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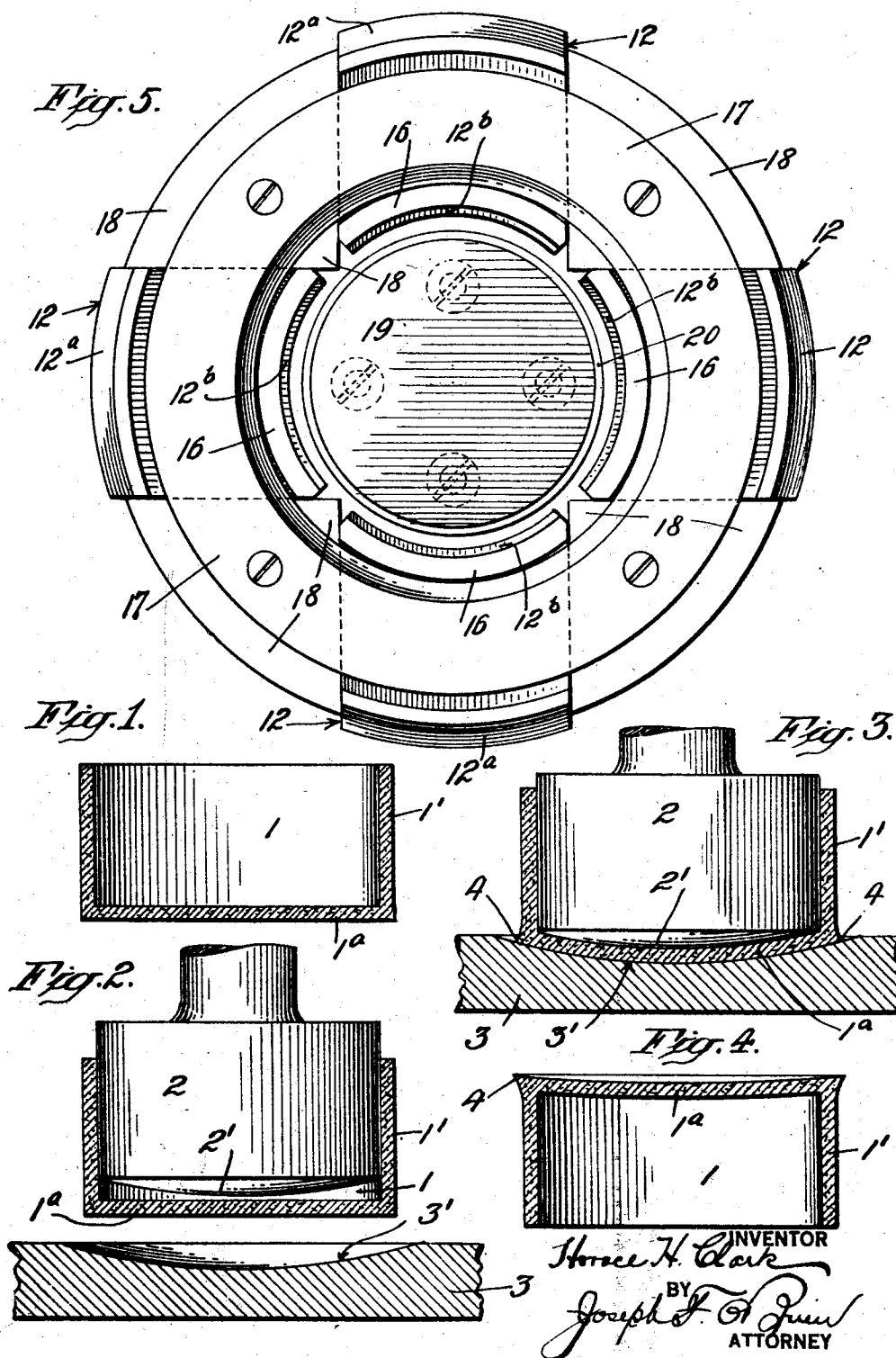
H. H. CLARK

1,776,888

METHOD AND APPARATUS FOR MAKING FLANGED CONTAINERS

Filed July 23, 1927

3 Sheets-Sheet 1



Sept. 30, 1930.

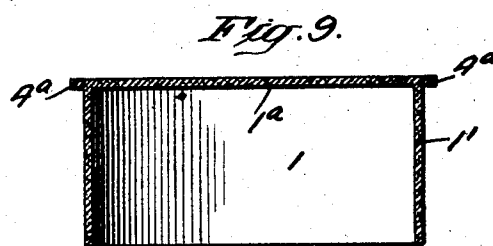
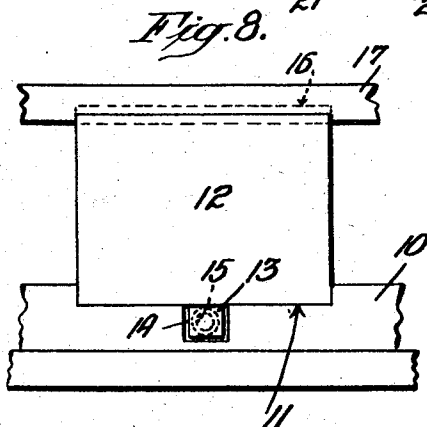
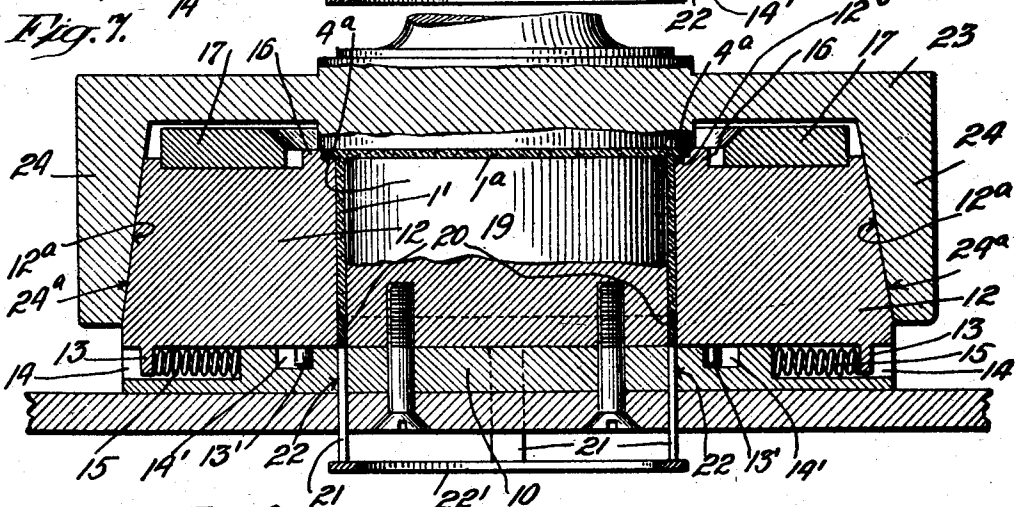
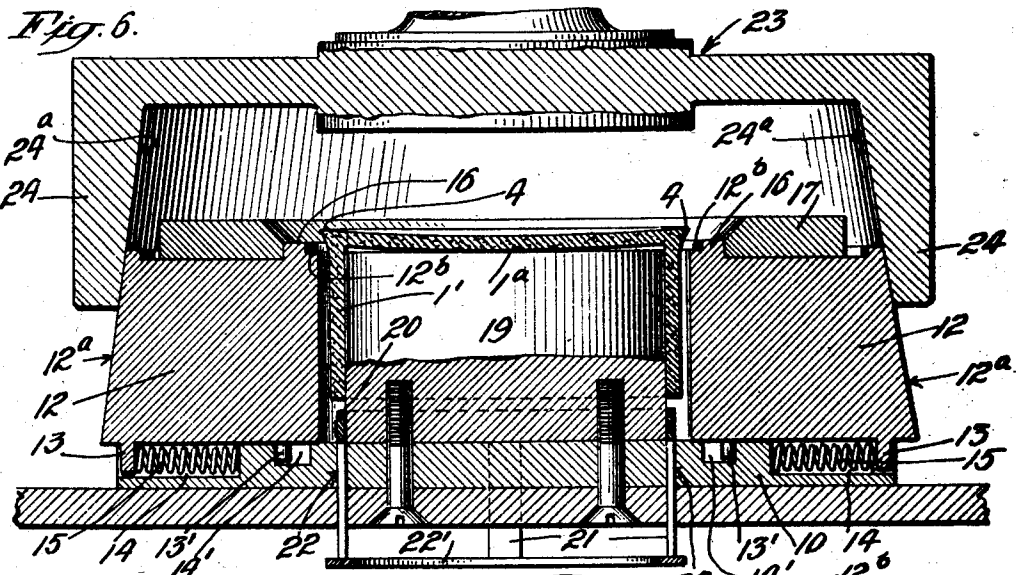
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METHOD AND APPARATUS FOR MAKING FLANGED CONTAINERS

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3 Sheets-Sheet 2



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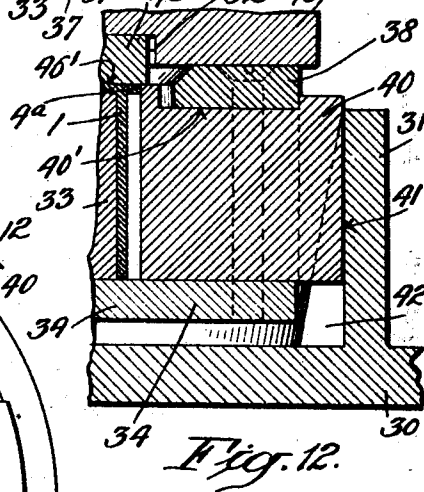
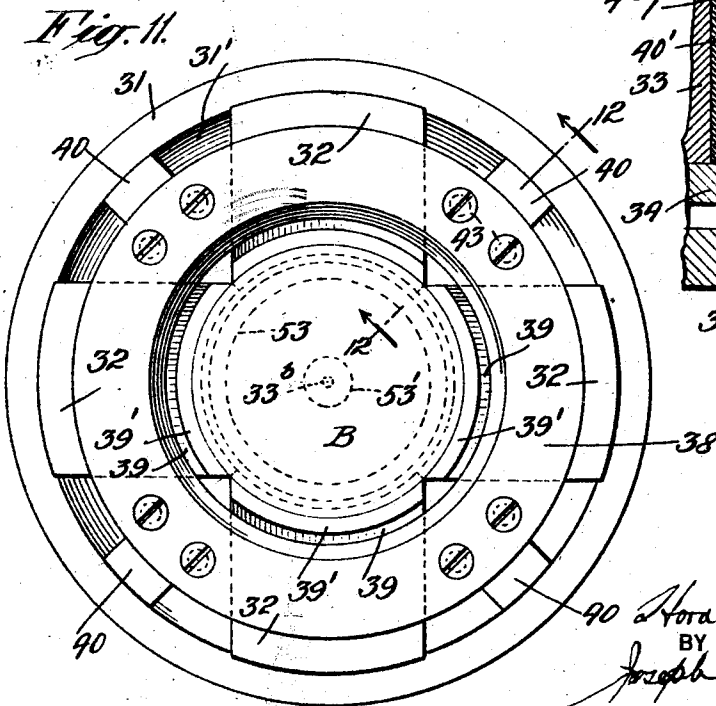
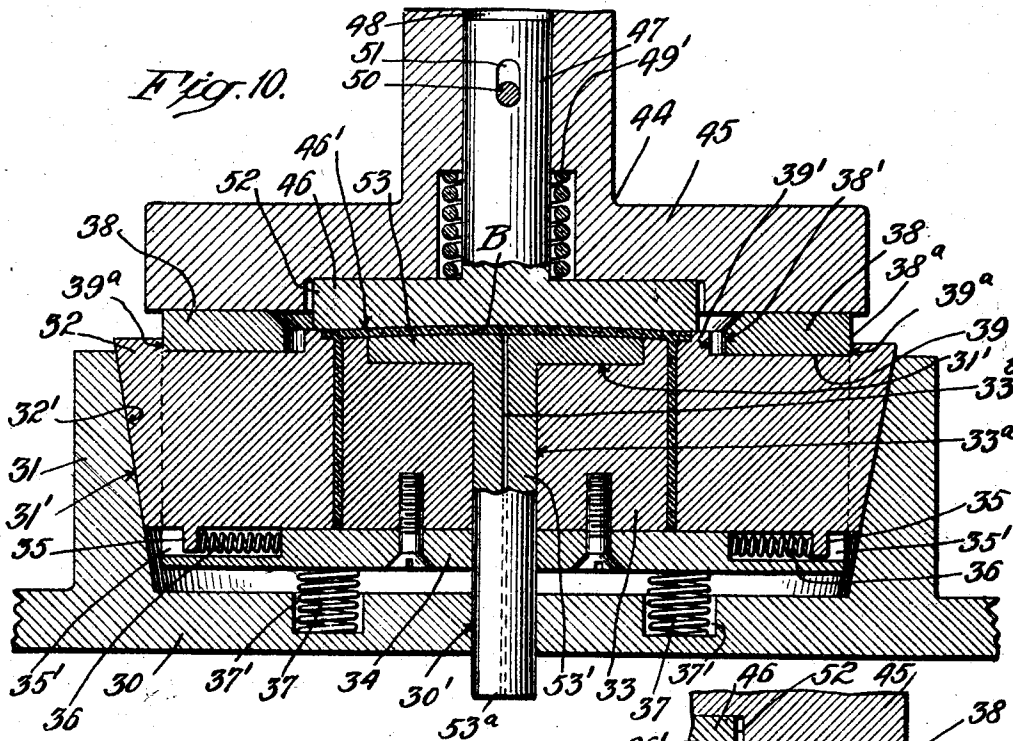
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METHOD AND APPARATUS FOR MAKING FLANGED CONTAINERS.

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3 Sheets-Sheet 3



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METHOD AND APPARATUS FOR MAKING FLANGED CONTAINERS

Application filed July 23, 1927. Serial No. 207,891.

This invention relates to improvements in method and apparatus for making flanged containers.

One of the objects of this invention is to produce boxes or containers for holding powders, perfumes, pills and the like which will have perimetric integral flanges forming stops for covers and by reason of the integral formation providing for the box increased strength, rigidity and durability and making the box capable without rupture of withstanding climatic changes, such as encountered in crossing the ocean; to produce from blanks of a moldable material such as paper stock or like fibrous material, boxes or containers having integral bottoms and integral perimetric flanges; to provide a method by which such perimetric integral flanges may be pressed from the material of the bottom and side walls of a container having a bottom initially formed integrally with the side walls; to provide a method whereby a flange integral with the bottom and side walls may be formed on the outer perimeter and in the plane of said bottom portion of the container to provide a stop for a removable cover; to provide a method whereby the bottom portion of a blank of general cup-shaped form produced by the usual screen method will be initially compressed to produce a rudimentary flange or initial projection, bulge or extension around the perimeter of such bottom and said blank is subsequently further compressed around the cylindrical body and bottom to further extrude material and to completely form a flange of the desired width and shape, said subsequent compression preferably being initially exerted on the cylindrical wall and thereafter exerted on the bottom and wall conjointly; to provide apparatus and preferably novel compressing dies, one for compressing one portion of the blank, such as the bottom while permitting the junction with the other portion to remain free so as to produce a rudimentary flange at such junction, and another die for compressing the entire blank against an internal core, but first compressing the uncompressed body part of the said blank to further force or press material outwardly toward and about

the junction with the bottom and thereafter, while continuing pressure on said body, again compressing the bottom and rudimentary flange to form the completed flange.

With these and other objects in view, the invention comprises the combination of members and arrangement of parts so combined as to co-act and cooperate with each other in the performance of the functions and the accomplishment of the results herein contemplated, and comprises in one of its adaptations the species or preferred form illustrated in the accompanying drawings, in which:—

Fig. 1 is a section of an uncompressed molded blank such as used by me;

Fig. 2 is a section showing the blank mounted on a plunger to be initially compressed to produce a rudimentary bottom flange;

Fig. 3 is a view similar to Fig. 2, showing the blank compressed between the plunger and the die;

Fig. 4 is a section showing the blank formed with rudimentary bottom flanges;

Fig. 5 is a plan view of the compression die preferably employed by me to compress the blank and complete the formation of the container with an integral bottom flange;

Fig. 6 is a vertical central section of the die shown in Fig. 5, with the plunger raised and the die sections in expanded position before compression of the blank by said sections and plunger;

Fig. 7 is a view similar to Fig. 6, showing the die sections and plunger in pressure-exerting position;

Fig. 8 is an end elevation of one of the die sections;

Fig. 9 is a section of the finished flanged box when removed from the apparatus after compression as shown in Fig. 7;

Fig. 10 is a vertical, central section similar to Fig. 7 of a modified form of finishing die and plunger mechanism in pressure-exerting position, the parts of the die being arranged in substantially reversed or inverted relationship to the parts shown in Fig. 7;

Fig. 11 is a plan view of the die shown in Fig. 10 with the plunger removed; and

Fig. 12 is a fragmentary section on the line 12—12 of Fig. 11.

Referring now to these drawings, 1, (Fig. 1) indicates a cup-shaped blank having a cylindrical side wall 1' and an integral bottom 1^a, the blank 1 preferably being molded by the depositing of pulp in a suitable screen or perforated mold. The cup-shaped blank 1 thus formed, while still in a wet, plastic condition, preferably has a portion, and as shown, the bottom portion compressed while the edge or junction thereof with the other part is free. The bottom, as shown, is so compressed between a plunger 2 and a die 3. The plunger has a convex bottom 2' and the die plate has a concave depression 3' of a curvature substantially parallel with the convex portion 2' of the plunger 2. It will be noted that the curvature of the engaging surfaces is in the direction of the uncompressed body portion and that said concave depression, while being substantially parallel, is of greater diameter than the width of the plunger so that when the plunger is forced downwardly, the bottom 1^a of the cup-shaped blank will be compressed and material forming a rudimentary or partial flange 4 will be forced or extruded outwardly between the concave and convex surfaces of the plunger 2 and a die plate 3, the bottom 1^a of the blank 1 being compressed and shaped into convex form. These blanks so initially compressed are then inverted and permitted to dry whereupon the bottom 1^a will drop so as to provide a concave outer surface and a convex inner surface. I preferably permit the blanks to dry for a period of days when the material will assume a substantially dry condition, though a considerable percentage of the water will still be contained therein.

When so dried, the partially compressed blank is then inserted in the finishing die, two forms of which are shown in the drawings, which first compresses the side wall while the junction portion with its rudimentary flange is still uncompressed so that material for the flange is further pressed or forced from the side wall toward the bottom. Thereafter pressure is applied on the bottom portion while pressure on the cylindrical side wall is maintained, the result being that the material extruded initially from the bottom by the plunger 2 and from the side wall by the sectional die will be consolidated into a flange which will be integral with the bottom and side wall of the container.

The finishing die shown in Figs. 5 to 8 inclusive comprises a base 10 having grooves 11 in which four jaws 12, have a limited sliding motion. Each jaw has a projection 13 extending downwardly into a lower groove 14 in the base 10, and 15 indicates compression springs nested in said lower groove 14 bearing on lugs 13 normally tending to force the jaws 12 outward. Lateral motion of these jaws is limited by pins 13' operating in limited openings 14' and by upwardly pro-

jecting lugs 16 on their upper inner corners cooperating with the retaining ring 17, which rests on the tops of the jaws. 18 indicates guide blocks for jaws 12, said blocks being formed in or fastened to the base 10 in any other convenient manner.

19 is a cylindrical core placed centrally of the apparatus, and 20 is a stripper ring surrounding the core 19 and located between said core and the die sections 12. Said ring 20 is movable upward by means of arms 21 projecting downwardly through openings 22 in the base and connected by an annular ring 22' below said base. The stripper ring is of a thickness equal to the thickness to which it is desired to compress side walls of the finished container or box.

23 is an exterior plunger supported over the die-jaws and movable along the line of the axis of the core 19. This plunger is hollow and has a flange 24 which extends downward around the jaws 12. The outer edges of the jaws 12 have inclined surfaces 12^a and the inner surface 24^a of the downwardly-extending flange 24 is given a complementary incline so that, when the plunger 23 descends, the interior surface 24^a of the flange 24 will wedge down on the exterior surfaces 12^a of the jaws 12 and force them inward toward the core 19.

The upper inner corner of each jaw 12 is cut away at 12^b to conjointly form an annular recess (see Figs. 5, 6 and 7) in which annular recess space is provided for the rudimentary flange of the blank and within which additional moldable material, which is temporarily left uncompressed by the blank-engaging side walls of the jaws, may be forced or squeezed to form the desired flange on the container to be molded.

According to my improved process, a blank which has been previously formed between the plunger 2 and die 3 to provide a rudimentary flange 4, is dropped between jaws 12 over core 19, as shown in Fig. 6, plunger 23 and flange 24 being raised to permit this, and the jaws being held apart by the springs 15. The plunger 23 is then forced down as shown in Fig. 7, the cooperating inclined surfaces 12^a and 24^a forcing the jaws toward the core 19, and compressing the side walls 1^a of the blank in the manner indicated in said Fig. 7. The die recess 12^b, however, leaves the material of the bottom 1^a and the rudimentary flange 4 uncompressed and undisturbed during a portion of the compression of the side wall. During the last fraction of the downward travel of the plunger 23, it bears upon the bottom 1^a of the blank while maintaining pressure against the wall, thus further compressing the bottom against the top of the core 19 and compacting the wall and bottom to uniform or other predetermined thickness and also completing the compacting and shaping of

the perfected flange 4^a within the groove 12^b (see Figs. 6 and 7).

The plunger 23 is then lifted, the stripping ring 20 forced upward to strip the molded cup from the core 19, another fresh blank is placed in the dies and the operation repeated.

In Figs. 10 to 12 inclusive, I have shown another form of finishing die which enables the use of a plunger having a shorter stroke and has the further advantage of more ready accessibility for the feeding of blanks. In this finishing die the complementary inclines or wedging surfaces are reversed and the plunger member is formed in sections to enable the blank to be more readily positioned in its seat over the core.

In this embodiment shown in said Figs. 10 to 12, a wedge member 30 is stationary and hollow or cup-shaped and is provided with a vertical flange portion 31 having an upwardly and outwardly-inclined surface 31'. Arranged within the flange portion 31 of said hollow wedge member 30 and cooperating therewith are blank-compression members for the side-wall and bottom of the blank. As illustrated, the side-wall compression members comprise a series of four jaws 32 mounted in a frame, movable vertically and comprising a bottom plate 34 and a ring 38 suitably spaced by blocks 40. This frame is movable vertically and carries the jaws 32 which are movable radially therein toward and away from a centrally-located core 33 also mounted in or carried by said frame. Radial compression movement is, as shown, imparted to the jaws 32 by providing them with inclines 32' complementary to the inclined surfaces 31' of the flange 31 and adapted to cooperate with and ride upon the said inclined or conical surfaces 31' of the exterior flanges 31 of the said base portion 30. Upon depression of the frame, the jaws 32 will engage the interior surfaces 31' of the said flange 31 and will ride down on its stationary incline which movement will force the said jaws 32 to slide inward toward the core 33. The sliding movement of the jaws is preferably limited in relation to the base plate 34 and, as shown, each jaw has a projection 35 extending downwardly into a groove 35' in the base plate 34, and 36 indicates compression springs nested in grooves 35' and bearing at one end against the downwardly-projecting lugs and at the other end against the wall of a groove 35'. These springs normally tend to force the jaws 32 into contact with the inclined surfaces 31'. The said frame is normally moved into elevated position so as to permit a separation of the jaws from the core by said springs 35. This elevation is imparted by expansion springs 37 arranged in grooves 37' in the base member 30. The radial movement of the jaws 32 is limited in opposite directions by the edges of the ring 38 which fits in grooves 39

in the upper edges of the jaws 32 and abuts in opposite positions against shoulders 39' and 39^a respectively. The ring 38 preferably also rests intermediate each of the jaws in grooves 40' in the stationary blocks 40 which are provided with a straight outer edge 41 which fit within grooves 42 on the interior wall of the flange 31, these blocks 40 being fastened to the said rings by screws 43 which extend downwardly at opposite sides of each of the blocks 40 into the base member 34. These blocks 40 with the ring 38 and base member 34 thus form the frame in which the jaws 32 are arranged to slide radially, and said sliding movement is limited, as aforesaid, by the shoulders 39', 39^a which contact with the inner and outer edges 38', 38^a of the ring 38.

In the preferred embodiment of my invention, downward compression movement is imparted to the side-wall compression jaws by a plunger 44. This plunger is also utilized to compress the bottom of the blank and, as illustrated, is formed of two sections 45 and 46, a main and an auxiliary plunger section, which are arranged to have a limited relative movement. For this purpose the main plunger section 45 carries the auxiliary plunger section 46 which is preferably provided with a stem 47 seated within a hollow stem-seat 48 in the stem 49 of the main plunger member 45 and is normally forced outwardly away from said main plunger member 45 by a compression spring 49' surrounding the stem 47, the said two parts preferably being connected together by a slot and pin connection, a pin 50 passing through the hollow stem 49 and through a slot 51 in the stem 47 so that a slot and pin connection is provided between the two parts of the plunger member 44. Said plunger section 46 is also preferably seated within a shallow groove 52 in the outer plunger 45 and has its lower surface 46' preferably slightly concave and adapted to contact with the upper surface of the blank B inserted between the die sections and the core 33.

Obviously in this form of die and plunger mechanism, the raising of the plunger a short distance uncovers the blank seat and enables the blank to be inserted therein with a shorter movement of the plunger. Furthermore, the formation of the plunger in two parts enables, upon depression of the plunger, the top portion of the blank to be initially compressed against the action of the spring 49'. Further movement of the plunger will cause the two sections to move together. The jaws will be moved inwardly in a radial direction to conjointly compress the side walls and the plunger section 46 compressing the bottom portion of the blank. This compression by the plunger 44 is exerted against the action of the springs 37. When the plunger is elevated but a slight distance, the bottom of the blank will be exposed. Release of pressure by the plunger will also cause the upward

movement of the die-frame carrying the sliding jaws, which jaws will thereupon be moved outwardly by the action of the springs 36 to release the blank.

5 In the preferred embodiment of my invention, the core 33 is provided with a depressed stripper seat 33' communicating with a central bore 33^a in which is seated a stripper 53 having a stem 53' extending through the bore 33^a and preferably also extending through a
10 bore 30' in the bottom member 30 so as to have a portion 53^a extending below said bottom portion to permit a raising of the stripper and a stripping thereby of the blank from the core while the plunger is raised and during
15 the outward radial movement of the die sections. The stem 33^a of the stripper is preferably provided with a vent hole 33^b to prevent occlusion of air between the stripper and the bottom of the blank. Any suitable
20 power may be applied to the plunger to cause a compression of the blank. When the plunger is lifted or raised, the stripper 53 may be forced upwardly to strip the molded cup from the core 33, whereupon a fresh blank is placed around the core and between the same and the die sections, and the operation is repeated.

While I have shown dies shaped to form
30 a circular container, dies producing boxes or containers of any polygonal cross section could be substituted and other changes made in the detail construction of the various parts without departing from the principle of my
35 invention so long as my improved product is produced or my novel method is followed or so long as the apparatus employed is capable of producing initially lateral compression of one portion toward a junction and
40 the subsequent compression of the other integral portion to form the desired flange.

It will be seen from the above that I have produced a container comprising a body portion provided with an integral bottom and
45 an integral flange at the junction of said integral portions; that such a flange is preferably formed in the plane of the bottom; that such a flange in the plane of the bottom will not only provide a stop for the usual cover
50 which is passed exteriorly over the cylindrical portion of the container, but will reinforce the said container, greatly increasing the rigidity and durability thereof; that in a box so formed the bottom will not part from the
55 cylindrical body as often happens when the two portions are formed by gluing one to the other; that boxes made in accordance with my invention will withstand exceedingly rough usage; that they may be carried
60 about by the user without rupture; that they may be placed upon radiators or other warm surfaces without danger of melting the glue or otherwise separating the bottom from the body portion; that such boxes will withstand
65 changes of temperature, particularly such as

is encountered in crossing the ocean, it being understood that in the use of this box as a container for powder, perfumes or the like, it is frequently compelled to be transported across the ocean and, furthermore, boxes may be so
70 formed in accordance with my invention as to extend beyond the usual cover of the container, so that a complete box thus formed will be reinforced by this strong, rigid and durable bottom flange and in fact that junction
75 between the side wall and the bottom becomes the strongest and most rigid portion of the box and that the conventional weak joint is eliminated.

Having described my invention, I claim:—

80 1. The method of forming boxes or containers consisting of taking a cup-shaped blank, initially forming thereon at the junction between the bottom and side wall rudimentary flange and subsequently completing
85 said flange.

2. The method of forming boxes or containers consisting of taking a cup-shaped blank, initially compressing one portion of said blank while at one side of the junction
90 between the bottom and side wall leaving the portion of the blank at the other side free to form a rudimentary flange, and then compressing the other portion of the blank to produce a finished box having a completed
95 flange.

3. The method of forming boxes or containers consisting of taking a cup-shaped blank, compressing the bottom portion upon the interior and exterior of the blank while
100 permitting the junction portion of the side wall to remain uncompressed to form an initial rudimentary flange, subsequently compressing the side walls while temporarily leaving said junction with its rudimentary
105 flange free from compression and thereafter compressing said bottom portion and rudimentary flange to produce a completely finished flanged box.

4. The method of forming boxes or containers consisting of taking a cup-shaped
110 blank, first, compressing between an axially-moving plunger and a die the bottom portion of the blank while permitting the junction with the side wall to remain uncompressed to form an initial rudimentary flange, subsequently exerting radial pressure by radially-moving members on the side wall while temporarily leaving the junction portion with its
115 rudimentary flange free from compression, and thereafter again compressing said bottom portion and rudimentary flange to produce a completely finished flanged box.

5. The method of forming boxes or containers consisting of taking a cup-shaped
125 blank, first, compressing the bottom portion into an arcuate form while permitting the junction with the side wall to remain uncompressed to form an initial rudimentary flange and a bottom having increased
130

area and subsequently exerting radial pressure by radially-moving members on the side wall of said cup-shaped blank while temporarily leaving the junction portion with its rudimentary flange free from compression and thereafter compressing the bottom and rudimentary flange simultaneously with the side wall portion to produce a completely flanged box.

6. Apparatus for forming boxes, embodying, in combination, means for initially forming on a molded cup-shaped blank a rudimentary flange and independent means for applying pressure on the exterior cylindrical surface of the blank and also applying pressure on the bottom exterior and interior of the bottom portion to finish the flanged container.

7. Apparatus for forming boxes, embodying, in combination, a plunger and a die having cooperating pressure-exerting parts bent to apply pressure radially on a portion of a blank, and to extrude material radially outward.

8. A multiple-part die for forming cups with exteriorly flanged bottoms, which comprises the combination of a central core, a plurality of radially movable exterior die-jaws each notched at one corner to leave space for the flange to be molded, an exterior plunger in line with said core, and mechanism operating to initially force said jaws inwardly to compress the sides of the blank and to subsequently force said plunger down on the bottom of said blank, whereby the material around the bottom of said blank is forced into final compacted form.

9. A multiple-part die for forming cups with exteriorly flanged bottoms, which comprises the combination of a central core, a plurality of radially movable exterior die-jaws each notched at one corner to leave space for the flange to be molded, an exterior plunger in line with said core, and mechanism operating to initially force said jaws inwardly to compress the sides of the blank and to subsequently force said plunger down on the bottom of said blank, whereby the material around the bottom of said blank is forced into final compacted form, and in which said jaws have inclined outer surfaces and said plunger has an inwardly inclined flange adapted to surround and engage said jaws.

10. A multiple-part die for forming cups with exteriorly flanged bottoms, which comprises the combination of a central core, a plurality of radially movable exterior die-jaws each notched at one corner to leave space for the flange to be molded, an exterior plunger in line with said core, and mechanism operating to initially force said jaws inwardly to compress the sides of the blank and to subsequently force said plunger down on the bottom of said blank, whereby the material around the bottom of said blank is

forced into final compacted form, and in which said jaws are normally forced away from said core by suitable springs.

11. A multiple-part die for forming cups with exteriorly flanged bottoms, which comprises the combination of a central core, a plurality of radially movable exterior die-jaws each notched at one corner to leave space for the flange to be molded, an exterior plunger in line with said core, and mechanism operating to initially force said jaws inwardly to compress the sides of the blank and to subsequently force said plunger down on the bottom of said blank, whereby the material around the bottom of said blank is forced into final compacted form, and a movable stripper plate resting on the end of said core.

12. A multiple-part die for forming cups with exteriorly flanged bottoms, which comprises the combination of a central core, a plurality of radially movable exterior die-jaws each notched at one corner to leave space for the flange to be molded, an exterior plunger in line with said core, and mechanism operating to initially force said jaws inwardly to compress the sides of the blank and to subsequently force said plunger down on the bottom of said blank, whereby the material around the bottom of said blank is forced into final compacted form, and also having a ring engaging recesses in said jaws for limiting their radial movements.

In witness whereof, I have signed my name to the foregoing specification.

HORACE H. CLARK.