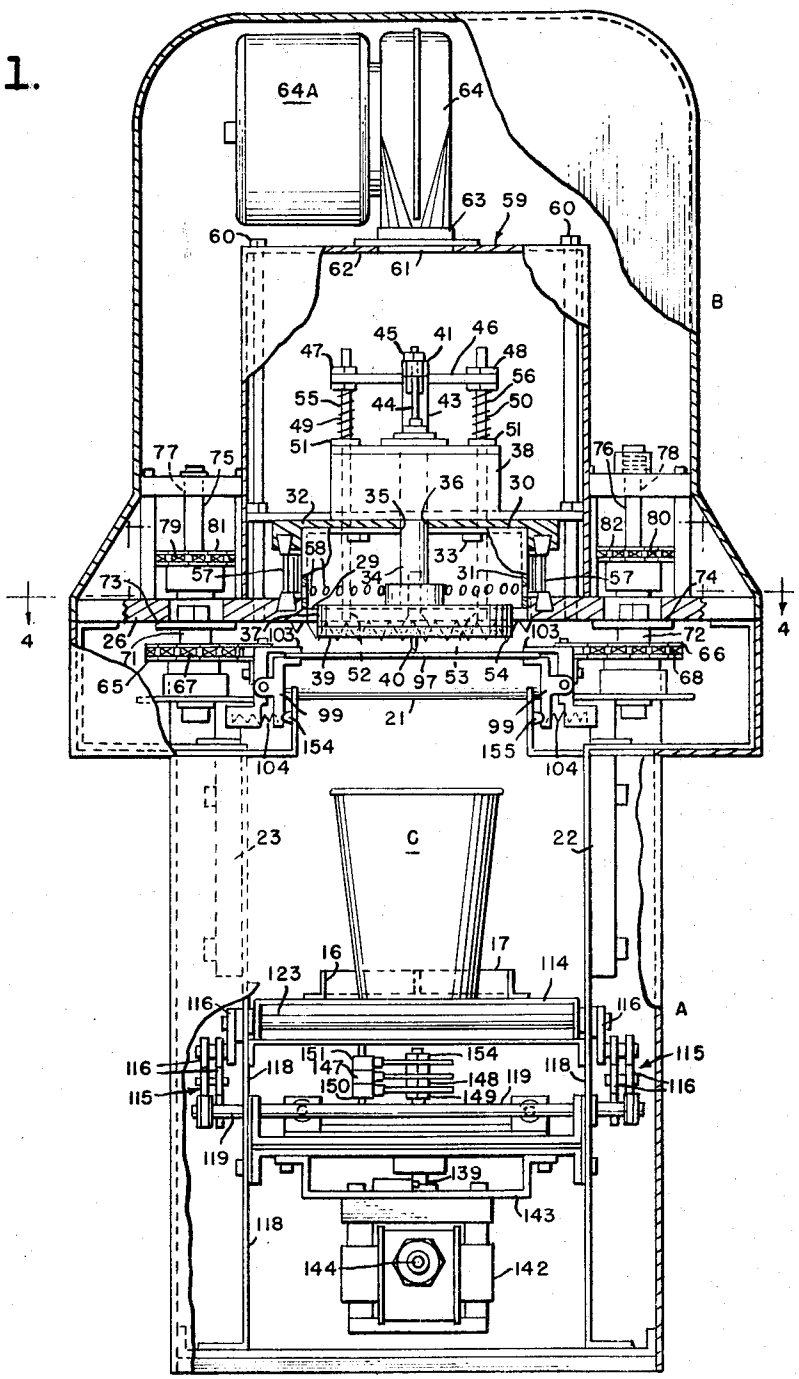
April 21, 1970 T. E. MARION 3,507,093

CONTAINER CAPPING MACHINE

Filed Aug. 16, 1967 7 Sheets-Sheet 1

FIG. 1.




INVENTOR

THOMAS E. MARION

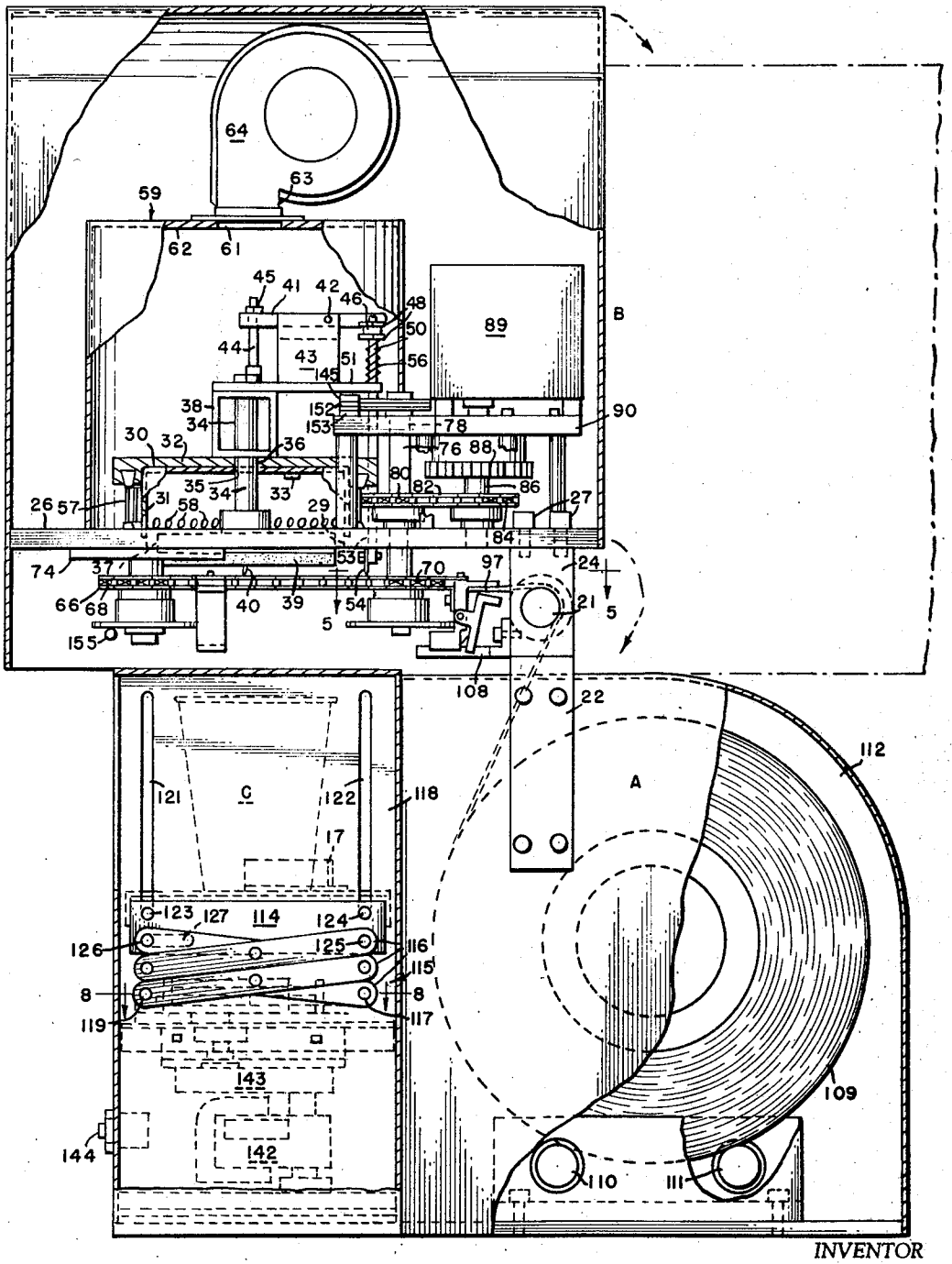
BY Albert J. Kramer

ATTORNEY

April 21, 1970 T. E. MARION 3,507,093

CONTAINER CAPPING MACHINE

Filed Aug. 16, 1967 7 Sheets-Sheet 2




INVENTOR
THOMAS E. MARION

FIG. 2.

BY Albert J. Kramer
ATTORNEY

April 21, 1970 T. E. MARION 3,507,093

CONTAINER CAPPING MACHINE

Filed Aug. 16, 1967 7 Sheets-Sheet 5

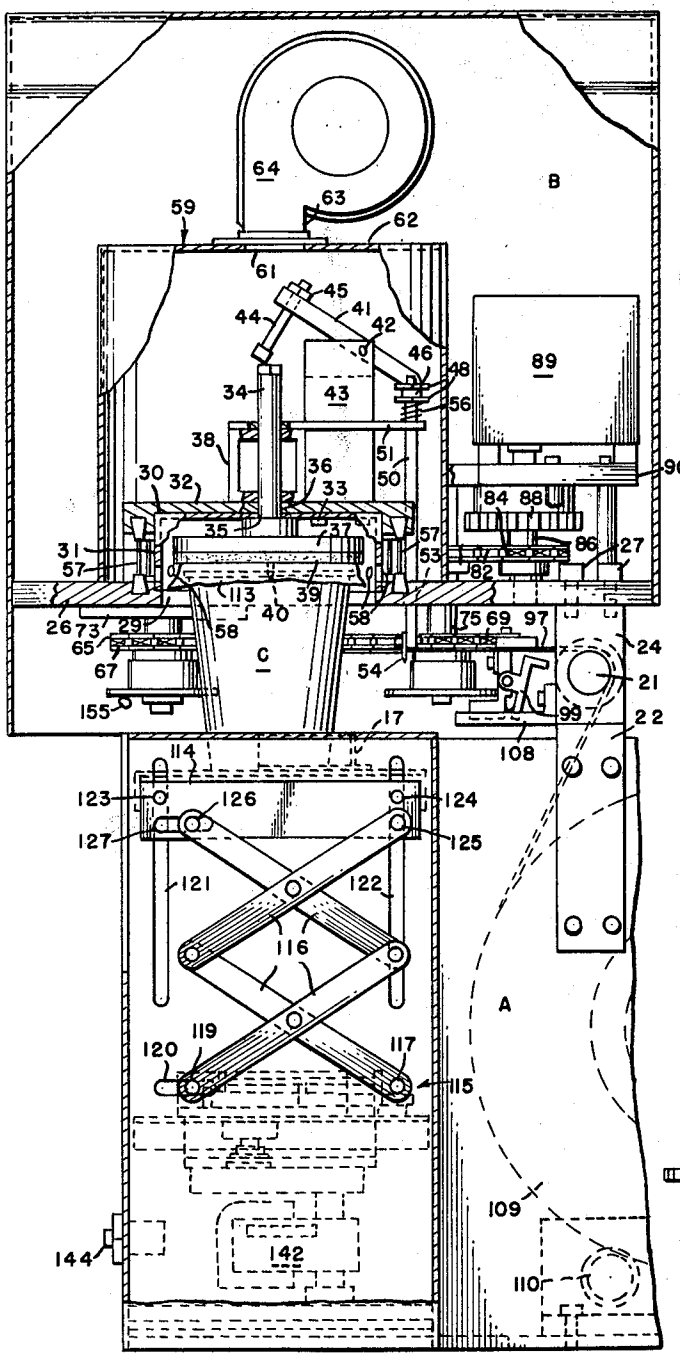



FIG. 3.

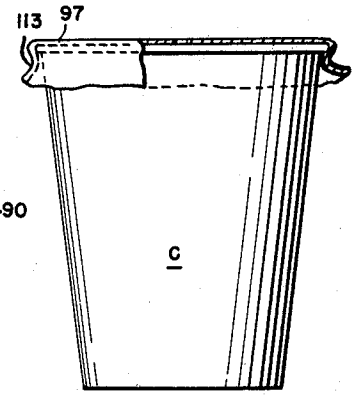



FIG. 11.

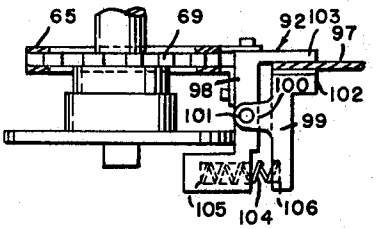



FIG. 7.

INVENTOR
THOMAS E. MARION

BY Albert J. Kramer

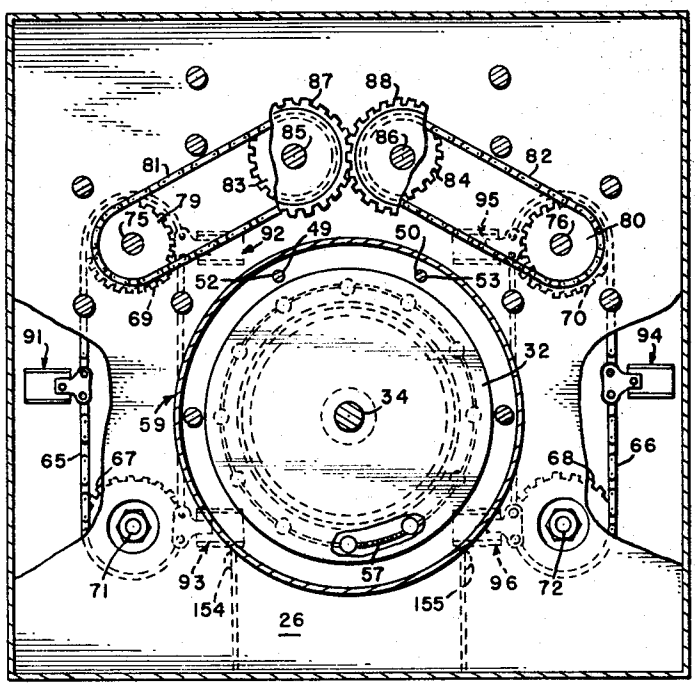
ATTORNEY

April 21, 1970 T. E. MARION 3,507,093

CONTAINER CAPPING MACHINE

Filed Aug. 16, 1967 7 Sheets-Sheet 4

FIG. 4.



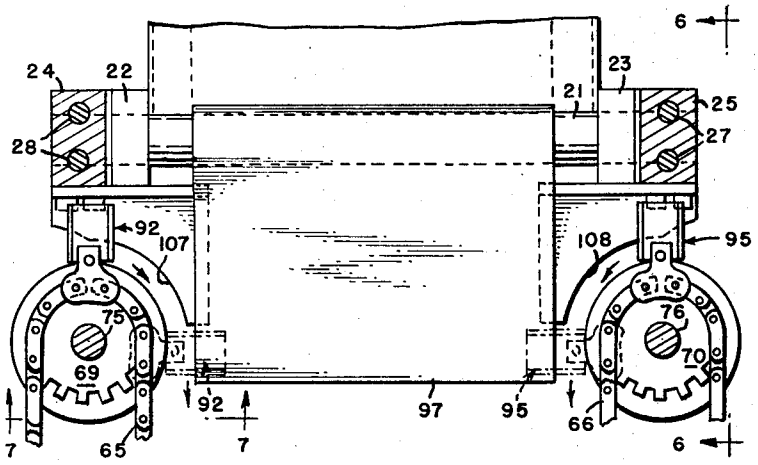




FIG. 5.

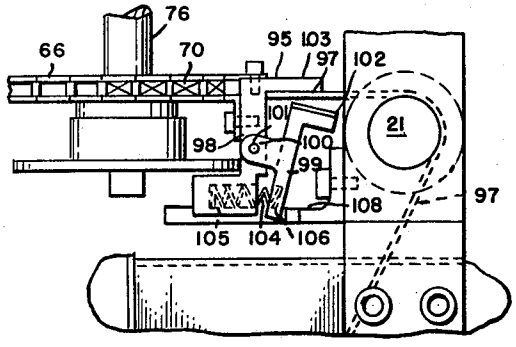



FIG. 6.

INVENTOR
THOMAS E. MARION

BY Albert J. Kramer

ATTORNEY

April 21, 1970 T. E. MARION 3,507,093

CONTAINER CAPPING MACHINE

Filed Aug. 16, 1967 7 Sheets-Sheet 5

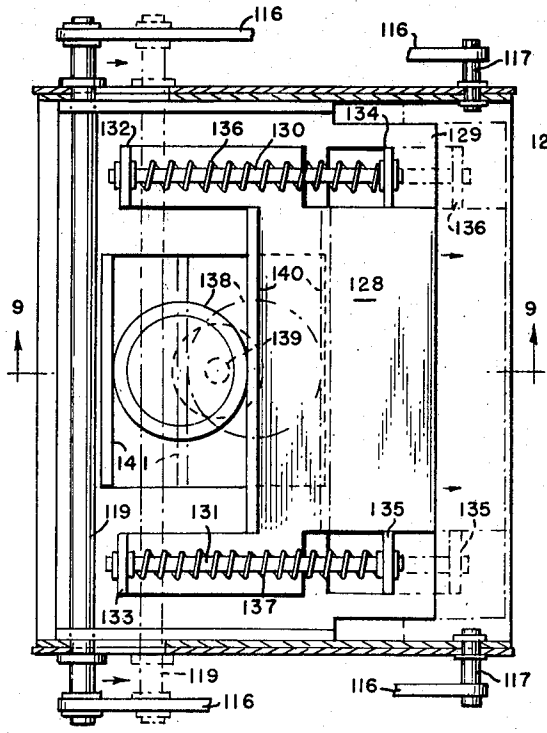



FIG. 8.

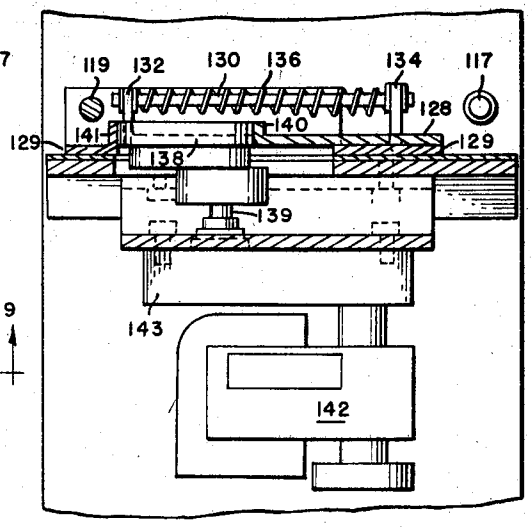



FIG. 9.

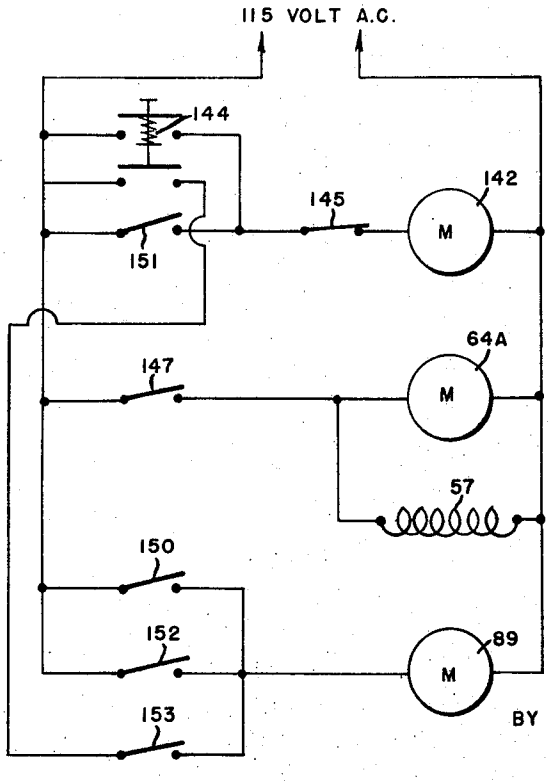



FIG. 12

INVENTOR
THOMAS E. MARION

BY Albert J. Kramer
ATTORNEY

April 21, 1970 T. E. MARION 3,507,093

CONTAINER CAPPING MACHINE

Filed Aug. 16, 1967 7 Sheets-Sheet 6

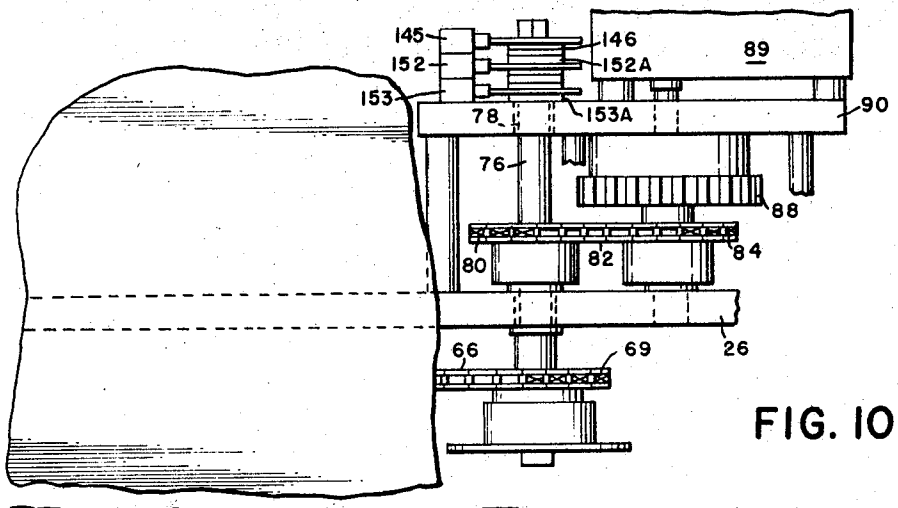



FIG. 10.

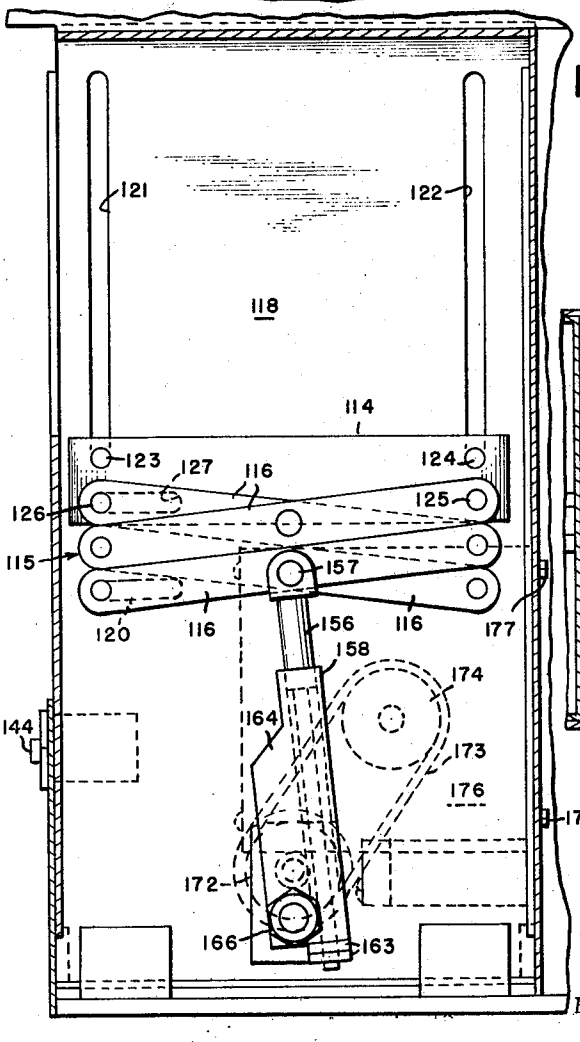
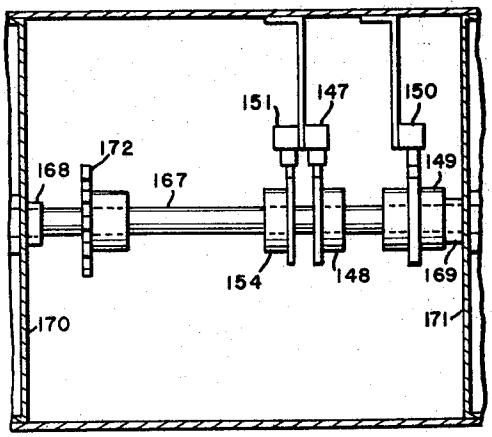



FIG. 14.

FIG. 15.




INVENTOR
THOMAS E. MARION

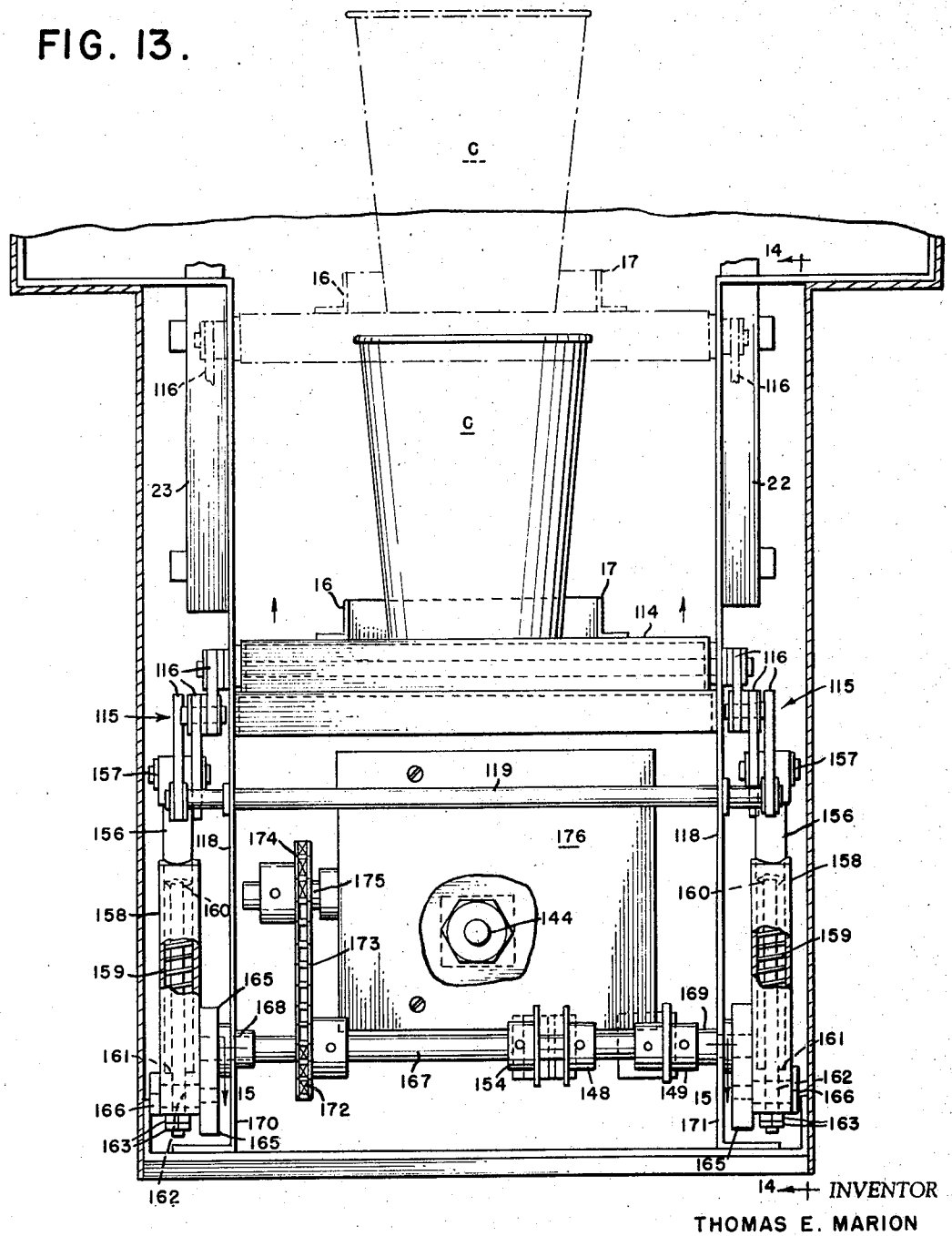
BY Albert J. Kramer
ATTORNEY

April 21, 1970 T. E. MARION 3,507,093

CONTAINER CAPPING MACHINE

Filed Aug. 16, 1967 7 Sheets-Sheet 7

FIG. 13.




INVENTOR
THOMAS E. MARION

BY Albert J. Kramer
ATTORNEY

United States Patent Office 3,507,093 Patented Apr. 21, 1970



3,507,093

# CONTAINER CAPPING MACHINE

Thomas E. Marion, Baltimore, Md., assignor to Maryland Cup Corporation, Owings Mills, Md., a corporation of Maryland

Filed Aug. 16, 1967, Ser. No. 660,948
Int. Cl. B65b 47/02, 53/06, 61/02
U.S. Cl. 53—141 23 Claims

## ABSTRACT OF THE DISCLOSURE

A machine is provided for placing a shrink film closure on the open end of a container. It comprises sprocket chains on opposite sides of a sheet of shrink film having clamps which engage marginal edges of the sheet and draw it from a storage roll to a position above a container to be so capped when positioned on an elevator and below a hood for receiving the top of the container. Upon actuation of the elevator upwardly the container is raised to engage the sheet of film. The film is larger than the diameter of the container and it is moved into the hood. A linkage is actuated resulting in a knife blade being lowered to cut off an end portion of the sheet with a sufficient marginal portion to overhang the container. Also, a pin hole is made in the sheet to release excess air which may become trapped between the container and the sheet. An electrical heating element is then energized adjacent openings in the hood simultaneously with actuation of an air blower which causes air to pass, first over the heating element, and then into the hood through the openings. As a result, a marginal portion of the sheet of film is heat shrunk about the top of the container, whereupon the elevator is moved downward with the capped container in position to be removed manually.

This invention relates to capping machines and it is more particularly concerned with a machine for placing an end closure about the open top of a container, such as an ordinary paper cup.

An object of the invention is the provision of a machine which places a shrinkable sheet over the top of a container and which shrinks it to fit the mouth of the container.

A further object is the provision of a machine of the type mentioned which is automatic in operation and by means of which a complete cycle is performed by merely placing a container in the machine and initiating its actuation, such as by a simple electrical switch.

A still further object of the invention is the provision of a machine of the type mentioned which is capable of operating consecutively on containers of different sizes.

A still further object of the invention is the provision of such a machine which is portable and capable of being used in small spaces, such as on a counter or shelf of a restaurant or confectionery store.

These and still further objects, features and advantages of the invention will be clear from the following description considered together with the accompanying drawing:

In the drawing:

FIG. 1 (sheet 1) is a front elevational view, partly in section, of an embodiment of the invention.

FIG. 2 (sheet 2) is a side elevational view, partly in section, showing the relation of parts in the initial position in the cycle of operation.

FIG. 3 (sheet 3) is a view similar to FIG. 1 showing the relation of parts in an advanced state in the cycle of operation.

FIG. 4 (sheet 4) is a sectional view along the line 4—4 of FIG. 1.

FIG. 5 (sheet 5) is a sectional view along the line 5—5 of FIG. 2.



FIG. 6 (sheet 6) is a sectional view along the line 6—6 of FIG. 5.

FIG. 7 (sheet 3) is a sectional view along the line 7—7 of FIG. 5.

FIG. 8 (sheet 5) is a sectional view along the line 8—8 of FIG. 2.

FIG. 9 (sheet 5) is a sectional view along the line 9—9 of FIG. 8.

FIG. 10 (sheet 7) is a fragmentary portion of FIG. 2 on a larger scale to show more clearly location of some of the cam switches.

FIG. 11 (sheet 3) is an elevational view, partly in section, of a capped cup resulting from the invention.

FIG. 12 (sheet 5) is a wiring diagram of the electrical elements of the embodiment.

FIG. 13 (sheet 6) is a vertical elevational view of the lower portion of a modified embodiment of the invention, partly broken away.

FIG. 14 (sheet 7) is a side elevational view, partly in section along the line 14—14 of FIG. 13.

FIG. 15 (sheet 7) is a cross-sectional view along the line 15—15 of FIG. 13.

Referring to the drawing with more particularity, the embodiment illustrated in FIGS. 1 to 12 comprises a machine having a bottom section A and an upper section B hinged to the bottom section on a horizontal pintle 21 which passes through hinge brackets 22 and 23 of the lower section and hinge brackets 24 and 25 of the upper section.

A platform 26 is mounted on the brackets 24 and 25 by means of bolts 27 and 28, respectively. A circular opening 29 is provided through the platform of a size sufficiently large to permit the passage of a container C to be capped. An inner hood 30 is mounted over the circular opening 29 comprising an annular wall 31 surmounted by an overhanging head member 32 secured by bolts 33.

A vertical shaft 34 is mounted for reciprocation through central openings 35 and 36 of the hood 30 and head member 32, respectively. The lower end of the shaft 34 is secured to a disc 37 of a size to pass through the opening 29. The upper end of the shaft 34 extends through a bracket 38 on the head 32. A soft rubber pad 39 is secured to the bottom of the disc 37. A vertical pin 40 is centrally secured to the disc and it projects below the pad 39.

A lever 41 is pivoted by a pin 42 to an upstanding bracket 43 mounted on the head 32. A vertical arm 44 is adjustedly mounted by means of threads and a lock nut 45 to the outer end of the lever 41. The lower end of the arm 44 bears against the top of the shaft 34 for actuation thereby.

The other end of the lever 41 is connected to a crossbar 46 to either end of which there is adjustably mounted by means of conventional threads and lock nuts 47, 48 respectively, posts 49 and 50. These posts pass downwardly through arms 51 mounted on the bracket 38 and continue through apertures 52 and 53, respectively, of the platform 26.

To the lower ends of the posts 49 and 50 below the platform 26 there is mounted a notched knife blade 54.

Tensioned coil springs 55 and 56 are mounted about the posts 49 and 50, respectively, between the crossbar 46 and the arms 51 to constantly urge the arm 44 in contact with the shaft 34.

By these means an upward force acting against the pad 39 will force the lever 41 through the arm 44 to tilt and thereby depress the posts 49 and 50 with the knife blade 54 attached thereto.

An electrical heating element 57 is circumferentially mounted between the overhanging portion of the head 32 and the platform 26 in close proximity to the annular

side wall 30. A series of apertures 58 are circumferentially disposed through the side wall 30 adjacent the heating element 57.

An outer hood 59 is mounted on the platform 26 by means of bolts 60 surrounding the heating element and it extends upwardly above the lever 41. An opening 61 through the top wall 62 of the hood 59 is connected to the outlet 63 of an air blower 64 powered by an electric motor 64A. By these means air flowing through the hood 59 from the blower 64 is compelled to pass over the heating element 57, thence through the apertures 58 into the hood 30, and then downwardly through the opening 29 in the platform 26.

Below the platform 26 there is disposed on either side of the opening 29 endless sprocket chains 65 and 66, respectively. These sprocket chains are mounted on forward sprockets 67 and 68 and rearward sprockets 69 and 70, respectively. The forward sprockets 67 and 68 are mounted on shafts 71 and 72 which are supported on brackets 73 and 74 attached to the bottom of the platform 26. The rear sprockets 69 and 70 are mounted on shafts 75 and 76 which pass upwardly and are journaled in bearings 77 and 78.

Above the platform 26 the shafts 75 and 76 are provided with upper sprockets 79 and 80. The last mentioned sprockets, in turn, are connected by sprocket chains 81 and 82 to central sprockets 83 and 84 on shafts 85 and 86 mounted on the platform 26. The shafts 85 and 86 are geared to each other by spur gears 87 and 88.

An electric motor 89 is mounted on a bracket 90 and it has its power takeoff connected to the shaft 86. As a result, the sprocket chains 65 and 66 are driven in unison but in opposite directions.

Attached to and spaced about each sprocket chain is a series of clamps 91, 92, 93, and 94, 95, 96, respectively. Each clamp comprises an inner S-shaped member interposed in its respective chain as a link thereof. To the vertical portion 98 of the S-shaped member there is pivoted an inverted L-shaped member 99 by means of an offset boss 100 and a pin 101 in such a manner that the upper finger portion 102 of the member 99 abuts the underside of the top finger portion 103 of the member 97 when the member 99 is in its upright position, thereby effecting a clamping action between the two finger portions.

The member 99 is biased to its clamping position by means of a coil spring 104 mounted between a socket 105 in the foot of the S-shaped member and a recess 106 at the bottom of the member 99.

By these means, a sheet of material 97 wider than the container may be held between oppositely facing clamps on the inner sides of the sprocket chains 65 and 66, and move forwardly as the sprocket chains are translated.

To open the finger 102, camming tracks 107 and 108 are provided for each sprocket chain adjacent the inner quadrants at the inner sides of the chains. As each clamp is carried adjacent its corresponding camming track, the track is contacted by the lower end of a member 99 which pivots it against the action of the spring 104, thereby separating the finger 102 from the finger 103 and permitting marginal edges of the sheet material to enter between these fingers. On leaving the camming track the finger 102 is urged to its closed position relative to the finger 103 by the spring 104, thereby effecting a clamping action against the sheet material 97.

The clamps are so spaced about the sprocket chains as to provide sufficient sheet material between successive clamps for one capping operation.

As the sprocket chains continue to be translated, the clamps carry the sheet material along with them to a position directly below the opening 28 and the knife blade 54.

The sheet material 97 is wider than the container C and is drafted from a roll 109 disposed on a pair of mounted rollers 110, 111 in a recess 112 of the bottom section A. The sheet 97 is drawn from the roll around the pintle 21 and then proceeds forwardly to be engaged by the clamps described above.

The container C to be capped is placed on an elevator platform 114 against positional cleats 16 and 17. When the container is elevated it contacts the sheet of heat shrinkable film lying across the opening 28 which is released from the clamps, as explained hereinafter. Continued upward movement of the container causes the sheet to contact the pin 40 which punctures it with a tiny relief hole for the escape of excess trapped air. Then the pad 39 is contacted which forces the shaft 34 upwardly causing the knife blade 54 to move downwardly against the sheet, thus effecting a severing of an end portion of the sheet longer than the container. While in this position switches, hereinafter explained, are actuated which result in energizing the heating element 57 and the air blower 64. This instantly forces air through the apertures 58 against the marginal skirt portion 113 of the sheet surrounding the lip of the cup resulting in a shrinkage of the skirt portion. See FIG. 11.

The platform 114 is actuated by a pair of extendable and retractable means 115 on either side of the platform. Each means 115 comprises a series of interconnected links 116 forming a conventional lazy tong linkage. The inner sides of the lower ends of the linkages are pivoted on a shaft 117 to the vertical inner walls 118 connected to the frame of the upper section B. The other sides of the lower ends are connected to a cross bar 119 slidably mounted in horizontal guide slots 120 of the side walls 118. Vertical guide slots 121 and 122 are also provided in the walls for pins 123 and 124 of the platform 114.

The inner side of the upper end of each lazy tong linkage is pivoted on a pin 125 to the platform 114 while the other side is connected to a pin 126 slidably mounted in a vertical slot 127 of the platform.

By these means, actuation of the bar 119 inwardly in the guide slots 120 will cause the lazy tong linkages to expand and move the platform 114 up while actuation of the bar 119 outward in the slots 120 will cause the linkage to retract and move the platform down.

The bar 119 is actuated by a spring cushioned mechanism in order to permit using the device with containers of different lengths. This mechanism in accordance with one embodiment comprises a pair of upper and lower plates 128 and 129. The plates are held together by means of pins 130 and 131 slidably engaging upstanding ears 132, 133 and 134, 135, respectively, of the plates. The inner ends of these pins are fixed to one of their respective ears, say the ears 132 and 133, while the other ends are slidably in the other ears 134 and 135.

The ears of the respective plates are separated by coil springs 136 and 137 mounted on the pins between the respective ears on either side.

A rotary eccentric cam 138 is mounted on a shaft 139 and it engages an upstanding shoulder 140 of the plate 128. Hence, by rotating the cam, force is exerted inwardly against the shoulder 140, which, through the springs 136 and 137, exerts an inward cushioned pull against the plate 129. Should a container be relatively long, the springs would compress to a greater degree than if the cup were relatively short during rotation of the cam. In fully extended position of the plate 127 relative to the plate 128 the cam will in this way raise the elevator a distance to accommodate a much shorter container. Thus, by this mechanism, a degree of flexibility is provided for different sizes of containers.

The mechanism is returned to its initial position by action of the cam 138 against an upstanding shoulder 141 of the plate 129.

The cam shaft 137 is connected to the power takeoff of an electric motor 142 mounted on a bracket 143 below the plates 128 and 129.

After a container C is placed in position on the platform 114, a push button starting switch 144 is closed. This closes a circuit through a switch 145 that is initially

held closed by a cam **146** on shaft **76**. (See FIG. 10 for clearer illustration.) Actuation of the motor **142** causes a cam **154** on shaft **139** to close a shunt switch **151** which maintains electric current to the motor **142** after the switch **144** opens by spring action to its initial position. This shunt switch **151** remains closed throughout a complete cycle of operation.

Further rotation of the shaft **139** causes a switch **147** to close and immediately open by a cam **148**. This switch controls operation of the heating element **57** and air blower **64**. Another cam **149** on the shaft **139** closes a switch **150** which starts operation of the motor **89**. This causes cam **152A** on shaft **76** to close switch **152**. The switch **152** remains closed until a cycle of operation is completed of motor **89** during which the switch **150** is opened in preparation for the next cycle of operation. The operation of motor **89** effects feeding of the sheet of film for a complete cycle. The cam **149** is designed to effect feeding just enough film for one capping operation.

The switch **145** is a safety switch which, as explained above, is initially held close by the cam **146** on shaft **76**. The switch **145** is thus held closed while the motor **89** is at rest. When the switch **145** is opened actuation of the motor **142** is prevented. This occurs during the time when the sheet of film is being moved into position by energizing of the motor **89** through switch **147**. Another open switch **153** is closed and opened by cam **153A** on shaft **76** slightly in advance of a sustained cycle of operation of the motor **89** to jog the motor **89** for an initial period and to cause the forwardmost of the clamps **91, 92, 93** and **94, 95, 96** to open against abutments **154** and **155**, thereby freeing the sheet.

By hingedly mounting the upper section B on the lower section A, insertion of a roll of film **109** is facilitated. The section B is simply hinged back 90° which exposes the cavity **112** from the front, whereby the roll is inserted and threaded around the pintle **21** with its end lying in the open jaws of the rearwardmost clamps.

The embodiment illustrated in FIGS. 12 to 14 comprises a modification of the elevator drive mechanism. In lieu of the cam drive **138** and its appurtenant means illustrated in FIGS. 8 and 9, a pair of vertical arms **156** are pivotally connected at their upper ends to the pivotal intersection **157** of the bottom most links **116** of the respective linkages **115**. The lower end of each arm **156** is telescopably mounted in a tubular member **158**.

Within the tubular member **158** there is disposed a coil spring **159** between a shoulder **160** of the arm **157** and the bottom **161** of the tubular member. The bottom **161** has an aperture **162** through which the lower threaded end of the arm **157** extends to receive a pair of adjusting nuts **163** which abut the bottom **161**.

A lobe **164** integral with the tubular member, extends forwardly and it is eccentrically pivoted to a rotating member **165** by means of a shoulder screw **166**. The member **165** is mounted for rotation on a cross shaft **167**. The cross shaft **167** is carried on bearings **168** and **169** of brackets **170** and **171**.

A sprocket **172** is also mounted for rotation on the shaft **167**. This sprocket is connected by sprocket chain **173** to drive sprocket **174** on the take-off shaft **175** of an electric motor **176**. The motor **176** is mounted by suitable bolts **177** on the frame of the machine.

The shaft **167** carries the cams **154, 148** and **149** which activate the switches **151, 147** and **150**, respectively.

Actuation of the motor **176** causes rotation of the shaft **167** and member **165** which forces the eccentrically mounted tubular members **158** upward. The upward force is exerted on the arms **157** through the springs **159** and hence against the lazy tong linkages which causes them to extend more or less, as explained above, and move the platform **114** upward. On the downstroke, the rotary members **165** force the tubular members down which act directly on the arms **157** through the nuts **163**.

I claim:

**1.** A capping machine for a container having an upper open end and a hollow section comprising a hood having an imperforate head, means for disposing a sheet of heat shrinkable film larger than the hood and the upper end of the container in juxtaposition to and below the hood, an elevator mechanism below the hood for supporting the container to be capped and moving it upwardly to cause its upper end to engage and bear against a central portion of said sheet and to enter said hood with the sheet, means while so engaged for heat shrinking marginal edges of the film in the hood, means for supporting a continuous supply of the heat shrinkable film in the form of a roll within the hollow section, said section being hinged to the remaining part of the machine to expose the interior of the hollow section in one hinged position, a hinge pin connecting the hollow section with the said remaining part of the machine, said roll having an unrolled portion normally passing from the hollow section to the remaining part of the machine around said hinge pin, and means for severing a portion of the sheet from the supply of film.

**2.** A capping machine as defined by claim **1**, and means for puncturing the sheet with a pin hole as a relief opening for the escape of trapped excess air when the sheet is contacted by the container.

**3.** A capping machine for a container having an upper open end comprising a hood, means for disposing a sheet of heat shrinkable film larger than the hood and the upper end of the container in juxtaposition to and below the hood, an elevator mechanism below the hood for supporting the container to be capped and moving it upwardly to cause its upper end to engage and bear against a central portion of said sheet and to enter said hood with the sheet, means while so engaged for heat shrinking marginal edges of the film in the hood, the means for disposing the sheet comprising a pair of parallel chains straddling the hood and clamps carried by the chains for gripping marginal edges of the sheet, means for moving said chains in unison and means for selectively gripping and releasing the clamps from engagement with said marginal edges during a cycle of operation of the machine.

**4.** A capping machine as defined by claim **1**, having a stationary frame structure, said elevator mechanism comprising an extendable and retractable linkage between the elevator and the stationary frame structure, and means for actuating said linkage.

**5.** A capping machine as defined by claim **4** in which the linkage comprises a lazy tong linkage.

**6.** A capping machine as defined by claim **4** in which the means for actuating the linkage comprises a resiliently yieldable mechanism.

**7.** A capping machine as defined by claim **4** in which the resiliently yieldable mechanism comprises a first member connected to the linkage, a coil spring having one end connected to said first member, a second member connected to the other end of the spring, and means for actuating said second member in relation to said first member.

**8.** A capping machine as defined by claim **1** in which the means for heat shrinking comprises a source of hot air and means for passing the hot air over the said marginal edges.

**9.** A capping machine as defined by claim **8** and means for pulse actuating said source of hot air upon engagement of the container with the sheet.

**10.** A capping machine as defined by claim **1**, having means for passing an end of the sheet of film from the supply to the hood and in which the means for severing the sheet from the supply comprises a knife blade lying across the path of the sheet and means for actuating said knife blade to cut the sheet.

**11.** A capping machine as defined by claim **7** in which the means for actuating the second member in relation to

the first member comprises a rotating eccentric cam abuttingly engaging the second member.

12. A capping machine as defined by claim 7 in which the first and second members comprise a pair of upper and lower plates mounted for reciprocation relative to each other, spring means between said plates, one of said plates being connected to the linkage and the other plate being abuttingly engaged with a rotary eccentric cam.

13. A capping machine as defined by claim 7 in which the first and second members comprise telescopable members, compressible spring means between said members, one of said members being connected to the linkage, and a rotary member eccentrically connected to the other member.

14. A capping machine as defined by claim 3 in which the clamps each comprises an S-shaped member secured to a chain, an inverted L-shaped member pivoted to the S-shaped member forming a pair of pivoted coacting jaws.

15. A capping machine as defined by claim 3 in which the clamps each comprises a pair of coacting jaws, resilient means urging the jaws to clamping position, and means for actuating one jaw relative to the other against the action of said resilient means during a selected portion of the travel of the chain.

16. A capping machine as defined by claim 5 in which the hood is provided with a series of circumferential apertures through which hot air is passed into the hood for shrinking the marginal edges.

17. A capping machine as defined by claim 16 and a source of hot air for passage through said apertures.

18. A capping machine as defined by claim 17 in which the source of hot air comprises an electrical heating element surrounding the hood adjacent said apertures, and means for directing a current of air over said heating element and through said apertures.

19. A capping machine as defined by claim 18 in which the means for directing the current of air comprises a second hood surrounding the first mentioned hood and an air blower having its outlet within said second hood and its inlet on the exterior of the said second hood.

20. A capping machine as defined by claim 10 in which the means for actuating the knife blade comprises a linkage including a lever having one end connected to the knife blade and the other end connected to a member below the hood, said member being actuatable on contact by an upwardly moving container on the elevator mechanism.

21. A capping machine as defined by claim 20 in which the hood is cylindrical and the movable member comprises a disc coaxially disposed at the bottom of the hood.

22. A capping machine as defined by claim 21 in which the disc has a soft rubber pad along its bottom surface.

23. A capping machine as defined by claim 21 having a pin carried by the disc and extending below its lower surface to contact the sheet of film when moved thereagainst by a container on the elevator mechanism.

**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,110,898 | 3/1938 | West | 53—141 |
| 2,455,461 | 12/1948 | Anderson | 53—141 |
| 2,763,203 | 9/1956 | Russell | 93—58 |
| 2,920,431 | 1/1960 | Izumi | 53—141 |
| 2,984,058 | 5/1961 | Meissner | 53—141 X |
| 3,017,729 | 1/1962 | Cheeley | 53—184 X |
| 3,197,940 | 8/1965 | Spangler | 53—184 X |
| 3,200,562 | 8/1965 | Zebarth | 53—184 |
| 3,286,437 | 11/1966 | Cole | 53—296 |
| 3,331,293 | 7/1967 | Mullaney | 93—44.1 |
| 3,348,358 | 10/1967 | Sternau | 53—30 X |
| 3,402,874 | 9/1968 | Sternau | 53—184 X |
| 3,378,989 | 4/1968 | Denker | 53—184 |
| 3,389,530 | 6/1968 | Yates | 53—30 |
| 3,427,729 | 2/1969 | Piazze | 53—184 X |
| Re. 25,302 | 12/1962 | Allen | 93—59 |
| 3,426,504 | 2/1969 | Christensson | 53—141 |
| 3,439,587 | 4/1969 | Sternau | 53—30 X |
| 3,224,163 | 12/1965 | Ray | 53—329 |
| 3,460,317 | 8/1969 | Carter | 53—42 X |

FOREIGN PATENTS

| | | |
|---|---|---|
| 694,781 | 7/1953 | Great Britain. |

WAYNE A. MORSE, JR., Primary Examiner

U.S. Cl. X.R.

53—296, 329; 93—58, 59