tool being pivotably mounted on a bearing and adapted to swing about a vertical axis from a position in flatwise relation to said narrower flange to a position away from said closing head, said vertical bearing mounting also being adapted to permit movement of said tool in a plane vertical and parallel to said tool receiving flange, said horizontal base having an octagonal mandrel mounted thereon in spaced vertical relation directly beneath said power driven closing head, said octagonal mandrel adapted to snugly fit the inside of said octagonal container body to position it in spaced relation beneath said closing head for the application of the closure member and the strap fastening means, said octagonal mandrel being slidably mounted in a slot in said horizontal base to allow movement to one side of said closing head to permit easy removal of said octagonal container body from said octagonal mandrel, said vertical support having rigid supporting means for holding a power cylinder in fixed spaced alignment with said shaft rigidly connected to said power driven closing head, said power cylinder imparting a reciprocal axial motion to said power driven closing head.

2. A closing device for a polygonal container having a similar polygonal closure member, each side of said closure being provided with a depending marginal closure flange, said marginal closure flanges being provided with stop means on the inner face thereof and a matching polygonal body member having marginal locking flaps foldably connected to the end edges thereof, said marginal body flaps adapted to cooperate in locking engagement with the stop means on said closure member flanges, said closing device comprising a horizontal base with a vertical supporting member thereon, a power actuated closing head with a vertical shaft rigidly connected to the upper portion thereof, said vertical shaft being slidably supported by bearing means attached to said vertical support, said power actuating closing head having a horizontal flat closing plate with a plurality of marginal side edges matching in length and position the side edges of said polygonal closure member, said closing plate edges being provided with vertically depending marginal flanges rigidly disposed at substantially right angles to the underface of said closing plate, said marginal closing flanges being of a width substantially less than the length of said side edges of said closing plate, the lower portion of said marginal closing flanges being flared angularly outwardly to admit strapping means for the lower portion of said container closure flanges, one of said closing flanges being shortened in length and divided in width to form two narrow flanges adapted to receive a tool for applying said strapping means to the lower portion of said closure flanges, said tool being pivotably mounted on a bearing and adapted to swing about a vertical axis in a position in said flatwise relation to said narrower flange to a position away from said closing head, said vertical bearing mounting also being adapted to permit movement of said tool in a plane vertical and parallel to said tool receiving flange.

3. A device for securing a closure to a container, the closure being normally substantially flat and having a plurality of flaps extending outwardly thereabout and defining same by a fold line, the container having a plurality of flaps similar in number to the closure flaps and

extending outwardly thereabout from the end of each side wall and defined therefrom by a fold line, the said flaps being in engagement and alignment with each other and substantially at right angles to each side wall when the closure rests loosely on the end of the container and adapted for movement in unison on their respective fold lines to a position substantially parallel with their adjacent side walls; the device comprising an interiorly unobstructed rigid head having similar fixed right-angularly extending closing flanges substantially equally spaced about the periphery thereof and corresponding in number to the closure and body flaps, the distance between the inner faces of opposed pairs of the flanges being substantially equal to the distance between the outer faces of opposed pairs of closure flaps when in substantial parallelism with their adjacent side walls, the outer portion of the flanges being similarly outwardly flared beyond the plane of the closing flanges, the ends of the outer flared portions of the flanges being adapted for engagement with said outwardly extending closure flaps at substantially equal points outwardly beyond their respective fold lines, means to provide relative movement between the head and container, so that with the end flared portions of the flanges engaging the closure flaps relative movement between the head and container effects movement of the engaged flaps on their respective fold lines toward their respective side walls, the closing flanges completing said movement of the closure flaps and maintaining the flaps in substantial parallelism with their respective side walls, and means for securing about the exterior of said flaps a means to permanently maintain the flaps in their substantial parallel engagement with the side walls.

4. The device as defined in and by claim 3 wherein the closure flaps each embody a stop means therewith on its inner face and the container flaps are in constant engagement with the said stop means when the flaps are being moved from their outwardly extending position to substantial parallelism with the side walls of the container.

5. The device as defined in and by claim 3 wherein the rigid head is carried at the end of a shaft, and means for reciprocating the said shaft.

6. The device as defined in and by claim 5 wherein power operated means is utilized for reciprocating the said shaft.

7. The device as defined in and by claim 3 wherein one of the said closing flanges is composed of a pair of spaced flanges which are of less length than the other flanges and have outwardly flared end portions that extend beyond the plane of the closing flanges, and the said means for securing the means about the flaps including movable means located in close proximity to the flanges of less length for tightening the means that is applied about the exterior of said flaps that are in substantial parallel engagement with the side walls of the container.

8. The device as defined in and by claim 3 wherein there is provided a base structure, an upstanding support carried by the base structure, operating means carried by the said support, a shaft connected with the operating means and with the said rigid head, the container with its outwardly extending flaps positioned on the base in alignment with the head, and the closure with its flaps overlying the end of the container and with the flaps thereof in engagement and alignment with the flaps on the container, whereby when the shaft carrying the head is moved with the outwardly flared portions of the closing flanges in engagement with the closure flaps outwardly beyond the fold lines thereof and the fold lines of the container flaps, the closure and container flaps are moved in unison from an outwardly extending position into substantial parallelism with their adjacent side walls.

9. The device as defined in and by claim 8 wherein power operating means is utilized for reciprocating the shaft carrying the head thereon.

10. The device as defined in and by claim 8 wherein the container is positioned about a mandrel that is supported on the base.

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