

June 11, 1940.

J. M. FREDERICK

2,203,955

METHOD AND MEANS FOR APPLYING AND ATTACHING METALLIC END CLOSURES TO CARTONS

Filed June 2, 1938

4 Sheets-Sheet 1

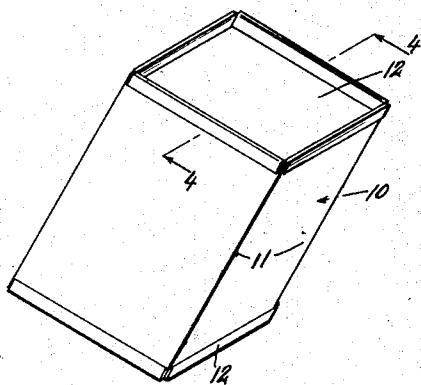


FIG. 1

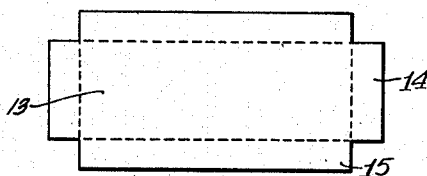


FIG. 2

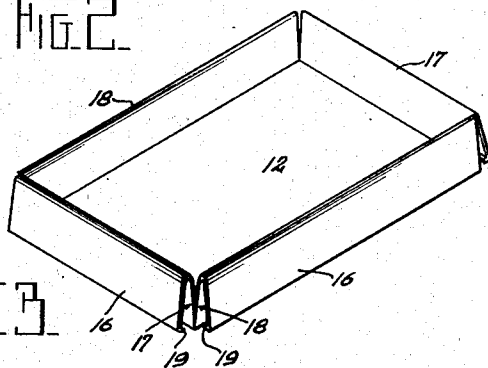


FIG. 3

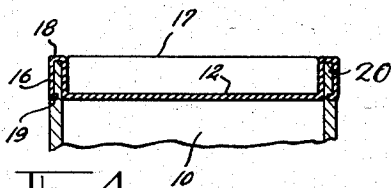


FIG. 4

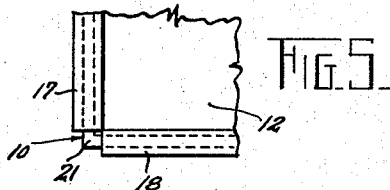


FIG. 5

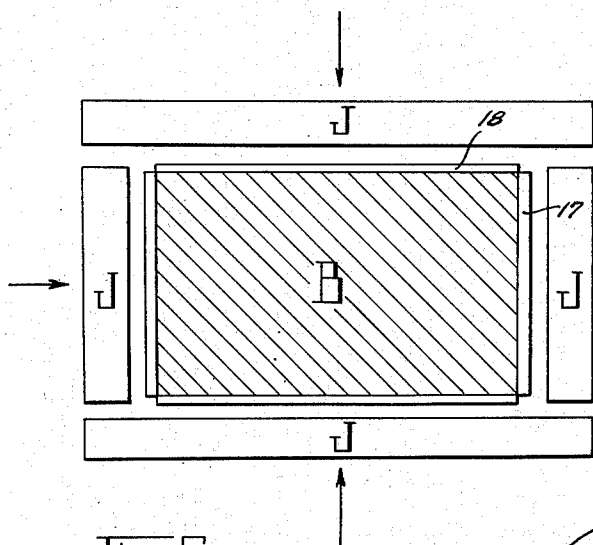


FIG. 6

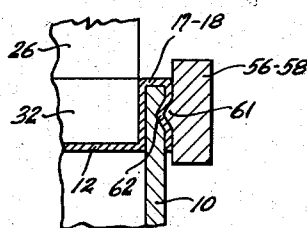


FIG. 4a

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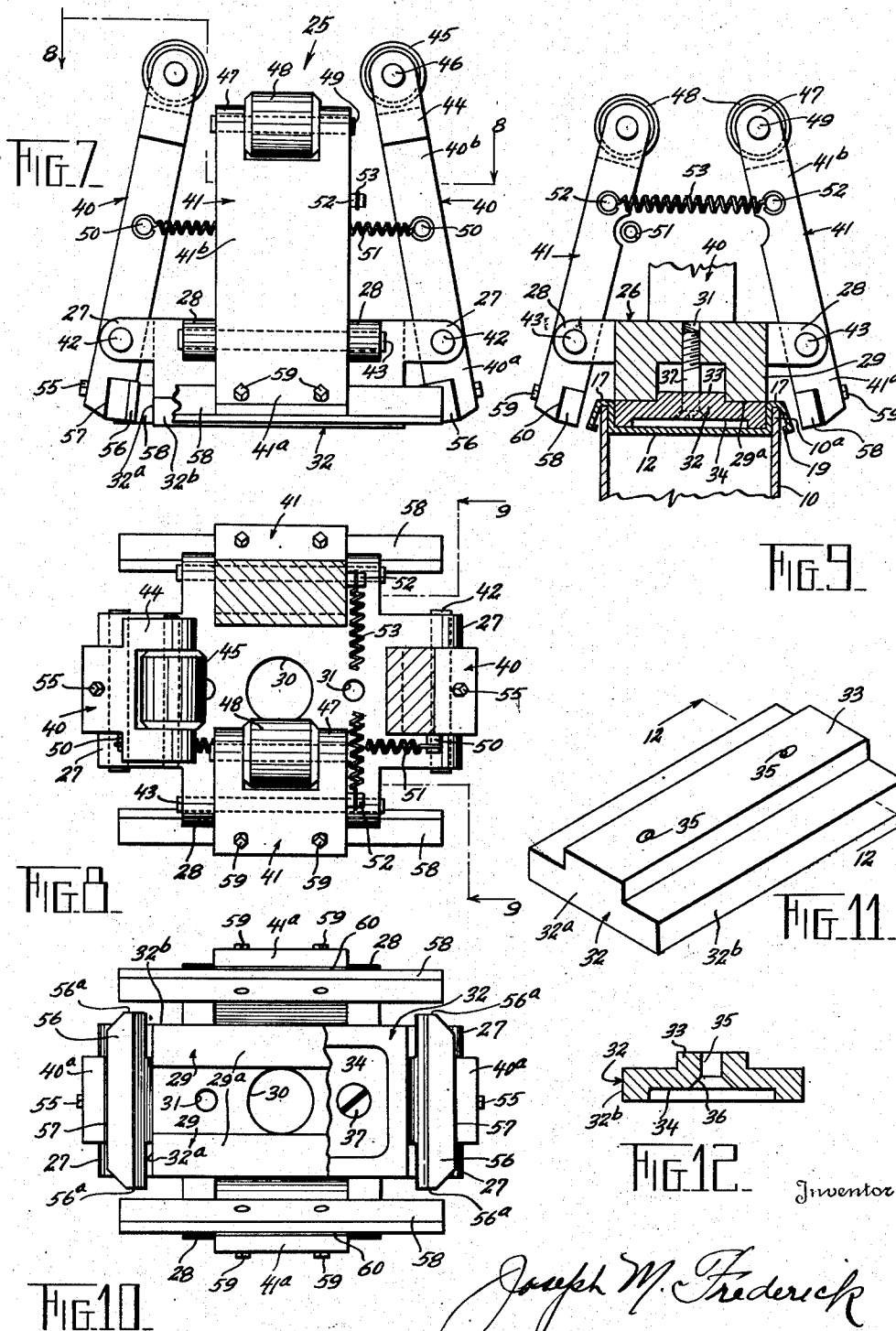
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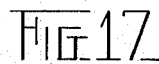
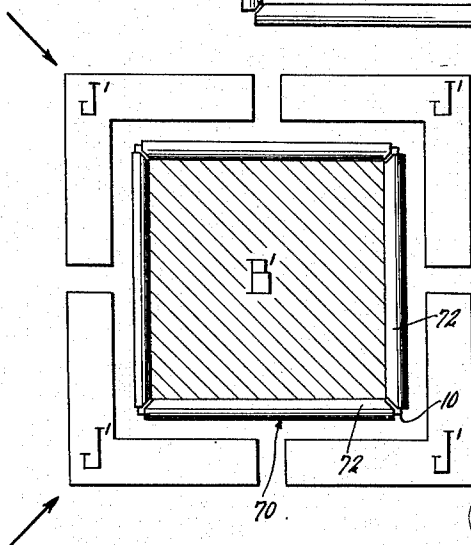
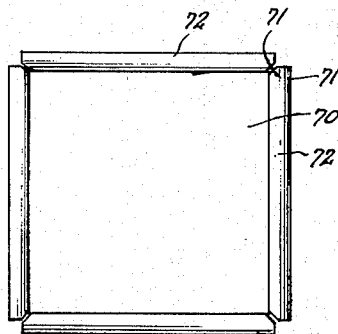
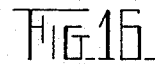
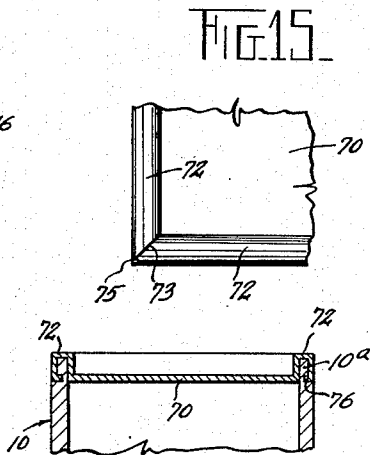
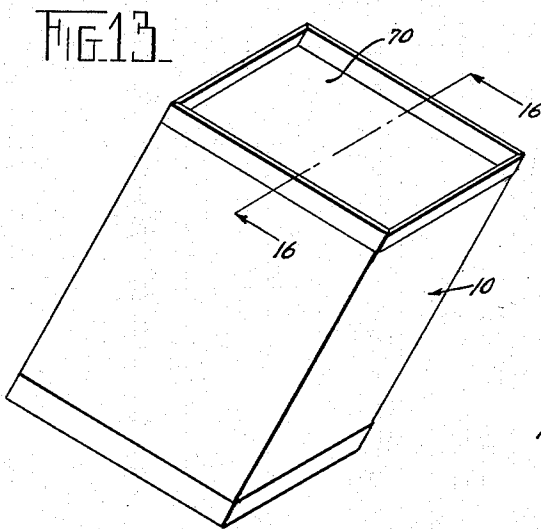
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METHOD AND MEANS FOR APPLYING AND ATTACHING METALLIC END CLOSURES TO CARTONS

Filed June 2, 1938.

4 Sheets-Sheet 3



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June 11, 1940.

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METHOD AND MEANS FOR APPLYING AND ATTACHING METALLIC END CLOSURES TO CARTONS

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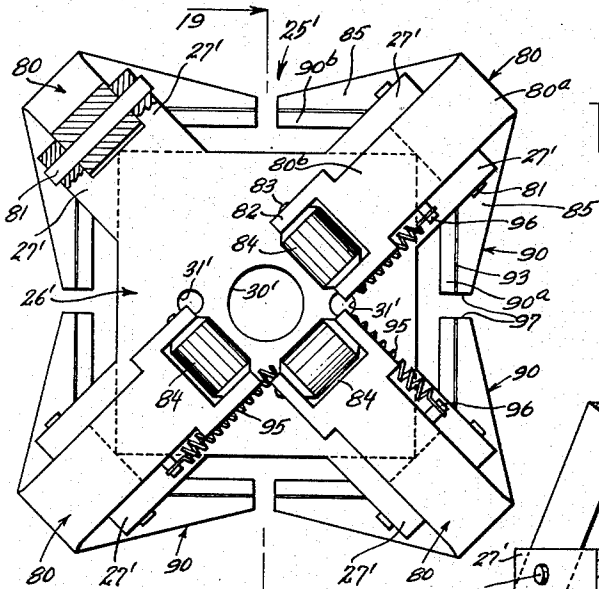


FIG. 18

FIG. 19

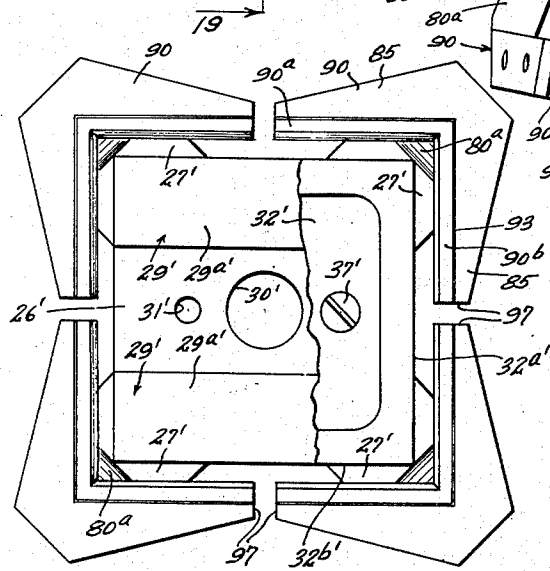
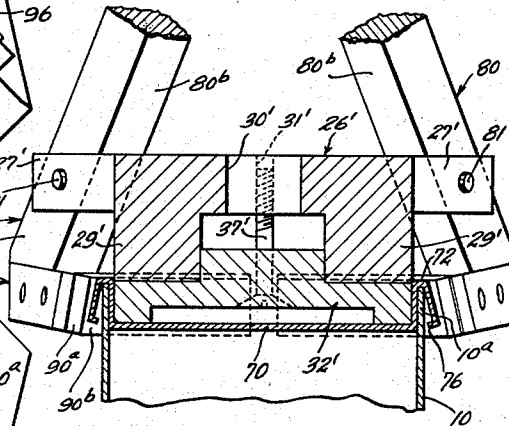


FIG. 20

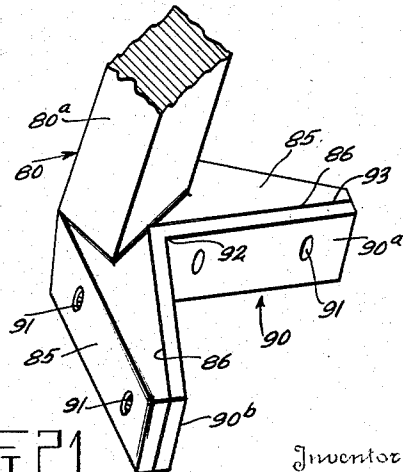


FIG. 21

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UNITED STATES PATENT OFFICE

2,203,955

METHOD AND MEANS FOR APPLYING AND
ATTACHING METALLIC END CLOSURES
TO CARTONSJoseph M. Frederick, Baltimore, Md., assignor of
one-half to Jacob L. Rosenfield, Baltimore,
Md.

Application June 2, 1938, Serial No. 211,472

17 Claims. (Cl. 153—1)

This invention relates to metallic end closures for non-metallic receptacles such as commonly referred to as paper cartons, and more particularly to the devices and methods used for assembly in securing such metallic end closures to the open end or ends of said cartons.

In my prior Patent No. 2,097,917, dated Nov. 2, 1937, there is described and shown a metallic end closure designed for use with a carton having sharp edges and corners which when assembled on the carton is secured thereto by a simple clamping operation to produce a tight and leak proof connection. There is also indicated in said patent a method of assembling the carton and end closure and the manner in which the clamping operation is effected, which method is embodied in the present application.

Generally, this invention contemplates as its principal object a method of assembling and securing a pre-formed multi-sided, circular or non-circular metallic end closure shaped to provide a vertical channel open at its bottom extending along the entire peripheral extent of the end closure to an open end of a carton, which consists in placing the end closure over the open end of the carton with the edge portions thereof fitting within said channel, holding the same and the carton in assembled position and in clamping the same to said carton, which clamping action takes place simultaneously along the entire peripheral channel of the end closure receiving said edge portion of the carton so as to draw the walls of the channels together into tight abutting engagement with said carton edge portions.

Another object of this invention relates to the provision of a mechanically operated jig for affecting the above holding and clamping actions which includes a centering block for holding the end closure and carton in assembled relation and a plurality of clamping jaws formed to be simultaneously actuated.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

Certain practical embodiments of the invention are illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a carton with the end closures attached thereto.

Fig. 2 is a plan view of a sheet metal blank forming the end closure.

Fig. 3 is a perspective view of the end closure.

Fig. 4 is a sectional view taken on line 4—4, Fig. 1.

Fig. 4^a is a sectional view similar to Fig. 4, showing a modified channel attaching construction.

Fig. 5 is a detail plan view of one corner of the end closure attached to the carton.

Fig. 6 is a diagrammatic view showing the method of attaching the end closure to the carton.

Fig. 7 is an elevational view of the jig utilized for mounting and attaching the end closure of Fig. 3 to the carton, Fig. 1.

Fig. 8 is a top plan view partly in section of the jig.

Fig. 9 is an end view of the jig partly in section taken on line 9—9, Fig. 8.

Fig. 10 is a bottom plan view of the jig, with part of the centering block broken away.

Fig. 11 is a perspective view of the centering block.

Fig. 12 is a sectional view taken on line 12—12, Fig. 11.

Fig. 13 is a perspective view of a carton with a modified form of end closure attached thereto.

Fig. 14 is a plan view of the modified form of end closure.

Fig. 15 is a detail plan view of one corner of the modified end closure attached to the carton.

Fig. 16 is a sectional view taken on line 16—16, Fig. 15.

Fig. 17 is a diagrammatic view showing the method of attaching the modified end closure to the carton.

Fig. 18 is a top plan view partly in section of the form of jig utilized to mount and attach the modified end closure to the carton.

Fig. 19 is a vertical sectional view through the jig taken on line 19—19, Fig. 18.

Fig. 20 is a bottom plan view of the jig, with part of the centering block broken away.

Fig. 21 is a perspective view of the lower part of one of the clamping jaws of the jig.

In view of the comparative thinness of the sheet metal employed in the end closures and the paper employed in the carton the same have been shown in the various figures of exaggerated thickness.

Figures 1 to 5

Referring to the drawings, 10 denotes a pre-

formed carton having sharp edges 11, of the character as described in detail in lines 8 to 22, page 1 of the specification of my prior patent referred to above. The metallic end closures 12 are attached to the carton 10 in the manner to be hereinafter described.

The end closure 12 is formed of sheet metal of relatively thin gauge as customarily employed in the manufacture of tin cans, etc., and in its initial form comprises a flat blank 13 rectangular in form and provided with rectangular extensions 14 and 15 at the sides thereof which are to be pressed into channel shape in the manner as indicated in my prior patent. In the stamping and forming operation of the blank 13, the free edge of the outer wall 16 of each of the channels 17 and 18 is formed with an inwardly directed penetrating flange 19. Obviously the dimensions of the blank 13 and the finished end closure 12 are such that the edge portions 20 of the carton 10 adjacent the open ends thereof will freely fit within the channels 17 and 18 when the same are assembled, the end closure 12 being secured to the carton 10 by the clamping of the walls of the channels together, with the carton edge portions clamped between the same, in such manner that the flanges 19 will penetrate into the walls of the carton to provide a tight and inseparable attachment of the end closure 12 to the open end of the carton.

It will be noted that the form of end closure 12 as made from the sheet metal blank 12 when attached to the carton 10 will leave exposed each of the four corners of the carton 10 as clearly indicated by the single corner 21, see Fig. 5. This results from the shape of the blank 13 which is the simplest design possible to provide an end closure for a four-sided carton. While lacking the advantages of the form of end closure as specifically described, shown and claimed in my above mentioned prior patent (and as shown herein in Figs. 13, 14, 15 and 16) it nevertheless possesses certain advantages as to cheapness and simplicity of manufacture, and is adaptable where a powder leak proof carton is not desired.

Figures 6 to 12

The method of assembling and attaching the form of end closure 12 to the carton 10 is diagrammatically shown in Fig. 6 and is achieved by means of the jig shown in Fig. 7. The steps of the method are; first, placing the pre-formed end closure 12 over the open end of the carton 10 with the edge portions of the walls thereof fitted within the channels of the end closure, all which is accomplished by means of a plunger die element or centering block "B" of an automatic capping machine acting on the end closure to force the same downwardly over the open end of the carton as above indicated; and secondly, simultaneously applying a clamping action to each of the channel walls to clamp the same to the carton edge portions, by means of a plurality of clamping jaws "J."

Thus, viewing Fig. 6, the centering block "B" is shown fitted within the end closure 12 with the sides of the block in abutting engagement with the inside walls of the channels 17. In laterally spaced relation to the outside wall of each channel is a clamping jaw "J." With the parts in position as shown, the clamping jaws "J" are simultaneously forced inwardly in the direction of the arrows towards the centering block "B" to apply a clamping pressure on the walls of the channels 17 to effect the desired clamping engage-

ment of the same with the carton edge portions. Obviously, the steps of the method, as indicated, are a minimum and the operation is simple, thus contributing to a capping operation of maximum efficiency, requiring a minimum amount of time and obviating the need for complex and expensive machinery.

For performing the steps of the method as set forth there is provided a jig 25, see Fig. 7, that is adapted for use with a conventional form of automatic capping machine. The jig comprises a rectangular platen 26 which is formed with a pair of integrally projecting ears 27 extending from the short sides thereof and a pair of projecting ears 28 extending centrally from the long sides thereof, and depending from the underside of the platen 26 are a pair of parallel longitudinally extending walls 29. The platen 26 is provided with a central bore 30 disposed between the walls 29, and on each side of the bore 30 in the central longitudinal plane of the platen 26 is a threaded opening 31. Arranged for seating engagement on the bottom faces 29^a of the walls 29 is the plunger die or centering block 32.

The centering block 32 is accurately machined so as to snugly fit within the end closure 12, in the manner shown in Fig. 9, and is provided on its upper side with a rib 33 arranged to be placed between the walls 29 for abutting engagement therewith. The underside of the centering block 32 is recessed as at 34, and is provided with a pair of openings 35 in the longitudinal center plane which are so positioned as to register with the threaded openings 31 in the platen 26; the openings 35 being countersunk as at 36 to receive the head of a screw 37, inserted through each said opening for coaction with the threaded openings 31 for effecting attachment of the centering block 32 to the platen 26.

Positioned respectively between the pairs of ears 27 and 28 are levers 40 and 41. The levers 40 are each pivotally mounted within their respective ears 27 on pivot pins 42, and in a like manner the levers 41 are each pivotally mounted within their respective ears 28 on pivot pins 43. Both the levers 40 and 41 are formed to provide short lower arm portions 40^a and 41^a respectively, and long upper arm portions 40^b and 41^b, respectively. The upper end of each lever 40 is formed to provide a yoke 44 between the arms of which is mounted a roller 45 supported for rotational movement on the pivot pin 46. In a like manner the upper end of each lever 41 is formed to provide a yoke 47 between the arms of which is mounted a roller 48 supported for rotational movement on the pivot pin 49.

Referring to Fig. 7 it will be observed that the lower arms 40^a and 41^a of the levers 40 and 41, are of equal length while the upper arms 40^b are made of a greater length than the arms 41^b, for a purpose to be hereinafter described. Fixed to one side of the lever arms 40^b are pins 50 to which are connected in any suitable manner the ends of a tension coil spring 51. In a like manner the lever arms 41^b are provided with pins 52 to which are connected the ends of a tension coil spring 53. Thus, under the action of the springs 51 and 53 the levers 40 and 41 are respectively pulled and inclined toward each other, and by virtue of the longer lever arms 40^b of the levers 40 the rollers 45 thereon will be above the rollers 48 on the lever arms 41^b, the arrangement being such that the rollers 45 and 48 are brought as close as possible to the vertical center line of the

platen 26 which corresponds with the axis of the bore 30 therein, see Fig. 8.

Removably attached to the inner side of the lower arms 40^a at the end thereof by means of the set screws 55 are transverse clamping jaws 56 arranged in opposed relation and each opposite to an end face 32^a of the center block 32, see Fig. 10. The clamping jaws 56 are of a length slightly in excess of the width of the end faces of the center block 32 and equal to the length of the channel walls to be clamped thereby, and are so mounted on the ends of the arms 40^a as to be brought into parallel relation with the end faces 32^a upon separating or outward swinging movement of the levers 40 when operating to clampingly engage the outer channel walls of the end closure 12 in the manner to be hereinafter described. To properly adjust the clamping jaws 56 on the lever arms 40^a, shims 57 may be utilized between the said jaws and arms, as best shown in Figs. 7 and 10.

In a similar manner the lower arms 41^a of the levers 41 are each provided on their inner side at the ends thereof with a removable clamping jaw 58, secured to said arms 41^a by means of the set-screws 59 and adjustably positioned by the shims 60. Viewing Fig. 10, it will be observed that the length of the clamping jaws 58 are such that the same extend beyond the terminal ends of the clamping jaws 56. In other words, the clamping jaws 58 are movably operative between the clamping jaws 56, the arrangement and construction thereof being such that the terminal ends 56^a of the clamping jaws 56 will be engaged by the clamping jaws 58 when all of said jaws are moved to their maximum clamping relationship, whereby said terminal ends 56^a will function as limit stops. Obviously, the clamping jaws 58 are similarly brought into parallel relation with the side faces 32^b of the centering block 32.

The jig 25 operates in the following manner which is best illustrated in Figs. 4, 9 and 10. The carton 10 with the end closure 12 placed thereon is brought in the operation of the capping machine (not shown) beneath the jig 25 which is suitably operatively mounted thereon, and the jig 25 is moved downwardly so that the center block 32 will enter the end closure 12 and force the same downwardly into the carton 10 whereby the edge portions 10^a of the walls thereof will completely enter the channels 17, 18, of the end closure 12 as clearly shown in Fig. 9. When so positioned, a cam plunger (not shown) operating on the rollers 45 and 48 and having guided engagement with the bore 30 will operate thereon to simultaneously move the lever arms 40^b and 41^b outwardly against the action of the coil springs 51 and 53. This movement will cause the levers 40 and 41 to swing about their respective pivots 42 and 43 to impart an inward movement to the lower arms 40^a and 41^a carrying the clamping jaws 56 and 58. Under the force of this movement as imparted to the levers 40 and 41 by the action thereon of the cam plunger (not shown) in the manner as aforesaid, each clamping jaw will simultaneously engage the outer channel wall in opposed relation thereto, to force the same into clamping engagement with the carton edge portions 10^a, the inside channel walls being "backed up" by the centering block 32 which serves as a rigid abutment. Thus, when the levers 40 and 41 are swung outwardly to their maximum position, the clamping jaws will under great force press the channel walls together to tightly clamp therebetween the carton edge portions 10^a, in the man-

ner readily apparent. In this clamping action the flanges 19 on the inside edge of the outer channel walls will be caused to penetrate into said edge portions 10^a, the clamping action being such that the outer channel walls will lie substantially flush with the outer wall surfaces of the carton, as clearly shown in Fig. 4, this primarily because of the thinness of the sheet metal employed in the end closures 12.

While the end closure 12 is shown provided with the penetrating flange 19 on the outer channel walls it is to be understood that such may be dispensed with if desired, the attachment of the end closure to the carton relying solely on the frictional engagement set up by the clamping action of the channel walls on the carton edge portions 10^a. Furthermore, the outer channel walls are susceptible of being provided with struck out formations of a variety of forms which would penetrate the carton walls under the clamping action. Also if desired, the clamping jaws could be provided with a projecting formation 61 which in the clamping action will act on the outer walls 16 of the channels 17 and 18 to provide a corresponding indentation 62 to effect a fastening engagement between the same and the carton edge portions, to thus securely lock the end closure 12 to the carton 10, as shown in Fig. 4^a.

It is to be understood that the principles of the method as set forth above and the jig construction described and shown for effecting the method may be equally as well applied to any form of end closure having a plurality of sides such as triangular, hexagonal, etc., as well as cylindrical, for attachment to a correspondingly shaped carton.

Figures 13 to 16

In Figures 13 to 16 there is shown an end closure 70 applied to a carton 10, said end closure being of the type described and claimed in my prior patent, referred to above, to which reference may be had for a detailed description thereof. The end closure 70 distinguishes over the end closure 12 by the form of corner construction which is such that the ends 71 of the channels 72 adjacent each other are mitered so that when the walls thereof are clamped together such mitered ends will abut each other as at 73, see Fig. 15, to form a completely tight and closed corner, completely enclosing the corner of the carton wall edge portions to thereby form a positive leak proof closure with said carton. While the end closure shown in my prior patent is rectangular in form the end closure 70 is herein shown square in form for application to a square carton, i. e., one having four sides of equal width.

Figures 17 to 21

In Fig. 17 there is diagrammatically shown the method utilized for simultaneously clamping the channel walls of the end closure 70 and for forming the completely tight and closed corners thereof, which is described in detail in my prior patent with reference to a like diagrammatic showing in Fig. 9 of said patent.

Referring to Fig. 17 the end closure 70 is placed over the wall edge portions of the carton which are positioned within the channels 72 of the end closure. Snugly fitted within the end closure 70 is a plunger die or centering block "B" similar in form and function to the centering block B, Fig. 6. Spaced from the outer channel walls are four corner clamping jaws "J" of right-angle form each of which is adapted for bodily movement at

an angle of 45° to its respective carton corner as indicated by the direction of the arrows, said clamping jaws being simultaneously operated. Except for the difference in shape of the clamping jaws "J" and the direction of movement thereof, the same method is utilized for attaching the end closure 70 to its carton as described above with reference to the attaching of the end closure 12 to its carton as shown in Fig. 6.

In Figs. 18 to 21 inclusive there is shown a jig construction 25¹ that is similar in structure and operates on the same principle as the jig 25 shown in Figs. 7 to 12.

Thus, the jig 25¹ comprises a square platen 26¹ formed at each corner thereof with a pair of parallel ears 27¹ each parallel to a corresponding diagonal of the platen. Depending from the underside of the platen 26¹ are two parallel walls 29¹, between which is provided a central guide bore 30¹ and on each side thereof a threaded opening 31¹. Fitted to the walls 29¹ in contact with the bottom faces 29^{a1} thereof is a plunger die or centering block 32¹, similar in form to the centering block 32, see Figs. 11 and 12, said centering block 32¹ being secured to the platen 26¹ by the screws 37¹.

Between each pair of ears is positioned a lever 80, pivotally supported on a pivot pin 81 carried by the ears 27¹, each lever comprising a long upper arm 80^b and a short lower arm 80^a. The upper arm 80^b is formed to provide a yoke 82 at its upper end between the arms of which is rotatably mounted on the pin 83, a roller 84. At the lower end of the lower arm 80^a there is formed two extensions or legs 85 integral with said arm arranged to provide a 90° angle between the inside faces 86 of said legs, see Fig. 21. Mounted on the faces 86 of the legs 85 is a right angle clamping jaw 90, removably secured thereto by the set screws 91, said clamping jaw providing two clamping faces 90^a and 90^b accurately machined in a 90° relationship and defining at their juncture a corner 92, which actually is a very small rounded fillet. This rounding of the corner 92 will bring the mitered edges 71 into abutting engagement in the manner to be hereinafter described and obviates sharp corners which might accidentally cause cuts and tears. Fig. 15 shows a rounded corner 75 of the attached end closure.

The arrangement of the clamping jaws 90 on the legs 85 is such that the same are brought into parallel relationship with the end and side faces 32^{a1} and 32^{b1} of the centering block 32¹ when the levers 80 are swung outwardly in the manner to be hereinafter described, to their maximum clamping position. In order to properly adjust the clamping jaws 90, shims 93 may be utilized between the same and the faces 86 of the legs 85. Connecting each pair of diagonally opposed levers 80 is a tension coil spring 95, the ends of which are suitably attached to pins 96 provided on the sides of the lever arms 80^b.

Inasmuch as the jig 25¹ is designed for a square end closure 70, each lever 80 and the clamping jaw 90 carried thereby is identical. In the normal inward position of the levers 80 under the action of the tension coil springs 95, the end faces 97 at each free end of the legs 85 are in spaced opposed relation, see Fig. 20. These end faces are constituted by the terminal ends of the legs and clamping jaws which preferably are machined to provide a true plane surface normal to the plane of its associated clamping jaw

face. Thus, when the levers 80 are forced outwardly to their maximum clamping position the opposed end faces 97 of adjacent legs will abut each other to not only provide a continuous clamping surface running the full length of each channel side of the end closure, but will also provide a limit stop to prevent a further clamping action which might prove destructive to the end closure and carton. By virtue of the diagonal mounting of each lever 80 the same will swing about their pivots 81 in diagonal planes in the manner readily apparent.

The jig 25¹ operates in much the same manner as the jig 25, and its operation is best illustrated in Figs. 17, 19 and 20. The method of operation has been illustrated and described with reference to the diagrammatic showing in Fig. 17. In Fig. 19, the end closure 70 is shown in placed position on the carton 10 with the edge portions 10^a thereof inserted within the channels 72, under the action of the plunger die or centering block 32¹ seated within said end closure. With the parts so positioned, as illustrated, a cam plunger (not shown) riding on the rollers 84 and having guided engagement with the bore 30¹ will operate on said rollers to simultaneously swing the levers 80 on their pivots 81, outwardly, against the action of the coil springs 95. This outward swinging movement of the levers 80 in diagonal planes will impart an inward movement to the lower arms 80^a carrying the right angle clamping jaws 90, to cause the same to forcibly engage the outer walls of the channels in opposed relation to the clamping jaw faces of each clamping jaw, so as to force said outer walls into clamping engagement with the said carton edge portions. The clamping pressure applied to the outer channel walls is compound, that is, part of the pressure acts normal to the outer walls in a direction towards the centering block 32¹ and part of the pressure acts at an inclination towards the outer walls in opposed directions from each end of an outer channel wall towards the center thereof. Thus the clamping pressure as applied not only closes the channel walls into clamping engagement with the marginal end portions 10^a of the carton but also acts to force the terminal opposed ends of adjacent channels into abutting engagement as at 73 to effect the closed corner thereat, rounded at its edge as at 75, see Fig. 15. During this movement the inside channel walls are "backed up" by the centering block 32 which serves as a rigid abutment, to thereby cause the channel walls to be drawn together under pressure for tight clamping engagement with the carton edge portions in the manner readily apparent. As with the end closure 12, the end closure 70 is provided with an inwardly directed flange 76 which under the aforesaid clamping action will be caused to penetrate into said edge portions 10^a, the clamping action being such that the outer channel walls will lie substantially flush with the outer wall surfaces of the carton as clearly shown in Fig. 16. In place of the penetrating flange 76 on the outer channel walls alternative securing means for a like purpose, may be utilized as suggested above with reference to the end closure 12.

By the above described method of clamping the end closure 70 over the open end of the carton 70 and by virtue of the mitered edge construction of the ends of the channels on the end closure 70, there will be produced a rounded edge 75, see Fig. 15, as above described at each corner of the carton. By this method there is thus produced

a corner closure construction that completely encloses the corner of the carton thereby providing a sealed closure that is leakproof in every respect.

It is to be understood that the two methods of attaching an end closure to a carton as described above and as performed by the figs 25 and 25¹ are susceptible of application to any similar type of end closure bounded by a plurality of channels to define the walls or sides of the end closure whether the channels constitute straight sides as in square, rectangular, triangular, hexagonal or other polygonal form of end closure or whether the channels of the end closure constitute curved sides such as in oval or circular forms of end closures.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and that the forms of end closures and assembling jigs as hereinabove described constitute merely preferred embodiments thereof.

What is claimed is:

1. The method of attaching an end closure having a channel formation at its sides to an open end of a carton, which consists in placing the end closure over the open end of the carton, forcing the end closure into the open end of the carton so that the marginal end portions of said carton will enter the channel formations, and thereafter simultaneously applying a plurality of individual independent clamping actions around the entire extent of said channel formation, in substantial normal relation thereto.

2. The method of attaching an end closure having a channel formation at its sides to an open end of a carton corresponding in shape to said end closure, which consists in holding the carton in a fixed upright position, superposing the end closure over the open end of said carton, forcing the end closure downwardly into the open end of the carton to a position where the edge of the marginal end portions of said carton entering said channel formations will abut the base of said channel formations, and thereafter simultaneously applying a plurality of individual independent clamping actions around the entire extent of said channel formation in substantial normal relation thereto.

3. The method of attaching an end closure having a peripherally divided channel formation to an open end of a carton having a shape corresponding to the shape of the end closure as defined by its peripheral channel formation, which consists in holding the carton in a fixed position, placing the end closure in position over the open end of the carton, forcing the end closure inwardly into the open end of the carton so that the marginal end portions of said carton will enter the channel formations, and thereafter applying simultaneously to each channel formation an individual independent clamping action in substantial normal relation thereto.

4. The method of attaching an end closure having a peripherally divided channel formation to an open end of a carton having a shape corresponding to the shape of the end closure as defined by its peripheral channel formation, which consists in holding the carton in a fixed position, placing the end closure in position over the open end of the carton, forcing the end closure inwardly into the open end of the carton so that the marginal end portions of said carton will enter the channel formations, and thereafter applying simultaneously to adjacent portions of ad-

jacent channel formations an individual independent clamping action.

5. The method of attaching an end closure having angularly related edges with a channel formation along each edge to an open end of a carton having a shape corresponding to the shape of the end closure as defined by its edge channel formations and to form a completely closed corner at the juncture of adjacent channel formations; which consists in holding the carton in a fixed position, placing the end closure in position over the open end of the carton, forcing the end closure inwardly into the carton so that the marginal end portions of said carton will enter the channel formations, providing a fixed rigid abutment at the inner wall portion of each channel formation, and applying to each channel formation along its outer wall portion a clamping pressure acting in part normal to said outer wall portion and in part at an angle thereto and in opposite directions whereby the carton marginal edge portions will be tightly clamped between the walls of the channel formations and the opposed ends of adjacent channel formations will be drawn into abutting engagement.

6. The method of assembling a pre-formed box-like sheet metal end closure shaped to fit over the open end of a paper carton and provided with raised channels on the side edges thereof to receive the side walls of the carton therein; comprising the steps of first, positioning the end closure over said open end; second, placing a die within said end closure in direct engagement with the inside channel walls and through the medium thereof forcing the same downwardly on said carton whereby to completely position the edge portions of the sides thereof into said channels; third, pressing said channel walls together into clamping engagement with said edge portions of said carton by a radial movement of a plurality of cornered dies corresponding in number to the number of corners on said end closure, against said channel outside walls.

7. The method of attaching an end closure having a channel formation comprising inner and outer walls formed at each of its sides to an open end of a correspondingly shaped carton, which consists in placing the end closure over the open end of the carton, forcing the end closure into the open end of the carton so that the marginal end portions of said carton will enter the channel formations, and striking out from said outer channel walls inwardly directed projections to enter said carton marginal end portions simultaneously with a clamping action applied to each of said channel formations.

8. The method of attaching an end closure having a channel formation comprising inner and outer walls at its sides with an integral penetrating portion formed on said outer walls to an open end of a correspondingly shaped carton, which consists in placing the end closure over the open end of the carton, forcing the end closure into the open end of the carton so that the marginal end portions of said carton will enter the channel formations, and simultaneously applying a plurality of individual independent clamping actions around the entire extent of said channel formation to force said penetrating portions into said marginal end portions.

9. A device for assembling and attaching a metallic end closure to an open end of a correspondingly shaped carton comprising a platen, a centering block carried by the underside thereof arranged to fit within said end closure, a plu-

5 rality of clamping jaws movably mounted on said platen substantially in the plane of said centering block, said device operating to first place said end closure in position with relation to the open end of said carton, and secondly to simultaneously move said clamping jaws for coaction with said end closure to effect a clamping engagement of the same to said carton.

10 10. A device for assembling and attaching a pre-formed metallic end closure including a vertical channel formed at each side thereof open at its bottom and extending above the plane of said end closure to the open end of a correspondingly shaped carton, comprising a platen, a centering block carried by the underside of said platen arranged to snugly fit within said end closure in abutting engagement with the inside walls of said channels, and a plurality of clamping jaws movably mounted on said platen; said device operating to first force said end closure into the open end of said carton whereby the marginal ends thereof will enter said channels, and secondly to simultaneously move said clamping jaws into engagement with the outer walls of said channels to force the same towards said inner walls whereby to effect a clamping engagement of said channel walls to the marginal ends of said carton.

15 11. In the device as set forth in claim 10, wherein said clamping jaws are each formed to independently engage an outer wall of each channel, and are adapted for movement normal to the plane of its associated channel outer wall.

20 12. In the device as set forth in claim 10, wherein said clamping jaws are each formed to correspond in shape to an associated corner of said end closure including angularly related clamping faces adapted to engage adjacent portions of adjacent channel outer walls forming said corner, and are adapted for diagonal movement towards said adjacent portions in a plane bisecting the angle defined by said corner, whereby under said simultaneous movement all of said clamping jaws will move diagonally inwardly towards said centering block to completely surround said channel outer walls at the end of their clamping movement.

25 13. In the device as set forth in claim 10, including a plurality of levers pivotally mounted intermediate their ends to said platen on axis parallel to the plane of said platen, each lever extending above and below said platen, the depending portion of each lever being adapted to carry one of said clamping jaws formed to independently engage an outer wall of each channel, the upper portion of each lever carrying a roller, the arrangement being such that all of said rollers are in juxtaposition and are adapted for engagement with a movable cam means for effecting a simultaneous movement of said levers to simultaneously operate said clamping jaws.

30 14. In the device as set forth in claim 10, including a plurality of levers pivotally mounted intermediate their ends to said platen on axis parallel to the plane of said platen for swinging movement in vertical planes bisecting the corners of said centering block and end closure, the depending portion of each lever being adapted to carry one of said clamping jaws formed with

angularly related faces corresponding in shape to the corner of said end closure opposite thereto, a roller carried by the upper portion of each lever, the arrangement being such that all of said rollers are in juxtaposition and are adapted for engagement with a movable cam means for effecting a simultaneous movement of said levers to simultaneously operate said clamping jaws.

35 15. A jig for assembling and attaching a pre-formed metallic end closure to an open end of a correspondingly shaped carton comprising a platen, a plurality of pairs of ears extending outwardly from the sides thereof, spaced parallel walls depending from the underside of said platen, a centering block removably secured to the walls of said platen, a lever pivotally mounted intermediate its ends between each pair of ears including a lower arm and an upper arm, a clamping jaw removably attached to the lower arm of each lever in opposed relation to said centering block, a roller mounted on the end of each upper arm, spring means connecting the upper arms of opposed levers to draw the same to each other so as to bring said rollers into juxtaposition, said rollers being adapted to be engaged by a cam means for effecting a simultaneous outward swinging movement of said levers to impart a movement of said clamping jaws toward said centering block.

40 16. In the jig as set forth in claim 15 wherein said platen is of rectangular form with each side thereof being provided with a pair of said ears whereby said levers pivotally mounted thereon at opposite sides of the platen are disposed in opposed relation, each said clamping jaw including shim means for adjustably mounting the same on its respective lever and provided with a flat clamping face adapted to be brought into parallel relation with an opposed end face of said centering block, the clamping jaws arranged at the long sides of said platen extending beyond the terminal ends of the clamping jaws arranged at the short sides of said platen whereby the latter are movable between the former, the clamping jaws being so constructed that in their final clamping position the first mentioned clamping jaws will abut the terminal ends of the second mentioned clamping jaws to provide a continuous clamping surface to completely surround said end closure.

45 17. In the jig as set forth in claim 15, wherein said pairs of ears are arranged on the platen in diagonally opposed relation, whereby said levers pivotally supported thereon are adapted to swing in vertically diagonally intersecting planes, the clamping jaw carried by the lower arm of each lever being formed to provide diverging legs having angularly disposed clamping faces complementary to the corner of the end closure and centering block opposite thereto, the construction of said clamping jaws being such that the terminal ends of opposed diverging legs present parallel flat end surfaces adapted to abut each other when said clamping jaws are moved to their clamping position whereby to provide a continuous clamping surface to completely surround said end closure.

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