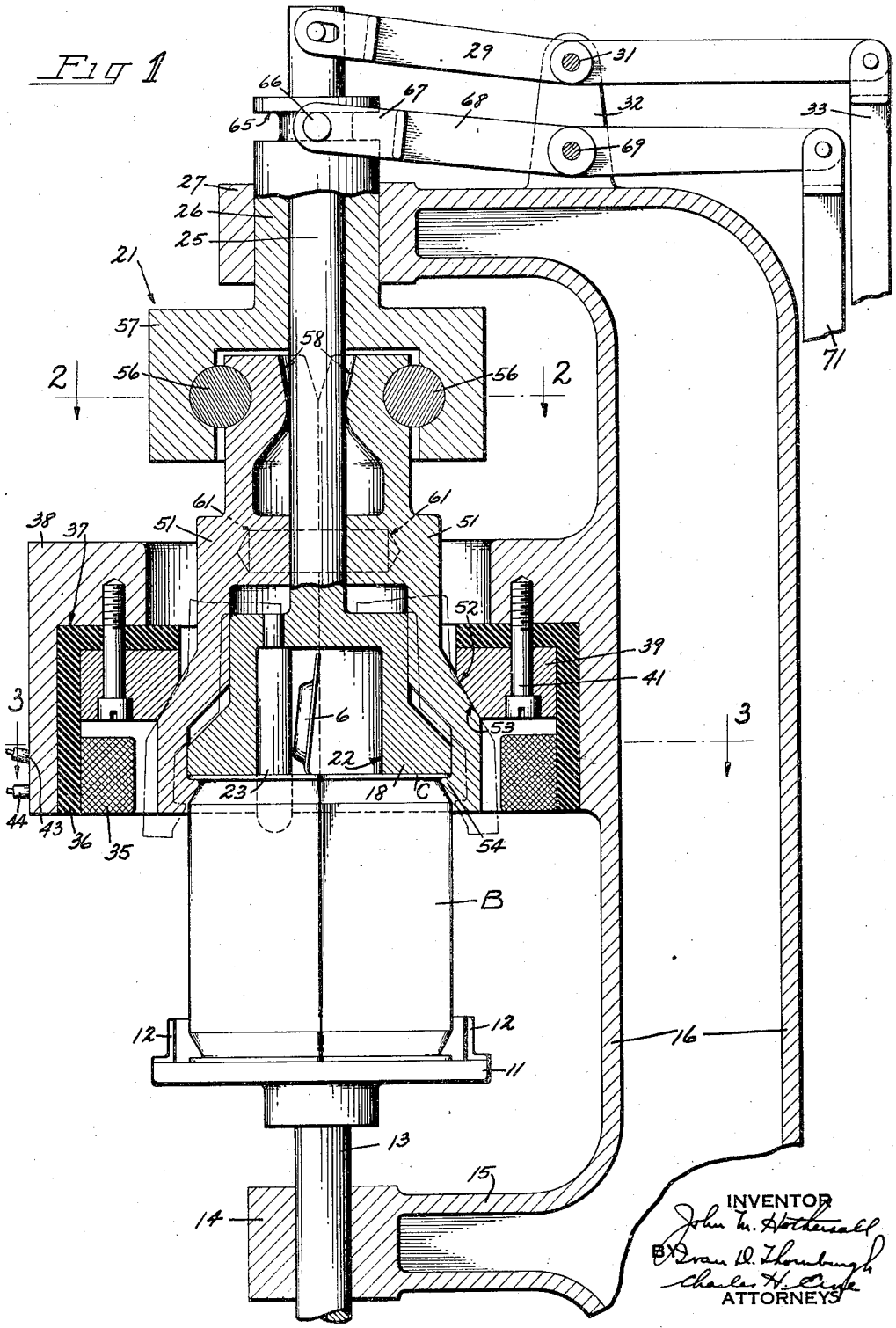
May 28, 1940. J. M. HOTHERSALL 2,202,006

CAN CLOSING MACHINE

Filed Dec. 30, 1938 2 Sheets-Sheet 1

Fig 1



INVENTOR
John M. Hothersall
BY Evan W. Thornburgh
Charles H. Cook
ATTORNEYS

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Fig 2

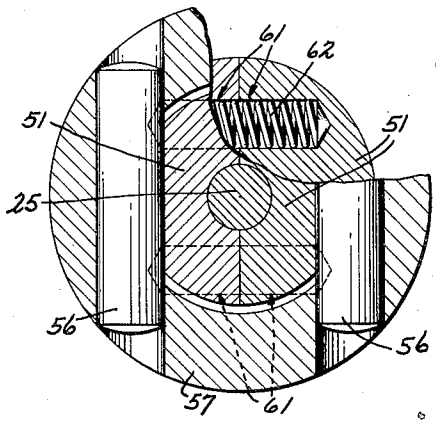


Fig 4

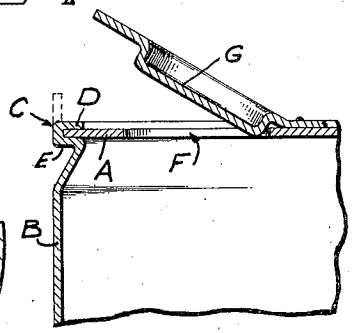
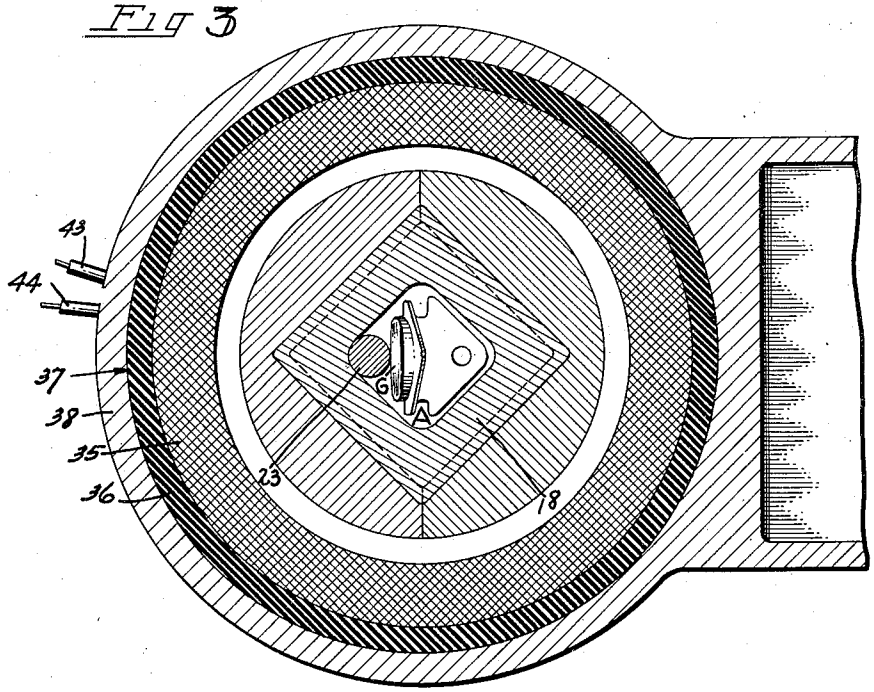


Fig 3



INVENTOR
John M. Hothersall
BY Evan O. Thornburgh
Charles H. Chase
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,202,006

CAN CLOSING MACHINE

John M. Hothersall, Brooklyn, N. Y., assignor to American Can Company, New York, N. Y., a corporation of New Jersey

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7 Claims. (Cl. 93—36.5)

The present invention relates to a machine for closing or sealing fibre containers or cans by a seaming of a fibre cover to a fibre can body and has particular reference to a squeezer head of the jaw type which is heated to make effective a confined adhesive within the joint to facilitate more effective closing of the can.

An object of the invention is the provision of a fibre can closing machine wherein a can cover is united with a body in a folded and glued seam formed by a squeezing together of the can parts in a squeezer head which is heated to condition the adhesive so that the resulting seam will be tight and secure.

Another object is the provision of such a machine wherein the squeezer head operates on the jaw principle and is heated by electricity so that it will perform its seaming or can closing function in an efficient and economical manner.

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 vertical sectional view of the upper part of a fibre can closing machine embodying the instant invention, with parts broken away;

Figs. 2 and 3 are enlarged horizontal sections taken substantially along the respective lines 2—2 and 3—3 in Fig. 1; and

Fig. 4 is an enlarged sectional view of the upper end of a fibre can sealed on the closing machine of Fig. 1.

As a preferred embodiment of the instant invention the drawings illustrate the principal parts of a can closing machine which is adapted to secure a preferably square and flat fibre can cover, end or top A (Fig. 4) to a preferably square fibre can body B in a seam C by a folding of a body flange D into holding engagement with the cover A. By way of example, the can illustrated is that now generally used for containing milk and disclosed in my United States Patent 2,085,979, issued July 6, 1937, on Container. The seam of the can is preferably bonded with a thermoplastic adhesive which may be on the cover or on the body flange, or may be on both. In any case, the adhesive is preferably dry when the cover is placed in position on the can body.

The can body of this exemplary container is formed with a necked-in ledge or seat E disposed adjacent the body flange D and extending entirely around the upper end of the can. Prior to assembling the cover with the body the flange D is in a vertical position as shown in dotted lines in Fig. 4. When the cover is in assembled position with the body it rests on top of the ledge E and is temporarily held there by a crimping or bending over of the body flange D. The bent flange, however, does not remain in contact with the cover but partially springs back extending at an angle thereto because of the natural spring in the fibre. It is in this partly open position when the can and its cover are introduced into the closing machine.

The can cover A is also provided with a dispensing opening F which is adapted to be closed by a hinged closure element G after seaming of can and cover. The closure element is already secured to the cover by a suitable operation not a part of this invention and during the seaming operation is in a vertical position where it will not interfere with the seaming. In fact, the closure element is in its raised position when the can and its cover are introduced into the machine.

In the machine the adhesive is partially melted to bring it into a tacky condition and simultaneously with this melting operation the body flange D is bent down onto the cover A, the flange, the cover and the ledge E being squeezed tightly together while the adhesive is tacky thereby producing a tight folded seam in which its parts are bonded together.

In the can closing machine, the can to be closed is supported in an upright position on a non-revolving but vertically movable lifter plate 11 (Fig. 1). The can is properly centralized as to the plate by a pair of angularly disposed guide rails 12 carried thereby and against which the can may be suitably located.

The lifter plate 11 is carried on the upper end of a vertical rod 13 mounted in a bearing 14 formed on a bracket arm 15 projecting from a frame 16 which may be the main frame of the machine. The rod and its plate are lifted vertically in any suitable manner in time with the other movable parts of the machine.

As the can is brought into its raised position, the angularly bent flange D of the can body engages with a non-rotating anvil or chuck 18 of a squeezer head generally indicated by the numeral 21. It is this chuck which re-bends the flange D down flat against the cover A. The closure element G on the can cover A extends up into a recess 22 formed in the chuck and is retained in a vertical position by a holding pin 23 secured in and extending down from the ceiling of the chuck recess. The lower end of the

holding pin projects into the dispensing opening F of the cover A.

The chuck 18 is also adapted to strip the can out of the seaming head after it has been closed. For this purpose the chuck is formed on the lower end of a vertical chuck shaft 25 which is carried in a head sleeve 26 mounted in a slide bearing 27 formed on the main frame 16. The upper end of the chuck shaft extends above the sleeve and is connected by a pin and slot connection to a bifurcated inner end of a lever arm 29.

Intermediate its length the lever arm is mounted on a pivot pin 31 secured to a lug 32 extended up from the main frame 16. At its outer end the lever arm is connected to a link 33 which is adapted to be actuated in any suitable manner in time with the other moving parts of the machine for rocking the lever arm at the proper time.

While the can is held against the chuck 18 the thermoplastic adhesive on the can body and/or on its cover is reduced to the tacky condition by an annular electric induction coil 35 which surrounds the chuck and is in spaced relation thereto. The coil is secured to the inner vertical surface of an inverted dish or cup shaped insulator member or casing 36 which is disposed in a recess 37 formed in a stationary head housing 38 projecting out from the frame 16. The insulator provides a lining for the housing recess. This insulator is clamped in place by a stainless steel ring cam 39 which is secured by bolts 41 to the head housing, the bolts extending through both the ring cam and the insulator.

Electric energy is supplied to the coil 35 from any suitable source of supply of such energy by way of lead wires 43, 44 which connect with the coil. This energy flows through the coil, setting up an induced current in the stainless steel parts in the head housing and also in the chuck 18. The housing itself is of iron which offers less resistance to heating by induced currents and it is shielded against heating by induction from the stainless steel parts by the insulator 36 so that substantially only those parts immediately adjacent the glued portions of the can and the cover will be heated to any great extent. It is this induced heat which conditions the thermoplastic adhesive for the sealing effect.

Simultaneously with this heating action the body flange D, the cover A, and the ledge E of the can are squeezed tightly together and are fully bonded by the adhesive. This squeezing action is effected by a pair of squeezer jaws 51 located inside the head housing 38. The lower portions of the jaws are disposed between the ring cam 39 and the chuck 18.

The lower portions of the squeezer jaws 51 are formed as L-shaped half molds, each half mold surrounding two sides of the can. The outside surfaces of the molds are preferably curved. That portion of the molds adjacent the ring cam is formed with a sloping cam surface 52 which engages against a corresponding sloping cam surface 53 formed on the inner surface of the ring cam. At their lower ends the molds are formed with can engaging hooks 54 which are as wide as the molds.

The upper ends of the squeezer jaws extend above the head housing 38 and are movably mounted on pivot pins 56 (Figs. 1 and 2) secured in a hollow annular block 57 formed on the lower end of the head sleeve 26. Above their pivotal engagement with the pins 56, the squeezer jaws are chamfered as at 58. This permits outward rocking movement of the jaws on their pivot pins. Intermediate their length the jaws are formed with horizontal bores 61 housing compression springs 62 which tend to spread the jaws apart at the bottom. This holds the cam surfaces 52, 53 in continuous engagement.

The jaws are adapted to be vertically lowered and raised in time with the entrance and discharge of the cans into and from the head. For this purpose the upper end of the head sleeve 26 is formed with an annular groove 65. Pins 66 project into the groove from two sides and these pins are secured in a bifurcated end 67 of a rocker arm 68. The rocker arm is mounted on a pivot pin 69 secured in the lug 32. At its outer end the rocker arm connects with the upper end of a link 71 which is operated in time with the other moving parts of the machine to raise and lower the jaws.

At the time the can is lifted and as its upper end enters the head housing 38, the squeezer jaws 51 are in a lowered and spread apart position as shown in dotted lines in Fig. 1. After a predetermined cycle of the machine during which the can parts are heated as described above, the jaws are raised vertically by the rocker arm link 71. This upward movement of the jaws results in a sliding of the jaw cam surfaces 52 along the stationary ring cam surfaces 53. This moves the half mold portions of the jaws around the upper end of the can as the jaws travel upward.

During this closing in movement, the hook sections 54 of the jaws engage under the can ledge E and cooperate to squeeze the ledge, the cover A, and the body flange D against the chuck 18 with the heated adhesive therebetween. It is this squeezing action that bonds these can and cover parts together in the finished seam C.

After the seam C is formed the chuck 18, the jaws 51, and the lifter plate 11 move down in unison under the influence of the lever arm 29, the rocker arm 68 and the lifter plate rod 13. The jaws move down and simultaneously spread apart to their original dotted line position shown in Fig. 1 and they then clear the can seam. The chuck in moving down with the jaws positively strips the can out of the head and thus insures that the can moves down with the lifter plate. The lifter plate thus returns the closed can to its original lowered position where it may be discharged in any suitable manner.

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 therof.

I claim:

1. In a can closing machine adapted to seal a fibre can cover onto a fiber can body by an interfolding of parts thereof with an interposed thermoplastic adhesive, said cover having a dispensing opening and a closure element hinged adjacent thereto, the combination of a squeezer head including squeezer jaws and an interposed chuck for producing a seam by a squeezing therebetween of can and cover parts held in said squeezer head in engagement with said chuck, means in said squeezer head for heating said can parts and the adhesive therebetween, and means carried by said chuck and adapted to enter the dispensing open-

ing of said cover for holding said hinged closure element away from said cover during the seam forming operation.

2. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of parts thereof with an interposed thermoplastic adhesive, said cover having a dispensing opening and a closure element hinged adjacent thereto, the combination of a squeezer head for producing a seam by a squeezing together of can and cover parts, a chuck for holding a can to be closed in said squeezer head, means in said squeezer head for heating said can parts and the adhesive therebetween, and means carried by said chuck and adapted to enter the dispensing opening of said cover for holding said hinged closure element away from said cover while the latter is being seamed to said can body.

3. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of parts thereof with an interposed thermoplastic adhesive, said cover having a dispensing opening and a closure element hinged adjacent thereto, the combination of a squeezer head including squeezer jaws and an interposed chuck for producing a seam by a squeezing therebetween of can and cover parts, a lifter plate for raising a can to be closed into said squeezer head in engagement with said chuck, means for moving said squeezer jaws into engagement with the can and cover parts to be seamed, an electric induction coil in said squeezer head for heating said can parts and the adhesive to produce an interfolded seam which is bonded by said adhesive, and means carried by said chuck and adapted to enter the dispensing opening of said cover for holding said hinged closure element out of engagement with the cover during the seam forming operation.

4. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of parts thereof with an interposed thermoplastic adhesive, the combination of a chuck, a lifter plate for supporting and for raising a can to be closed into engagement with said chuck, squeezer jaws for squeezing parts of the can and of the cover into engagement with said chuck to produce a seam, means for moving said squeezer jaws into seam engaging position, and means adjacent said chuck and said squeezer jaws for heating the can parts and the adhesive therebetween, said moving means being operative to engage said squeezer jaws with said can body and cover after the latter have been raised by said lifter plate into engagement with said chuck.

5. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of parts thereof with an interposed thermoplastic adhesive, the combination of a chuck, a lifter plate for supporting and for raising a can to be closed into engagement with said chuck, a pair of half mold squeezer jaws surrounding said chuck for squeezing parts of the can and of the cover into engagement with said chuck to produce a seam, elements for moving said squeezer jaws into seam engaging and producing position, and means adjacent said chuck and said squeezer jaws for heating the can parts and the adhesive therebetween, said moving elements being operative to engage said squeezer jaws with said can body and cover after the latter have been raised by said lifter plate into engagement with said chuck.

6. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of parts thereof with an interposed thermoplastic adhesive, the combination of a stationary head housing and chuck vertically reciprocable relative thereto, a lifter plate for supporting and for raising a can to be closed into engagement with said chuck, pivoted squeezer jaws disposed within said housing for squeezing parts of the can and of the cover into engagement with said chuck to produce a seam, devices for moving said squeezer jaws along a path of travel which is parallel with said can, an insulator casing contained within said housing, a cam member housed within said casing for shifting said squeezer jaws into seam producing position while said jaws are moving parallel with said can, yieldable means for holding said jaws in engagement with said can, and electrical heating means also housed within said insulator casing and surrounding said chuck and said squeezer jaws for heating the can parts and the adhesive therebetween.

7. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of parts thereof with an interposed thermoplastic adhesive, said cover having a dispensing opening and a hinged closure element adjacent thereto, the combination of a chuck, a lifter plate for supporting and for raising a can to be closed into engagement with said chuck, pivoted squeezer jaws for squeezing parts of the can and of the cover into engagement with said chuck to produce a seam, devices for moving said squeezer jaws along a path of travel which is parallel with said can, a cam for shifting said squeezer jaws into seam producing position while moving parallel with said cam, yieldable means for holding said jaws in engagement with said cam, means surrounding said chuck and said squeezer jaws for heating the can parts and the adhesive therebetween, instrumentalities for moving said chuck and said lifter plate in unison to remove the closed can from its position adjacent said squeezer jaws, and means carried by said chuck and adapted to enter the dispensing opening of said cover for holding said hinged closure element out of engagement with the cover while the latter is being seamed to said can body.

JOHN M. HOTHERSALL.