April 15, 1941. J. M. HOTHERSALL 2,238,056

CAN CLOSING MACHINE

Filed Dec. 27, 1938

Fig 1

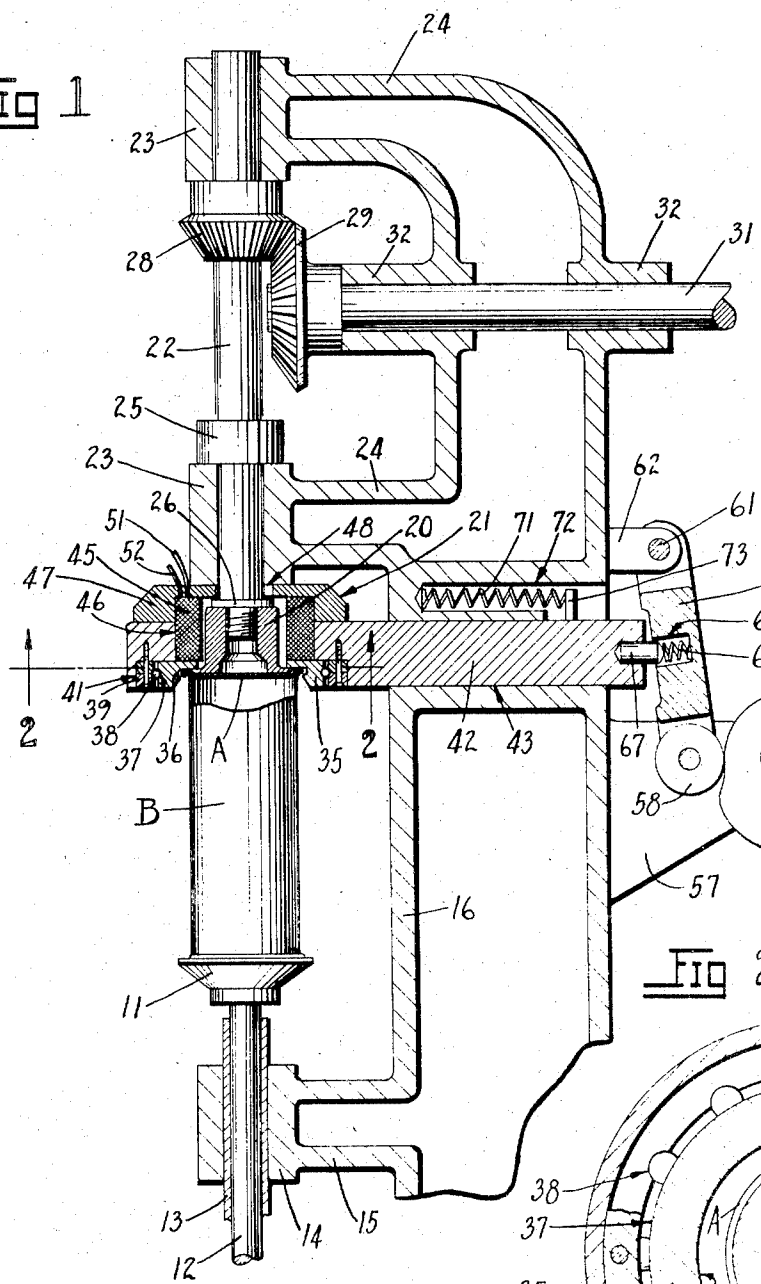



Fig 2

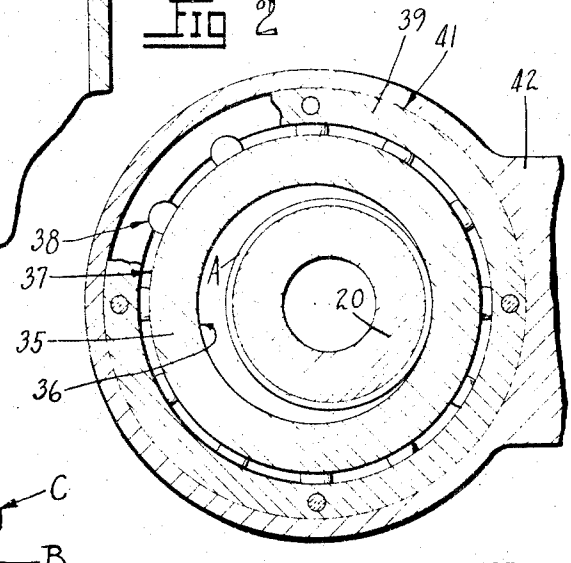
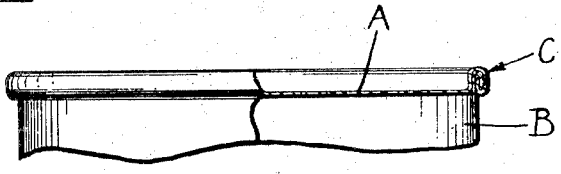



Fig 3




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## CAN CLOSING MACHINE

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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 seaming head which is heated to make effective a confined adhesive within the joint to facilitate 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 an interfolded and glued seam formed by a seaming head which is heated to condition the adhesive so that the resulting seam will be tighter and therefore more secure than otherwise.

Another object is the provision of such a machine wherein the seaming head operates on a planetary 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 drawing, discloses a preferred embodiment thereof.

Referring to the drawing:

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;

Fig. 2 is an enlarged horizontal section taken substantially along the line 2—2 in Fig. 1 and looking upward; and

Fig. 3 is an enlarged view of the upper end of a fibre can sealed on the closing machine of Fig. 1, the view being partly in side elevation, and partly in section to illustrate the end seam construction.

As a preferred embodiment of the instant invention the drawing illustrates the principal parts of a can closing machine which is adapted to secure a fibre can cover A (Fig. 3) to a fibre can body B in a seam C by an interfolding of suitable flange parts formed on both cover and body. The seam illustrated is preferably a regular double seam having its parts bonded together by a thermoplastic adhesive. The adhesive may be in the cover curl, or on the body flange, or may be on both. In any case, the adhesive is preferably dry.

When the container is placed in the sealing machine for closing, the cover A is already resting loosely on top of the body B ready for the sealing operation. In the machine the adhesive is melted into a tacky condition and simultaneously with the melting operation the flange parts of the cover and body are reformed and pressed tightly together by a rolling action while the adhesive is tacky thereby producing the tight double seam mentioned above in which its parts are bonded together by the melted adhesive.

In the can closing machine, the container to be closed is supported in an upright position on a rotatable and vertically movable lifter pad 11 (Fig. 1). The pad is carried on the upper end of a vertical rod 12 mounted in a bearing sleeve 13 secured in a bearing block 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 pad may be lifted vertically in any suitable manner operating in time with the other movable parts of the machine.

When the container is in its upper position the cover A engages with a rotatable chuck 20 of a seaming head generally indicated by the numeral 21. This chuck is located above the lifter pad and in vertical alignment therewith. The chuck fits snugly within the cover and provides a backing or support for the cover curl.

The chuck is carried on the lower end of a vertical chuck shaft 22 journaled in a pair of spaced bearings 23 formed on bracket arms 24 which project from the main frame 16. The chuck shaft is maintained in place against vertical displacement by a collar 25 which is pinned on the shaft and by a collar 26 which is formed integrally with the shaft.

The chuck shaft 22 is continuously rotated. For this purpose the chuck shaft is provided with a bevel gear 28 which meshes with a driving bevel gear 29 mounted on a drive shaft 31 journaled in bearings 32 formed in the main frame 16. The drive shaft may be rotated in any suitable manner in time with the other moving parts of the machine.

Rotation of the chuck 20 frictionally rotates the can and the lifter pad 11, the pad remaining in its raised position in order to hold the lifted can tight against the chuck. While the can is thus rotated the seam C is formed as will now be explained.

Forming of the seam C is accomplished by an annular seaming ring 35 which surrounds the chuck 20 and is normally concentric therewith. The inner diameter of the ring is larger than the outside diameter of the chuck so that considerable clearance space obtains between them. The inner edge of the ring is formed with a seaming groove 36. The outer edge is provided with a ball race 37 which constitutes the inner race of a ball bearing 38. An outer race 39 of the bearing is secured in a recess 41 formed in

an enlarged head of a horizontal slide member 42 carried in a slideway 43 in the frame 16. The seaming ring 35 is therefore free to rotate in the slide member.

Above the seaming ring 35 and in engagement therewith there is disposed an electric induction coil 45 which surrounds the chuck 20 and which is located in a bore 46 formed in the slide 42. An overcap 47 having a clearance hole 48 for the chuck shaft 22 is secured to the top of the slide and holds the coil in place.

Electric energy is supplied to the coil 45 from any suitable source of supply of such energy by way of lead wires 51, 52 which connect with the coil. This energy continuously flows through the coil, setting up an induced current in the adjacent chuck 20, seaming ring 35, slide 42, and overcap 47. The chuck 20 and the seaming ring 35 are preferably made of stainless steel while the slide member 42 is preferably cast iron. The induced current passes through the more electrically resistant stainless steel parts with greater difficulty than the cast iron slide member and hence the chuck and the seaming ring become heated. It is this heat which melts into a tacky condition the adhesive on the can parts in engagement with the chuck 20.

While the can is rotated within this heated seaming head 21 the slide member 42 is shifted transversely thereof to effect the seaming operation. This shifts the seaming ring 35 into frictional engagement with the flanged parts of the can and cover which are backed up by the chuck 20. This shifted position of the seaming ring is best shown in Fig. 2. The rotating chuck thus rolls the can and cover flanges between it and the seaming ring groove 36 in a planetary action, the ring rotating by friction in its ball bearing 38. It is this rolling action which interfolds the heated can and cover flanges and the interposed cement thus forming the can and cover parts into the double seam C with the adhesive acting as a bond for the joint.

Shifting of the slide member 42 to bring about this planetary rolling action is effected by an edge cam 55 which is mounted on a cam shaft 56 carried in bearings formed in a bracket 57 on the main frame 16. The cam shaft is rotated in any suitable manner in time with the other moving parts of the machine. The cam operates on a cam roller 58 carried on one end of an arm 59 which is supported on a pivot pin 61 secured in lugs 62 formed on the main frame 16.

Intermediate its length the cam arm 59 is formed with a recess 65 which houses a compression spring 66 engaging against a pin 67 secured in the outer end of the slide member 42. The rotating cam 55 thus rocks the cam arm 59 and hence presses the spring 66 against the pin 67 and thereby shifts the slide member 42 and its seaming ring 35 into the can seaming position shown in Fig. 2 with the seaming ring in eccentric relation to the chuck 20. The spring forms a yieldable connection between the cam and the slide member and thus exerts a predetermined uniform seaming pressure on the seaming ring.

After completion of the seaming operation the cam 55 releases its pressure on the cam arm 59 and slide member 42 and these parts are returned to their original position by a compression spring 71. Spring 71 is housed in a horizontal recess 72 formed in the frame 16, the spring being interposed between the bottom of the recess and a pin 73 which is secured in the slide member 42.

In the original or returned position of the slide member 42 the seaming ring is again concentric with the chuck 20. There is thus sufficient room to release the seamed can without interference with the ring. This releasing of the can is effected by a lowering of the lifter pad 11, the closed can being returned to its lowermost position of the pad from which it may be removed in any suitable manner. This completes the can closing operation.

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 can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of flanges thereof with an interposed thermoplastic adhesive, the combination of a chuck for engaging a cover to be sealed on a said body, a bodily movable seaming head, an annular seaming member carried by and rotatable relative to said seaming head and surrounding said chuck for producing a seam by interfolding of can parts held in said seaming head, means in said seaming head for heating said can parts and the adhesive therebetween, and means for bodily moving said seaming head at right angles to the axis of said can and said chuck into engagement with the heated can parts to be seamed.

2. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of flanges thereof with an interposed thermoplastic adhesive, the combination of a chuck for engaging a cover to be sealed on a said body, a bodily movable annular seaming head surrounding said chuck for producing a seam by interfolding of can parts, means for holding a can to be closed in said seaming head in engagement with said chuck, means in said seaming head for heating said can parts and the adhesive therebetween, and means for bodily moving said seaming head at right angles to the axis of said can and said chuck into engagement with the heated can parts to be seamed.

3. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of flanges thereof with an interposed thermoplastic adhesive, the combination of a chuck for engaging a cover to be sealed on a said body, a bodily movable annular seaming head surrounding said chuck, a seaming ring carried by and rotatable relative to said seaming head for producing a seam by interfolding of the can parts, a lifter pad for raising a can to be closed into said seaming head into engagement with said chuck, an electric induction coil in said seaming head for heating said can parts and the adhesive to produce an interfolded seam which is bonded by said adhesive, and means for bodily moving said seaming head at right angles to the axis of said can and said chuck into engagement with the heated can parts to be seamed.

4. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of flanges thereof with an interposed thermoplastic adhesive, the combination of a rotatable seaming head chuck, a bodily movable seaming ring surrounding said chuck and in

spaced relation thereto, a lifter pad for raising a can to be closed into said ring and into engagement with said chuck, means adjacent said ring and said chuck for heating the can, cover and the adhesive carried therebetween, and actuating devices for bodily shifting said ring at right angles to the axis of said can into engagement with the heated can parts to clamp the latter against said chuck, the forming of the can seam thereafter being effected by a planetary rolling movement between chuck and ring and with the adhesive providing a bond.

5. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of flanges thereof with an interposed thermoplastic adhesive, the combination of a rotatable seaming head chuck, a bodily movable seaming ring concentric with said chuck and in spaced relation thereto, a lifter pad for raising a can to be closed into said ring and into engagement with said chuck, means adjacent said ring and said chuck for heating the can parts and the interposed adhesive, actuating devices for bodily shifting said ring at right angles to the axis of said can into engagement with the heated can parts and for clamping them against said chuck, thereby forming the can seam by a planetary rolling of the chuck inside the ring, and a yieldable connection intermediate said ring and said actuating devices for creating a predetermined uniform seaming pressure during seaming.

6. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of flanges thereof, a said flange carrying a thermoplastic adhesive which is incorporated in a bonded seam, the combination of a rotatable seaming head chuck, a bodily movable seaming ring surrounding said chuck and frictionally rotatable therewith, a lifter pad for raising a can to be closed into said ring and into engagement with said chuck, means adjacent said ring and said chuck for heating the can parts therebetween and also the adhesive, and cam actuated devices for bodily shifting said ring at right angles to the axis of said can into engagement with the heated can parts to clamp the same against said chuck, thereby effecting the formation of the can seam by a planetary rolling of the chuck inside the ring.

7. In a can closing machine adapted to seal a fibre can cover onto a fibre can body by an interfolding of flanges thereof and with a said flange carrying a thermoplastic adhesive which is incorporated in a bonded seam, the combination of a rotatable seaming head chuck, a slide adjacent said chuck, said slide having an enlarged head surrounding said chuck, a seaming ring surrounding said chuck and floatingly mounted in said slide head, an electric induction coil also carried in said slide head and surrounding the chuck for heating said chuck and said ring, a lifter pad for raising a can to be closed into said slide head and for clamping it against said chuck, a cam for shifting said slide relative to said chuck, and a yieldable connection between said cam and said slide, the shifting of said slide clamping the can parts between the heated seaming ring and said heated chuck thereby effecting a planetary rolling action between chuck and ring while interfolding and heating said interposed can parts which produces an adhesive bonded seam for the can, the said yieldable connection insuring a predetermined seaming pressure for the interfolded parts.

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