

May 18, 1943.

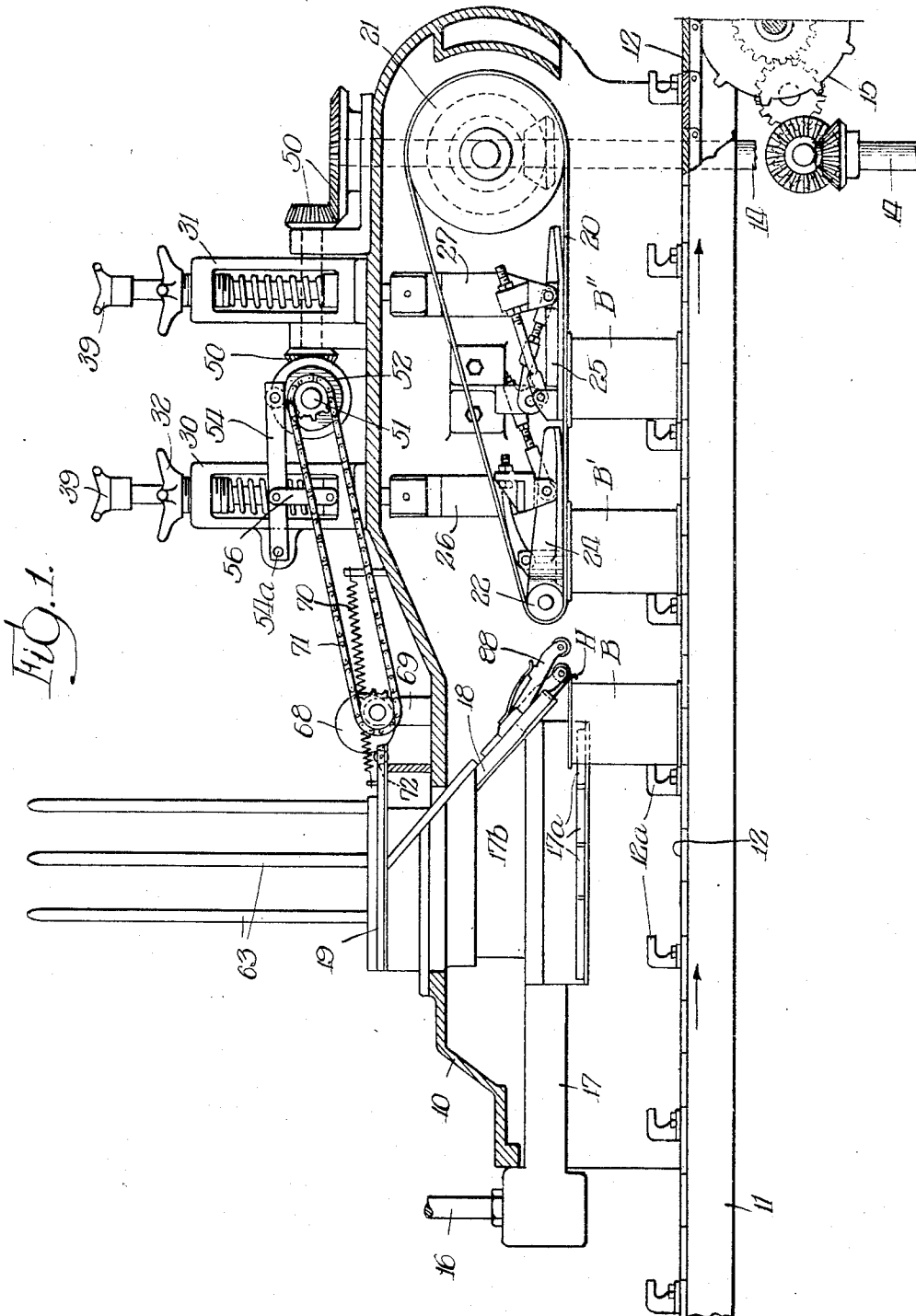
L. E. DAVIES

2,319,213

PACKAGING APPARATUS

Filed Sept. 25, 1939

3 Sheets-Sheet 1



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May 18, 1943

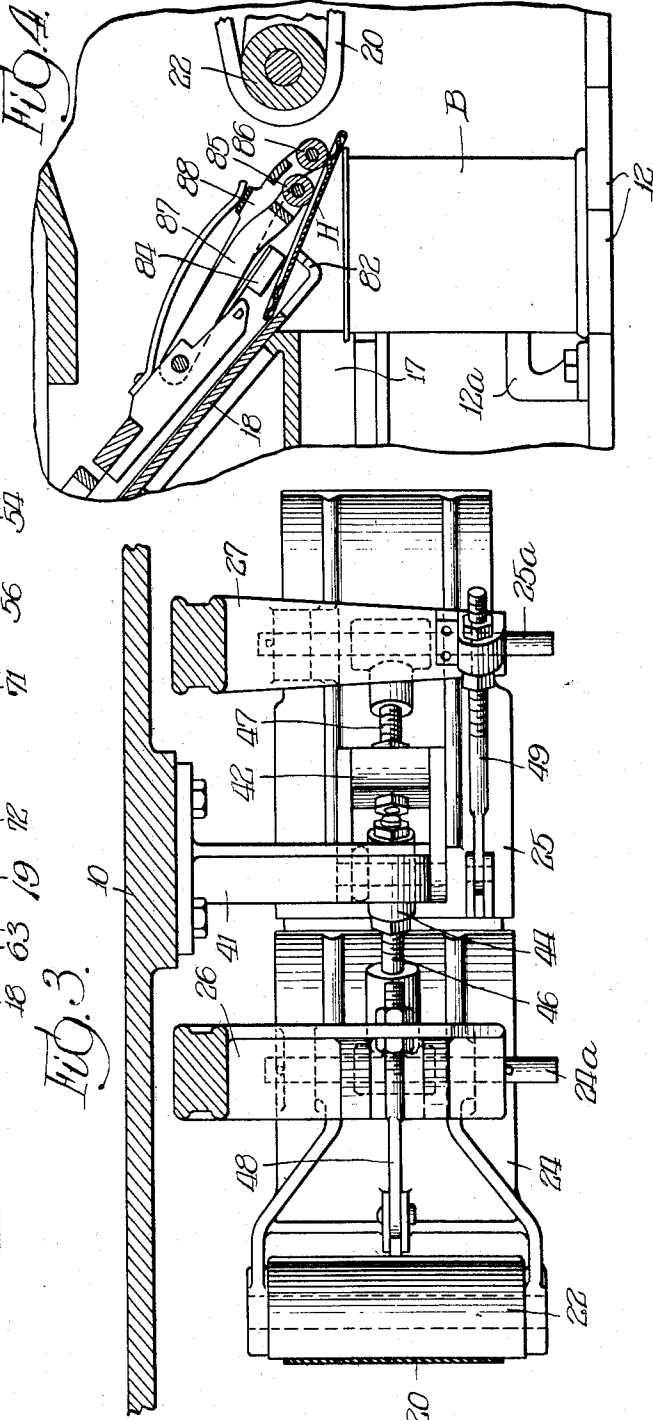
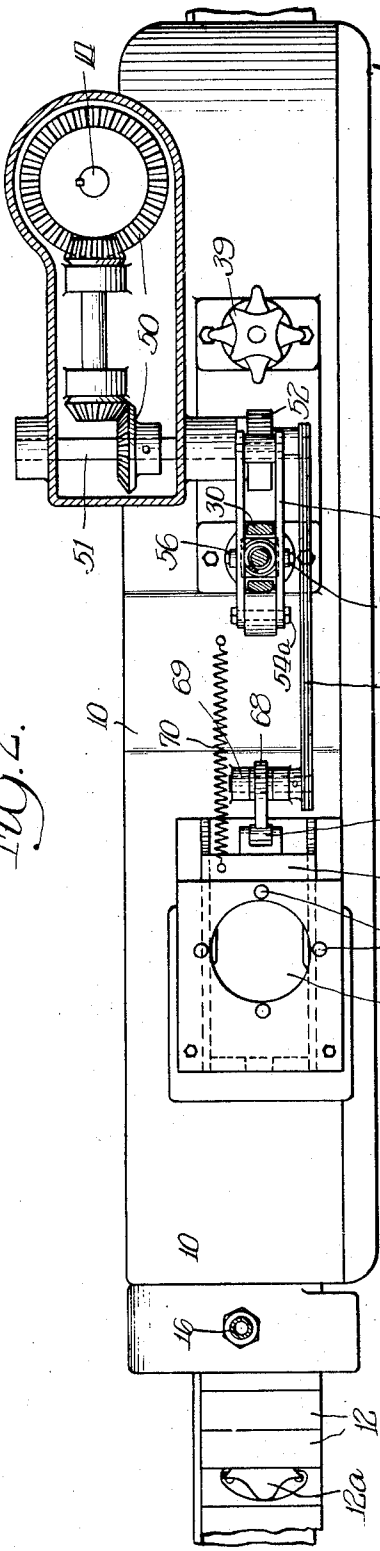
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PACKAGING APPARATUS

Filed Sept. 25, 1939

3 Sheets-Sheet 2



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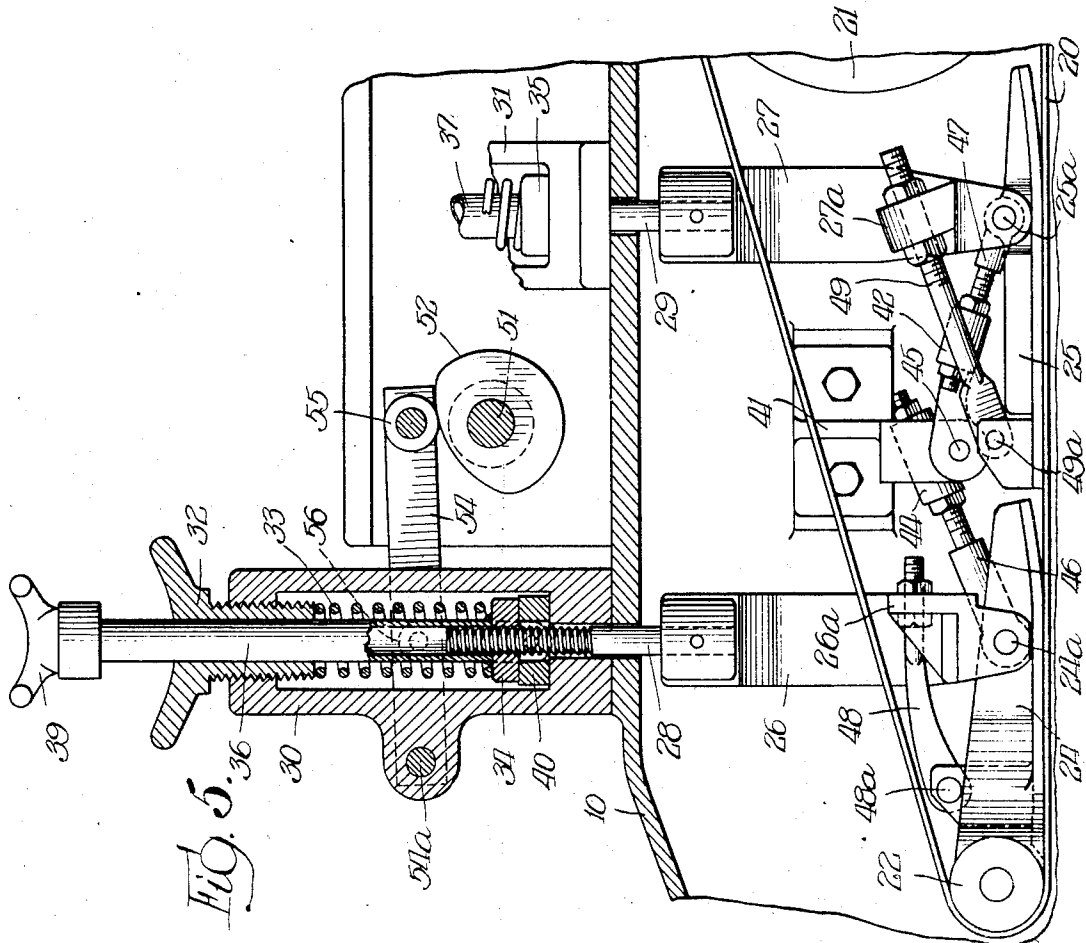
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PACKAGING APPARATUS

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3 Sheets-Sheet 3



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Patented May 18, 1943

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UNITED STATES PATENT OFFICE

2,319,213

PACKAGING APPARATUS

Lynn E. Davies, Park Ridge, Ill., assignor to
White Cap Company, Chicago, Ill., a corpora-
tion of Delaware

Application September 25, 1939, Serial No. 296,370

15 Claims. (Cl. 226—80)

This invention relates to apparatus for automatically applying closures to packing vessels or containers, such as jars or cans, while they are being moved in a series progressively and continuously, and hermetically sealing the closures on the containers, if they are of a character adapted for hermetic sealing, immediately after such application and in the course of their continued progressive movement. This application is a continuation in part of my co-pending application Serial No. 203,425, filed April 21, 1938.

A general object of the invention is the provision of such an apparatus which will operate with certainty and reliability to apply and seal quite shallow closures, such as can heads, upon suitable packing receptacles while the latter are moving progressively and rapidly and in close succession to one another, and which will be particularly reliable and efficacious for producing an hermetic seal under conditions such that the head space of the receptacle is evacuated of air as by displacement with condensible vapor or otherwise.

A particular object of the invention is the provision of such an apparatus which will be effective to apply the closure accurately, so as to provide an air-excluding contact between it and the receptacle initially, and then to press the closure down to a secure sealing relationship with the receptacle without disturbing their original relationship in any fashion such as to permit entry of air into the package after the closure is initially applied.

Other objects reside in the provision of improved mechanism whereby the apparatus may be adjusted or adapted for very accurate cooperation with the closures and receptacles.

Other and further objects of the invention will be pointed out or indicated hereinafter, or will be understood by one skilled in the art upon an understanding of its nature or its employment in use.

For the purpose of aiding in an explanation of the invention, I show in the accompanying drawings forming a part of this specification, and hereinafter describe, certain apparatus as embodiments of it. It is to be understood, however, that this is presented merely by way of illustration, and hence is not to be construed in any fashion for the purpose of limiting the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawings,

Fig. 1 represents a vertical section of a machine embodying the present improvements, the

section being taken longitudinally thereof so that various of the parts are shown in side elevation;

Fig. 2 is a top view of the machine shown in Fig. 1, certain parts being in section;

Fig. 3 is a sectional view showing a top view of portions of the head pressing mechanism;

Fig. 4 is a detail in the nature of a side elevational view of the lower end portion of the head chute illustrating the manner in which a head is removed from it by a progressively moving receptacle;

Fig. 5 is a side elevational view of portions of the head pressing mechanism shown in Fig. 3.

While the embodiments illustrated in the drawings are designed for handling metallic cans and can heads, it is to be understood that the invention is not limited to use of those particular types of receptacles and closures, or to the particular embodiments shown. However, an understanding of the invention will be most quickly had from the following detailed description of the illustrative embodiment here presented.

It is to be understood that the machine here shown is of a type wherein the filled receptacles, or cans, are passed in a series progressively through a tunnel-like housing wherein an atmosphere of hot steam or other condensible vapor is maintained in such location and condition that air will be displaced by it from the unfilled head space of the receptacles incident to their progressive movement. The closures or heads for the cans are introduced into this hot vapor atmosphere at a suitable location and are applied respectively to the successive receptacles while they are advancing, in such relationship that the hot vapor in the head space is trapped therein and a sufficiently close contact between the closure and the receptacle is obtained to prevent ingress of air. The receptacle with the closure thus upon it meanwhile moves to a position under a closely adjacent pressing apparatus by which the closure is pressed down to a securely seated position on the receptacle, thus establishing a secure hermetic seal, and the parts are held in this assembled relationship incident to their further progressive movement to a locality where they are subjected to cooling influence which has the effect of contracting and condensing the trapped vapor and thus reducing pressure within the container to a value below that of the external atmosphere, with the result that the closure is securely held in place.

The reference numeral 10 designates the casing portion of the machine which forms a tunnel-like housing over a trackway 11 upon which runs a

continuous chain belt conveyor 12 carrying equidistantly spaced flights or lugs 12a. This belt conveyor is actuated from a drive shaft 14 through suitable transmission gearing, so that its upper traverse is moved in the direction indicated by arrows, thus causing the flights 12a to travel through the tunnel of the casing 10. From a pipe 16 hot steam is supplied to a hollow steam distributor 17 supported within the casing, and a portion of the hot steam is emitted in the tunnel through the outlets 17a. The steam distributor has an upwardly extending portion 17b which supports a sloping chute 18 down which the closures are fed, and on its upper portion which projects through the top of the casing 10, the steam distributor supports a portion of the cap feeding mechanism, which is designated generally in Fig. 1 by the reference numeral 19. The steam distributor which is here illustrated is of the type more fully described in my U. S. Letters Patent No. 2,107,237, granted February 1, 1938, to White Cap Company. The head separating mechanism located at 19 may be of the type described in more detail in U. S. Letters Patent No. 2,173,602, granted September 19, 1939, to White Cap Company on my copending application Serial No. 218,596, filed July 11, 1938.

The head pressing mechanism comprises a broad belt 20, which travels on a sheave 21 and roller 22 so that its lower traverse travels above and parallel with the conveyor belt 12, the sheave 21 being journaled on the casing 10 and driven by suitable gearing from the drive shaft 14. The elevation of the lower traverse of the belt 20 is controlled by overlying shoes 24 and 25 against which it rides, and which I will designate respectively as the entering shoe and the trailing shoe. The roller 22 is journaled in the end of the entering shoe 24 and occupies a position adjacent the lower end of the closure chute 18.

The shoes are journaled respectively at 24a and 25a (see Fig. 5) on hangers 26 and 27 which, in turn, are fixed on vertically adjustable rods 28 and 29. These rods extend upwardly through holes in the top of the casing 10 and into spring cages 30 and 31 mounted thereon. In the upper ends of said spring cages are threaded adjustable nuts 32 which bear against the upper ends of coiled springs 33, the lower ends of which springs bear against nuts 34 and 35 respectively, which nuts are threaded on the upper portions of the rods 28 and 29 respectively. These nuts are fixed to the lower ends of tubes 36 and 37 which, at their upper ends, are equipped with adjusting heads or hand wheels 39. Hence, by rotation of tubes 36 and 37, respective nuts 34 and 35 may be rotated to adjust the respective rods 28 and 29 vertically and hence change the vertical positions of the hangers 26 and 27. Of course, either of said hangers may be adjusted independently of the other. Adjustment of the nuts 32 varies the compression of springs 33, and hence varies the resistance to upward movement of nuts 34 and 35 respectively, said nuts being movable upwardly against the pressure of said springs. Downward movement of the nut 35 is limited by the bottom of cage 31, whereas downward movement of nut 34 is limited by a collar 40 which, in turn, is stopped by the bottom of cage 30. Through this means, therefore, the lower limit position of the journals 24a and 25a may be varied independently of each other, and each shoe likewise is permitted upward movement, against the pressure of its spring 33, independently of the other, but always with its lower sur-

face maintained in the same angular relationship to the conveyor.

Means is provided for selectively varying the inclination of the respective shoes. A bracket 41 is mounted on a side wall of the casing 10 and carries a journal 45 upon which shackles 44 and 42 are mounted for rocking movement. Shackle bolts 46 and 47 are rockingly mounted on the journals 24a and 25a respectively, and extend through the sleeves of the shackles 44 and 42, against which they are clamped by jam nuts. Hence the shackle bolts and the shackles act as radius rods for the journals 24a and 25a and brace the shoes against the drag of the belt. For changing the inclination of the shoes, means is provided for raising and lowering their rearwardly presented ends. For the shoe 24 this means consists of a bolt 48 which has hinge connection with the shoe at 48a and has its threaded end passing through a hole in the flange 25a of the hanger 26. Jam nuts on said threaded end of the bolt 38 clamp against opposite sides of the flange 26a, and thus sustain the rearward end of the shoe 24 at the selected elevation with respect to the journal 24a, said elevation being susceptible of variation by adjustment of the jam nuts. A similar arrangement for adjustment of the shoe 25 is afforded by the bolt 49 which is hinged to the shoe at 49a and is clamped to a flange 27a of the hanger 27 by means of the jam nuts, as shown.

Means is provided for raising and lowering the entering shoe 24, and hence the rearward end of the belt 20, relative to the shoe 25 and relative to and in timed relationship with the progressive movement of the conveyor belt 12. As seen in Figs. 1 and 2, a train of gearing 50 leads from the drive shaft 14 to a stub shaft 51 which is journaled in brackets on the casing 10. This shaft 51 carries a cam 52 which is located adjacent the spring cage 30. On said cage 30 a yoke 54 is journaled at 54a and at its other end said yoke carries a roller 55 which rides upon the periphery of the cam 52. The yoke 54 is connected by links 56 on both sides with the collar 40. Consequently, with rotation of cam 52, yoke 54 is rocked upwardly and downwardly, thus raising and lowering collar 40 and hence nut 34 against the pressure of spring 33, thus raising and lowering rod 28, hanger 26 and shoe 24 in timed relationship with progressive movement of conveyor belt 12. This timing of shoe 24 is in relationship to the positions of the conveyor belt flights 12a, which establish the spacing of cans B, B', B'' which are fed through the machine by the conveyor, the shoe 24, and hence the rearward end of the belt 20, being raised just as a can nears the roller 22, and lowered after the can has attained a position under the shoe 24. The actual extent of this raising and lowering of the entering end of the belt, in instances where shallow closures, such as can heads, are being applied, need be but very slight, a quarter of an inch or so, just enough to permit the receptacle with the closure in place thereon to move under the belt freely and without contacting it.

A stack of can heads is guided vertically by the guides 63 to the cap feeding mechanism 19, which is operated intermittently, and in timed relationship with the conveyor 12, through the medium of chain 11, cam 68 and spring 70, to discharge the heads singly and successively from the stack into the sloping chute 18. When so discharged, each head slides downwardly in chute 18 until its movement is arrested by a pair of stops 82 which

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are arranged at opposite sides of the chute and are spaced apart sufficiently to permit the can head to pass between them for almost half of its diameter and hold it in sloping position with almost half of it depending beyond the lower end of the cap chute. The head is further retained in this position by a pair of overlying detent members 84 which overlie its extreme marginal portions adjacent the stops 82, said detent members 84 being carried on light leaf springs which permit them to be lifted to the position in which one is shown in Fig. 4. Fig. 4 shows the relationship of the parts after the downwardly projecting portion of the can head H has been engaged by the advancing receptacle B and swung upwardly until it is clear of the stops 82, such lifting of the lower portion of the can head raising the detent members 84 against the pressure of their leaf springs. The rearward marginal portion of the can head remains supported on the cap chute, and meanwhile the can head is dragged forwardly by the advancing receptacle until its rearward margin drops off of the lower end of the chute, at which time the head is in position to fall directly downwardly onto the top flange of the receptacle. This is accomplished in the atmosphere of hot vapor through which the mouth portions of the receptacles have been moving as they approach and pass the lower end of the chute, in the course of which movement air in the unfilled head space of the receptacle has been displaced by the hot vapor. Accordingly, when the can head drops onto the receptacle, it traps some of the hot vapor in the head space from which the air has been displaced. To expedite the dropping of the can head onto the receptacle, and to retain it in proper relationship thereto while it is being withdrawn from the cap chute and after it has dropped onto the receptacle, I provide a holding device comprising rollers 85 and 86 which are carried respectively on swinging yoke members 87 and 88 so that they depend beyond the end of the cap chute and over the projecting portion of the can head. As the can head is lifted by the advancing receptacle and withdrawn from the cap chute, these rollers apply downward pressure upon it and continue to roll in contact with it as it advances after it has found its position on the receptacle.

Almost as soon as the head is thus in position on the receptacle, the latter has begun to enter below the end of the shoe 24 which at that time is held in its elevated position by the cam 52 as above described. When the receptacle with its head on it has entered to a sufficient distance under the end of the belt 20, the shoe 24 is lowered as above described, thus exerting downward pressure upon the head and fully seating and holding it in position on the receptacle. It is to be understood that the heads are provided with suitable gaskets or inlays of proper plastic sealing composition so disposed as to seat upon the top flange of the receptacle when the head is applied thereto as above described. Consequently, the slight downward displacement of the head relative to the receptacle which is accomplished by the belt and shoe 24, is effective to press the receptacle flange into this gasket or inlay of plastic sealing material, thus forming a secure hermetic seal. As the now hermetically sealed receptacle continues to advance, now being carried forwardly by both conveyor belt 12 and sealing belt 20 which are moved at the same rate of travel, the head is held firmly in place, while at the same time the container and its head are subjected to

cooling influence, because of the fact that they are moving in a zone cooler than that in which the head was applied. As a consequence, some cooling of the trapped vapor in the head space is accomplished, with the result that a pressure differential is established, so that by the time the receptacle passes beyond the sheave 21, the head is additionally held in place by the superior external atmospheric pressure. The pressure maintained by the belt 20 upon the containers is of a resilient character, because of the action of the springs 33, and this is an important feature to obtain the proper seating of the can body flanges in the inlay of plastic sealing material without causing said flanges to be intruded all the way through it and break the hermetic seal. Moreover, since the respective shoes 24 and 25 move bodily upwardly and downwardly with the compression and extension of the springs 33, their lower surfaces are maintained at the proper angular relationship to the surface of the conveyor 12 to apply pressure uniformly to the respective can heads, and hence avoid any tilting action on the heads which might open the seal. The proper angular relationship of the shoes to the conveyor is obtained by adjustment of the bolts 48 and 49 as above described, the proper spring tension is established by adjustment of the nuts 32, and the proper lower limit position of the shoes and belt is accomplished by adjustment of the hanger rods 28 and 29 through rotation of nuts 34 and 35 by hand wheels 38. Of course, the extent to which shoe 24 is lifted by the cam 52 remains the same irrespective of the lower limit position of said shoe or its inclination or the pressure to which it is subjected by spring 33.

Accordingly, by virtue of the features above described, the apparatus is adapted to apply and hermetically seal suitable heads on tin cans with almost complete evacuation of air from the unfilled space in the package, and to accomplish all this very rapidly, with the result that the packages are delivered with their heads retained in proper position with adequate security to permit their being handled quite freely and subjected to the operation of a double seaming machine or header for the purpose of permanently double seaming the heads to the bodies.

What I claim is:

1. Sealing apparatus comprising, in combination, a sealing belt arranged to move about horizontal axes, means for transmitting said belt, shoe sections arranged to bear upon the upper surface of the lower flight of said belt, means for independently adjusting said shoes vertically, and means for selectively changing the inclination of said shoes in the direction of the belt's travel.

2. In an apparatus for applying closures to container bodies, in combination, an endless sealing belt for applying pressure to the closures and arranged to move about horizontal axes with its lower flight running in approximately horizontal position, means for actuating said belt, shoe sections arranged to bear upon the upper surface of the lower flight of said belt one after another in the direction of the belt's travel, whereby to oppose elevation of said flight in its various portions, and means selectively adjustable independently of the belt for varying the normal vertical positions of respective shoes independently of one another.

3. In an apparatus for applying closures to container bodies, in combination, an endless sealing belt for applying pressure to the closures

and arranged to move about horizontal axes with its lower flight running in approximately horizontal position, means for actuating said belt, shoe sections arranged to bear upon the upper surface of the lower flight of said belt one after another in the direction of the belt's travel, whereby to oppose the elevation of said flight in its various portions, and means for selectively changing the inclination of respective shoes relative to others.

4. In an apparatus for applying closures to container bodies, in combination, an endless sealing belt for applying pressure to the closures and arranged to move about horizontal axes with its lower flight running in approximately horizontal position, means for actuating said belt, shoe sections arranged to bear upon the upper surface of the lower flight of said belt one after another in the direction of the belt's travel, whereby to oppose elevation of said flight in its various portions, means for varying selectively the vertical positions of respective shoes independently of others, and a roller carried on one of the shoe sections and forming the guide for the belt where it changes direction to pass under the shoe sections.

5. In an apparatus for applying closures to container bodies, in combination, an endless sealing belt for applying pressure to the closures and arranged to move about horizontal axes with its lower flight running in approximately horizontal position, means for actuating said belt, a shoe arranged to bear upon the upper surface of the lower flight of said belt to oppose its deflection upwardly, a support for said shoe movable upwardly against spring pressure, a roller carried on said shoe and forming the guide for the belt where it changes direction to pass under the shoe, and means for adjustably varying the inclination of said shoe and the elevation of said roller relative to said support.

6. In an apparatus for applying closures to container bodies, in combination, an endless sealing belt for applying pressure to the closures and arranged to move about horizontal axes with its lower flight running in approximately horizontal position, means for actuating said belt, shoe sections arranged to bear upon the upper surface of the lower flight of said belt one after another in the direction of the belt's travel, whereby to oppose elevation of said flight in its various portions, and means for changing selectively and independently the inclination of respective shoes in directions longitudinally of said flight.

7. In packaging apparatus having a conveyor movable horizontally to advance progressively receptacles supported thereon, an endless sealing belt operably mounted above the conveyor with its lower flight running approximately parallel therewith, shoes overlying the upper surface of said lower flight to restrain it against upward displacement, actuating means for driving the conveyor and belt at uniform speed, and means for raising and lowering one of said shoes in its entirety in timed relationship with the movement of the conveyor.

8. In packaging apparatus having a horizontally movable conveyor, a pair of hangers mounted above the conveyor for vertical movement toward and from it under spring pressure and independently of each other, shoes hinged respectively on the hangers one ahead of the other in the direction of the conveyor's movement, an endless sealing belt running about the shoes on horizontal axes with its lower flight

underlying them and restrained by them against upward movement, means whereby the shoes may be selectively adjusted on their hinges and means for raising and lowering one of the hangers independently of the other in timed relationship with the movement of the conveyor.

9. In package sealing apparatus having an endless sealing belt arranged to move about horizontal axes with its lower flight running in approximately horizontal position, a shoe arranged for cooperation with the upper surface of the lower flight of the belt to oppose upward deflection of it, a movably mounted hanger supporting said shoe and movable upwardly against spring pressure to permit upward movement of the shoe, and adjusting means carried by the hanger and operable to change the inclination of the shoe lengthwise the belt and fix it at selected inclination relative to the hanger.

10. In package sealing apparatus having an endless sealing belt arranged to move about horizontal axes with its lower flight running in approximately horizontal position, a shoe arranged for cooperation with the upper surface of the lower flight of the belt to oppose upward deflection of it, a movably mounted hanger supporting said shoe and movable upwardly against spring pressure to permit upward movement of the shoe, a fixed anchorage support, and a radius member having hinge connection with the hanger and with said support for holding the hanger against movement longitudinally of the belt.

11. In package sealing apparatus having an endless sealing belt arranged to move about horizontal axes with its lower flight running in approximately horizontal position, a shoe arranged for cooperation with the upper surface of the lower flight of the belt to oppose upward deflection of it, a movably mounted hanger supporting said shoe and movable upwardly against spring pressure to permit upward movement of the shoe, a fixed anchorage support, and a radius member extending longitudinally of the belt and having hinge connection with the shoe and with said support for holding the shoe against being moved longitudinally by the drag of the belt.

12. In package sealing apparatus having an endless sealing belt arranged to move about horizontal axes with its lower flight running in approximately horizontal position, a shoe arranged for cooperation with the upper surface of the lower flight of the belt to oppose upward deflection of it, a movably mounted hanger supporting said shoe and movable upwardly against spring pressure to permit upward movement of the shoe, adjusting means carried by the hanger and operable to change the inclination of the shoe lengthwise the belt, a fixed anchorage support, and a radius member having hinge connection with said support and hanger to hold the latter against movement longitudinally of the belt, said radius member being adjustable as to its effective length.

13. In package sealing apparatus having an endless sealing belt arranged to move about horizontal axes with its lower flight running in approximately horizontal position, a shoe arranged for cooperation with the upper surface of the lower flight of the belt to oppose upward deflection of it, a movably mounted hanger supporting said shoe and movable upwardly against spring pressure to permit upward movement of the shoe, adjusting means carried by the hanger and operable to change the inclination of the

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shoe lengthwise the belt, a fixed anchorage support, and a radius member having hinge connection with said support and shoe to hold the latter against movement longitudinally of the belt, said radius member being adjustable to vary its effective length.

14. In an apparatus for applying closures to containers, an endless belt for applying pressure to the closures and arranged to move about horizontal axes with its lower flight running in approximately horizontal position, a roller upon which said belt is entrained, a hanger upon which said roller is supported, said hanger being movable upwardly against spring pressure, a fixed anchorage support, a radius member having hinge connection with said support and hanger for holding the latter against movement longitudinally of the belt and means for varying the effective length of said radius member.

15. In an apparatus for applying closures to containers, an endless belt for applying pressure to the closures and arranged to move about horizontal axes with its lower flight running in approximately horizontal position, a roller upon which said belt is entrained, a hanger upon which said roller is supported, said hanger being movable upwardly against spring pressure, a fixed anchorage support, means for adjusting the elevation of said roller relative to the hanger, and a radius member having hinge connection with said support/hanger to hold the latter against movement longitudinally of the belt, said radius member being adjustable to vary its effective length.

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CERTIFICATE OF CORRECTION.

Patent No. 2,319,213.

May 18, 1943.

LYNN E. DAVIES.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, second column, line 12, claim 15, for "support hanger" read --support and hanger--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of June, A. D. 1943.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.