

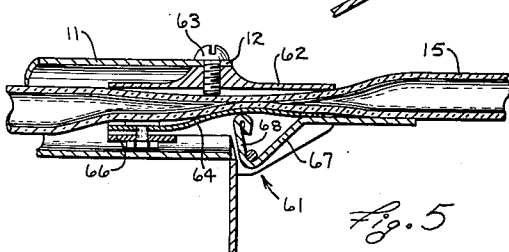
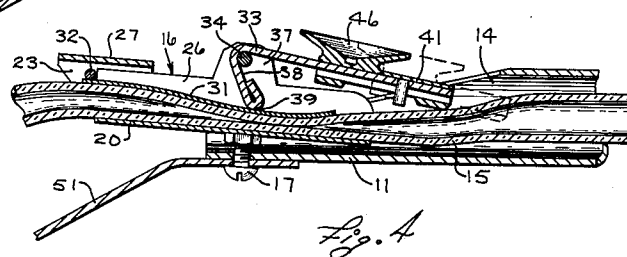
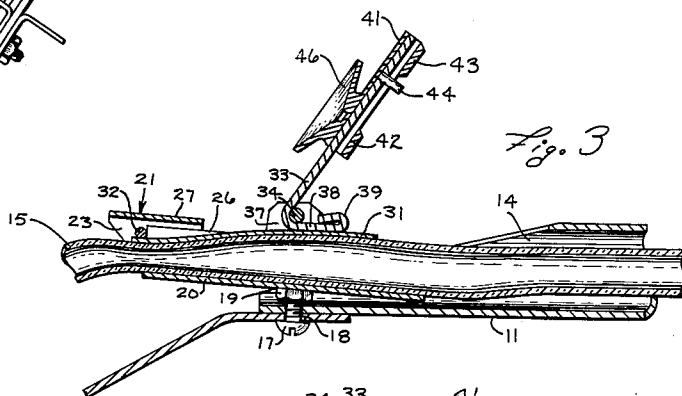
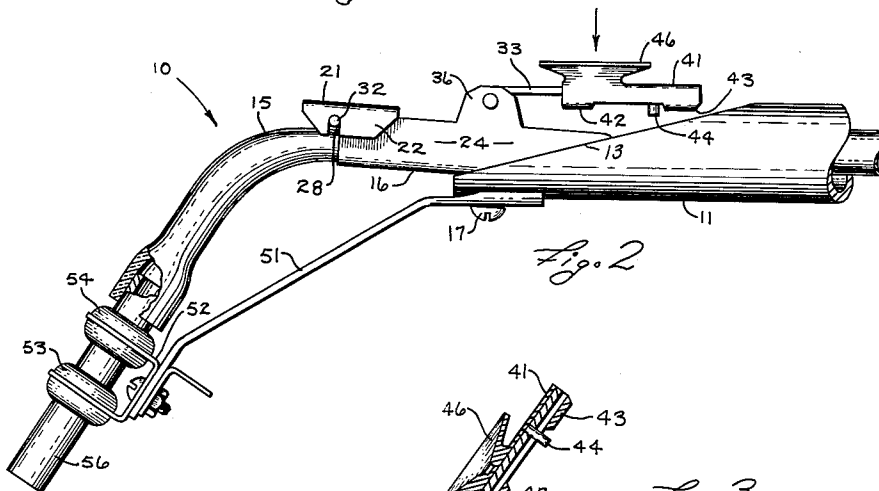
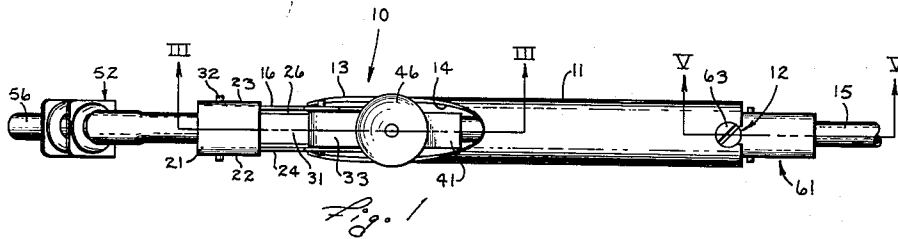
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TUBE CLAMP FLOW CONTROL DEVICE

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TUBE CLAMP FLOW CONTROL DEVICE

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2 Claims. (Cl. 251-9)

This invention relates to a flow control device and, more particularly, relates to a type of flow control device having a pinch-clamp for controlling the dispensing of liquids from a container.

Pinch-clamp type, flow control devices are widely used in chemical laboratories and the like for the purpose of controlling the dispensing of liquids from a container. A wide variety of pinch-clamp flow control devices have been suggested in the past for this purpose. However, the prior art devices have not been completely satisfactory for a variety of reasons. For example, prior types of pinch clamp devices frequently require the use of two hands to open and close the clamp and this is not always possible or desirable. Further, in manipulating the clamp the end of the tube on which the clamp is mounted frequently is uncontrolled and is free to move. When the clamp is opened and the liquid suddenly flows through the free end of the tube, such causes same to move erratically so that the liquid may not be discharged where intended.

Prior pinch-clamp devices either have been relatively flimsy and, therefore, are easily damaged or else such devices have been prohibitively expensive. In addition, many types of prior pinch-clamp devices did not provide a completely effective shutoff. Accordingly, improvements in pinch-clamp, flow control devices have long been sought and the present invention is intended to overcome the foregoing defects in the prior art devices.

It is an object of this invention to provide an improved pinch-clamp type of flow control device.

It is a further object of this invention to provide an improved pinch-clamp device, as aforesaid, which requires only the use of a single hand to move the clamp from an open to a closed position.

It is a further object of this invention to provide a pinch-clamp device, as aforesaid, in which the discharge end of the tube or hose on which the clamp is mounted is nonmovable so that flow of the liquid in the desired direction can be easily effected.

It is a further object of this invention to provide an improved pinch-clamp device, as aforesaid, having an improved form of clamping mechanism which insures a completely tight shutoff of the liquid being dispensed.

It is a further object of this invention to provide an improved pinch-clamp device, as aforesaid, which is of relatively simple and durable construction, which is inexpensive to manufacture and maintain in operating condition and which is reliable and effective in operation.

Other objects and advantages of the invention will become apparent to persons acquainted with equipment of this type upon reading the following disclosure and inspecting the accompanying drawings, in which:

FIGURE 1 is a top view of the flow control device to which the invention relates.

FIGURE 2 is a broken, side view of the leftward end portion of the device shown in FIGURE 1.

FIGURE 3 is a sectional view taken along the line III-III of FIGURE 1 showing the clamp in open position.

FIGURE 4 is a sectional view taken along the line III-III of FIGURE 1 and showing the clamp in closed position and showing in solid lines one position of the slidable locking plate and showing in broken lines a second position thereof.

FIGURE 5 is a sectional view taken along the line V-V of FIGURE 1.

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Referring to FIGURE 1 in the drawings, the invention provides an improved flow control device 10 which includes an elongated, tubular handle 11 having a notch 12 in the rearward end thereof for purposes to be described hereinafter. The front end of the handle 11 is cut on a bias to form an end edge 13 which extends at an acute angle to the longitudinal axis of the handle. The edge 13 defines a substantially elliptical, front end opening 14. The length of the handle 11 is such that the user may conveniently grasp same with his finger extending under the lowermost portion thereof and with his thumb lying over the opening 14.

A resilient, compressible tube or hose 15 extends through the handle 11. The tube 15 is connectible to a source (not shown) of liquid, which may be either at atmospheric pressure where a siphoning action is used or may be under super-atmospheric pressure. The other end of the tube 15 is adapted to direct the liquid toward the place of use.

A channel-shaped extension 16 is partially received within the handle 11 through the end opening 14 thereof and is secured to the handle in any convenient manner. Here a screw 17 (FIGURE 3) extends through an opening 18 in the handle 11 and is threaded into a nut 19 which is secured, as by welding, to the web 20 of the extension 16. The tube 15 extends through the extension 16.

A channel-shaped cover plate 21 is secured to the forward end of extension 16 with its side walls 22 and 23 fitting over and secured, as by welding, to the side walls 24 and 26 of extension 16. The web 27 of cover plate 21 is opposed to and spaced from the web 20 of extension 16 so that the tube 15 extends therebetween. The side walls 22 and 23 of the cover plate each have a notch cut therein, of which one notch appears at 28 (FIGURE 2), adjacent the front end of the extension 16.

A flat leaf spring 31 (FIGURE 3) is secured, as by welding, to a pin 32 which is received in the notches 28. The leaf spring 31 extends rearwardly from the notches 28 toward the opening 14 and overlies the tube 15. A substantially L-shaped lever 33 is secured, as by welding, to a pin 34 which is pivotally mounted on and extends between the ears 36, 37 of the extension 16. The ears 36 and 37 are located between the ends of the extension 16. The lever 33 has an integral leg 38 which extends therefrom at an acute angle, such as about 45 degrees, with respect thereto. The leg 38 has a rounded edge 39 which is adapted to engage the leaf spring 31 intermediate the ends thereof to move same between a closed position (FIGURE 4), wherein it clamps the tube shut, and an open position (FIGURE 3), wherein it permits the tube to assume its open position. It will be observed that the leg 38 faces toward the free rearward end of the spring 31 and engages same, when in its shut off position, intermediate the ends thereof so that the spring has a somewhat arcuate shape when in its shut off position. This has been found to be desirable since it provides a highly effective shut off while minimizing wear of the tube 15 which might otherwise occur if an edge of the leaf spring engaged same.

A slide plate 41 (FIGURES 3 and 4) is slidably mounted on top of the lever 33 and has a pair of cross bars 42 and 43 secured thereto and underlying said lever. The cross bars 42 and 43 are engageable with a pin 44 extending downwardly from the lever 33 to limit the movement of the slide plate along the lever 33. A thumb button 46 is integral with the slide plate 41 and is engageable by a user's thumb whereby the lever 33 can be depressed in order to close the tube 15. The lever 33 can be permitted to move upwardly under the resiliency of the tube 15 when it is desired to open the tube to permit flow of liquid therethrough. The slide plate 41 is

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of such width that it can fit through the opening 14 and can be moved by the button 46 to a position shown in the broken lines in FIGURE 4 wherein it is partially received within the handle 11 so that the lever 33 is locked against pivoting movement. Thus, the lever 33 can be locked in a position wherein the tube is closed.

A bracket 51 is secured to the forward end of the handle 11 and extends downwardly at an acute angle with respect to the longitudinal axis thereof. A U-shaped support 52 is secured to the lower end of the bracket 51 and has openings in the legs thereof in which annular grommets 53 and 54 are disposed. A discharge pipe 56 extends through the grommets 53 and 54 and is telescoped within the end of the tube 15. The bracket 51 and the discharge pipe 56 hold the end of the tube 15 in a fixed position so that the direction of discharge of the liquid from the tube 15 is at all times closely controlled.

A second clamp structure 61 (FIGURE 5) may be provided if desired adjacent the rearward end of the handle 11. The second clamp structure includes a channel-shaped member 62 through which the tube 15 extends and which may be secured to the handle 11 by means of a screw 63 which is receivable in the notch 12. A leaf spring 64 is mounted on a plate 66 which is secured to the member 62 and said spring extends rearwardly within the channel-shaped member 62. A substantially L-shaped lever 67 is pivotally mounted on the member 62 and has a leg 68 engageable with the leaf spring 64 in a manner generally similar to that disclosed above with respect to the lever 33 so that the leaf spring 64 may be urged into clamping engagement with the tube 15. Here the leg 68 and lever 67 are so shaped that the leg 68 is in an over-center position when the same is clamping the tube 15 shut so that the lever will remain in such position until it is manually released.

Assembly and Operation

While the assembly and operation of the device are believed to be apparent in view of the foregoing description the same will be briefly described for the purpose of insuring a complete understanding of the invention. The flow control device 10 is mounted upon the tube 15 by sliding the tube between the web of the channel-shaped member 62 and the leaf spring 64. This may be done before the second clamp structure 61 is connected to the handle 11. The tube 15 is then slid through the handle 11 and is then moved through the space between the web 20 of extension 16 and the leaf spring 31. The tube 15 is then telescoped within the end of discharge pipe 56 and the device is then ready for operation. The other end of the tube will be connected to a source of liquid, which may be either a container under atmospheric pressure where a siphoning type of flow is provided or, alternatively, the tube 15 may be connected to a suitable fluid source under super-atmospheric pressure.

When it is desired to permit flow of liquid, the levers 33 and 67 will be positioned in positions wherein the legs 38 and 68 are substantially parallel with the leaf springs 31 and 64, respectively. The natural resiliency of the tube 15 will expand the tube into its open position and liquid will be free to flow therethrough.

In normal use of the device 10, the operator will control the flow of fluid by manipulating only the lever 33 since such will be sufficient to effectively control the flow of liquid. Such manipulation is effected by the operator placing his thumb on the thumb button 46 and depressing same so that the leg 38 engages the leaf spring 31 and forces same against the tube until same is closed, as shown in FIGURE 4. If the flow of fluid is to be blocked for a substantial period of time or if the operator wishes to free his hand for other uses, the lever 33 may be locked in this position by sliding the slide plate 41 so that the end thereof is received within the handle 11. When the resilient tube 15 is compressed into the closed position

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(FIGURE 4) by the lever 33, said tube will urge rotation of said lever in a counterclockwise direction. Thus, if the slide plate 41 is extending through the opening 14 into the handle 11, said slide plate will be urged upwardly against the inner wall surface of the handle 11 near said opening 14. The frictional engagement between the slide 41 and the wall of the handle member 11 will tend to hold the slide plate 41 in its broken line position of FIGURE 4 until said slide plate is positively moved into its solid line position. Thus, the resiliency of the tube 15, which opposes its own closing by the lever 33, is used to hold the lever in its tube closing position. When it is desired to open the clamp to permit flow of fluid, the slide plate 41 will be moved forwardly so the lever 33 will be free to move upwardly and, upon release of the downwardly acting pressure thereon, the lever will be moved upwardly by the resiliency of the tube 15.

Under certain conditions, such as where it is desired to move the dispensing device, it may be desired to be completely sure that there will be no dispensing of liquid, even through the lever 33 may be accidentally moved to its open position. In such a case the second clamp structure 61 may be utilized to clamp the tube shut. This is effected by pivoting the lever 67 so that the leg 68 thereon engages the leaf spring 64 and forces same to hold the tube 15 shut. Due to the fact that the lever 67 will be in an over-center position at such time, the clamp structure 61 will remain in the shut off position until it is manually released.

It is particularly pointed out that release of the clamps to permit the flow of liquid through the tube 15 will not effect any movement of the discharge end of the tube 15 since same is held in a fixed position with respect to the handle structure 11 by bracket 51. Thus, the liquid will always flow in a direction determined by the orientation of the handle and the dispensing operation will be performed without difficulty. Further, the structure is such that the operator can both control the direction of discharge of the liquid and can manipulate the lever 33 with one hand and his other hand will be free to be used for such other purposes as may be required, such as to hold the container into which the liquid is to be dispensed.

The device can be formed of any suitable material and, for example, may be formed of stainless steel where it is to be used with corrosive liquids or where cleanliness and ease of sterilization are required. Obviously, however, it can be formed of other metals or plastic material depending upon the particular conditions under which it is to be used.

While a particular preferred embodiment of the invention has been disclosed hereinabove, the invention contemplates such changes or modifications therein as lie within the scope of the appended claims.

What is claimed is:

1. A flow control device comprising:

- a resilient, compressible tube;
- an elongated, tubular handle member through which said tube extends, said handle member having a cut-away portion defining an opening in said handle member;
- an elongated, plate-form member extending substantially axially within said handle member and lying adjacent the tube, said plate-form member being mounted adjacent said cut-away portion for movement in a direction transverse to said tube to open and close said tube;
- an L-shaped lever pivotally mounted on said handle member adjacent said cut-away portion for movement toward and away from said plate-form member, said lever having first leg means movable through said opening and engageable with said plate-form member for moving same in said direction transverse to said tube, said lever having manually engageable, second leg means;
- a slide member slidably mounted on said second leg

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means and receivable into said opening in said handle member when said first leg means is causing said plate-form member to compress and thereby close said tube, said slide member being slidable along said second leg means between a first position where it can move with said second leg means through said opening and a second position wherein said slide member extends into the interior of said handle member to a point spaced axially from said opening, said slide member when in said second position being urged against an inner wall of said handle in response to the urging of said first leg by the compressed resilient tube, whereby movement of said slide member out of said handle member is positively opposed.

2. A flow control device according to claim 1 including a plate-form bracket mounted on said handle member adjacent said one end thereof and extending at an acute angle to the longitudinal axis thereof; means on

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the other end of said bracket engaging the end of said tube and holding same in a position where it is fixed with respect to said handle member and is directed at an angle with respect to the longitudinal axis of said handle member.

References Cited in the file of this patent

UNITED STATES PATENTS

255,341	Shadduck	Mar. 21, 1882
259,034	Meyer	June 6, 1882
402,272	Norris	Apr. 30, 1889
1,667,141	Crowley	Apr. 24, 1928
2,356,865	Mason	Aug. 29, 1944
2,825,525	Kellam	Mar. 4, 1958
2,865,038	Versteeg	Dec. 23, 1958

FOREIGN PATENTS

464,869	Italy	of 1951
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