Feb. 9, 1954 J. B. WILSON 2,668,650

PRESSURE-SUSTAINING SEALING HEAD

Filed Aug. 3, 1950 2 Sheets-Sheet 1

Fig. 1.

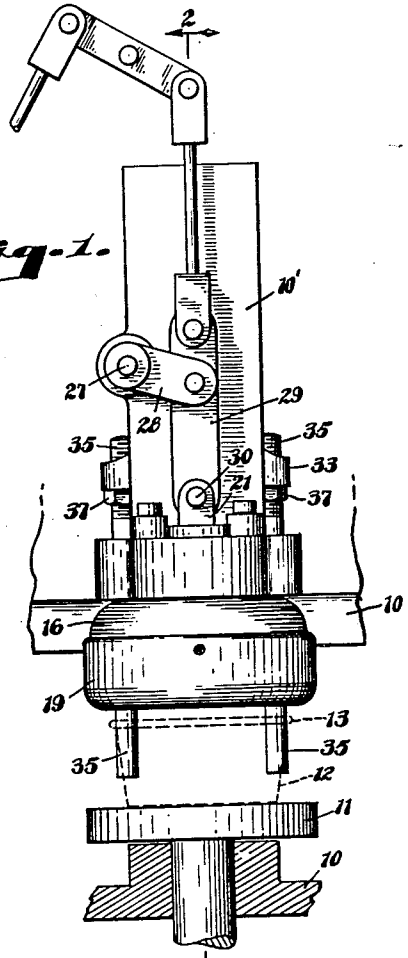


Fig. 2.

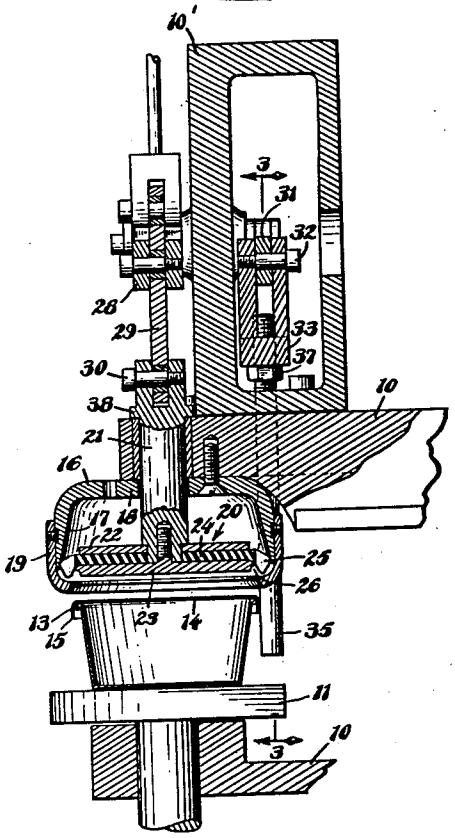
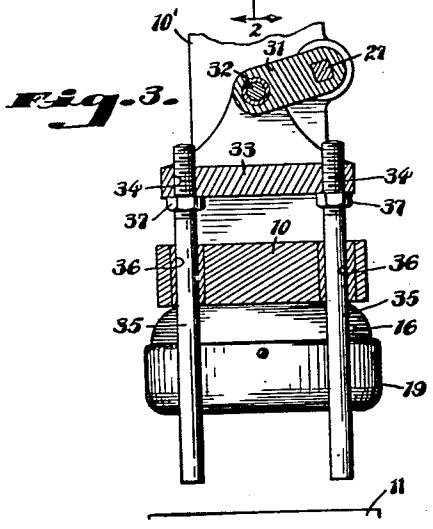


Fig. 3.



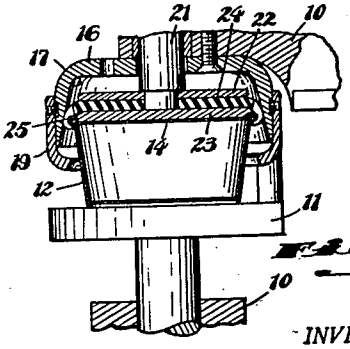


Fig. 4.

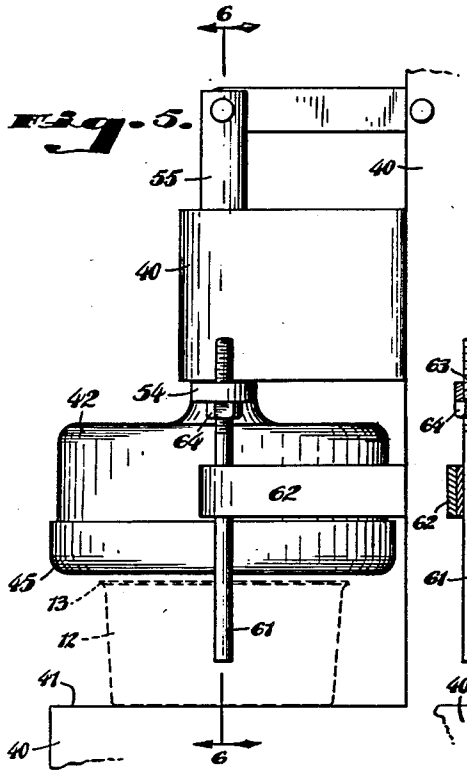
INVENTOR.
JOHN B. WILSON,
BY: Harold B. Hood.
ATTORNEY.

Feb. 9, 1954 J. B. WILSON 2,668,650

PRESSURE-SUSTAINING SEALING HEAD

Filed Aug. 3, 1950 2 Sheets-Sheet 2

Fig. 5.



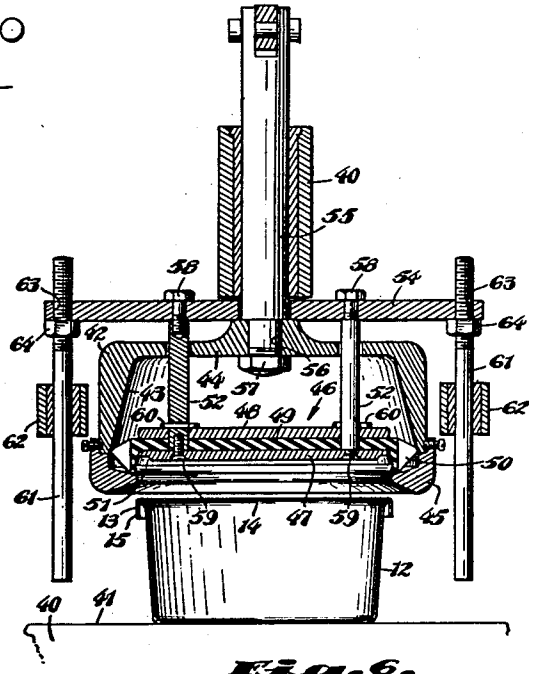


Fig. 6.

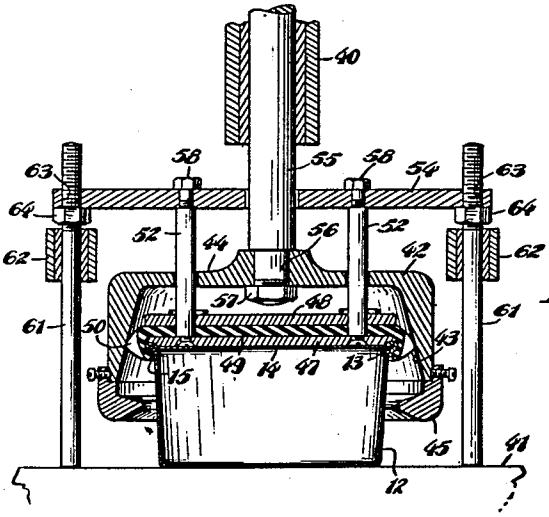


Fig. 7.

INVENTOR.
JOHN B. WILSON,
BY: Harold B. Hood.
ATTORNEY.

Patented Feb. 9, 1954 2,668,650

UNITED STATES PATENT OFFICE

2,668,650

PRESSURE-SUSTAINING SEALING HEAD

John B. Wilson, Indianapolis, Ind., assignor, by mesne assignments, to Huyler's, New York, N. Y., a corporation of New York

Application August 3, 1950, Serial No. 177,450

14 Claims. (Cl. 226—85)

1

The present invention relates to a cap crimping machine, and more particularly to a pressure-sustaining sealing head forming a part of such a machine. The invention finds its primary utility in applying foil caps to the beaded mouths of containers, and more particularly in connection with containers which are axially, and perhaps radially, fragile.

The type of foil cap with which the invention is primarily concerned comprises a substantially planar body adapted to rest loosely upon the rim of a receptacle mouth, and a perimetral flange, substantially perpendicular to the body, adapted to overlie, span or enshroud the bead at the receptacle mouth, and further adapted to be distorted to a condition in which it embraces such bead to secure the cap in place on the receptacle mouth. The present invention is particularly concerned with mechanism for thus distorting cap flanges.

Mechanism for accomplishing this function in connection with milk bottles and the like has been known heretofore, typical examples of such mechanism being disclosed in the patents to Hogg 2,086,552 and 2,112,842. In such devices, a plastic element having flow characteristics is pressed agaianst the body of the cap to be applied and then a shroud or cowl is moved downwardly with respect to such element to produce a flowing action in the perimeter of such element which spreads or rolls the cap flange into intimate contact with the entire surface of the bead and with a portion of the receptacle surface beneath the bead, the receptacle body, in the meantime, sustaining the downward force necessarily exerted against the plastic element to accomplish that flowing action.

It is desired similarly to apply similar caps to other types of containers made from materials too fragile, in an axial direction, to sustain that necessary downward pressure; and it is the primary object of the present invention to provide a sealing head, otherwise similar to the devices heretofore known in the art and exemplified by the above-identified patents, but so constructed as to be self-sustaining and to relieve the receptacle from the necessity of withstanding the force required thus to mold the cap flange about the receptacle bead.

Some of such relatively fragile receptacles are fragile also in an inwardly radial direction. It will be obvious that the molding pressure exerted against the cap flange has a substantial radially-inward component. It is a further object of the invention so to construct a sealing

2

head that the head itself will sustain the receptacle rim against distortion resulting from the application of such radially-inward pressure thereagainst during the flange-molding step.

Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, my invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a front elevation of one form of sealing mechanism constructed in accordance with the present invention;

Fig. 2 is a sectional view therethrough taken substantially on the line 2, 2 of Fig. 1;

Fig. 3 is a fragmental section taken substantially on the line 3, 3 of Fig. 2; and

Fig. 4 is a fragmental view, taken on the plane of Fig. 2, but showing the parts in different relative positions.

Fig. 5 is a side elevation of a modified form of the invention;

Fig. 6 is a sectional view taken substantially on the line 6, 6 of Fig. 5; and

Fig. 7 is a view similar to Fig. 6 but showing the parts in different relative positions.

Conventional capping (and sometimes filling) machines include two types, in one of which, receptacles to be capped are successively brought to the capping station where they are located upon a platform, which platform is then reciprocated into cooperative relation with a capping device. The platform is then lowered, the receptacle is moved away from the platform, and a new receptacle to be capped is deposited upon the platform. In another form of conventional capping machine, the platform is stationary, and the sealing head is reciprocated toward and away from the platform. Hand capping devices are usually of the latter form.

In Figs. 1 to 4, I have shown an embodiment of my invention adapted for installation in the former type of conventional capping machine. I have shown fragments of a frame 10 upon which is mounted a platform 11 guided in the frame for substantially vertical reciprocation; and means, forming no part of the present invention, is provided for periodically reciprocating the platform 11.

I have shown a conventional form of paper receptacle 12 stationed on the platform 11 and

having an outwardly rolled bead 13 surrounding its upwardly-open mouth. I have shown a conventional form of foil cap, comprising a body 14 adapted to rest upon and span the receptacle mouth, and a depending perimetral flange 15 enshrouding the bead 13 and extending therebelow.

A cowl 16 is fixedly supported upon the frame 10 above the platform 11, in registry therewith, and disposed in the line of reciprocation thereof. Said cowl is formed to provide an upwardly-tapering internal surface 17 merging with a top wall 18 through which the cowl may be fixed to the frame 10. A guide bell 19 is preferably associated with the cowl 16.

Supported within the cowl is a head indicated generally by the reference numeral 20 and supported upon a stem 21 guided in a portion of the frame 10 for reciprocation in the line of movement of the platform 11. The head, in its preferred form as illustrated, comprises a back plate 22 and a forward plate 23, both fixedly supported upon the stem 21, and gripping therebetween a plastic shaping element 24 which projects perimetrally beyond the plates 22 and 23, as at 25. The plates 22 and 23 will preferably be quite rigid, and may be made of any suitable metal. The shaping element 24, and particularly its perimetrally-projecting portion 25, on the other hand, will be formed of readily plastic material such as rubber or its substitutes, having flow characteristics. Preferably, the forward face of the plate 23 will be provided with a perimetral channel 26 opening forwardly and nicely proportioned to receive accurately the rim of the receptacle mouth, so that the radially-outwardly-facing wall of said channel will snugly enter the receptacle mouth to sustain the rim of the receptacle against radially-inward distortion.

Journalled in a frame portion 10' upon an axis transverse to the line of movement of the platform 11 and the head 20 is a rock shaft 27 fixedly carrying an arm 28. The remote end of the arm 28 is pivotally connected to a link 29 which, in turn, is pivoted at 30 to the upper end of the stem 21. A second arm 31 is fixedly carried by the rock shaft 27 and has its remote end operatively connected as at 32 (through a suitable lost motion connection) with a bar 33. At its opposite ends, the bar 33 is provided with tapped openings 34, 34 in which are threadedly received the upper ends of two rods 35, 35, said rods being guided, as in bushings 36, 36 supported by the frame 10, for reciprocation in the direction of movement of the platform 11 and the stem 21. Stop nuts 37, 37 are preferably mounted on the rods 35, 35.

The operation of the mechanism just described is as follows: A fragile receptacle 12, which may be made of paper or similar material, is located on the platform 11 in registry with the cowl 16, a cap 14 being loosely supported upon the upwardly-opening mouth of the receptacle in the manner illustrated in Fig. 2. The rods 35, 35 are nicely adjusted, in their openings 34, 34, so that their lower ends will be engaged by the platform 11, during upward movement of the platform, precisely at the instant when the receptacle mouth bead 13 seats itself snugly in the channel 26 of the head plate 23. The body 14 of the cap will be distorted inwardly of the receptacle mouth by a very slight pressure which the receptacle is capable of sustaining, as the bead so seats itself.

As the platform 11 engages the lower ends of the rods 35, the rods will be entrained to participate in further upward movement of said platform; and, as the rods move upwardly, they will cause clockwise movement of the arms 31 and 28, as viewed in Fig. 3, to enforce corresponding movement of the head 20. Thus, the exertion of any substantial pressure, between the platform 11 and the head 20, axially upon the receptacle 12, is prevented; and the head 20 is forced to move upwardly, with respect to the stationary cowl, along with the platform 11 and the receptacle 12.

Such upward movement of the head 20 with respect to the tapered wall 17 of the cowl 16 results in a flowing distortion of the perimetrally-projecting portion 25 of the element 24, thus rolling and molding the cap flange 15 into intimate engagement with the entire surface of the bead 13 and with a portion of the external wall of the receptacle 12, in the manner illustrated in Fig. 4. The rods 35, as has been said, cooperate with the platform 11 to prevent the exertion of any substantial force upon the receptacle 12 in an axial direction; and the receptacle mouth is sustained against distortion in response to the radial pressure exerted thereagainst by the portion 25 of the element 24, by the engagement of the plate 23 with the inner surface of the receptacle mouth.

As the platform 11 retreats, it will be followed by the head 20 and the rods 35 until the collar 38 on the stem 21 meets the frame portion 10 in which said stem is guided.

In the form of invention illustrated in Fig. 5, a frame 40 is fragmentally and somewhat diagrammatically illustrated, said frame providing a platform 41 upon which a receptacle 12 is adapted to be supported in registry with a cowl 42 similar to the cowl 16. The cowl 42 is provided with an upwardly-tapering inner wall 43 and an upper end wall 44; and preferably a guide bell 45 will be associated therewith.

A head indicated generally by the reference numeral 46, comprises a forward plate 47 and a back plate 48 between which is engaged a plastic element 49 similar to the element 24 and having a portion 50 perimetrally projecting beyond the stiff plates 47 and 48. The plate 47 is preferably formed with a peripheral channel 51 functionally identical with the channel 26.

Two rods 52, 52 penetrate the upper wall 44 of the cowl 42 and are suitably suspended from a cross bar 54. A stem 55, suitably guided in a portion of the frame 40 for reciprocation toward and away from the platform 41, has its lower end received in an opening 56 in the cowl wall 44, and carries a nut 57 whereby said cowl is suspended from the stem 55. Screws 58 penetrate the bar 54 and are threaded into suitable sockets in the upper ends of the rods 52, while screws 59 penetrate the head plate 47 and are received in sockets in the lower ends of the rods 52, whereby the head 46 is suspended from the rods 52, and the element 49 is clamped between the plates 47 and 48, the latter of which is backed by pins 60 penetrating the rods 52.

Stop rods 61, functionally similar to the rods 35, are threadedly mounted in tapped openings 63 in the opposite ends of the bar 54, which bar is supported centrally upon the cowl 42. Stop nuts 64 are preferably carried by the rods 61, and said rods are guided, in frame elements 62, for reciprocation along lines parallel with the line of reciprocation of the stem 55.

A receptacle 12 being located upon the platform 41 in registry with the cowl 42, and carrying

a cap to be affixed thereto, the stem 55 is moved downwardly by suitable mechanical or manually manipulable means (not shown). Downward force is thus exerted upon the cowl 42, while the bar 54 and the head 46 supported thereupon will move downwardly correspondingly under the effects of gravity. At the instant when the bead 13 finds its seat in the channel 51, the rods 61 will engage the platform 41 to arrest downward movement of the bar 54 and the head 46 supported thereon. The cowl 42, however, continues to be moved downwardly by the force exerted thereupon by the stem 55, whereby the tapered cowl wall 43 will distort the perimetrally-projecting portion 50 of the plastic element 49 to mold the flange 15 about the bead 13 and against the side wall of the receptacle 12 in the manner illustrated in Fig. 7. During this operation, the radially outwardly facing wall of the channel 51 sustains the receptacle rim against radial distortion, while the rods 61 sustain the downward pressure exerted upon the head 46, through the portion 50 of the element 49, by the downwardly moving cowl wall 43.

After the crimping or molding operation has been completed, the stem 55 is lifted to raise the cowl 42. In most instances, the head assembly will not partake of the upward movement of the stem until the cowl wall 44 engages the bar 54. If, by any chance, the frictional engagement of the portion 50 of the element 49 against the cowl wall 43 should entrain the head assembly with the cowl during initial upward movement thereof, the bar 54 will soon strike the guide portion of the frame 40, whereby its upward movement will be arrested while the cowl returns to the position of Fig. 6.

Obviously, the vertical position of the rods 35 with respect to the bar 33, or of the rods 61 with respect to the bar 54, may be adjusted to accommodate the mechanism to the capping of receptacles of various heights; or rods of different lengths may be substituted for the rods illustrated in order to accommodate the devices to receptacles of different heights. Similarly, the plates 23 and 47 may be replaced by plates of different proportions to accommodate the mechanisms to receptacles of different mouth diameters.

I have found that, through the use of the present invention, the currently extremely popular caps can be successfully applied to receptacles which could not possibly be closed by such caps through any mechanism heretofore known to me.

I claim as my invention:

1. In a machine of the class described, a head member, a plastically-deformable element supported concentrically adjacent said head member and having a perimetral portion projecting beyond the limits of said head member and free for deformation relative thereto, a cowl element coaxially associated with said head member and presenting a perimetral wall toward said perimetral portion of said deformable element for cooperation therewith, one of said elements being axially tapered and said cowl element wall cooperating with said deformable element perimetral portion, upon relative movement between said head member and said cowl element in one direction, to deform said deformable element perimetral portion toward the center of said deformable element, a platform member adjacent said head member, means for effecting relative movement of said platform and said head and cowl toward each other, and a spacer normally fixed relative to one of said members for limiting the approach of said platform member and head member while permitting further approach of said platform member and cowl element to effect relative movement of said head member and cowl element in said one direction.

2. A machine for crimping a cap upon the beaded mouth of an axially-fragile receptacle, comprising a platform upon which the bottom of such a receptacle may rest, a head above said platform for registration with a receptacle on said platform, means for producing relative movement of said platform and head toward each other, means including an element operatively connected to said head for arresting such relative movement at the point of engagement of said head with a cap supported on such a receptacle supported on said platform, a plastically-deformable element concentrically supported adjacent said head and having a perimetral portion projecting beyond the limits of said head and free for deformation relative thereto, a cowl coaxially associated with said head and presenting a tapered perimetral wall toward said perimetral portion of said element for cooperation therewith, said cowl wall cooperating with said element perimetral portion, upon relative movement between said head and said cowl in one direction, to deform said element perimetral portion toward the center of said element, and means for effecting relative movement of said platform and cowl toward each other after arrest of relative movement of said platform and head toward each other to deform said element perimetral portion.

3. The device of claim 1 in which said spacer is normally fixed with respect to said head member and further is adjustable relative to said head member to vary the relative positions of said head member and platform member at which such approach is stopped.

4. The device of claim 3 in which said spacer comprises a pair of rods adjustably threadedly connected to said head member, projecting toward said platform member, and engageable with said platform member to limit relative movement of said head and platform member toward each other.

5. The device of claim 1 in which said cowl element is fixed, said head member is axially reciprocable relative to said cowl element, said platform member is reciprocable, in the line of movement of said head member, and said spacer establishes a driving connection between said platform member and said head member at a point intermediate the ends of the path of movement of said platform member.

6. The device of claim 1 in which said platform member is fixed, said head member is supported from said cowl element, said cowl element is axially reciprocable toward and away from said platform member, said means for effecting relative movement has a driving connection with said cowl element, and said spacer engages said platform member at a point intermediate the ends of the path of movement of said cowl element and supports said head member therefrom during further movement of said cowl element toward said platform.

7. In a machine for applying to the open, perimetrally-beaded mouth of a fragile receptacle a cap of deformable material having a body and a depending perimetral flange adapted, when said cap body rests on the rim of said receptacle mouth, to span the bead at the receptacle mouth, the invention comprising a platform for supporting the bottom of such a receptacle, a head

adapted to engage the body of a cap resting on the mouth of a receptacle so supported, means carried by said head and movable relative thereto to engage the flange of such cap and crimp the same around and under such bead, cam means operatively associated with said movable means and acting, upon relative movement between said head and said cam means in one direction, to actuate said movable means, means for producing relative movement of said platform and said head and cam means toward each other, and means independent of such receptacle for arresting relative approach of said platform and said head while relative approach of said platform and cam means continues, said arresting means, comprising a spacer element fixed with respect to said head and engageable with said platform to limit the exertion of pressure between said platform and said head upon such receptacle.

8. Forming apparatus comprising a platform adapted to support a fragile receptacle having a closure thereon, a cowl adapted to enshroud said closure and the portion of such receptacle with which said closure is associated, a shaping means having flow characteristics located within said cowl, said cowl and said shaping means being relatively axially movable and said cowl cooperating with said shaping means, upon such relative movement in one direction, to cause said shaping means to exert radially-inward shaping pressure upon such closure to mold the same into conforming engagement with the external surface of such receptacle, means for effecting relative movement of said platform and said cowl and shaping means toward each other, and spacer means independent of such receptacle and comprising a rigid element extending between said shaping means and said platform for arresting relative approach of said platform and shaping means while relative approach of said platform and cowl continues.

9. In a device of the class described, a frame, a platform guided by said frame for reciprocation relative thereto, a cowl fixedly supported by said frame in the line of reciprocation of said platform, a head concentrically associated with said cowl and supported for reciprocation relative thereto in said line, an annular shaping element having flow characteristics carried by said head and projecting perimetrally therefrom for cooperation with said cowl, a rod guided in said frame outside said cowl for reciprocation in the direction of reciprocation of said platform, an end of said rod projecting into the path of movement of said platform, and means providing a driving connection between said rod and said head to enforce reciprocation of said head relative to said cowl upon movement of said rod by said platform.

10. The device of claim 9 in which said driving connection includes an element connected for movement with said head, said rod having an adjustable threaded connection with said element

upon an axis parallel with the line of movement of said platform.

11. The device of claim 9 in which said driving connection comprises a rock shaft journalled on said frame on an axis transverse to the line of movement of said platform, an arm fixed to move with said rock shaft, means providing an operative connection between said arm and said head, a member having an adjustable threaded connection with said rod, a second arm fixed to move with said rock shaft, and means providing an operative connection between said second arm and said member.

12. In a device of the class described, a frame, a platform stationary with respect to said frame, a cowl guided in said frame for reciprocation toward and away from said platform, a head concentrically associated with said cowl, means supporting said head from said cowl for relative movement therebetween in the line of reciprocation of said cowl, an annular shaping element having flow characteristics carried by said head and projecting perimetrally therefrom for cooperation with said cowl, a rod fixed for movement with said head and engageable with said platform, upon movement of said head and cowl toward said platform to arrest approach of said head toward said platform while approach of said cowl toward said platform continues, said cowl, during such further approach, acting upon said shaping element to produce flowing distortion thereof radially inwardly.

13. The device of claim 12 in which said rod is fixed to said head for adjustment relative thereto in a line parallel with the line of movement of said head.

14. The device of claim 12 in which said cowl enshrouds said head and shaping element and is formed to provide an internal surface progressively tapering away from said platform, the means supporting said head comprising an element fixed to said head and penetrating that wall of said cowl remote from said platform, and a bar outside said cowl and adapted to rest on said remote cowl wall, said element being fixed to said bar and said rod being fixed to said bar.

JOHN B. WILSON.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,696,819	Sutcliffe	Dec. 25, 1928
1,753,449	Swift	Apr. 8, 1930
1,811,344	Bauw	June 23, 1931
1,846,670	Barbieri	Feb. 23, 1932
1,888,397	Slick	Nov. 22, 1932
2,202,181	West	May 28, 1940
2,327,262	Hall	Aug. 17, 1943
2,534,997	Smith	Dec. 19, 1950

FOREIGN PATENTS

Number	Country	Date
255,207	Great Britain	July 22, 1926