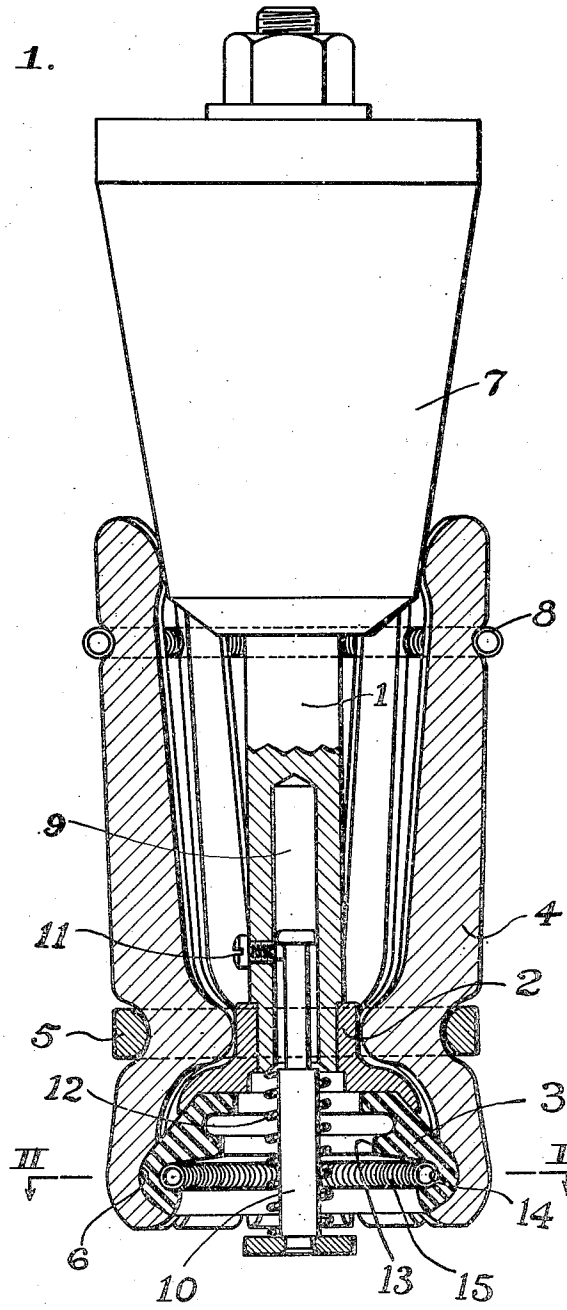
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SEALING APPARATUS

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Fig. 1.



INVENTOR.
EMERSON E. HOGG.

BY O. Ernest Low
ATTORNEY.

Oct. 17, 1939. E. E. HOGG 2,176,133

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Fig. 2.

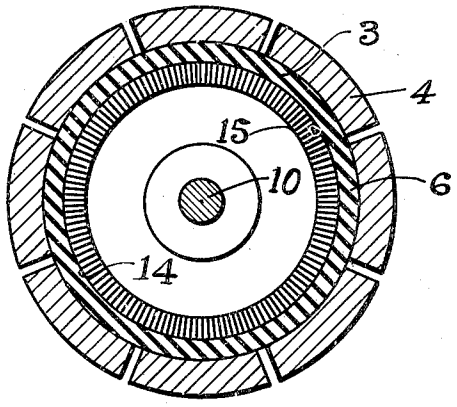
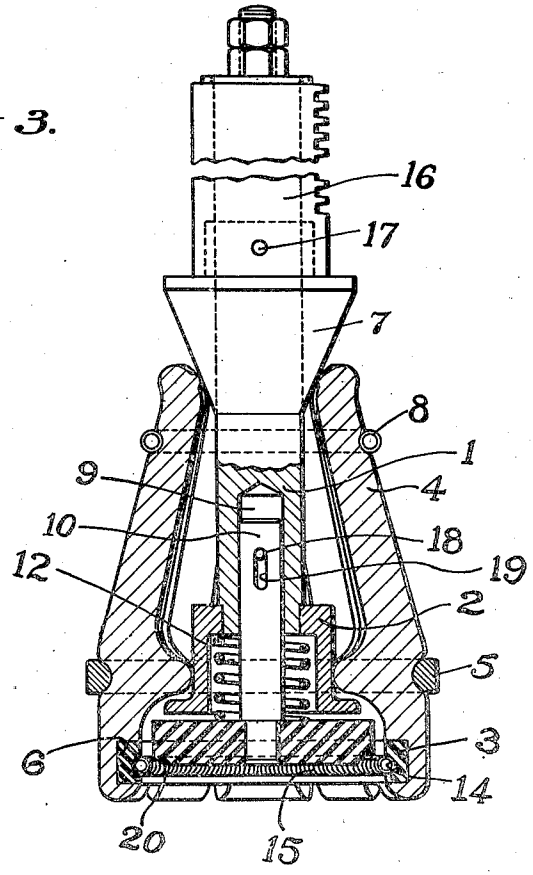


Fig. 3.



INVENTOR.
EMERSON E. HOGG.

BY
A. Ernest Lowe.
ATTORNEY.

Patented Oct. 17, 1939

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SEALING APPARATUS

Emerson E. Hogg, New Kensington, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa., a corporation of Pennsylvania

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5 Claims. (Cl. 226—86)

This invention relates to that class of machines known as sealing machines, and relates particularly to an improvement in sealing apparatus for affixing closure caps to containers by shaping the caps against the containers in conformity therewith.

Closures of the external cap type are made from sheet metal of various thicknesses or gauges, ranging from those of thin frangible foil to those generally identified with tin plate. The difficulties and problems of affixing closure caps vary with the sheet thickness, and those relating to the thicker gauges differ sufficiently from those of the thinner gauges to have required sealing apparatus of widely different constructions. Ordinarily, sealing machines for closure caps of the heavier gauges have been characterized by rigid undeformable elements for working the metal in the manner desired such as, for example, steel segments for contracting a portion of a cap skirt under a retaining bead. On the other hand, plastically deformable and resilient elements such, for example, as rubber pressure rings, have been used in machines for applying foil closure caps. Success has also been had with apparatus utilizing an annular coil spring as a working element for affixing closure caps, but such apparatus when used to affix foil closure caps tends to tear or rupture the fragile foil.

It is the principal object of this invention to provide improved sealing apparatus that will suitably affix closure caps by deformation thereof against containers. It is an additional object of this invention to provide improved sealing apparatus characterized by pressure means capable of affixing sheet metal closure caps made of stock of any thickness within the gauge range used commercially for such caps. Related thereto is the object to obtain these objectives by means of a construction suitable for use in either hand-operated or power-driven machines, and further, by means of a construction readily adaptable to many of the commercially known sealing machines whereby their usefulness can be greatly enhanced.

I have discovered that these objects can be attained by providing a plastically deformable member adapted to accommodate a resilient metal annulus to form in combination a compound pressure means characterized by both suitable application and relief of sealing pressure as the nature of the closure cap to be affixed requires.

This invention and the stated objects thereof and the objects and advantages hereinafter described will be more fully understood when considered in connection with the following detailed description of the accompanying drawings, in which:

Fig. 1 is a central vertical section of sealing apparatus embodying my invention;

Fig. 2 is a sectional view taken on the line II—II of Fig. 1;

Fig. 3 is a central vertical section of a second embodiment of sealing apparatus illustrative of my invention.

With reference now to the sealing head shown in Figs. 1 and 2, a central shaft 1 has secured to its lower end a flanged collar 2 which is provided with a shallow end recess that accommodates a resilient member 3. The collar 2 on the upper surface of its lateral flange supports rigid, unyielding fingers or segments 4 which are exteriorly retained by the rigid ring 5. The lower portion of each finger has a recess 6 to receive the outer side wall of the cup-like member 3 and thereby to retain that member. The upper end of each finger is held in contact with a cam member 7 by a spring 8. The cam member 7 is co-axially secured with respect to the shaft 1 in a manner permitting relative movement between the shaft and cam to actuate the fingers 4. Within an axial recess 9 in the shaft 1 a cap-seating plunger 10 is secured by a screw 11 which also serves as a stop to limit the vertical movement of the plunger which is normally held in the projected position of Fig. 1 by a compression spring 12.

The resilient member 3 is made of a material having such hardness that it has satisfactory resistance to wear and yet remains plastically deformable, and is preferably made of vulcanized rubber. This member varies in cross-sectional thickness to provide an inwardly projecting shoulder 13 and below the shoulder an annular recess 14 which serves as a seat for a spring-like annulus 15. The annulus 15 is radially deformable and is preferably a coiled, resilient, metal annulus of wire-like stock having a flat exposed face in order to present a substantially smooth surface to the closure which it encircles in sealing position. To permit the resilient metal annulus to be contracted radially and compressed against a closure cap without obstruction, the annular recess or seat 14 should be of such a depth to envelop about half of the resilient annulus.

The sealing apparatus of Figs. 1 and 2 may have a suitable handle (not shown) attached to the cam 7 for use as a hand machine, or either the shaft 1 or the cam 7 may be secured to a suitable support, depending upon the manner of

effecting relative movement therebetween. In the operation of the apparatus, a closure, when presented upon a container, contacts the cap-seating plunger 10, and either by lowering of the head or by elevation of the container, the plunger 10 is forced upwardly against the spring 12 until the closure rests against the shoulder 13 of the deformable member 3. The pressure exerted by the plunger 10 by reason of compression of the spring 12 insures sufficient top pressure to maintain a seal during the affixation of the closure, which is accomplished by relative movement between the shaft 1 and cam 7. Regardless of the manner of effecting such movement, the result thereof is oscillation of the fingers 4 caused by the cam 7 forcing the upper ends of the fingers 4 outwardly. This oscillation of the fingers which encompass and support both the member 3 and the annulus 15 contracts the side wall of the member 3 and the annulus 15 carried thereby so that sealing pressure is applied by the annulus to reform the cap skirt into conformity with the securing elements of the container finish.

Referring now to Fig. 3, the sealing apparatus shown therein for the purpose of further illustration of my invention is similar in many details of construction to that of Figs. 1 and 2, so that like reference numerals designate like parts, and only such additional description as is necessary follows. In this modification, the shaft 1 extends through both the cam 7 and an apertured member 16, and is movably suspended from the latter to permit relative movement between the shaft 1 and the cam 7 rigidly joined to the member 16 by a short pin 17. The rubber member 3 which provides the seat 14 for the annulus 15 is a ring substantially rectangular in cross-section that is carried solely within the finger recesses 6 which are complementary thereto. An alternative manner of supporting the seating plunger 10 is also shown, which consists of a pin 18 secured to the shaft 1 and extending through a slot 19 in the plunger which permits increased loading thereof by compression of the spring 12. In order to provide top pressure during the affixation of a closure, the head of the plunger 10 is provided with a recessed peripheral shoulder 20 adapted to hold the closure tightly against the entire sealing surface of a container.

In both illustrative embodiments, the member 3 provides a plastic deformable back-up member for the resilient metal annulus or spring 15 that insures the desired range of usefulness of the apparatus. In order to affix closures of relatively stiff and unyielding metal, pressure of considerable magnitude is necessary, which the member 3 transmits readily, since its radial deformability and compressibility decreases as the force applied by the fingers 4 increases. On the other hand, the early deformability of the member 3 permits the use of the annulus 15 in contact with fragile closures without tearing, regardless of the application of force by the fingers of a magnitude that with the annulus alone is dangerous. The plastic deformability of this member has a further advantage, in that as the annulus 15 is distorted and partially flattened against a closure, the plastic nature of the member permits slip of the annulus from a position slightly above re-entrant detents of the container down to and into such detents, and consequently gives rise to a wiping action of the annulus against the closure to insure the constriction thereof necessary for affixation. It is manifest also that the inclusion of the plastic deformable member 3 between the annulus 15 and the rigid segmental fingers 4 allows ready accommodation of the annulus to out of round shapes and removes the likelihood of crushing such shapes.

The embodiments shown and described herein have been merely illustrative of my invention and have not been included by way of limitation. Therefore, with the intent to include all forms and embodiments coming within the true scope of my invention, I claim:

1. In a sealing machine, a resilient metal annulus adapted to encompass a closure cap, plastic deformable means carrying said annulus, and radially movable rigid segments circumferentially disposed against said plastic deformable means and thereby spaced from said annulus whereby radially compressive force exerted by said segments is yieldably transmitted by said plastic deformable means to said annulus.

2. In a sealing machine, a resilient metal annulus adapted to encompass a closure cap, plastic deformable means carrying said annulus, and a plurality of rigid segments circumferentially disposed against said plastic deformable means and spaced thereby from said annulus whereby inward movement of said segments yieldably compresses said annulus against the closure cap to be affixed.

3. In a sealing machine, a radially deformable metal annulus adapted to encompass a closure cap, a plastic deformable member carrying said annulus with an appreciable portion thereof exposed, and a plurality of rigid segments circumferentially disposed against said member whereby inward movement of said segments yieldably compresses said annulus against the closure cap to be applied.

4. In a sealing machine, a radially deformable coiled metal annulus adapted to encompass a closure cap, a rubber member carrying said annulus with an appreciable portion thereof exposed, and a plurality of rigid segments circumferentially disposed against said member and spaced thereby from said annulus whereby inward movement of said segments yieldably compresses said annulus against the closure cap to be applied.

5. In a sealing machine, a radially deformable coiled metal annulus having a substantially smooth exterior surface and adapted to encompass a closure cap, a vulcanized rubber member carrying said annulus with an appreciable portion thereof exposed, and a plurality of oscillatable rigid segments circumferentially disposed against said member and spaced thereby from said annulus whereby oscillation of said segments yieldably compresses said annulus against the closure cap to be applied.

EMERSON E. HOGG.