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H. HAIDEGGER

2,697,996

CLOSING TOOL

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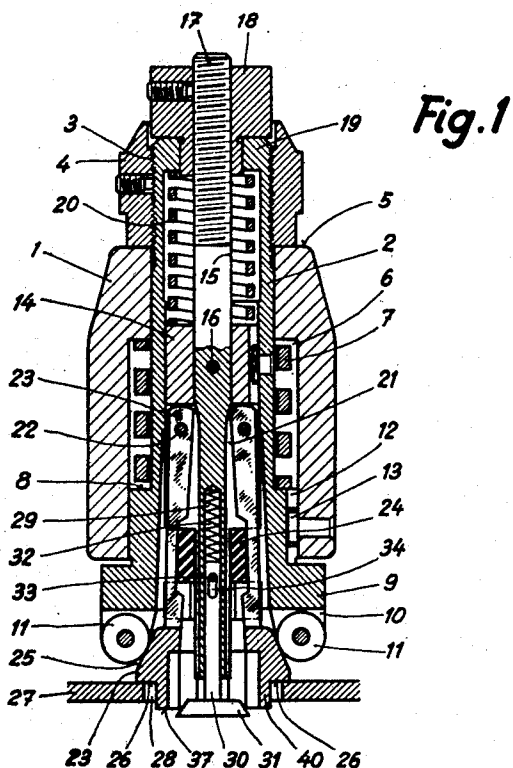


Fig. 1

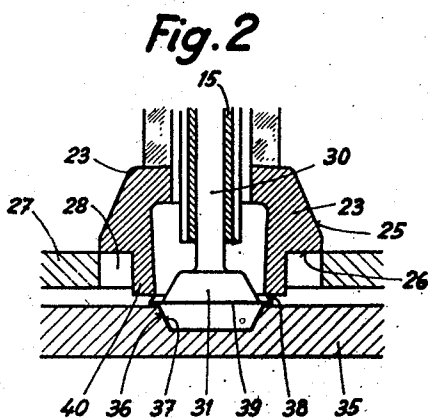


Fig. 2

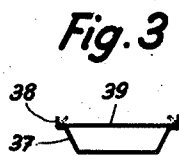


Fig. 3

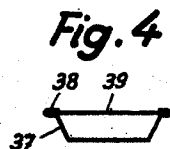


Fig. 4

Inventor
Hans Haidegger
by Karl Kichart's atty.

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CLOSING TOOL

Hans Haidegger, Soleure, Switzerland, assignor to
Ebauches S. A., Grenchen, Switzerland

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The present invention relates to a closing tool particularly suitable for use in securing a cover in closing position on a packing body.

In the manufacture of packings for small parts such as watch repair parts or the like, the body of the packing may be pressed from thin sheet material such as aluminum. It is convenient to make the packing body with an upwardly turned flange adapted to receive a flat cover member. The flange is then turned inwardly and pressed against the rim of the cover.

It is an object of the invention to provide a closing tool which is simple in manufacture, efficient and economical in operation, and rugged in use.

In accordance with the invention a closing tool is provided which is adapted to operate in a reciprocatory manner, the tool including at least one jaw which first moves transversely folding in the flange and then moves vertically pressing or clamping the flange in final closing position.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawing which shows, by way of example, an embodiment of the invention.

In the drawings:

Figure 1 is a vertical sectional view through a closing tool in accordance with the invention, the parts of the tool shown at rest.

Figure 2 is an enlarged fragmentary view of the lower portion of the tool shown in Figure 1. Additionally, a packing body is shown positioned on a support, and the parts of the closing tool are shown in the position wherein the flange is folded inwardly and the jaw is ready to start a vertical movement pressing the flange into its final position.

Figure 3 is a vertical sectional view of a packing illustrating in full lines the position of the flange before being folded inwardly, and in dotted lines, the position of the flange corresponding to the showing in Figure 2.

Figure 4 is a vertical sectional view through a closed packing.

Referring to the drawing, there is shown a reciprocable body member or block 1 within which is an actuating member or sleeve 2 adapted to move in a reciprocatory manner within the body member 1 as will later appear. The body member 1 may be reciprocated by the use of any conventional machinery well-known in the art. The upper end of sleeve 2 is provided with an external thread onto which a nut 4 is threadedly engaged. The nut 4 bears against a shoulder 5 forming the upper end of the block 1. A spring 7 inserted within a bore 6 of the block 1 bears between the under surface of the shoulder 5 and a shoulder 8 of the sleeve 2. The compression spring 7 presses the nut 4 against the shoulder 5 and is not compressed during a normal pressing process, being only safety means protecting the tool in the event of improper operation.

On the lower end of the sleeve 2 is a flange 9 provided with eyelets 10 carrying pins for the rotatable support of pressure rolls 11. The sleeve 2 is secured against axial rotation by a wedge 13 fixed to the block 1 and engaging in a groove 12 of the sleeve 2.

In the sleeve 2 a collet body 14 is mounted for upward and downward reciprocal movement. A rod 15 passes through a central bore of the collet body 14 and is rigidly connected with the body 14 by means of a transversely extending pin 16. The upper end of the rod 15 is provided with a thread 17 having a nut 18 in threaded engagement therewith bearing against the upper edge of an internal shoulder or flange 19 of the sleeve 2. A compression

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spring 20 is positioned between the top of the body 14 and the inner face of the internal flange 19, so that the internal flange 19 is pressed against the nut 18.

The collet body 14 supports jaws 23 pivotally mounted thereon by means of pins 22. The jaws 23 are positioned in slots 21 of the collet body 14 each being radially swingable therein on its pin 22. An elastic packing 24, which may be made of rubber, for example, is positioned within the space surrounded by the jaws 23 and owing to its elasticity tends to move the jaws 23 away from one another and to thereby press upwardly and inwardly inclined cam surfaces 25 of the lower portion of the collet jaws 23 against the pressure rolls 11. The lower portion of the jaws 23 is made with stop surfaces 26 which, in the position of Fig. 1 bear against the upper surface of a check plate or member 27 while an extending hammer end 40 of the jaw 23 passes through an opening 28 of the stop plate 27. The lower portion of the rod 15 is provided with a blind axial bore 29 slideably receiving a shank or stem 30 of a holding-down plate or presser foot 31. A compression spring 32 is positioned between the upper or inner end of the bore 29 and the upper end face of the stem 30 tends to move the shank 30 together with the holding-down plate 31 downwardly. The downward movement of the plate 31 is limited by a transversely extending pin 33 through the rod 15, passing through a slot 34 of the stem 30.

As shown in Figure 2 a plate 35, which may be a revolving table of a packing machine, formed with a die 36 for receiving a packing body 37 is provided beneath the tool. The packing body 37 may be made of sheet aluminum and is formed with an upwardly turned edge or flange 38 to receive a cover member 39. In order to close the packing 37 with the cover 39 in position, the flange 38 is first folded into the dotted position of Figure 3 by the closing tool which thereafter presses the flange into the position of Figure 4, that is, against the cover 39 of the packing.

This is accomplished by the operation of the closing tool after the packing 37, of Figure 3, has been placed in the die 36 as shown in Figure 2. In order that the upright flange 38 of the packing may be received in the space between the collet jaws 23 and the holding-down plate or presser foot 31, the closing operation is started with the closing tool in its raised position (higher than shown in Figure 1). Upon the downward motion of the body 1, the shoulders 26 of the jaws 23 bear against the check member 27 temporarily preventing further downward movement of the collet 14. As the body 1 continues its downward movement, energy is stored in the spring 20 and the pressure rolls 11 turn on the cam surfaces 25 moving towards the bottom thereof to urge each of the jaws 23 with a transverse movement towards the opposite jaw while the stop surfaces 26 slide on the check member 27 towards the opening 28. During this transverse movement the jaws 23 turn in or fold the flange 38 inwardly into the position of Figure 2, that is, into the dotted line position of Figure 3. The transverse movement continues until the stop surfaces 25 slide along the upper surface of the stop plate 27 to reach the edge of the opening 28 as shown in Figure 2, which illustrates the lower edge of the collet jaws 23 bearing against the upper edge of the turned-in flange 38.

Since the jaws 23 are now no longer prevented from an axial downward movement by the check plate 27, and since on the previous downward motion of the block 1, the spring 20 has been compressed, the jaws 23 are suddenly released downwardly inside the wall of the opening 28 with a hammer-like movement. By this action of the jaws 23 the turned-in flange 38 is clamped against the cover 39 closing the packing.

During the initial increment of downward movement of the block 1 the holding-down plate or presser foot 31 bears against the cover 39 and holds it in position on the packing 37 by the compression of the spring 32. If the block 1 is now moved upwardly, the spring 32 is gradually released and the jaws 23 slide upwardly along the wall of the opening 28 until the position is reached as shown in Figure 2. In this position, the jaws 23 are released to spread apart, the spreading being limited by the contact of jaw hammer ends 40 with the wall of the

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opening 28. The elastic packing 24, which has been previously compressed between the jaws 23, then spreads the jaws away from one another into the position shown in Figure 1. The closed packing 37 may then be removed from the die 36 and another packing may be inserted, whereupon the above-described cycle may be repeated.

In the embodiment shown in the drawing, the jaws 23 of the collet are pivoted to the collet body 14 by means of pins 22. However, in an equivalent construction a collet might be provided in which the jaws are integral with the body of the collet so that the jaws 23 might be moved transversely outwardly by their inherent elasticity without the use of the elastic packing 24.

I claim:

1. In apparatus for securing a cover on a packing body having a shoulder on which said cover seats and a flange projecting upwardly from the outer periphery of said shoulder, a support for said shoulder, a check plate disposed a predetermined distance above said support and having an opening directly over a packing body on said support, an actuating member guided for reciprocatory motion along the axis of said opening and having an internal shoulder at the end located away from said check plate, a collet axially reciprocable in said actuating member, a spring acting between said collet and said internal shoulder to force the collet downwardly relative to said actuating member; means for limiting said downward movement of the collet, said collet comprising a plurality of downwardly extending swingable jaws each of which has a hammer portion normally extending through the opening in said check plate, an outwardly extending stop surface which abuts said check plate during an initial increment of downward movement of the actuating member so that the actuating member moves downwardly relative to the collet against the action of said spring, and an upwardly and inwardly inclined cam surface; and means on the lower end of said actuating member engaging the cam surfaces of said jaws to force said jaws inwardly as the actuating member moves downwardly relative to the collet so that the stop surfaces of the jaws slip off of the edges of said opening permitting sudden downward movement of said jaws under the action of said spring, the inward movement of the jaws acting to bend said flange inwardly and the sudden downward movement of said jaws acting to hammer said flange down on the marginal portion of the cover.

2. In apparatus for securing a cover on a packing body having a shoulder on which said cover seats and a flange projecting upwardly from the outer periphery of said shoulder, a support for said container including said shoulder, a check plate disposed a predetermined distance above said support and having an opening directly over a packing body on said support, an actuating member guided for reciprocatory movement along the axis of said opening and having an internal shoulder at its upper end, a collet axially reciprocable in said actuating member, a spring acting between said collet and said shoulder of the actuating member to force the collet downwardly relative to the actuating member; means for adjustably limiting the downward movement of the collet relative to the actuating member, said collet comprising a plurality of downwardly extending swingable jaws each of which has a downwardly projecting hammer portion normally disposed in the opening in said check plate, an outwardly extending stop surface adapted to engage said check plate during an initial increment of downward movement of the actuating member so that the actuating member moves downwardly relative to the collet against the action of said spring, and an upwardly and inwardly inclined cam surface; rollers carried by said actuating member and engaging said cam surfaces of said jaws to swing said jaws radially inwardly as the actuating member moves downwardly relative to the collet so that said abutments of the jaws slip off of the edges of said opening permitting sudden downward movement of the jaws under the action of said spring, the inward movement of the jaws acting to bend said flange inwardly and the sudden downward movement of said jaws acting to hammer said flange down on the marginal portion of the cover, and resilient means inside the collet for spreading said jaws during upward movement of said actuating member.

3. In apparatus for securing a cover on a packing body

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having a shoulder on which said cover seats and a flange projecting upwardly from the outer periphery of said shoulder, a support for said container including said shoulder, a check member disposed a predetermined distance above said support and having an opening directly over a packing body held by said support, an actuating member guided for reciprocatory movement in axial alignment with said opening and having an internal shoulder at its upper end, a collet axially reciprocable in said actuating member, a spring acting between said collet and said shoulder to force the collet downwardly relative to the actuating member, a stem extending upwardly from said collet and projecting above the upper end of the actuating member, the upper end portion of said stem being threaded; a nut screwed on said threaded portion and adapted to engage the upper end of said actuating member to limit the downward movement of the collet relative to the actuating member, said collet comprising a plurality of downwardly extending swingable jaws each of which has a downwardly projecting hammer portion normally disposed in the opening of said check member, an outwardly extending stop surface adapted to engage said check member during an initial increment of downward movement of the actuating member so that the actuating member moves downwardly relative to the collet against the action of said spring, and an upwardly and inwardly inclined cam surface; means on the lower end of said actuating member engaging the cam surfaces of the jaws to swing the jaws inwardly as the actuating member moves downwardly relative to the collet so that said abutments of the jaws slip off of the edges of said opening permitting sudden downward movement of the jaws under action of said spring, the inward movement of the jaws acting to bend said flange inwardly and the sudden downward movement of the jaws acting to hammer said flange downwardly on the marginal portion of the cover, and resilient means inside the collet for spreading said jaws during upward movement of said actuating member.

4. In apparatus for securing a cover on a packing body having a shoulder on which said cover seats and a flange projecting upwardly from the outer periphery of said shoulder, a support for said container including said shoulder, a check member disposed a predetermined distance above said support and having an opening directly over a packing body held by said support, an actuating member guided for reciprocatory movement in axial alignment with said opening and having an internal shoulder at its upper end, a collet axially reciprocable in said actuating member and having a tubular body portion, a spring acting between said collet and said shoulder to force the collet downwardly relative to the actuating member, a stem extending through and secured to the tubular body portion of the collet and projecting above the upper end of said actuating member, an upper end portion of said stem being threaded, a nut screwed on said threaded portion and adapted to engage the upper end of said actuating member to limit the downward movement of the collet relative to the actuating member, a lower end portion of said stem having a blind axial hole, a presser foot having a shank axially slideable in said hole, a compression spring in said hole and acting between the inner end of the hole and said shank to urge the presser foot downwardly; means for limiting downward movement of the presser foot, said collet comprising a plurality of swingable jaws extending downwardly from the body portion of said collet, each of said jaws having a downwardly projecting hammer portion normally disposed in the opening of said check member, an outwardly extending stop surface adapted to engage said check member during an initial increment of downward movement of the actuating member so that the actuating member moves downwardly relative to the collet against the action of said spring, and an upwardly and inwardly inclined cam surface; means on the lower end of said actuating member engaging the cam surfaces of the jaws to swing the jaws inwardly as the actuating member moves downwardly relative to the collet so that said abutments of the jaws slip off of the edges of said opening permitting sudden downward movement of the jaws under action of said spring, the inward movement of the jaws acting to bend said flange inwardly and the sudden downward movement of the jaws acting to hammer said flange downwardly on the marginal portion of the cover, and resilient means

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inside the collet for spreading said jaws during upward movement of said actuating member.

5. In an apparatus for securing a cover member in inserted position against a shoulder of a packing body having an upwardly turned flange, a check member, a reciprocable body member, a jaw carried by the reciprocable body member and including a stop surface adapted to engage with the check member, and means for transverse movement of the jaw while its stop surface is in engagement with the check member for a turning-in movement of the upwardly directed flange of the packing body and for movement of the stop surface past the check member for downward movement of the jaw towards the packing body clamping the inwardly turned flange over the cover member.

6. In an apparatus for securing a cover member in inserted position against a shoulder of a packing body having an upwardly turned flange, a check member, a reciprocable body member, a jaw carried by the reciprocable body member, means forming a stop surface of a predetermined width carried by the jaw, the stop surface adapted to engage with the check member, and means for transverse movement of the jaw while the stop surface is in engagement with the check member for a turning-in movement of the upwardly directed flange of the packing body and for movement of the stop surface past the check member for downward movement of the jaw towards the packing body clamping the inwardly turned flange over the cover member.

7. In an apparatus for securing a cover member in inserted position against a shoulder of a packing body having an upwardly turned flange, a support for the packing body, a check member, a reciprocable body member, a jaw carried by the reciprocable body member for movement towards and away from the support, the jaw adapted to engage with the check member stopping downward movement of the jaw for a predetermined portion of the length of the stroke of the reciprocable member, means for transverse movement of the jaw while in engagement with the check member for a turning-in movement of the upwardly directed flange of the packing body, and means for storing energy and for suddenly furthering the movement of the jaw towards the packing body rendered operative by movement of the reciprocable body member towards the packing body whereby upon a predetermined transverse move-

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ment of the jaw past the edge of the check member the jaw is impacted against the turned-in flange of the packing body firmly clamping the cover member in inserted position.

8. In an apparatus for securing a cover member in inserted position against a shoulder of a packing body having an upwardly turned flange, a support for the packing body, a check member having a top surface and spaced a predetermined distance from the support and having an opening in alignment with the packing body positioned on the support, a reciprocable body member guided for motion along the axis of the opening, a jaw having a stop surface thereon and carried by the reciprocable body member for movement towards the support and normally positioned for contact by the jaw stop surface with the top surface of the check member, cam means for transverse movement of the jaw operative upon engagement of the jaw stop surface with the top surface of the check member for a turning-in movement of the upwardly directed flange of the packing body, and a spring positioned between the jaw and the reciprocable body member, the spring compressed by downward movement of the reciprocable body member while the jaw stop surface is in contact with the check member, whereby upon a predetermined transverse movement of the jaw stop surface over the edge of the opening of the check member the jaw stop surface is released and the jaw under the combined action of the reciprocable body member and of the spring is impacted against the turned-in flange of the packing body clamping the cover member in inserted position.

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