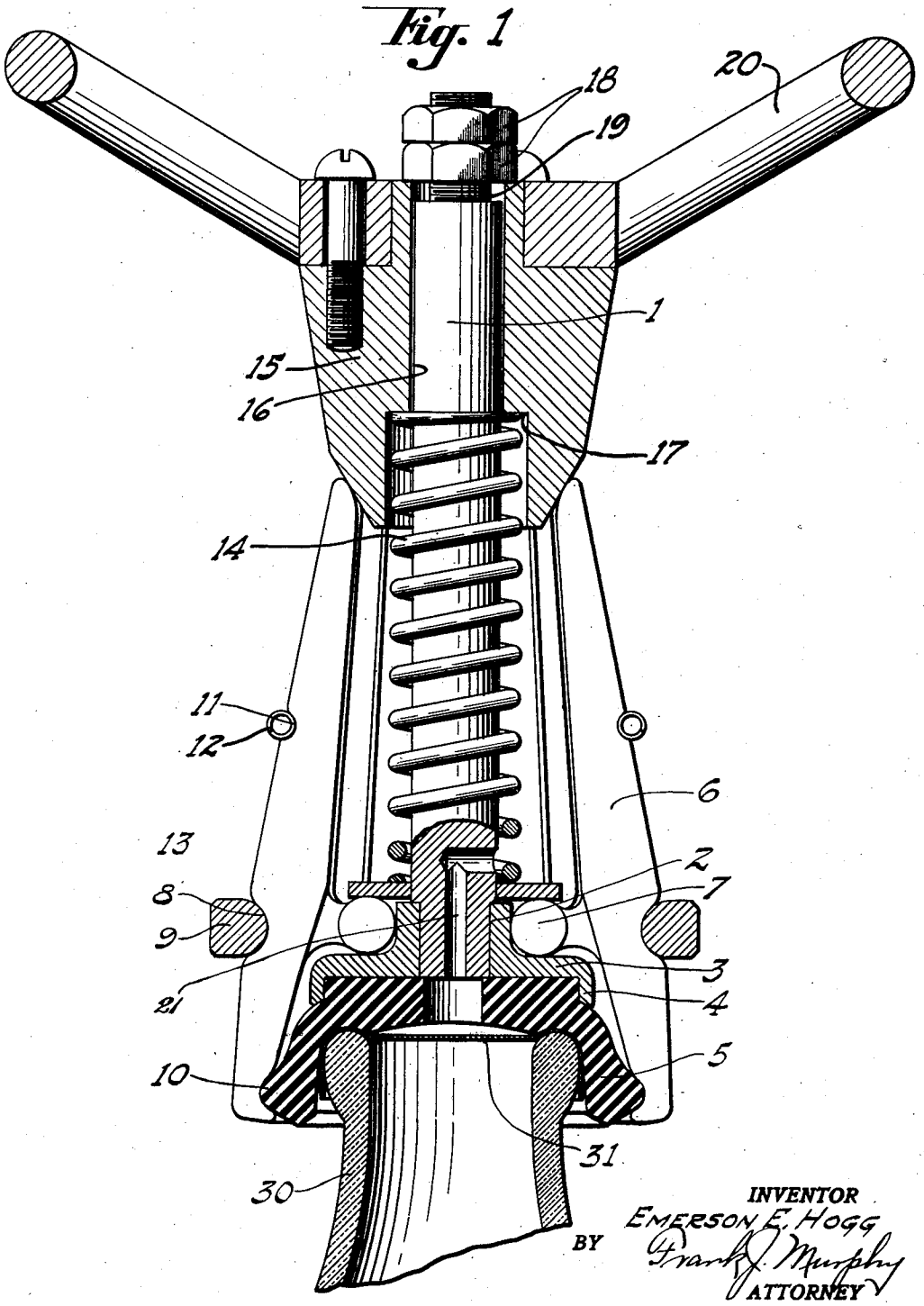
April 5, 1938. E. E. HOGG 2,112,842

CAPPING MACHINE

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Fig. 1



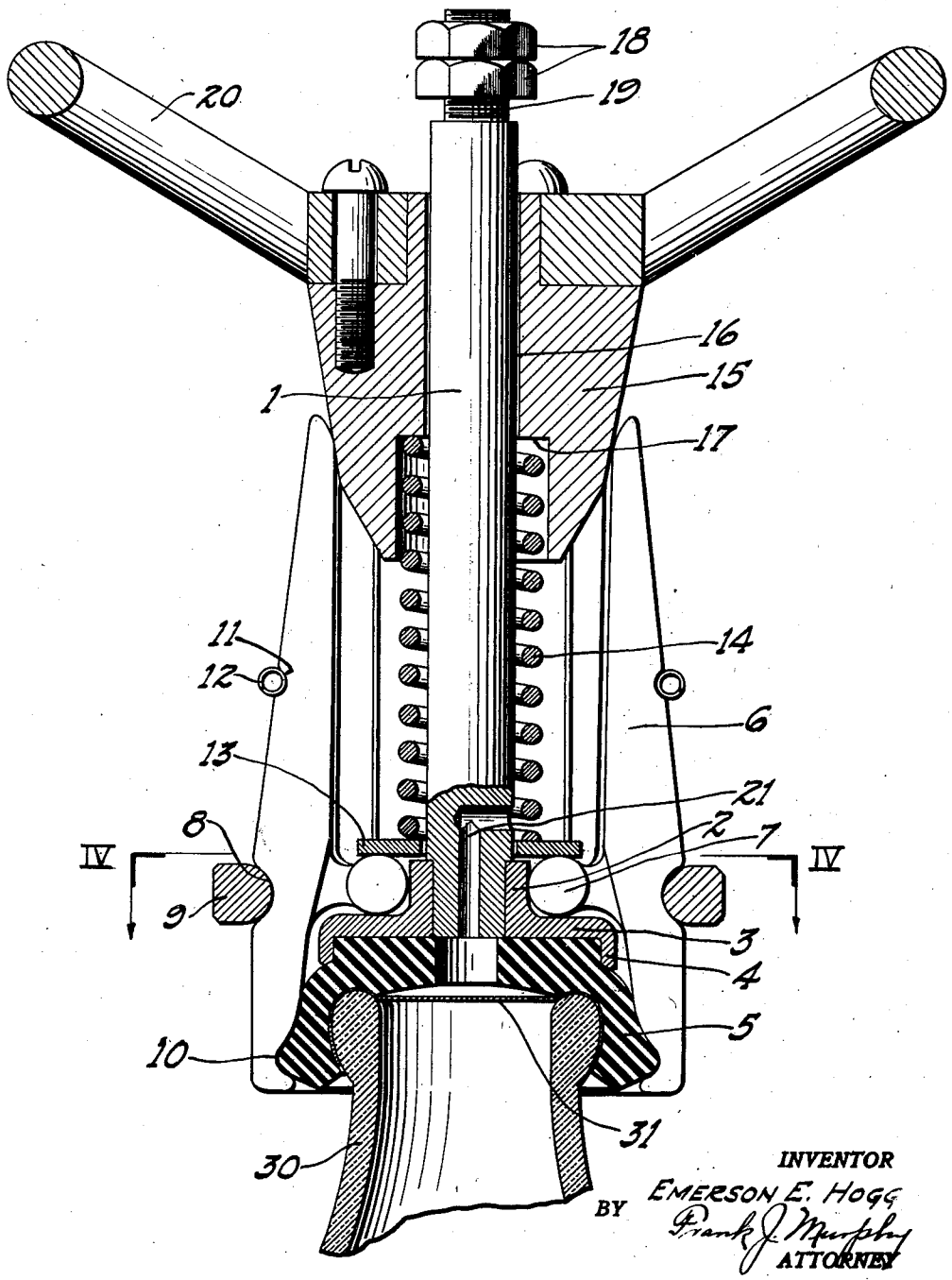
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Fig. 2



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Fig. 3

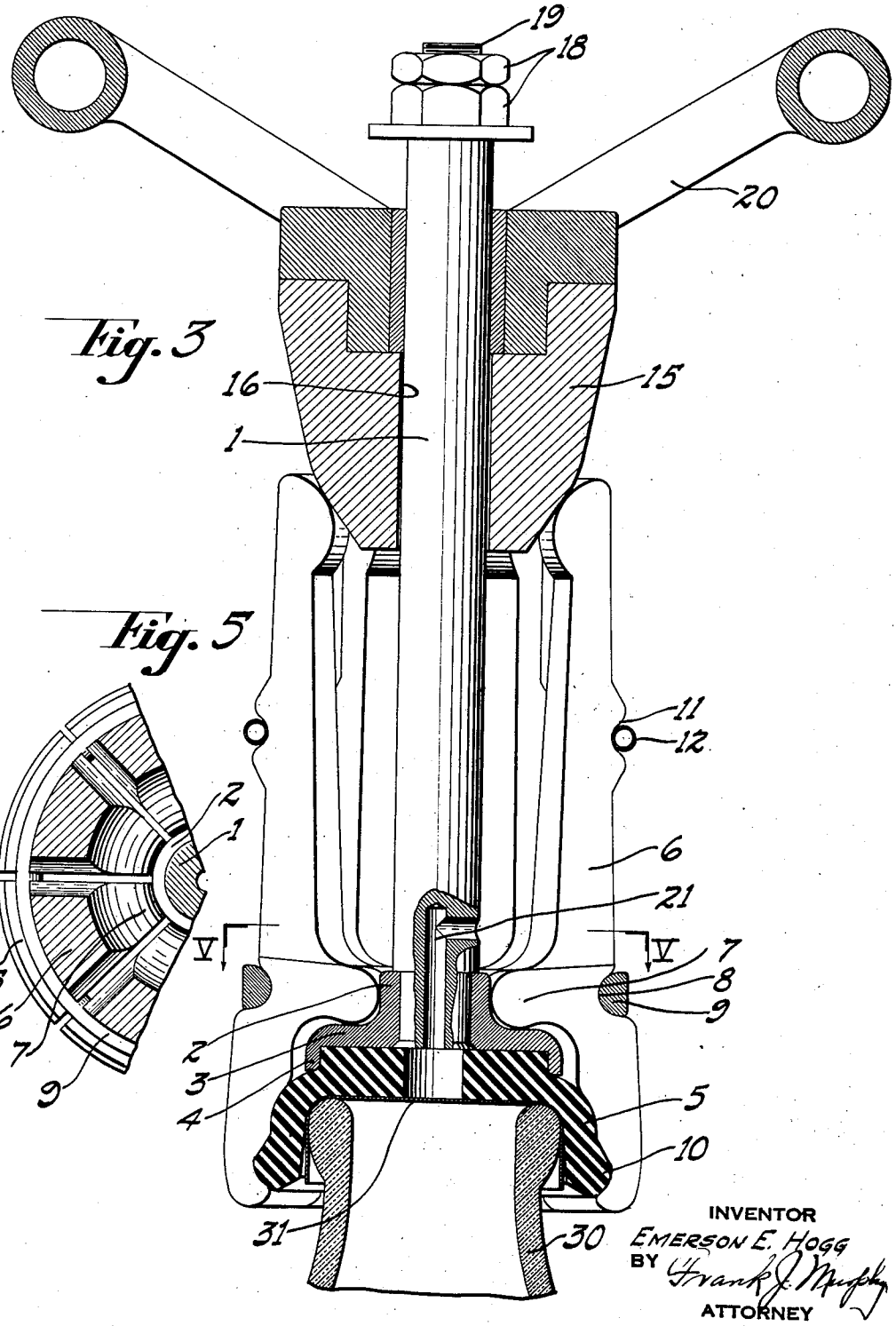


Fig. 5

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Fig. 4

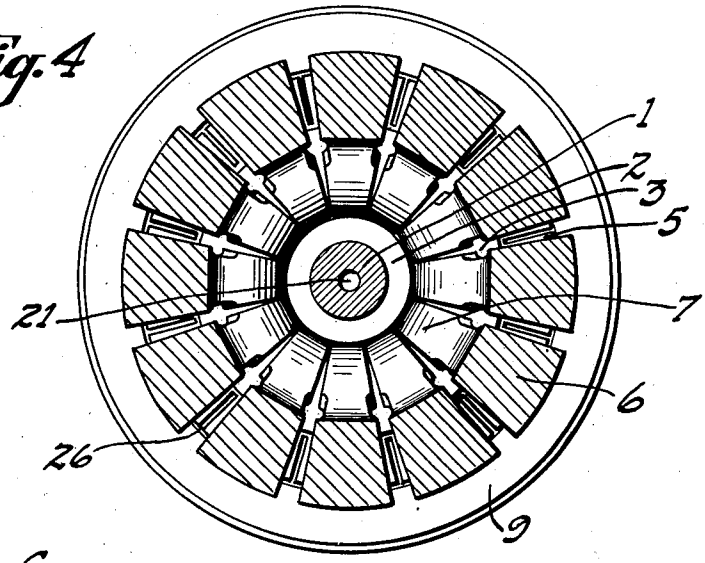


Fig. 6

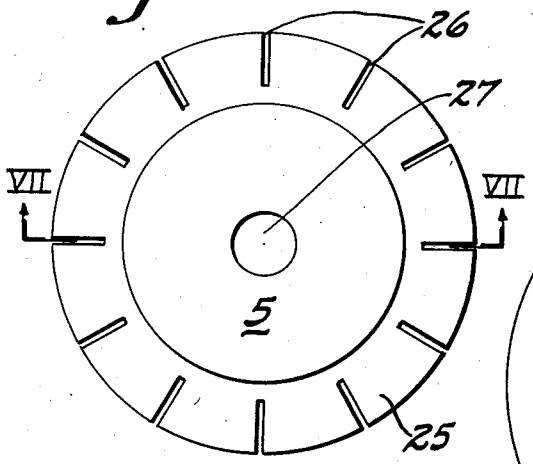


Fig. 8

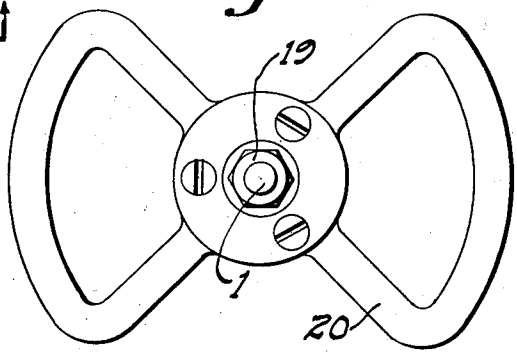
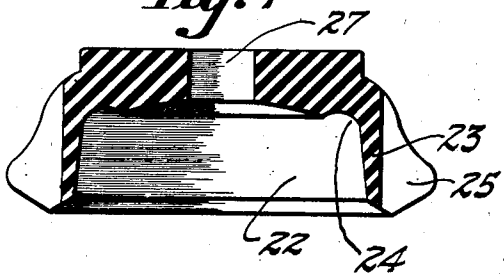


Fig. 7



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UNITED STATES PATENT OFFICE

2,112,842

CAPPING MACHINE

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Application September 12, 1935, Serial No. 40,296

15 Claims. (Cl. 226—85)

This invention relates to a capping machine for receptacles, and particularly to a capping machine for applying closures secured to receptacles by a depending flange or skirt of deformable material.

It is an object of my invention to provide an efficient hand-capping machine that is simple in construction, yet which can be used as a driven capping head with the same advantages of simplicity that attend its use as a hand-capping machine. Many hand-capping machines have been developed, but it is characteristic of them that they include some form of pedestal which, of course, means that a receptacle must be presented to the machine for sealing. It is an object of my invention to provide a capping machine that eliminates the pedestal and thereby to give the unit a greater range of usefulness and to reduce the amount of handling of the receptacles otherwise required. Capping of receptacles positioned in crates is illustrative of this usefulness. It is a further object of this invention to accomplish these purposes by supporting the entire unit upon a central element. My invention also contemplates the provision of a device that will fix a closure by working the closure skirt progressively downwardly and inwardly while the closure is held firmly seated upon the receptacle.

Various additional objects and advantages of the invention will be in part obvious and in part discussed with reference to the accompanying drawings, of which:

Fig. 1 is a central vertical sectional view of my capping machine with the parts shown in the position which they occupy preparatory to the affixation of the closure;

Fig. 2 is a central vertical sectional view of the machine with the parts shown in the position which they occupy at the completion of the capping operation;

Fig. 3 is a central vertical sectional view of a second embodiment of the machine with the parts shown in the position which they occupy preparatory to the affixation of the closure;

Fig. 4 is a cross-sectional view of the machine taken on line IV—IV of Fig. 2;

Fig. 5 is a fragmentary section taken on the line V—V of Fig. 3;

Fig. 6 is a plan view of the pressure sealing head;

Fig. 7 is a cross-sectional view of this head taken on the line VII—VII of Fig. 6; and

Fig. 8 is a plan view of a handle suitable for the portable machine.

In the following description, like reference numerals designate like parts throughout the several figures. Referring now to the embodiment shown in Figs. 1 and 2, the spindle 1 forms the central element about which the machine is assembled. A flange, generally designated by the reference numeral 2, is attached to the lower end of the spindle in any fashion that will provide a strong joint, as by the shrink-fitted collar that is shown. The flange 2 has a horizontal web 3, and a peripheral flange 4 disposed perpendicularly to the web 3 which forms therewith an annular recess that provides a seat and retaining means for the resilient sealing head 5 that is seated therein under compression. This attachment of the sealing head 5 to the spindle is optional, however, since the head may be retained in assembled relationship by the fingers to be described below.

The top surface of the web 3 serves as a support and bearing surface for projections of a plurality of pressure fingers that will hereinafter be called fingers, and which are designated generally by the reference numeral 6. These fingers extend in axial planes of the spindle 1, and enclose its lower portion and the sealing head 5. Each finger is an unbalanced lever having a projection 7. As is shown to particular advantage in Fig. 4, the end of each projection is rounded, so that a free point of oscillation is established. The projections bear against the web and collar of the flange 2, as shown in Figs. 1 and 2, so that the flange serves as both a support and bearing surface. On the outer side of each finger opposite the projection, there is an arcuate recess 8 that receives a narrow, radially unyielding ring 9 that serves as a finger retaining ring. The lower ends of the fingers on the inner surface have a second recess 10 that receives a portion of the sealing head 5 and tends to direct the application of pressure by the head to a closure. This same recess may, of course, be used to retain the sealing head if a recessed bottom is not provided upon the spindle flange. Between the recess 8 and the upper ends of the fingers there is on the outer surface thereof a third recess 11 that accommodates a small spiral spring 12 which serves to restore the fingers to a non-operative position.

Within the space enclosed by the fingers 6, spindle 1 carries an annular plate 13 that rests upon the ends of the projections 7. This plate in turn supports one end of a spiral spring 14 that surrounds part of the spindle. The end of the spring supports a spreader block designated generally by the numeral 15. The block has an

axially stepped bore 16 through which the spindle projects and into which the spring 14 extends as far as the shoulder 17. The upper end of the spindle projecting beyond the spreader block 15 carries any suitable means for maintaining the assembly of the unit and adjusting the stroke of the block, such as the nuts 18 turned upon the screw-threaded end 19 of the spindle. As shown in Fig. 1, part of the spreader block at all times extends into the cavity defined by the fingers 6, so that the upper ends of these fingers bear upon an inclined face or surface of the block. It may be desirable to create graduated sealing pressures at various stages of the sealing operation, and for this reason, the block 15 is provided with surface areas of various inclinations. As is shown in Figs. 1, 2 and 3, this can be easily accomplished by making the spreader block a composite structure of several truncated cones. A handle 20, shown to better advantage in Fig. 8, is attached to the block 15 by any suitable means. It is also desirable to provide in the spindle, as is shown in Figs. 1, 2 and 3, a vent 21 to permit the escape of air from the sealing head 5 during the capping operation.

Referring now to Fig. 3, a second embodiment of the capping machine is shown, wherein several changes and omission of parts with respect to the embodiment shown in Figs. 1 and 2 have been made. The general organization, however, remains the same. As will be noted, the fingers 6 of this form have the same general shape as those shown in the first described form, but a change has been introduced in the projection 7. The cylindrical bearing surface as shown in Fig. 4 has been modified to the extent of the provision of a concave bearing surface against the collar of the flange 2. This change of shape is clearly shown in Fig. 5. It is apparent that a line contact will now be made between the projection and the collar at any given operative position of the fingers with the attendant advantage of retarding the growth of undesirable play of the fingers between the collar and the retaining ring 9. As is also shown in Fig. 3, the spring 14 of the earlier figures that loads the head 15 and the plate 13 that supports the spring have been omitted. With closures of relatively thick stock, it has been found that it is desirable to remove the spring, which removal, of course, increases the pressure transmitted as sealing pressure through the sealing head. It has also been found that the spring 12 and the resiliency of the sealing head 5 will return the fingers to non-operative position upon the return of the spreader block 15 to non-operative position. The spring 14 is not required to return the block, since this normally attends the lifting of the machine from the sealed receptacle.

In Figs. 6 and 7, the pressure head 5 is shown in detail. This head should be constructed of resilient material, and it has been found that vulcanized rubber is the most suitable. The head has a closure-receiving recess 22 that is defined by a side wall 23 that has an outwardly and downwardly inclined inner surface. The recess may also include an annular depression 24, as indicated, to conform with and receive a bead adjacent to the receptacle mouth. The outer surface of the side wall has a bulbous conformation 25 that is divided by radial slits 26 into the same number of segments as there are fingers 6. A center passage 27 that coincides in assembly with the vent 21 of the spindle should also be provided to permit the escape of air that would otherwise be trapped in the head during the sealing operation.

Fig. 8 merely illustrates a convenient form of handle for attachment to the spreader block 15 when the device is used as a portable capping machine.

It is apparent that the machine in either form is easily assembled and disassembled. With reference to the form shown in Figs. 1 and 2, the sealing head 5 should first be placed within the recess of the spindle flange. The fingers 6 are then assembled within the ring 9 and the spindle 1 carrying the sealing head, is slid between the projections 7 of the fingers until they rest upon the flange web 3. The supporting plate 13 is then slipped over the spindle and allowed to reach its position upon the top surface of the projections 7. The spring 12 can now be placed in position in the recess 11, and the spring 14 should next be placed around the spindle 1. The spreader block 15 with the handle 20 attached is then mounted upon the spindle and the retaining nuts 19 are turned down to complete the assembly of the machine. To assemble the form shown in Fig. 3, the steps are the same except for the omission of the supporting plate 13 and the spring 14.

The sealing operation of the machine is as simple and efficient as the construction and assembly just described. The capping machine is placed upon a receptacle such as the milk bottle 30 shown in Figs. 1 and 2, which receptacle has been supplied with a closure having a depending skirt of deformable material such as has been indicated by the reference numeral 31 in Figs. 1, 2 and 3. After the machine has been set upon the bottle closure so that the closure and bottle neck occupy the recess 22 of the sealing head as is illustrated in Fig. 1, the spreader block is forced downwardly relative to the spindle by the application of suitable pressure. This transmits pressure to both the top and sidewalls of the sealing head 5. By reason of the fingers being supported upon the spindle flange, the head, also carried thereby, and in particular the top of the head, is forced against the closure with pressure increasing directly with the pressure applied. At the same time, the block forces the upper ends of the fingers outwardly, so that they rock about the projections 7 carrying inwardly the lower ends of the fingers against the bulbous segmental portions of the sealing head 5 which transmit radial sealing pressure to the skirt of the closure. It is apparent that the skirt of the closure 31 will necessarily be forced into intimate contact with the surface of the receptacle and around any form of detents carried thereby. Since the recess of the sealing head has an outwardly sloping wall, the contraction necessary to force the closure skirt inwardly will be less near the top of the receptacle mouth than is needed near the bottom thereof, so that the actuation of the fingers will cause a progressive downward working of the skirt into contact with the receptacle surface in a fashion that simulates a downward rolling action. As hitherto described, the fingers are held in assembly by the retaining ring 9, and, upon actuation of the fingers, the ring will tend to move slightly downwardly relative to the spindle. This adjustment of the ring permits the fingers to turn freely upon the supporting flange of the spindle. It may well be that at the end of this downward movement of the ring, the fulcrum of each finger shifts from the projection 7 to the ring itself. In any event, it is apparent that pro-

jections of the fingers are not positively secured to the supporting flange of the spindle, but are free to move to some degree in a vertical plane upon actuation. When the spring 14 is used in the assembly, as appears in Figs. 1 and 2, the floating relationship of the fingers upon the spindle flange is slightly altered, in that the force tending to shift the projections upwardly must be sufficient to overcome the force applied through the spreader block to the spring. It is apparent, however, that the floating support of the projections upon the spindle flange and the retaining ring carried by the fingers themselves, along with the resiliency of the sealing head, permits automatic adjustment to any irregularities found in the bottle finish. The machine is therefore well adapted to apply closures to bottle finishes of the type shown in United States Patents 1,796,728 and 1,796,729, which include projecting detents.

While the invention has been described with reference to several embodiments, it is clear that numerous additional modifications are possible that utilize the substance of my invention. With the intention, therefore, of including all modifications coming within the true scope of the invention, I claim:

1. A machine for applying skirt-retained closures comprising a central spindle having a lateral flange at its lower end, a resilient sealing head carried immediately beneath the flange, a plurality of pressure fingers adapted to contract the head and positioned circumferentially about both the spindle and head, said pressure fingers having inwardly directed projections freely supported upon the spindle flange, means carried by the fingers exteriorly thereof adapted to retain the fingers upon the spindle flange, reciprocable means co-axial with the spindle adapted to actuate the pressure fingers, and means associated with the spindle to maintain the assembled relationship.

2. A machine for applying skirt-retained closures comprising a central spindle having a lateral bottom flange, a resilient sealing head located immediately beneath the flange, a plurality of pressure fingers having inwardly directed projections freely supported upon the spindle flange circumferentially of both spindle and head, means carried by the fingers exteriorly thereof adapted to retain the fingers upon the spindle flange, reciprocable means co-axial with the spindle adapted to actuate the pressure fingers, means encircling the spindle adapted to return the actuating means to a non-operative position, and means associated with the spindle to maintain the assembled relationship.

3. A machine for applying skirt-retained closures comprising a vertical central spindle having a lateral bottom flange, a resilient sealing head secured to the under surface of the flange, a plurality of pressure fingers positioned circumferentially of both spindle and head, said pressure fingers having inwardly directed projections freely supported upon the spindle flange, a spreader block reciprocably mounted upon the spindle in contact with the upper ends of the pressure fingers, a retaining ring carried exteriorly by the pressure fingers in substantially the horizontal plane of the finger projections, and means associated with the spindle to maintain the assembled relationship.

4. A machine for applying skirt-retained closures comprising a vertical central spindle having a lateral bottom flange, a resilient sealing head secured to the under surface of the flange, a plurality of pressure fingers positioned circumferentially of both spindle and head, said pressure fingers having inwardly directed projections freely supported upon the spindle flange, a retaining ring carried exteriorly by the pressure fingers in substantially the horizontal plane of the finger projections, a spreader block reciprocably mounted upon the spindle in contact with the upper ends of the fingers, a loading spring carried by the spindle between the spreader block and the finger projections, and means asociated with the upper end of the spindle adapted to maintain the assembly and regulate the travel of the spreader block.

5. A spindle supported capping mechanism comprising a central vertical spindle having a recessed lateral flange at the lower end, a resilient recessed sealing head held within the flange recess, a plurality of vertical pressure fingers having inwardly directed projections freely supported upon the spindle flange with the lower ends thereof in contact with the sealing head, a retaining ring carried exteriorly by the pressure fingers, a spreader block reciprocably mounted upon the spindle in contact with the upper ends of the fingers, a block loading spring carried by the spindle between the spreader block and the finger projections, a spring carried by the upper ends of the pressure fingers adapted to return the fingers to a non-operative position, and securing means associated with the upper end of the spindle to maintain the assembled relationship.

6. In a machine for applying skirt-retained closures to receptacles, a central spindle, a skirted resilient sealing head carried by the spindle, pressure means movable axially of both spindle and head, and oscillatable means supported by the spindle in contact with the pressure means whereby relative movement between the pressure means and the spindle induces the transmission of pressure by the oscillatable means to the sealing head both vertically and radially thereof.

7. In a machine for applying skirt retained closures to receptacles, a central spindle having a bottom flange, a skirted resilient sealing head carried by the spindle beneath the flange, pressure means associated with the spindle movable axially of both spindle and head, and oscillatable means supported by the spindle flange in contact with the pressure means whereby relative movement between the pressure means and spindle induces the transmission of pressure by the oscillatable means to the sealing head vertically through the spindle flange and radially by contact with the sealing head.

8 In a capping mechanism, a central spindle having a lateral flange, a plurality of pressure fingers having inwardly directed projections supported upon the flange, reciprocable means co-axial with the spindle and contacting the fingers for actuation thereof, and unyielding circumferential finger-retaining means carried exteriorly by the fingers

9. In a capping mechanism, a central spindle having a lateral flange, a plurality of fingers having inwardly directed projections supported upon the flange, a reciprocable spreader block carried by the spindle in contact with the fingers for actuation thereof, and a narrow unyielding ring carried exteriorly by the fingers in substantially the horizontal plane of the finger projections, said ring maintaining the fingers in circumferential relationship to the spindle and permitting

free oscillation upon the movement of the spreader block.

10. In a capping mechanism, a central spindle having a lateral flange, a plurality of pressure fingers having inwardly directed projections supported upon the flange, resilient sealing means located beneath the spindle, finger-actuating means coaxial with the spindle, and circumferential finger-retaining means carried exteriorly by the fingers, said finger-retaining means permitting actuation of the fingers to compress said sealing means.

11. In a capping mechanism, a central spindle having a lateral flange, a plurality of fingers having inwardly directed projections supported upon the flange, a resilient sealing means located beneath the spindle, a spreader block coaxial with the spindle for actuation of the fingers, and a narrow ring carried exteriorly by the fingers, said ring maintaining the fingers in circumferential relationship to the spindle and permitting actuation of the fingers to compress said sealing means.

12. In a capping mechanism, a central spindle having a lateral bottom flange, a plurality of pressure fingers having inwardly directed projections freely supported upon the spindle flange, a resilient sealing head located beneath the flange and in contact with said fingers, means carried by the fingers exteriorly thereof to retain the fingers upon the spindle flange, means coaxial with the spindle adapted to actuate the fingers, means associated with the fingers to return the same to normal position after actuation, and means associated with the spindle to maintain the assembled relationship.

13. In a capping mechanism, a central spindle having a lateral bottom flange, a resilient sealing head located immediately beneath the flange, a plurality of pressure fingers having inwardly directed projections freely supported upon the spindle flange, a narrow ring carried exteriorly by the fingers to maintain the fingers upon the spindle flange, a spreader block coaxial with the spindle to actuate the pressure fingers, a spring carried exteriorly by the fingers to return the same to normal position after actuation, and means associated with the spindle to maintain the assembled relationship.

14. In a capping mechanism, a central spindle, oscillatable means supported by the spindle, resilient sealing means carried beneath the spindle, means coaxial with said spindle and contacting said oscillatable means, whereby relative movement between said spindle and said means coaxial therewith actuates said oscillatable means and transmits pressure therethrough to said sealing means both vertically and radially thereof.

15. In a capping mechanism, a central spindle, oscillatable means supported by the spindle, a skirted resilient sealing head located immediately beneath the spindle and in contact with said oscillatable means, means coaxial with said spindle and contacting said oscillatable means, whereby relative movement between said spindle and said means coaxial therewith actuates said oscillatable means and transmits pressure therethrough to said sealing head both vertically and radially thereof.

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