May 26, 1942. I. F. MANDELL 2,284,492

AUTOMATIC DUPLEX MECHANISM FOR SPINNING CONTAINER CLOSURES

Filed March 13, 1939 2 Sheets-Sheet 1

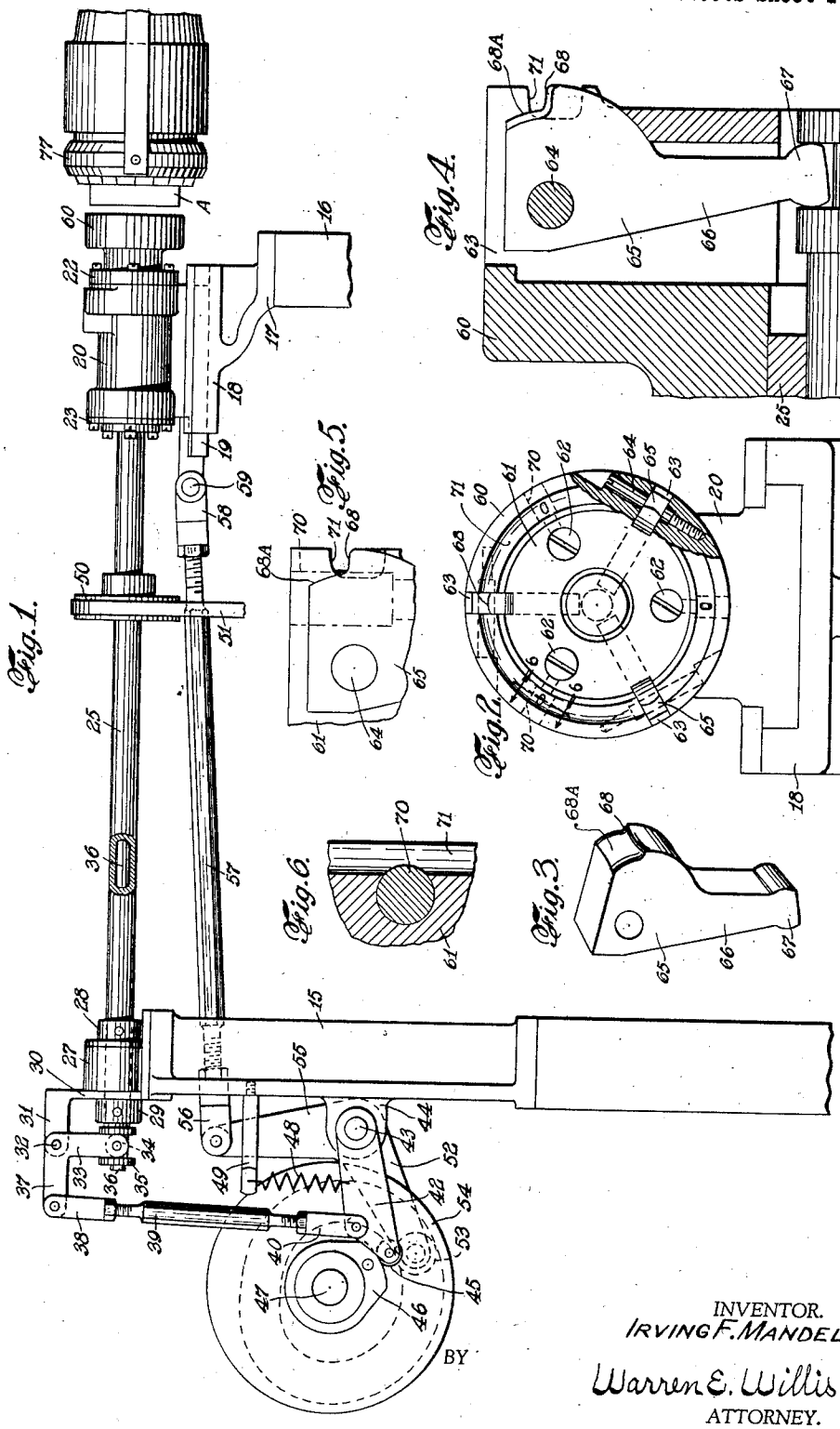


Fig. 1.

Fig. 4.

Fig. 5.

Fig. 2.

Fig. 6.

Fig. 3.

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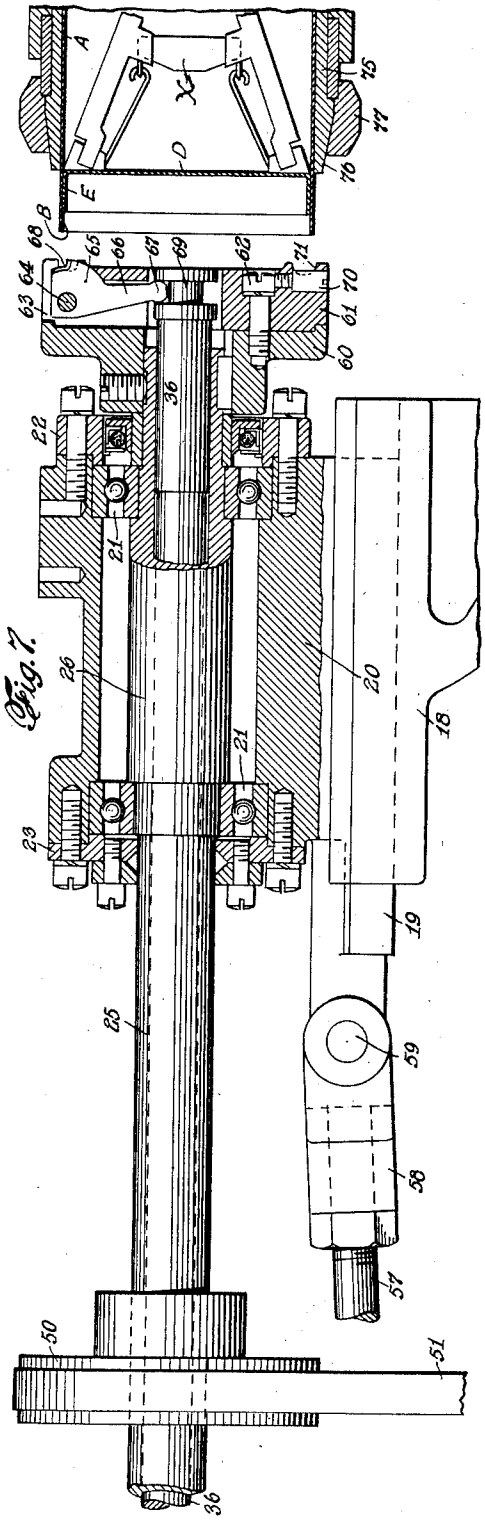


Fig. 7.

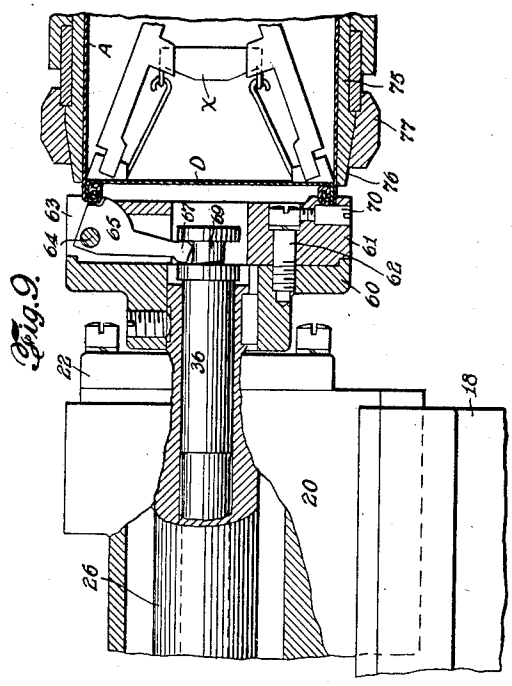


Fig. 9.

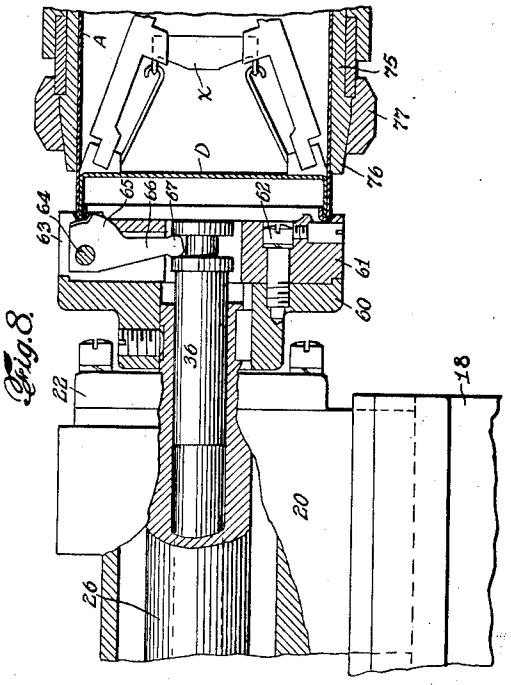


Fig. 8.

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AUTOMATIC DUPLEX MECHANISM FOR SPINNING CONTAINER CLOSURES

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Application March 13, 1939, Serial No. 261,578

15 Claims. (Cl. 93—55.1)

This invention relates to means and mechanisms, employed in the construction of cylindrical paper containers, with especial reference to the formation of their bottom structures, and is an alternate form of structure respective to applicant's co-pending application, filed February 9, 1939, Serial No. 255,469.

An object of the invention is to simplify the mechanism, by reducing the number of parts used, and combining two distinct, but similar, operations into a single unit.

A further feature is in the provision of a mechanism whereby the bottom formation of such containers is brought to a degree of perfection hitherto thought unattained.

Another object of this invention is to provide more efficient inter-locked spinning or curling of the container closure than has heretofore been obtainable by the spinning means previously used.

Another purpose is to produce a mechanical device whereby the production of such containers is materially accelerated, a result highly advantageous in their manufacture.

These and other prominent attainments, which will become obvious as the description proceeds, are accomplished by the novel construction, combination and arrangement of parts hereinafter narrated and revealed in the accompanying drawings, constituting a tangible component of this disclosure, and in which:

Figure 1 is a side elevational view of a complete embodiment of a duplex spinning mechanism made in conformity with the invention.

Figure 2 is a front elevational view of the same, parts being in section to show the construction.

Figure 3 is a perspective view of a bottom spinner element in detail.

Figure 4 is an enlarged fragmentary sectional view of the spinner mounting and associated parts.

Figure 5 is a fragmentary view, similar to Figure 4 showing the relation of the spinner elements.

Figure 6 is an enlarged fragmentary sectional view looking on line 6—6 of Figure 2.

Figure 7 is an enlarged longitudinal sectional view of the machine head in its retracted position relative to the container base.

Figure 8 is a similar view of the same parts as in advanced, primary operative position.

Figure 9 is another like view showing the head as in performing its final operation.

Mounted on the frame of the machine, at its rear, is a column 15 and at the front is a bracket 16 supporting a stand 17, its upper portion merging into a horizontal guideway 18 for a slide 19, part of a housing 20.

Carried in the ends of the housing are anti-friction bearings 21 provided with oil seals of any preferred type at their outer sides to prevent soiling the containers; these bearings are arranged in such manner as to operate both as radial and thrust bearings, and are held in position by bolted clamp rings 22—23, respectively at the front and rear of the housing.

Mounted in these bearings is a hollow shaft 25 having an enlarged diametral portion 26, its shoulders contacting the inner sides of the respective bearings, in such manner as to be moved endwise with the housing by the slide 19.

The rear end of the shaft is journalled in a bearing 27 held between collars 28—29 the bearing being slidably mounted on the column 15.

A plate 30, secured to the bearing, intermediate the collar 29, has a rearwardly reaching arm 31 pivotally supporting, at 32, a bell-crank lever having a downreaching arm 33 carrying a roll 34 engaged between the flanges of a shift collar 35 fixed on the rear extremity of a spindle 36, disposed within the hollow shaft 25.

The other arm 37 of the bell-crank lever is pivotally connected, to one element 38 of a turnbuckle link 39, which is positioned to allow endwise movement of shaft 25 and its associated parts without disturbing the required relative position of the spindle 36 and shaft 25, another, lower element 40 being pivotally engaged with a lever 42, pivoted on a fixed spindle 43 carried by a bracket 44, on the rear face of the column 15.

At the outer end of the lever 42 is a roll 45 actuable by a cam 46 fast on a traverse shaft 47, driven in synchronism with the time cycle of the machine, the roll being held in engagement with the cam by a tension spring 48 attached to a stud 49 set in the column 15.

Thus it will be seen that the spindle 36 is moved reciprocatively and uniformly with relation to the shaft 25, at intermittent intervals by action of the cam 46 irrespective of the position or motion of the shaft 25.

The shaft 25 is rotated at a high rate of speed by a pulley 50, driven by a belt 51, trained thereover, and leading to a motor or other driving means (not shown).

Also pivoted on the spindle 43 is another bell-crank lever, one of its arms 52 carrying a roll 53 engaged in the groove of a cam 54 fixed on the shaft 47 adjacent the cam 46.

The other upstanding arm 55 of the lever is

pivoted to the end element 56 of a substantially horizontal turnbuckle link 57 adjustable in length and having a similar forwardly reaching element 58 at its front end engaged by a pivot to an arm 59 on the slide 19, and by which the slide, and housing 20 fixed upon it, are moved reciprocatively, imparting movement to the shaft 25, and its associated parts.

Set-screwed and keyed to the front end of the hollow shaft 25 is a circular spinning flange 60, its front recessed to receive a spinning head disc 61 secured therein by screws 62.

These elements contain three equidistant radial slots 63 (see Figure 2) in which, pivoted on transverse screw studs 64, are inserts 65, of the nature of levers, their inreaching arms 66 reduced in width and having partly cylindrical terminals 67.

The outer front extending edges 68 of these inserts are curved convexly in a transverse plane and shaped in a peculiar manner for a purpose further on apparent.

The front end of the spindle 36 has an annular recess 69 in which the terminals 67 of the inserts engage, thereby shifting their curling portions 68A upon operation of the cam 46.

The head 60 also has set in it radial studs 70, midway between the inserts 65, the peripheries of their body portions intersecting the semicircular bottom of a shallow annular groove 71 in the face of the head.

The curved portion 68 of the insert 65 is radial about the center of the pin 64, and must be in line with, or slightly back of the level of the studs 70.

In alinement with the axis of the shaft 25 is a spring collet or holder 75 having a conical end 76 directed towards the head and held in spaced relation thereto by another part of the machine, not herein described: this collet is closable by a slidable collar 77 tapered internally to engage the conical end 76 and adapted, when drawn rearwardly, to clamp the wall or shell A of a paper container body entered within the collet.

Engaged near the lower end of the wall is an inverted cup-shaped closure element consisting of a disc D having a short annular skirt E, attachable by an adhesive to the interior of the shell A, which extends beyond the skirt edge a definite distance, as at B.

This bottom closure is firmly backed by a collapsible mandrel X, described in detail in U. S. Patent No. 2,181,816.

In operation, the head is advanced by the cam 54, the primary curling elements 65 being in the position shown in Figures 4, 7 and 8, as the head slowly advances to meet the edge of the container wall; as the head still further advances, the outer portion of the groove 71, studs 70 and the curling portion 68 of the primary curling element 65, co-act to form a relatively close initial inward curl, as in Figure 8.

The relative rotative position of the spinner studs 70, the groove 71, and the curling portion 68A of the preliminary curling element 65, are indicated in Figure 5, in which the element 65 is shown in its preliminary curling position in full lines, while the relative rotative position of the studs 70 is indicated by broken lines, these elements being revolved at a high rate of speed, causing the curling surfaces as indicated in Figure 5 to curl the edges of the container.

When the initial curl has been formed to 180 to 200 degrees from the original wall shape, the primary curling elements 65 are quickly retracted to an inoperative position, as in Figure 9, while the head is still slowly advanced, by the cam 54. During its further advance, to the end of its travel, the groove 71, and studs 70 in the head, complete the interlocking curl by spinning the combined edges of the container and its closure, the studs 70 also having a flattening effect on the bottom portion of the curled closure thereby producing a level base on the container.

From the foregoing it will be seen that a simple device for this purpose has been disclosed in the preferred form of its embodiment, but it is not desired to restrict the details of the invention to the exact construction shown, it being obvious that changes may be made without departing from the scope of the invention in its broadest aspect.

Having thus described the invention, what is claimed as new and desired to secure by Letters Patent, is:

1. A machine for clinching closures in containers, comprising a spinner head having an annular groove of curved cross section, cam actuated means to slide said head linearly, means to rotate said head, a plurality of integral spinner formers movably mounted therein, and means to move said formers in timed relation with the sliding movement of said head.

2. A machine for setting closures in cylindrical containers, comprising a spinner head having an annular groove of curved cross section, cam controlled means to slide said head linearly, means to rotate said head, a plurality of non-rotative spinner formers pivotally mounted therein, cam controlled means to control the position of said formers relative to the outer annular portion of said groove, and radial studs set in said head intersecting the bottom of said groove.

3. In a machine for clinching a closure in a cylindrical container shell, a head having an annular spinning groove in its face corresponding with the diameter of the container, means to impart rapid rotation to said head, cam actuated means to move said head intermittently endwise, non-revoluble unitary spinner formers movably mounted in said head, cam means to move said formers into and out of curl restricting position relative to the container body shell and closure skirt therein and a backing to support said closure enterable through the opposite open end of said container.

4. A machine for uniting an inverted cup-shaped closure within a cylindrical paper container, comprising in combination with a stationary holder for the container and inserted closure therewithin, and a collapsible member enterable the opposite open end of the container to support the closure, a shaft mounted for longitudinal movement, means to rotate said shaft, means to move said shaft intermittently endwise, a head fixed on said shaft, said head having an annular groove in its face, spinner formers movably mounted in said head adapted to closely curl the end wall of the container inwardly when pressed thereagainst, and spinner elements in said head intermediate said formers transversely intersecting the bottom of said groove to complete curling the closure seam when said formers are retracted.

5. A machine for uniting an inverted cup-shaped closure within a cylindrical paper container, comprising in combination with a stationary holder for the container and inserted closure therewithin, a head having an annular

spinning groove in its face corresponding with the diameter of the container, means to impart rapid rotation to said head, a cam having connections to move said head linearly in the plane of the axis of the container, spinner formers movably mounted in said head adapted to closely curl the end wall of the container inwardly when pressed thereagainst, a second cam having connections controlling the movement and position of said formers, said cams and head operated in timed relation, and other means in said head to compress, complete and cause coalesence of the curled edges.

6. A machine for uniting an inverted cup-shaped closure within a cylindrical paper container, comprising in combination with a stationary holder for the container having an inserted closure therewithin, a spinning head having an annular spinning groove in its face corresponding with the diameter of the container to cause an initial inward curl on the container edge, means to impart rapid rotation to said head, spinner formers movably mounted in said head, a cam having connections whereby the formers are moved into and out of curl forming position in advance of said head, a second cam having connections to move said head linearly in the plane of the axis of the container, said second cam advancing the spinning head to first restrictedly curl the container wall inwardly, and secondly, after retraction of said formers to complete the curling of the combined edges of the container and closure.

7. A machine for uniting an inverted cup-shaped closure within a cylindrical paper container, comprising in combination with a stationary holder for the container and an inserted closure therewithin, a hollow shaft mounted for longitudinal movement, means to rotate said shaft, means to move said shaft endwise, an annularly grooved spinning head fixed on said shaft, spinner formers movably mounted in said head, intersecting the groove, a cam to move said formers into and out of curl restricting position in timed relation to the endwise movement of said spinning head, a second cam to advance said head to restrictedly curl the edge of the container wall inwardly, thereafter upon retraction of said formers to complete the curling of the combined edges of the container and closure when further advanced.

8. In a machine for uniting a closure within the shell of a container, in combination with a holding device for the container having a closure disposed therein, a revoluble head having a spinning groove its outer face initially curling the container edge inwardly, movable former means in said head to further close the partly formed curl, said means being retractible, fixed means in said head to fully complete the curl, the last named means operative upon retraction of the first named means to interengage the edges of the container and closure, means to rotate said head, a cam to advance and retract said head, and a second cam to actuate said former means in timed relation to the movement of said head.

9. In mechanism for uniting a closure having an annular skirt within the shell of a container in which the closure is disposed, in combination with a holder for the container, a slidably mounted revoluble head having a groove in its outer face for spinning the end of the container shell inwardly into a curl of restricted radius, a cam controllably actuating the sliding movement of said head, movable formers in said head to further complete the curl and to include the edge portion of the closure skirt, a cam to actuate said formers in timed relation to the endwise movement of said head, and fixed elements in said head operative upon retraction of said formers to fully complete the curling operation, whereby the end edges of the container and closure are effectually interlocked.

10. A machine for uniting an inverted cup-shaped closure within a cylindrical paper container, comprising in combination with a stationary holder for the container and a closure therewithin, a spinning head having an annular spinning groove in its face corresponding with the diameter of the container, means to impart rapid rotation to said head, spinner formers movably mounted in said head, a cam having connections controlling the position of said formers, a second cam having connections to move said head linearly in the plane of the axis of the container, the first cam moving said formers into and out of curl restricting position in timed relation to the advance of the spinning head, said second cam advancing the spinning head to first restrictedly curl the edge of the container inwardly, and secondly, after retraction of said formers, by means intermediate said formers to complete the curling of the combined edges of the container and closure when further advanced.

11. A machine for securing a skirted closure within a cylindrical container shell, comprising in combination with a holder for the shell and closure therein, and a support for said closure movable within said shell, a rotatable die having means to produce an initial curl on the end of the shell, a series of oppositely disposed friction formers pivotally mounted in said die to complete the curling of said shell and skirt of its closure, means to rotate said die, means to advance and retract the die relative to the shell, and means to move said formers on their pivots to complete the curling operation.

12. A machine for securing a skirted closure within a cylindrical container shell, comprising in combination with a holder for the shell and closure therein, and a support for the closure, a rotatable die having means to produce an initial curl on the end of the shell, a series of levers pivoted at opposed points in said die, said levers having integral curling elements, a single means to actuate all of said levers simultaneously to expand and retract said curling elements, means to rotate said die and means to move said die linearly as the curling progresses.

13. A machine for securing a skirted closure within a cylindrical container shell, comprising in combination with a holder for the shell and closure therein, and a retractible support for the edges of the closure enterable within the shell, a rotatable die having means to produce an initial curl on the end of the shell, a series of levers pivoted at opposed points in said die, said levers having integral curling elements, a single means to actuate all of said levers simultaneously to expand and retract said curling elements, means to rotate said die, means to move said die linearly as the curling progresses, and means in said die to produce substantially square corner edges on the curled joint thus formed.

14. A machine for securing a skirted closure within a cylindrical container shell, comprising in combination with a holder for the shell and closure therein, and retractible means to support the closure within the shell, a rotatable die having means to produce an initial curl on the end

of the shell, radial lever formers pivoted in said die, means to move said formers simultaneously to complete the curl, spaced studs fixed radially in said die to produce a level bottom surface on the curl, means to move said die linearly, and means to rotate the die.

15. In a machine for sealing a skirted closure disc within a cylindrical container shell, a die having an annular groove to produce an initial inward curl on the edge of the container, means to advance said die, means to rotate the die, a series of spinners pivoted in said die, said spinners having a curved projecting face to engage the inner surface of the initial curl and integral levers extending radially within the die, means common to all of said levers to turn the spinner faces uniformly outward as said die advances and means within said shell to support said disc.

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