Jan. 23, 1945. M. H. SIDEBOTHAM 2,368,046

MACHINE FOR SEALING CONTAINERS

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Fig. 1

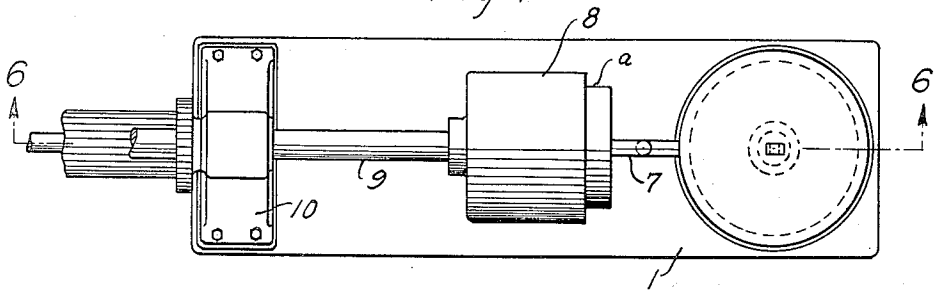


Fig. 2

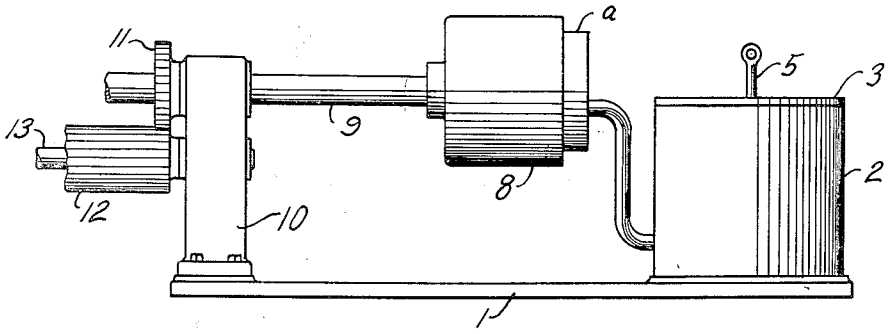


Fig. 3

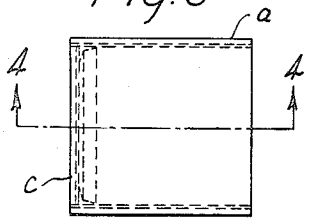


Fig. 5

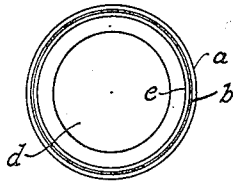
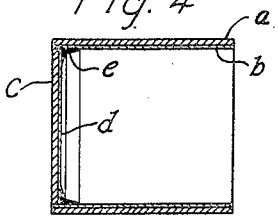


Fig. 4



INVENTOR.
Melvin H. Sidebotham
BY
Roderick Wm Hoag, Atty.

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Fig. 6

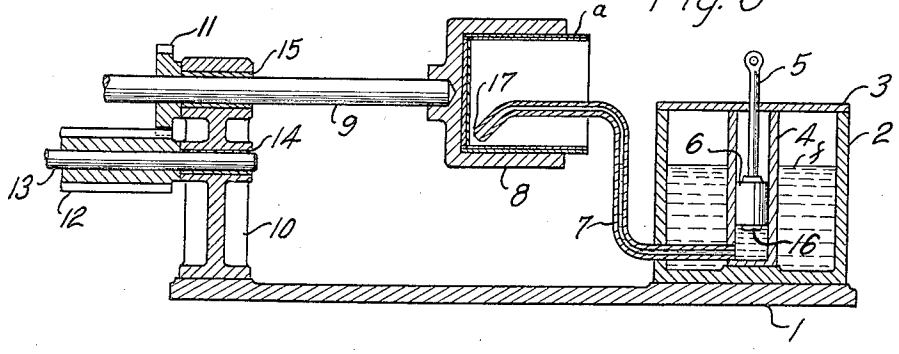


Fig. 7

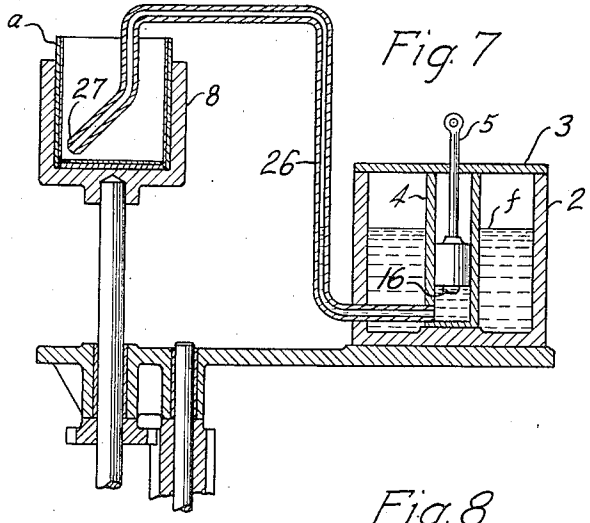
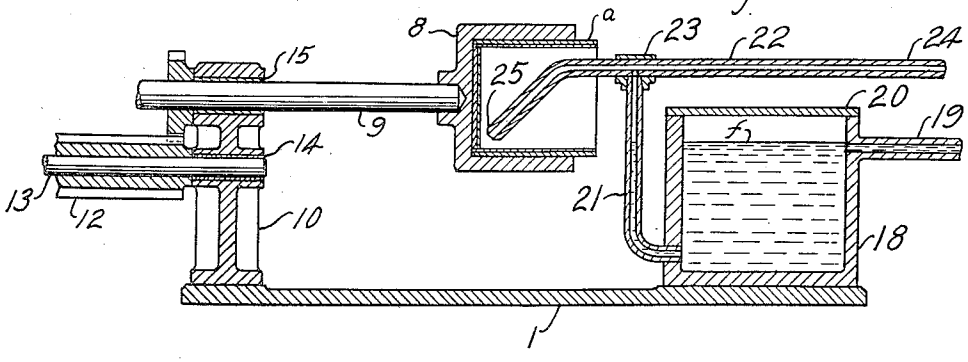


Fig. 8



INVENTOR.
Melvin H. Sidebotham.
BY
Roderick Wm. Hoag, Att'y.

Patented Jan. 23, 1945

2,368,046

UNITED STATES PATENT OFFICE

2,368,046

MACHINE FOR SEALING CONTAINERS

Melvin H. Sidebotham, Newton, Mass., assignor of one-half to Harlow M. Russell, Chelsea, Mass.

Application August 14, 1942, Serial No. 454,883

5 Claims. (Cl. 91—44)

This invention relates generally to machines for sealing annular joints of containers, and more particularly to devices for sealing circular bottom lining discs to cylindrical side wall linings of containers.

One object of my invention is to provide an improved machine for forming annular liquid tight joints for cylindrical containers.

Another object of my invention is to provide a device for sealing Cellophane discs within Cellophane cylinders.

Another object of my invention is to provide a device which will economically and at high speed apply a liquid thermoplastic material to adjoining parts of annular container members to form an uninterrupted sealed joint.

Other objects and advantages of the invention will be apparent to persons skilled in the art as the same becomes better understood by reference to the following description, taken in connection with the accompanying drawings, in which I have illustrated forms of my inventions, and wherein—

Figure 1 is a plan view of the preferred embodiment of my invention, with certain conventional operating members omitted for the sake of clearness.

Figure 2 is a front elevation of the device shown in Figure 1.

Figure 3 is an elevation of a lined cylindrical container, the bottom lining disc of which has been sealed to the cylindrical wall lining.

Figure 4 is a section at 4—4 of Figure 3.

Figure 5 is an end view of Figure 3.

Figure 6 is a section at 6—6 of Figure 1.

Figure 7 is a section through a device embodying a modified form of my invention wherein the container is rotated horizontally instead of vertically, while the joint is being sealed.

Figure 8 is a section through a device embodying another modified form of my invention, wherein the thermoplastic sealing material is sprayed on the joint by air pressure.

Similar reference characters indicate similar parts or features in all of the views.

It will aid toward an understanding of the operation of the device and of the method of sealing the lined container, to first explain the action of the machine.

Figures 3, 4 and 5 illustrate a lined container of the type which may be sealed by use of my improved method and machine. The lined container assembly is composed of a cylindrical wall *a*, which may be made of paperboard or other suitable material; a wall lining *b*, of Cellophane or other liquid proof material; and a paperboard bottom disc *c* having a Cellophane lining disc *d* secured thereto. The wall lining *b* is adhesively secured to the inside of the cylindrical wall *a*, and the Cellophane lining disc *d* is adhesively secured to the inside of the bottom disc *c*. The annular joint between the bottom lining disc *d* and the wall lining *b* is sealed by thermoplastic material *e*.

The bottom disc *c*, with the lining disc *d*, secured thereto, is pressed into the end of the lined cylindrical wall of the container and is thus frictionally held in place while the container assembly is being placed in position to be sealed.

The container to be sealed is positioned in a mandrel 8 (Figs. 1, 2 and 6), and the mandrel rotated at moderately high speed. While the container is rotating with the mandrel, a supply of liquid thermoplastic material is forced against the juncture of the bottom lining disc with the side wall lining. The rotating or whirling action of the container serves, by means of centrifugal force, to hold the applied thermoplastic material in contact with the joint to be sealed. This action also causes thermoplastic material to be forced into any seam or opening in the joint and thus close and seal any such opening.

The thermoplastic material may be applied to the joint very slowly, with the result that the joint of the whirling container receives many layers or coatings of thermoplastic material. A plurality of thin coatings or layers of thermoplastic material serve to prevent "pin holes" or air holes which usually occur when the sealing material is applied in a single layer. Also the plurality of thin coatings will dry or set much more rapidly than a single thick layer of thermoplastic material. The whirling action of the container causes a movement of air which aids in drying or setting the applied thermoplastic material.

Referring to Figures 1, 2 and 6, wherein is illustrated a device embodying one form of my invention; the support for the device comprises a base 1 to which the reservoir 2 containing the liquid adhesive is secured. The reservoir 2 is provided with a cover 3 to minimize evaporating of the thermoplastic material before it is applied to the joint. The said base 1 also has secured thereto a bearing bracket 10. The mandrel shaft 9 is rotatably and slidably mounted in bearing 11 provided in bearing bracket 10. Secured to one end of the mandrel shaft 9 is a cylindrical mandrel 8 having an opening in its end to retain therein the container to be sealed. The mandrel shaft 9 also has secured thereto a spur gear 11 which meshes with and is driven by a spur gear

12 secured to drive shaft 13 journalled in bearing 14 in the bearing bracket 10. Power is supplied, by means not necessary to describe, to rotate drive shaft 13 and consequently spur gear 12 which in turn drives spur gear 11 and mandrel shaft 9.

In the operation of placing a container in the mandrel 8, the mandrel shaft 9 is moved horizontally within the bearing 15 to draw the mandrel away from engagement with the thermoplastic applying device. After the container has been placed in the mandrel 8, the mandrel shaft 9 is moved back to position where the nozzle 17 is in operating position to apply thermoplastic material to the annular joint of the container. The spur gear 11 moves horizontally with the mandrel shaft 9. The face of the spur gear 12 is made wide enough to permit the spur gear 11 to remain in mesh with said gear 12 when the mandrel shaft is moved horizontally.

The reservoir 2 is provided with a piston cylinder 4 (Fig. 6) positioned therein. An opening 16 in the piston cylinder wall permits the liquid thermoplastic *f* contained in the reservoir 2 to pass into the space between the bottom of the piston cylinder 4 and the bottom of the piston 6 which is slidably mounted within the said piston cylinder. The piston 6 is operated up and down at predetermined intervals, by piston rod 5 secured thereto, to force the liquid adhesive in the bottom portion of the piston cylinder through the tube 7 thence through nozzle 17 from which the liquid adhesive is ejected upon the joint of the container to be sealed. The piston rod 5 is operated by hand or by mechanical means as may be desired.

In the operation of the device, the container to be sealed (Figs. 3, 4 and 5) is positioned in the mandrel 8 (Fig. 6), and the mandrel moved horizontally to bring the joint of the container into close proximity with the nozzle 17 of the tube 7. The mandrel 8 is then revolved or whirled vertically about its horizontal axis at moderately high speed. The piston 6 is then moved downward by piston rod 5, with the result that the liquid adhesive in the bottom portion of the piston cylinder 4 will be forced through tube 7 and ejected through nozzle 17 and upon the joint of the revolving container. The piston 6 is then moved upwardly in the piston cylinder to a position to repeat the operation of ejecting thermoplastic material through the tube 7 and upon the joint of the next container to be treated. The upward movement of the piston 6 causes the liquid thermoplastic remaining in the tube 7 to be drawn back into the lower portion of the piston cylinder 4. Thus there will be no dripping of the liquid thermoplastic at the nozzle 17 of the tube 7 upon the completion of the sealing operation, and the tube and nozzle will not become clogged by the congealing of the material remaining in the tube and nozzle.

Figure 7 illustrates a modified form of my invention. This construction and its operation is the same as that illustrated in Figures 1, 2 and 6, except that the mandrel 8, mandrel shaft 9, bearings 14 and 15, and spur gears 11 and 12 are placed and operated in vertical instead of horizontal position. The bearing bracket 10 is combined with the base 1 instead of being a separate element as is the case in the preferred embodiment shown in Figures 1, 2 and 6. The tube 26 and nozzle 27 shown in this embodiment perform the same function as does tube 7 and nozzle 17 in the embodiment shown in Figures 1, 2 and 6. This modified construction is sometimes desirable because the liquid thermoplastic material, as it is applied to the container joint, will tend to be drawn downwardly into the joint by gravity, when the container is revolved horizontally.

Figure 8 illustrates another modified form of my invention. This modified construction is substantially the same as that of the preferred embodiment illustrated in Figures 1, 2 and 6, except that the means for feeding the thermoplastic material through the tube to the joint is somewhat different.

The device shown in Figure 8 for applying the thermoplastic material includes a reservoir 18 supported by the base 1. A supply pipe 19 serves to convey liquid thermoplastic, from any desired supply source, to keep the thermoplastic in the reservoir 18 at a constant level. The reservoir is provided with a cover 20. The thermoplastic material is drawn from the reservoir 18 and applied to the joint of the container, by tubes 21 and 22. The lower end of tube 21 is connected with the reservoir, and its upper end is connected to tube 22 by means of T-connection 23. Thus there is an opening for the passage of thermoplastic material from the reservoir 18 through tube 21 to tube 22 and nozzle 25. In the operation of this device the mandrel 8, holding the container to be sealed, is caused to rotate in the same manner as in the embodiments illustrated in Figures 1, 2 and 6. The nozzle 25 of the tube 22 is positioned with its opening overlying the joint of the container to be sealed. The end 24 of the tube 22 is connected to an air pump or other device for forcing air through tube 22 and through nozzle 25. Air being forced through the tube and nozzle at a rate which will cause thermoplastic material to be drawn from the reservoir 18 through pipe 21 and thence through pipe 22 to the nozzle 25 from which the thermoplastic material is ejected upon the joint of the container to be sealed.

The term "liquid thermoplastic material" as used in the appended claims is intended to include all compositions suitable for coating and sealing together adjacent areas of cellulose materials, to provide a sealed joint that is solid and non-tacky at room temperature, and to include such compositions with or without the use of volatile solvents.

My invention is not limited to the embodiments herein shown and described, its scope being set forth in the following claims.

Having now described my invention, what I claim is:

1. In a device for thermoplastically sealing an annular joint of a container, a base for supporting the device, a reservoir for holding a supply of liquid thermoplastic material, a piston slidably mounted in a piston cylinder, the piston cylinder being positioned within the reservoir and having an opening in the wall thereof, the said opening being located immediately below the lowermost part of the piston when in its highest operative position to permit liquid thermoplastic material to flow from the reservoir into the bottom portion of the piston cylinder, a tube having one end operatively connected to the piston cylinder and having at its other end a nozzle positioned to engage a container joint, a bearing bracket, a mandrel shaft slidably and rotatably mounted in the bearing bracket, a mandrel secured to the mandrel shaft, for holding the container to be sealed, and means for rotating the mandrel shaft.

2. In a device for thermoplastically sealing an

annular joint of a container, a base for supporting the device, a reservoir for holding a supply of liquid thermoplastic material, a piston slidably mounted within a piston cylinder, the piston cylinder being positioned within the reservoir and having an opening in the wall thereof immediately below the lowermost part of the piston when in its highest operative position, a tube having one end operatively connected to the piston cylinder and having its other end in position to engage a container joint, a bearing bracket, a mandrel shaft slidably and rotatably mounted in the bearing bracket, a mandrel secured to the mandrel shaft, for holding the container to be sealed, and means for rotating the mandrel shaft.

3. In a device for thermoplastically sealing an annular joint of a container, a reservoir for holding a supply of liquid thermoplastic material, a piston slidably mounted within a piston cylinder, the piston cylinder being positioned within the reservoir and having an opening in the wall thereof immediately below the lowermost part of the piston when in its highest operative position, a piston slidably mounted within the piston cylinder, a tube having one end operatively connected to the piston cylinder and having its other end in position to engage a container joint, a bearing bracket, a mandrel shaft slidably and rotatably mounted in the bearing bracket, a mandrel secured to the mandrel shaft, for holding the container to be sealed, and means for rotating the mandrel shaft.

4. In a device for thermoplastically sealing an annular joint of a container, a base for supporting the device, a reservoir for holding a supply of liquid thermoplastic material, a piston slidably mounted within a piston cylinder, the piston cylinder being positioned within the reservoir and having an opening in the wall thereof immediately below the lowermost part of the piston when in its highest operative position, a tube having one end operatively connected to the piston cylinder and having its other end in position to engage a container joint, a mandrel shaft, means for supporting and rotating the mandrel shaft, and a mandrel secured to the mandrel shaft.

5. In a device for thermoplastically sealing an annular joint of a container, a reservoir for holding a supply of liquid thermoplastic material, a piston slidably mounted within a piston cylinder, the piston cylinder being positioned within the reservoir and having an opening in the lower part of the wall thereof immediately below the lowermost part of the piston when in its highest operative position, a tube having one end operatively connected to the lower end of the piston cylinder and having its other end in position to engage a container joint, a mandrel shaft, means for supporting and rotating the mandrel shaft, and a container supporting mandrel secured to the mandrel shaft.

MELVIN H. SIDEBOTHAM.