July 11, 1944. K. SUNDELL 2,353,200

CAN CAPPING MACHINE

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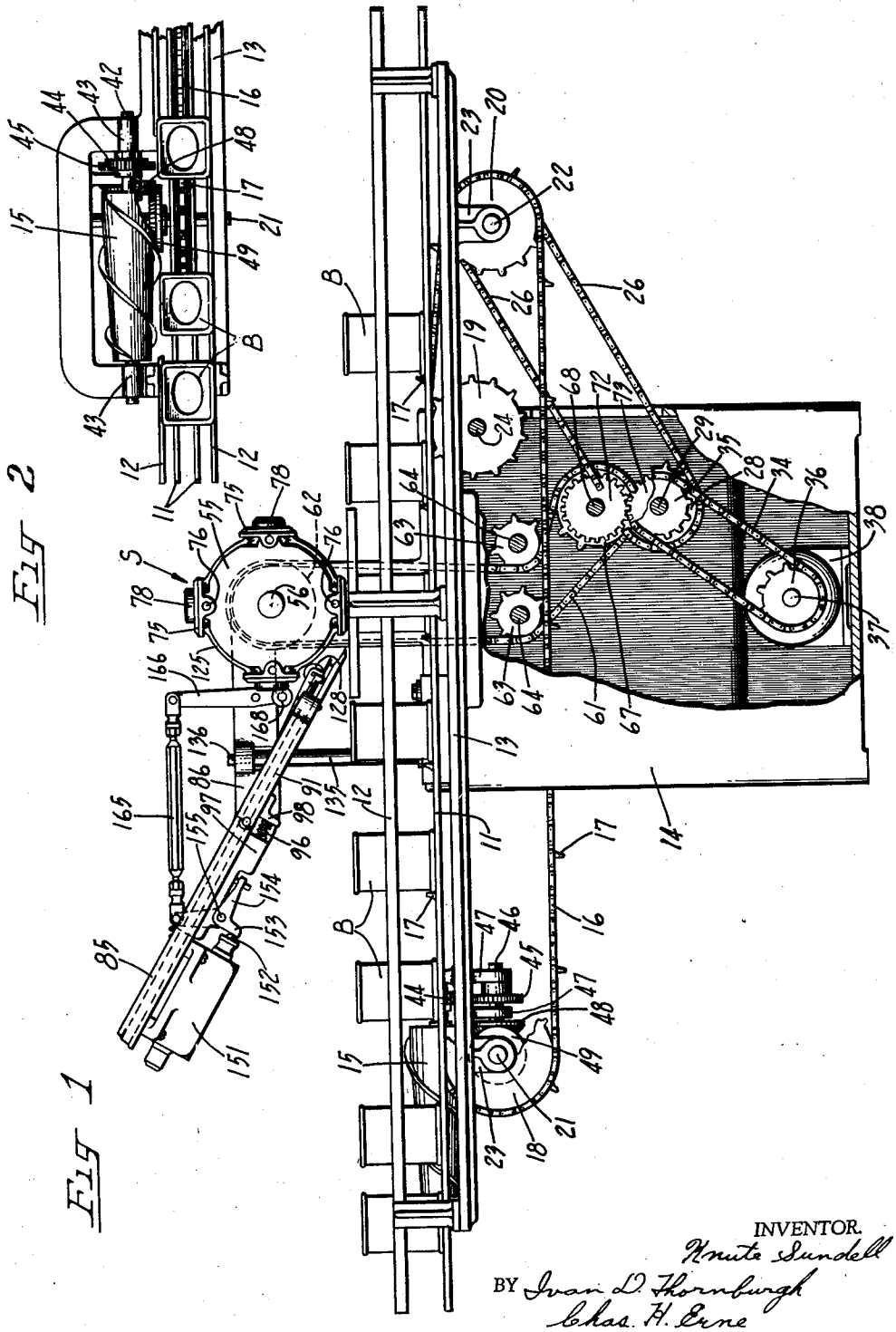

Fig 2

Fig 1

INVENTOR.
Knute Sundell
BY Ivan D. Thornburgh
Chas. H. Erne
ATTORNEYS

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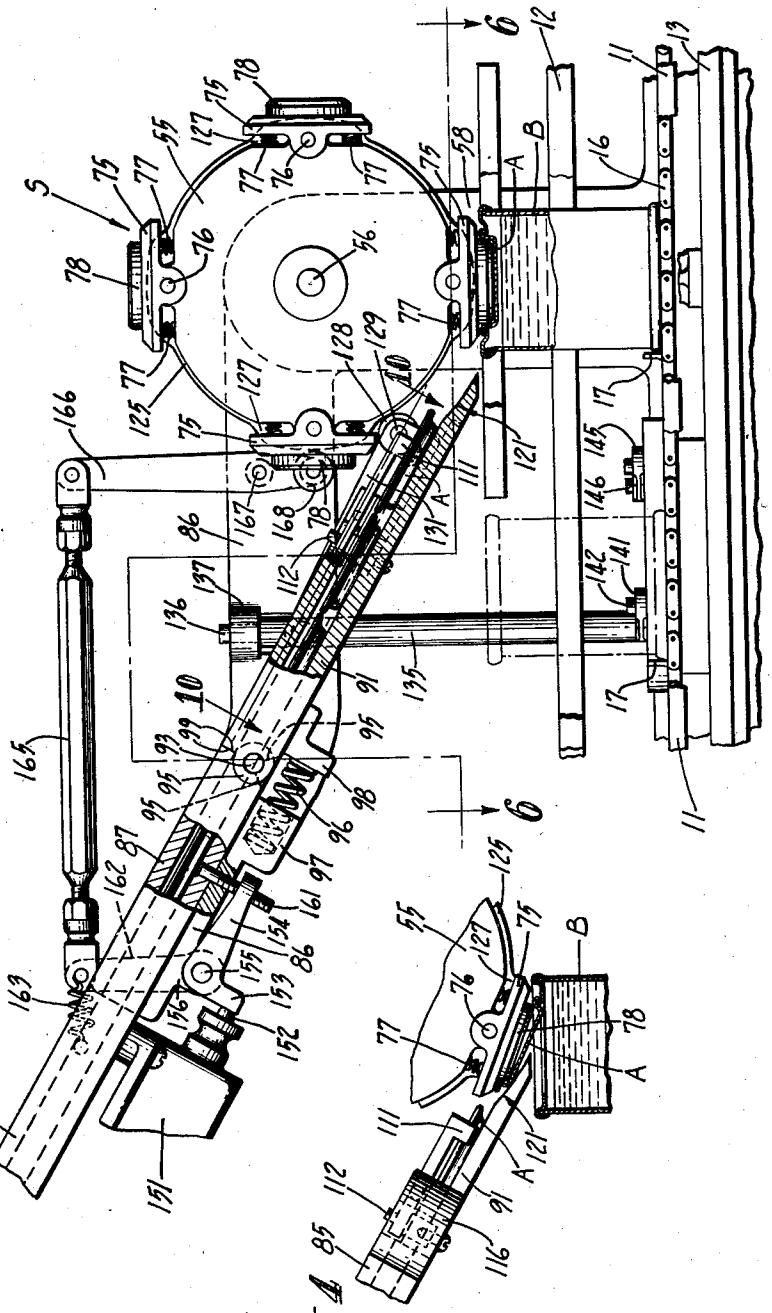

Fig 3

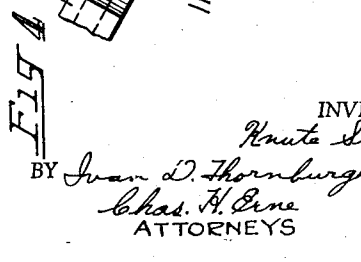

Fig 4

INVENTOR.
Knute Sundell
BY Ivan D. Thornburgh
Chas. H. Erne
ATTORNEYS

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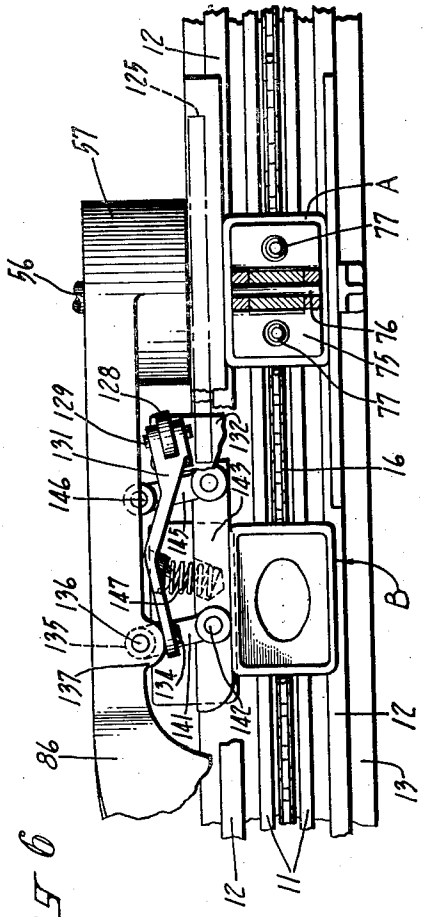

Fig 6

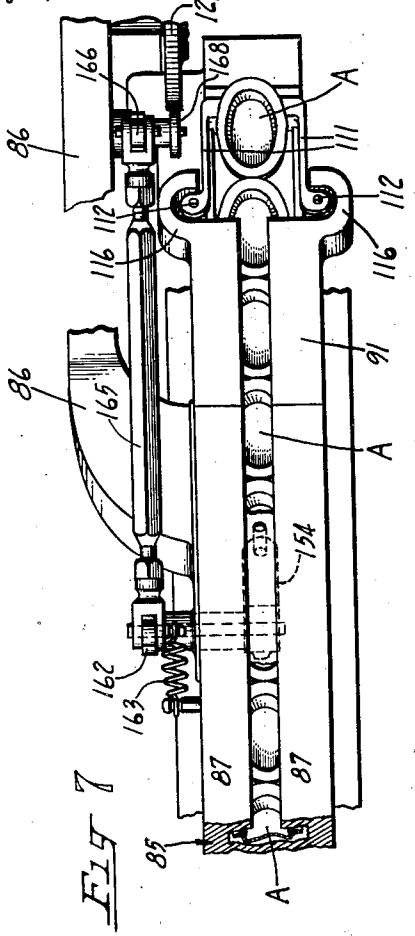

Fig 7

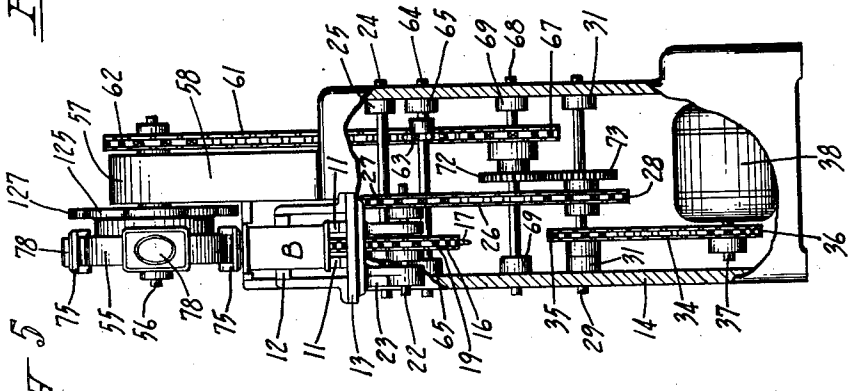

Fig 5

INVENTOR.
Knute Sundell
BY Ivan D. Thornburgh
Chas. H. Erne
ATTORNEYS

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Fig 9

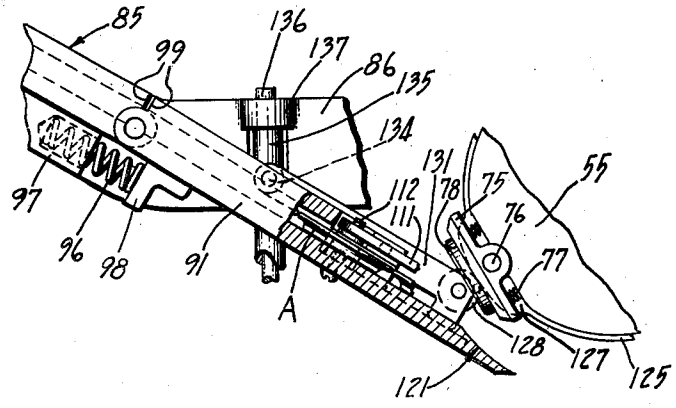


Fig 8

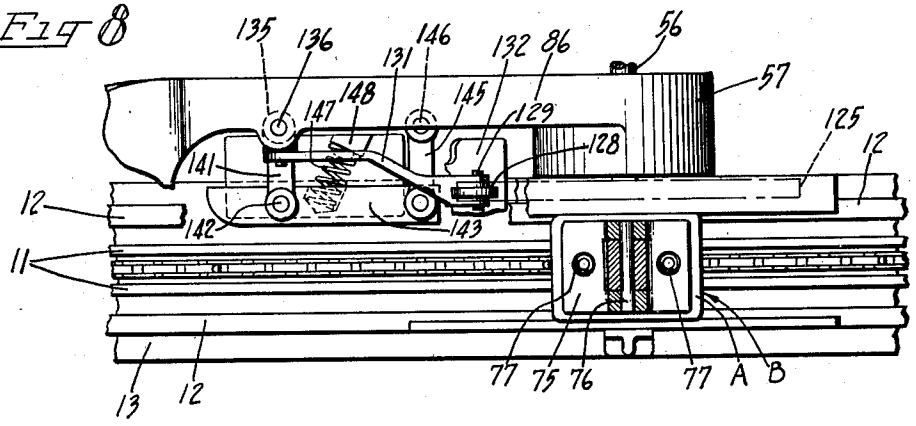


Fig 10

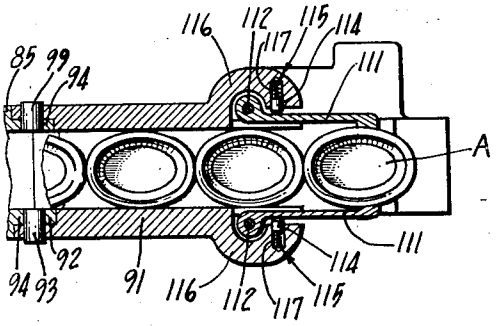
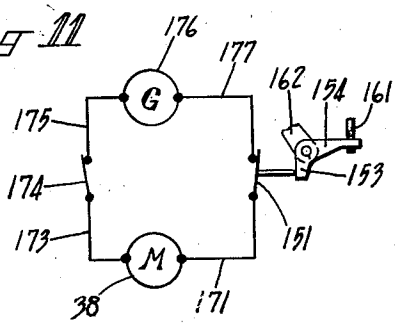


Fig 11



INVENTOR.
Knute Sundell
BY Ivan D. Thornburgh
Chas. H. Erne
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,353,200

CAN CAPPING MACHINE

Knute Sundell, Waukegan, Ill., assignor to American Can Company, New York, N. Y., a corporation of New Jersey

Application July 1, 1941, Serial No. 400,675

6 Claims. (Cl. 226—80)

The present invention relates to container or can capping machines and has particular reference to a multiple head machine in which the heads feed the can covers or caps into place and press them down tight on the cans.

An object of the invention is the provision of a multiple head can capping machine wherein the heads are carried on a rotating wheel in such a manner that they feed can covers in a continuous procession and position and force the covers down tightly onto cans passing in a similar procession adjacent the rotating wheel so that the cans may be closed more efficiently under high speed production.

Another object is the provision of such a machine wherein a cover is prevented from being fed if no can is in place to receive it and wherein the machine is stopped when there is no cover for a can.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a side elevation of a can capping machine embodying the instant invention, with parts broken away;

Fig. 2 is a fragmentary top plan view of that portion of the machine which is shown at the left in Fig. 1;

Fig. 3 is an enlarged side elevation of the upper portion of the machine with a can and a cover in place in the machine, with parts broken away and parts shown in section;

Fig. 4 is a fragmentary detail of portions of the machine shown in Fig. 3 showing how a can cover is placed on the upper end of a can;

Fig. 5 is an end elevation of the machine shown in Fig. 1 as viewed from the right in that figure, with parts broken away and shown in section;

Fig. 6 is a fragmentary top plan and sectional view taken substantially along the broken line 6—6 in Fig. 3;

Fig. 7 is a fragmentary top plan view taken along a plane above that shown in Fig. 6;

Fig. 8 is a top plan view similar to Fig. 6 showing the position of certain movable parts when no can is in place in the machine;

Fig. 9 is a fragmentary detail of parts shown in Fig. 3 with the movable parts in a different position;

Fig. 10 is a sectional detail taken substantially along the line 10—10 in Fig. 3, with parts broken away; and

Fig. 11 is a wiring diagram of the electric apparatus used in the machine.

As a preferred embodiment of the instant invention, the drawings illustrate a capping machine in which sheet metal oval shaped friction plug covers A of the countersunk panel character are fed into position and forced down tightly onto cans B of the kind used for cocoa and the like products. The body of the can is rectangular in shape and preferably is made of fibre. The ends of the can preferably are made of sheet metal and the top end is formed with a friction ring opening into which the cover A is frictionally and tightly pressed. However, the invention is equally well adapted to closing all metal or all fibre cans with covers made of fibre or metal.

The filled cans B to be closed are introduced into the machine by way of a horizontal, straight line runway 11, having side guide rails 12 which maintain the cans in line. The runway and the guide rails extend the full length of the machine and are supported on a longitudinal table 13 secured to a frame 14 which constitutes the main frame of the machine.

Adjacent the entrance end of the machine, the cans are engaged by a constantly rotating timing screw 15 which spaces the cans in timed order while advancing them along the runway. The timed cans are received on a continuously moving chain conveyor 16 having feed dogs 17 secured thereto at spaced intervals along its length for advancing the cans through the machine.

The conveyor 16 takes over an idler sprocket 18 disposed at the entrance end of the runway 11 and over an idler sprocket 19 and a driving sprocket 20 which are located at the opposite or discharge end of the runway. The sprockets 18 and 20 are mounted on respective shafts 21, 22 journaled in bearing blocks 23 which depend from the longitudinal table 13. The idler sprocket 19 is mounted on a shaft 24 journaled in bearings 25 (see also Fig. 5) in the machine frame.

The conveyor driving sprocket 20 is rotated by a chain 26 (see also Fig. 5) which operates over a sprocket 27 on the shaft 22 and over a sprocket 28 on a cross shaft 29 journaled in bearings 31 in the machine frame. Shaft 29 is rotated by a chain 34 which operates over a sprocket 35 mounted on the shaft and over a sprocket 36 which is mounted on a rotor shaft 37 of an electric motor 38 secured to the machine frame. The motor is the main source of power for the entire machine.

The timing screw 15 is rotated from the conveyor 16. For this purpose the screw is mounted on a shaft 42 (Fig. 2) which is journaled in bearings 43 in the table 13. The screw shaft carries a gear 44 which meshes with and is driven by a gear 45 (Fig. 1) carried on a bevel gear shaft 46 journaled in bearings 47 which depend from the table 13. This shaft carries a bevel gear 48 which meshes with and is driven by a bevel gear 49 mounted on the rotating conveyor idler sprocket shaft 21.

Cans B moving through the machine on the

runway 11 pass a closing station S which is located adjacent the middle of the machine. At this station a rotatable cover feeding and inserting disc wheel or turret 55 (Figs. 1 and 5) is disposed above the path of travel of the cans. The wheel is mounted on a wheel shaft 56 journaled in a bearing 57 formed in an upright column 58 on the machine frame 14. The wheel is rotated by a chain 61 which operates over a sprocket 62 carried on the wheel shaft and over a pair of small idler sprockets 63 mounted on cross shafts 64 journaled in bearings 65 in the machine frame. The chain also takes over a driving sprocket 67 on a cross shaft 68 journaled in bearings 69 in the machine frame. Shaft 69 is rotated through a gear 72 which is carried on the shaft and which is driven by a meshing gear 73 on the cross shaft 29. This train of gears, sprockets and chains rotate the wheel in time with the passage of the cans along the runway 11.

The wheel 55, adjacent its periphery, carries a plurality of can closing heads 75 (see also Fig. 3) which are mounted on pivot pins 76 carried in the wheel. Each of these heads is backed up by a pair of compression springs 77 located one on each side of the pivot pin and interposed between the head and the periphery of the wheel. This construction of closing head permits tilting of the head when necessary under the yieldable backing of the springs.

Each head carries a pad 78 which has the same contour as the inside surface wall of the countersunk panel in the can cover A. As each can B on the runway passes under the wheel, one of the heads 75 comes down against the top of the can with its pad 78 in registry with the friction ring opening in the can top. This action results in applying a cover to the can as will now be explained.

The can covers A are introduced into the machine from any suitable source of supply, preferably direct from the press which forms them, by way of a straight line inclined magazine chute 85 (Figs. 1, 3 and 7). This chute is disposed above the path of travel of the cans and slopes downwardly on a bracket arm 86 which extends out from the column 58. The top of the chute is partially closed by overhanging plate sections 87 which also retain the covers in the chute.

The inner end of the chute 85, i. e., the end nearest the closing wheel 55, is formed with a hinged section 91 which constitutes a continuation of the main portion of the chute. The hinge extension is formed with hinge lugs 92 (see also Fig. 10) which carry pivot pins 93 secured in hinge lugs 94 of the main chute. The lower abutting adjacent edges of the two chute sections are cut away along bevel lines 95 to permit the hinge section 91 to move down when required.

The hinge section 91 is maintained normally in longitudinal alignment with the main chute 85 by a compression spring 96 which is located below the chute and which is interposed between a lug 97 on the chute supporting bracket arm 86 and a lug 98 secured to the hinge section. The upper abutting edges 99 of the chute sections engage each other under the force of the spring and thus serve as stops for locating the hinge section in alignment with the main chute.

Can covers A introduced into the chute 85, slide down to the inner end of the hinge section 91. The line of covers which collects in the chute, is retained in place by a pair of stop fingers 111 (Figs. 4, 7 and 10). These fingers engage against the sides of the lowermost cover in the chute. There is one of these fingers on each side of the chute and they are mounted on pivot pins 112 secured in the floor of the chute. The fingers are pressed inwardly against the covers by spring barrels 114 located in sockets 115 formed in bosses 116 which surround the pivot ends of the fingers. Compression springs 117, located in the sockets, press the barrels outwardly against the fingers.

The lowermost cover A in the chute 85 is held normally by the stop fingers 111 in the path of travel of a closing head 75 as the latter moves downwardly with the wheel 55. Since the wheel rotates in a counterclockwise direction, as viewed in Fig. 3, this downward movement is at the left of the wheel. As the closing head moves into alignment with the cover, the pad 78 on the head enters into the countersunk panel of the cover and thus pulls the cover out from between the stop fingers 111. This removal of the lowermost cover in the line permits the entire line to slide down the chute the length of one cover and thus brings the next cover in the line into the lowermost cover position.

The closing head 75 remains in engagement with the removed cover A and slides it along the extreme inner end of the hinged section 91 of the chute in time and in contact with a can B moving immediately beneath the chute. As the can continues to advance, the closing head slides the cover off the end of the chute and deposits it into the opening of the friction ring in the can, as best shown in Fig. 4. The inner end of the runway is formed with a concave surface 121 to facilitate this cover placing action.

With further advancement of the can and continued rotation of the wheel 55 the closing head 75 presses the cover A down tightly into the can opening and thus seals the can, the springs 77 in the closing head permitting the latter to tilt in the required direction to seat the cover home in the can opening. This sealing action takes place when the can is in vertical alignment with the center of the wheel 55, as best shown in Fig. 3. After such a can sealing operation, the sealed can continues to advance along the main runway 11 toward the discharge end of the machine from which the cam may be discharged to any suitable place of deposit.

With completion of the sealing operation the closing head pad 78 withdraws from the cover panel and is carried up around the right hand side of the wheel 55, over the top and down along the left hand side in readiness for another closing operation. In this manner the positioning of the covers onto the cans and the sealing of the cans is carried on in a continuous process as the cans pass through the closing station.

Provision is made for preventing the feeding of a cover A from the chute 85 by a closing head 75 when there is no can on the runway 11 to receive a cover. This is accomplished by an edge cam 125 (Figs. 1, 3 and 5) which is mounted on the wheel shaft 56 adjacent the closing wheel 55. Adjacent each of the closing heads 75 on the wheel, the cam 125 is formed with a raised cam projection 127.

The cam projections 127 at times are adapted to engage against a roller 128 (Figs. 3, 6 and 8) which is mounted on a pivot pin 129 carried in an end of a lever 131 disposed adjacent the chute 85. The roller end of the lever slidably rests

on a pad 132 which extends out from the hinged section 91 of the chute. The opposite end of the lever is mounted on a pivot pin 134 (see also Fig. 9) carried in a vertical sleeve 135 mounted on a rod 136. The upper end of the rod is carried in a bearing 137 formed on the chute bracket arm 86. The lower end of the rod is carried in a suitable bearing formed in the top of the machine frame 14 (Fig. 3).

Adjacent its lower end the sleeve 135 is formed with a parallelogram link 141 which carries a pivot pin 142 secured in a movable shoe 143 which projects into the path of travel of the cans B moving along the runway 11, as best shown in Fig. 8. The shoe is pivotally connected to a link 145 which is parallel with the link 141 and which carries a pivot pin 146 secured in the top of the machine frame 14. The shoe is maintained in the path of travel of the cans under the yielding action of a compression spring 147 which is interposed between the shoe and a lug 148 on the machine frame.

Hence as the cans B are passing along the runway 11, they successively engage against the shoe 143 and press it back out of the way, as shown in Fig. 6. This shifts the parallelogram links 141, 145 and thus turns the sleeve 135 on its rod 136. Turning of the sleeve shifts the lever 131 carried thereon into sidewise position (Fig. 6) so that the roller 128 is clear of the cam projections 127. This is the normal position of these parts as when cans B are moving through the machine in a continuous procession and this normal position permits of the feeding of the covers A to the cans as they pass through the closing station as hereinbefore explained.

However, when a space occurs in the procession of cans, as when a can is missing and when cans cease passing through the machine, the compression spring 147 pushes the shoe 143 inwardly into the space normally occupied by such missing can. This movement of the shoe turns the sleeve inwardly and thus shifts the lever 131 into a position where its roller 128 is in alignment with the cam 125.

When the closing head 75, which normally is to feed a cover, moves adjacent the cover in the chute the cam projection 127 adjacent the head engages the roller 128 and pushes it and its lever down against the hinge section 91 of the cover chute 85. This depresses the chute hinge section 91 and the cover carried thereon so that it is out of the path of travel of the closing head. The head thus moves past the feed off end of the chute without picking up the cover and the cover remains in place in the chute until the next can comes along to receive it.

If a number of cans are missing in succession the roller 128 remains in alignment with the cam and every time a closing head moves adjacent the cover chute the cam projection adjacent the head depresses the chute hinge section and thus omits feeding a cover. If only one can is missing in the procession the next can adjacent the space operates the shoe 143 and pushes the roller 128 out of the way so that the next closing head 75 on the wheel will pick up the cover from the chute and feed it into place on the can. In this manner covers are prevented from being fed when cans are not in place to receive them.

Provision is made also for stopping the machine when the covers A fail to enter the chute 85 as when there are no covers to be fed onto the cans. This is brought about by a normally closed electric stop switch 151 (Figs. 1 and 3) which is secured to the bottom of the cover chute 85. A movable element 152 of the switch is backed up by a compression spring which forces the element against a lug 153 of a lever 154 mounted on a pivot pin 155 carried in a boss 156 formed on the chute bracket arm 86.

The outer end of the lever 154 extends under the chute 85 and carries an adjustable detector stud 161 which extends up through clearance holes formed in the chute bracket arm 86 and in the bottom of the cover chute. When covers A are in the chute up as far as the detector stud the covers prevent the stud from entering into the chute and this condition holds the electric switch in its normally closed position.

When the covers slide down through the chute as when a cover is fed from the feed off end thereof, the pressure of the detector stud 161 against the covers is relieved by the cam 125. This is brought about by an arm 162 which is mounted on the detector lever pivot pin 155. The upper end of the arm is maintained under the tension of a spring 163 which extends between the arm and the chute 85. This upper end of the arm is connected by way of a link 165 to the upper end of a vertical lever 166 mounted on a pivot pin 167 carried in the chute bracket arm 86. The lower end of the lever carries a cam roller 168 which is adjacent to and which is in alignment with the cam 125.

Hence when a closing head 75 on the wheel 55 moves adjacent the feed off end of the chute 85 to pick up a cover A, the cam projection 127 on the cam 125 engages the cam roller 168 and rocks the lever 166. Rocking of the lever pulls on the link 165 and the arm 162 and thus slightly depresses the detector lever 154 and the detector pin 161 carried therein. This shifting of the detector pin away from the covers in the chute, permits them to slide down the chute as the lowermost cover is removed. As soon as the lowermost cover has been removed, the cam projection 127 rides off the cam roller 168 and allows the spring 163 to return the detector pin 161 to its normal position against the covers in the chute.

When there are no covers A in the chute at the detector stud 161, as when the supply of covers is exhausted or when no new covers enter the chute, the detector stud in moving back into position moves further than usual and extends up into the chute. This extra movement of the stud rocks the detector lever 154 further than usual and shifts its lug 153 away from the movable element 152 of the electric switch 151. This opens the switch.

The electric switch 151 is included in a normally closed electric circuit illustrated in the wiring diagram in Fig. 11. The switch is connected by a wire 171 to the electric motor 38 which constitutes the main source of power for actuating the machine. The motor is connected by a wire 173 to a service switch 174 which in turn is connected by a wire 175 to a suitable source of electric energy such as a generator 176. The generator is also connected by a wire 177 to the switch 151.

Hence as long as the service switch 174 and the detector switch 151 remain closed, electric energy from the generator 176 flows along the circuit and maintains the motor in operation. However, when the detector switch opens even though the service switch remains closed the circuit is broken and the motor and the machine actuated thereby cease to operate. In this manner the

machine is shut down when no covers are in the chute to be fed onto cans passing through the machine.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a container capping machine, the combination of a conveyor for advancing a container along a predetermined path of travel, an inclined chute disposed above the path of travel of the container, a chute extension hingedly connected to the lower end of said chute for supporting a cover for the container, a closing head traveling adjacent said chute extension for sweeping the cover onto a container passing thereunder and for pressing the cover down tight into sealing position on the container, and means operable when no container is in place to receive a cover for shifting said chute extension and the cover carried thereon out of the reach of said closing head so that the cover will not be removed from the chute extension by the closing head.

2. In a container capping machine, the combination of a conveyor for advancing containers in a continuous procession along a predetermined path of travel, an inclined chute disposed above the path of travel of the containers for supporting a procession of covers for the containers, a chute extension hingedly connected to the lower end of said chute for supporting the lowermost cover in the procession, a rotatable wheel disposed adjacent the lower end of said chute, means for rotating said wheel in time with the said conveyor, a plurality of closing heads mounted on said wheel, said heads individually removing the lowermost cover in the chute and placing it on the container and forcing it down tight in sealing position on the containers as they advance, a cam rotating with said wheel and having a cam projection adjacent each closing head, a cam roller supported on said chute extension and movable into and out of the path of travel of said cam projections, and yieldable means engageable by the containers moving with said conveyor for shifting the cam roller into the path of a cam projection when no container is in place to receive a cover so that the chute extension and the cover carried thereon will be depressed out of the reach of the adjacent closing head to prevent the cover from being fed from the chute.

3. In a container capping machine, the combination of a conveyor for advancing containers in a continuous procession along a predetermined path of travel, actuating means for said conveyor, a yieldable closing head moving above said container path, an inclined chute comprising a stationary portion and a yieldable end section and supporting a supply of covers in procession, said closing head and chute section yielding mutually as the former transfers a cover from the latter to a container below, a cover detector mounted in the stationary portion of said chute and normally contacting a cover therein under pressure and adapted to stop the machine when no cover is in position to be thus engaged by the detector, a second detector adjacent the path of the containers and normally in contact with at least one of the containers, means cooperating with the container detector to move said chute end section and covers thereon out of the path of said closing head when no container is engaged by the detector, and detector releasing means operating prior to the transfer of a cover from said chute and section to remove the pressure of the first mentioned detector on an engaged cover, thereby releasing the covers for gravity feeding before a cover is removed from the chute end by the closing head.

4. In a container capping machine, the combination of a cover feeding turret, a conveyor for advancing a container along a predetermined path of travel, an inclined chute disposed above the path of travel of the container, a chute extension yieldingly connected to the lower end of said chute for supporting a cover for the container, a closing head pivotally mounted on the periphery of said turret, resilient means for retaining the head in normal tangency with its rotary path about the turret axis, the rotation of said turret moving said head adjacent said chute extension so that the resiliently mounted head sweeps a cover from the end of the extension into closing position on the container, said head and chute extension yielding so as to distribute contact pressures evenly on the cover during the transfer and avoiding scratching and marring of the cover.

5. In a container capping machine, the combination of feeding means for advancing containers along a predetermined path of travel, a straight line inclined magazine chute having means for yieldably mounting the same above the path of travel of the containers for feeding and supporting container covers, and a closing head moving adjacent said inclined support in time with the advancing containers, means for yieldably and resiliently mounting said closing head, said head when passing close to said chute sweeping a cover off its support and onto a passing container, said head and chute yielding mutually the while, and said head also forcing the cover down into sealing position on the container as the latter advances.

6. In a container capping machine, the combination of a conveyor for advancing friction plug containers in a continuous procession along a predetermined path of travel, a straight line inclined magazine chute having an end section provided with means for yieldably mounting the same above the path of travel of the containers for supporting and feeding a procession of friction plug covers, a rotatable wheel disposed adjacent the lower end of said chute, means for rotating said wheel in time with the said conveyor, and a plurality of closing heads having means for resiliently and pivotally mounting the same on said wheel, each head as it passes said chute engaging into and removing the lowermost cover in the chute while placing it on the container, said head and chute end section yielding mutually the while, said head also forcing the cover down into tight sealing position on the container as can and cover further advance with said conveyor.

KNUTE SUNDELL.