Feb. 24, 1970 B. K. KOLAND 3,497,175

FLUID REGULATOR AND CLOSURE VALVE

Filed Sept. 11, 1967

Fig. 1

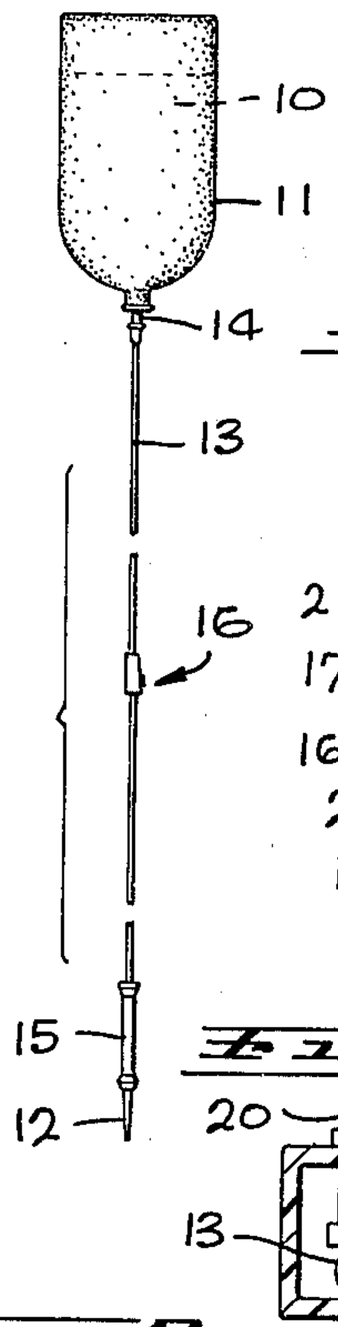


Fig. 2

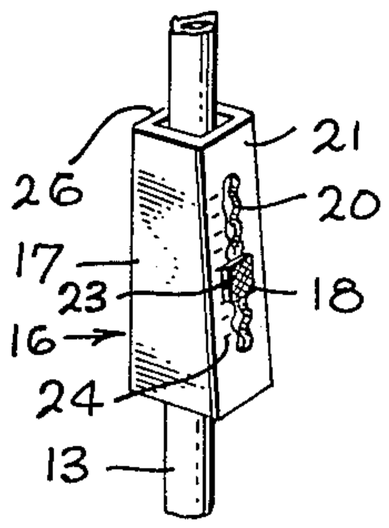


Fig. 3

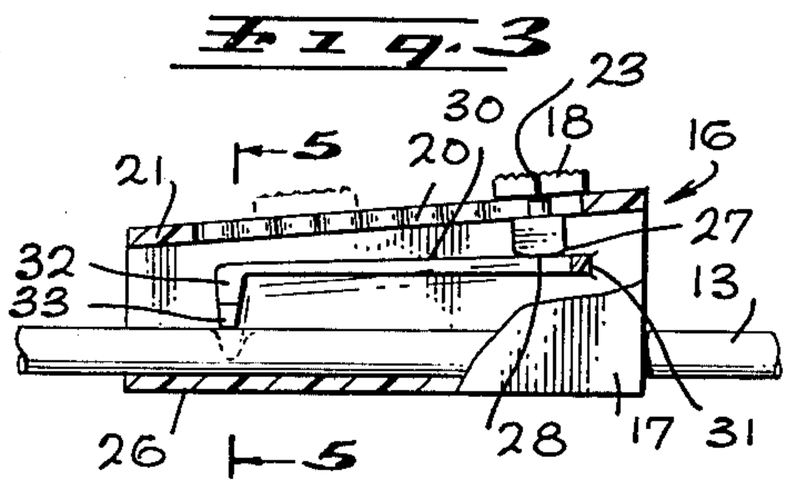


Fig. 4

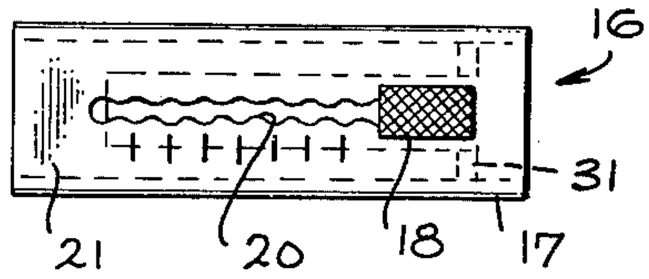


Fig. 5

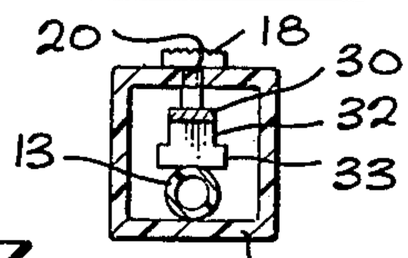


Fig. 6

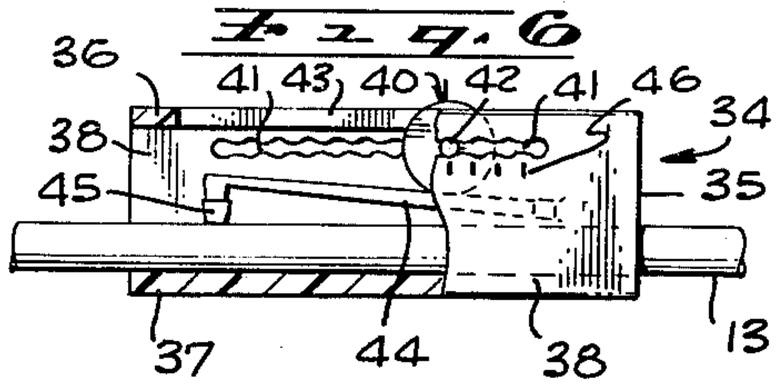


Fig. 7

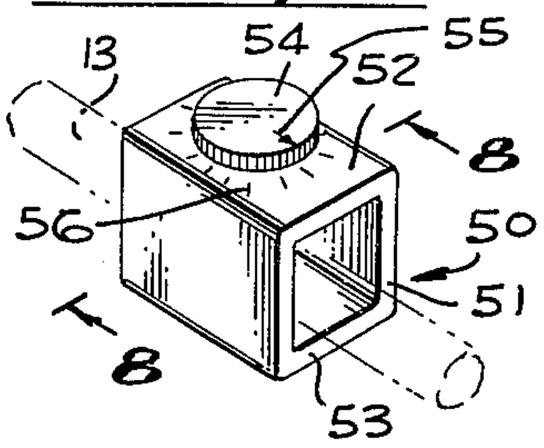


Fig. 8

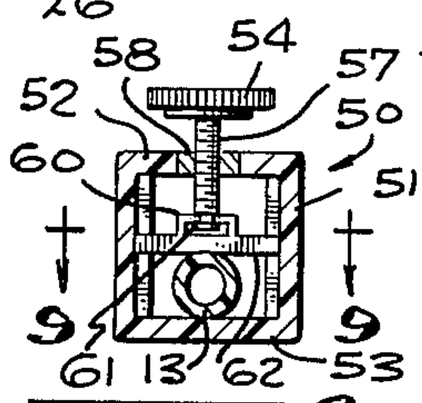


Fig. 9

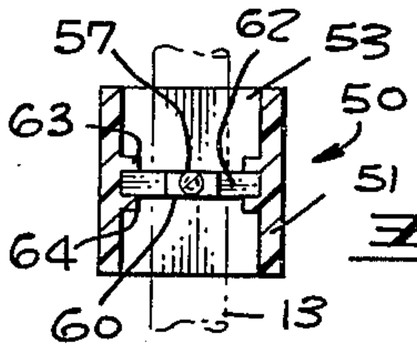


Fig. 12

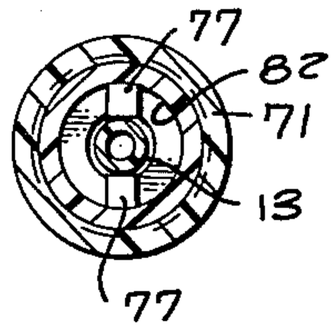


Fig. 10

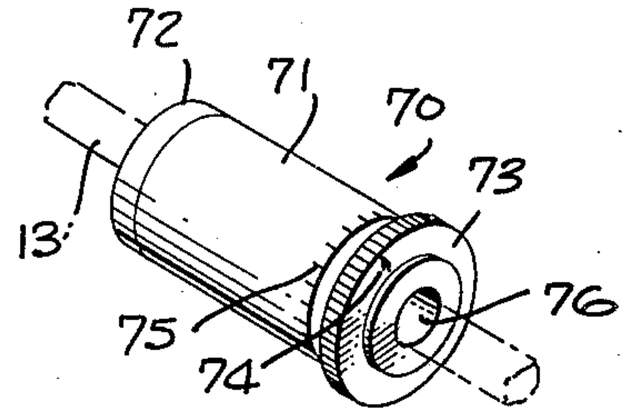
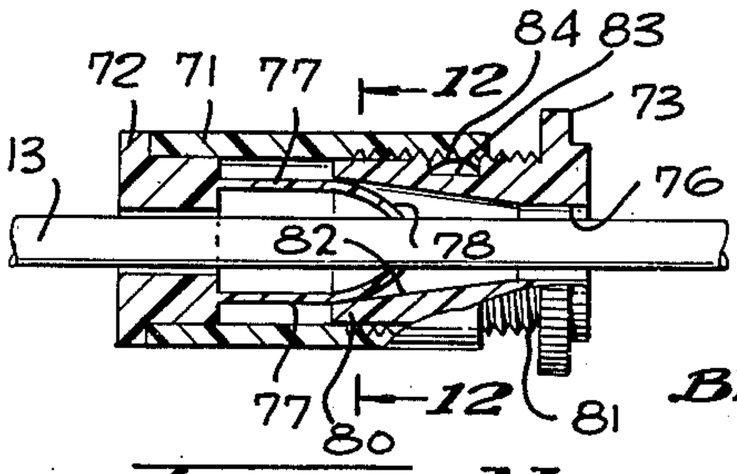


Fig. 11



BETTY K. KOLAND
INVENTOR.

BY Roger G. Morris

United States Patent Office

3,497,175
Patented Feb. 24, 1970

3,497,175

FLUID REGULATOR AND CLOSURE VALVE

Betty K. Koland, Glendora, Calif.
(1630 N. Kenmore Ave., Los Angeles, Calif. 90027)

Filed Sept. 11, 1967, Ser. No. 666,849
Int. Cl. F16k *13/00;* F16l *21/04*
U.S. Cl. 251—9 6 Claims

ABSTRACT OF THE DISCLOSURE

The valve device disclosed herein includes a hollow housing surrounding a portion of a flexible walled, fluid carrying tube and a movable closure means cooperating with a rigid wall of the housing effective to collapse the tube so as to provide a restricted orifice and a positive fluid closure. The closure means may take the form of a sliding member, rotary member, or a cylindrical telescoping member. A scale corresponding to the size of restricted orifice is provided on the stationary housing adapted to be registered with a marker carried on the movable closure means which corresponds, when set to a selected value, to a predetermined orifice closure in the tubing so that fluid therethrough may be metered according to a selected fluid rate.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to fluid regulators, and more particularly to a novel fluid metering device adapted to effect a positive fluid closure and incorporating a movable closure means adapted to control the volume of fluid passing through a restricted tubular orifice at a selected rate.

Description of the prior art

In the administration of fluids into the human body system for medical purposes, it is the customary practice to store a quantity of the desired fluid in a container such as a bottle until a physician prescribes the use thereof for a particular patient. In the introduction of the fluid into the body system of the patient, a syringe is normally employed for administering the fluid intravenously which is connected to the container in fluid communication therewith via a flexible plastic tube. Generally, the physician will require that the stored fluid be metered to the patient in terms of a given number of drops per minute. To this end, a valve mechanism is usually employed about a portion of the flexible tube midway between the container and the syringe so that by this mechanism, the volume and rate of fluid flow through the tube can be controlled.

Conventional valve mechanisms which have been employed for the foregoing medical application may take the form of a simple spring biased pinch valve. However, the closure member employed in such a device either maintains the central tube opening fully opened or fully closed so that the fluid conducting therethrough cannot be metered according to physician instructions.

Another attempt to provide a suitable valve mechanism resides in a device having a housing for surrounding a portion of the tube and including a thumb wheel adapted to be moved rectilinearly on the housing through an elongated slot wherein the periphery of the wheel presses the annular wall of the tube against an opposing inclined, opposite wall formed in the housing. The binding of the wheel periphery against a collapsed or partially collapsed tube as the wheel progresses up the inclined wall will not only determine orifice size so as to meter the fluid, but operates as an applied force to prevent the wheel from backing off. However, experience with this latter device

has proven that the wheel closure member may be readily dislodged from its setting by relatively gentle tugs on the tube normally encountered by inadvertent movement of the patient during the administration of the fluid. Such an occurrence will open the tube orifice completely and permit immediate and rapid dispensing of stored fluid into the patient's body system which may be extremely damaging and, particularly in the instance involving infants, may cause death.

Still another conventional valve mechanism incorporates a housing having a rotatable member therein which may be actuated so as to force the closure means to collapse the flexible wall of the tube against the opposing housing wall surface. Therefore, the rotary movement of the member moves the closure means up and down depending upon the direction of rotation so that the orifice may be either completely blocked or restricted so as to meter the flow of fluid therethrough. Although this rotary device obviates the difficulty of inadvertent release due to body movement of the patient, there is no provision for registering the rotation of the closure member to orifice size for fluid metering purposes. Normally, an attendant must closely monitor the dispensing of the fluid through the valve mechanism by counting the drops of fluid and converting the number of drops counted into a time conversion ratio whereby the prescribed number of drops per minute may be permitted to pass through the restricted metering orifice. Obviously, such a procedure is extremely time-consuming, subject to aspects of human error and highly inaccurate for modern day standards.

Another drawback of this type of mechanism resides in the fact that since the closure member is of a rotary type, the closure means cannot be provided with sharp corners or other edges which would cut or otherwise sever the soft material of the tube as the closure member is rotated into position. Consequently, the tip of the closure member is rounded and, therefore, cannot completely close the opening in the tube to effect a positive closure to the fluid passing therethrough. In actual practice, it has been found that the flexible walled tube will substantially bulge around the rounded closure member so that fluid may still continue to flow through the side lobes of the tube although the closure means effectively collapses the central portion of the tube.

Therefore, a need has long existed to provide a fluid regulator and closure device which will not only provide a positive closure but which will provide a visual indication to the attendant of the rate at which fluid is being dispensed to the patient. Inasmuch as the device is employed for medical purposes, the device should be inexpensive to manufacture and be considered disposable so that the device may be discarded after a single use so as to avoid any contamination problems. Such a device is represented by the novel device of the present invention.

SUMMARY OF THE INVENTION

Accordingly, the above problems and difficulties are overcome by the present invention which provides, in general, a hollow housing through which the flexible fluid carrying tube passes and which includes a closure means movable in cooperation with the housing to selectively close a portion of the tube so as to restrict flow of fluid being dispensed. An indexing means is provided on the closure means adapted to register with a progressive scale carried on the housing whereby visual indication is given correlated to the amount of restrictive tube closure so that accurate metering of the fluid therethrough is permitted. The closure means is contoured with respect to the cooperating housing wall so that upon complete closure of the tube, absolute cessation of fluid flow is achieved.

In one form of the inventive concept, the device may

include a rectilinear closure action while in other forms, rotary action as well as rotary telescopic closure action may be employed.

Therefore, it is a primary object of the present invention to provide a novel liquid regulator and metering valve including a closure means for controlling the flow rate of a fluid being dispensed through a flexible tube so that the fluid flow may be metered at an accurate and predetermined flow rate.

Another object of the present invention is to provide a novel closure valve for use in connection with the administration of medical fluids intravenously into the body system of a patient whereby the flow rate through the valve is under control of the manual closure means which may be selectively set to administer a predetermined quantity of fluid to the body system and which may be employed to completely block or fully restrict the flow of fluid therethrough.

Still another object of the present invention is to provide a novel fluid regulator and closure valve which is relatively inexpensive to manufacture, has relatively few component parts, and which may be readily disposed of or discarded after initial use has terminated.

Yet another object of the present invention is to provide a novel controllable rate valve having a manually operable closure means which when set to a given location cannot be dislodged or upset from that location by the inadvertent tugging of the tube through which the fluid is transmitted.

Still a further object of the present invention is to provide a novel controllable rate valve having a manually operated closure means adapted to cooperate with the housing thereof to visually indicate the degree of restrictive orifice closure in the tube carrying fluid so that the visual indication is indicative of the orifice opening.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of the novel fluid regulator and closure valve of the present invention illustrated in a typical medical application for dispensing fluid from a container through a syringe into a patient's body system;

FIGURE 2 is an enlarged perspective view of the fluid regulator and closure valve shown in FIGURE 1;

FIGURE 3 is a longitudinal cross-sectional view of the valve device showing a sliding closure means in its non-restrictive flow position;

FIGURE 4 is a top plan view of the valve device shown in FIGURE 3;

FIGURE 5 is a transverse cross-sectional view of the valve device as taken in the direction of arrows **5—5** of FIGURE 3;

FIGURE 6 is a side elevational view, partly in section, of another embodiment of the fluid regulator and control valve incorporating the present invention;

FIGURE 7 is a perpective view of still another embodiment of the present invention having a rotary closure means;

FIGURE 8 is a transverse cross-sectional view of the valve device shown in FIGURE 7 as taken in the direction of arrows **8—8** thereof;

FIGURE 9 is a transverse cross-sectional view of the valve device as taken in the direction of arrows **9—9** of FIGURE 8;

FIGURE 10 is a perspective view of still another embodiment of a fluid regulator and closure valve employing a cylindrical closure means;

FIGURE 11 is a longitudinal sectional view of the valve device illustrated in FIGURE 10; and

FIGURE 12 is a transverse cross-sectional view of the valve device shown in FIGURE 11 as taken in the direction of arrows **12—12** thereof.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIGURE 1 a standard medical procedure is illustrated for dispensing a quantity of fluid **10** contained in a bottle **11** into the body system of a patient through a syringe **12**. The fluid is transferred via the force of gravity through a flexible, thin-walled plastic tube **13** which interconnects the bottle **11** with the syringe **12**. One end of the tube **13** is releasably coupled to the mouth of the bottle **11** by means of an interference-fit coupler **14** while the syringe **12** is secured to the opposite end of the tube **13** by means of a fitting **15**. Located midway between the bottle **11** and the syringe **12**, there is provided a fluid regulator and closure means in accordance with the present invention as indicated in the general direction of arrow **16** which surrounds a portion of the tube **13**. The regulator and closure means **16** is adapted to selectively meter the flow of fluid through the tube **13** so that a prescribed quantity of fluid is dispensed to the patient's body system.

As illustrated in FIGURE 2, the fluid regulator enclosure means **16**, which incorporates the present invention, includes a hollow housing **17** preferably composed of a disposable plastic-like material and is provided with a rectangular shape in cross section so that a portion of the tube **13** may readily extend through the housing **17**. Movably mounted on the housing **17** is a slide member **18** which is preferably knurled so that the member may be readily moved by the thumb of an attendant when it is desired to either meter the fluid through the tube **13** or to provide a positive closure completely blocking the flow of fluid therethrough. The slide member **18** moves through an elongated slot **20** formed in an inclined wall **21** of the housing. The edge marginal regions of the slot **20** opposing each other are formed with a plurality of irregularities so as to provide a plurality of detents **22** adapted to releasably receive and hold the slide member **18** when the member is set to a predetermined location.

The particular location of slide member **18** is determined by the registration of a marker **23** carried on the slide member **18** with a selected one of a plurality of scale indications **24** marked on the exterior surface of wall **21** adjacent each of the respective detents **22**. The scale represented by the indications **24** are progressive so as to be related to the restriction of the orifice of tube **13** through which the fluid must pass as determined by the closure of the slide member **18**.

Referring now in detail to FIGURE 3, the tube closure means of the present invention is more clearly illustrated in that the slide member **18** includes a shank of reduced size which is adapted to slide in the slot **20** as the member **18** is positioned along the surface of wall **21**. It is to be particularly noted that the inclined wall **21** decreases the inner spacing of the hollow of the housing **17** from the right hand side of the housing as shown in the drawing to the left hand side thereof. Furthermore, it is to be noted that the wall **21** is inclined with respect to the opposite wall **26** of the housing **17**. The inner surface of the wall **21** functions as a bearing surface against which an element **27** may slide as the member **18** is positioned along the slot **20**. The element **27** is enlarged so as to bear against the underside of the wall **21** on the opposing edge marginal regions of the slot **20**. The extreme terminating end **28** of the element **27** slidably engages with a movable arm **30** secured in the hollow of the housing **17** by means of a pivot connection **31**. The opposite end of the arm **30** from its end pivotally connected to the housing includes a member **32** formed

perpendicularly to the major length of the arm **30** and which terminates in a button **33** adapted to engage a predetermined portion of the tube **13**. The predetermined portion at which the button **33** engages the tube, determines the closure point of the tube for metering the fluid therethrough depending upon the degree of closure provided by the arm **30** in response to depression or pivotal movement thereof by element **27** as the slide member **18** is moved through the slot **20**. The position of the closure button **33** is shown in broken lines when the slide member **18**, as indicated in broken lines, is in a midway position between the opposite ends of the slot **20**, as indicated in broken lines.

Therefore, it can be seen that as the slide member **18** is moved through the slot **20**, element **27** will bear against the movable arm **30** to cause the arm to pivot about its pivot connection **31** as the distance between the opposing wall surfaces of housing walls **21** and **26** decreases. It is also to be noted that the closure of the predetermined location of tube **13** beneath button **33** represents a positive closure in that inadvertent tugs of the tube **13** in either direction will not have a tendency to upset the closure determined by slide member **18**. No dislodgement of the button **33** can be inadvertently experienced and the button **33** preferably includes rounded corners so that the tube will not be damaged, torn or cut.

Referring now to FIGURE 4, it can be seen that the slide member **18** may be readily registered with the scale indications **24** by aligning the marker **23** therewith. The slot **20** is so configured so as to provide a plurality of successive and alternate reduced portions and enlarged portions so that a detent action is produced to releasably hold slide member **18** in a desired indicating location. By this means, an attendant may readily select from the progressive scale **24**, a desired unit of fluid flow rate through the orifice immediately adjacent to button **33**. The scale is so related to the orifice that an accurate metering of the fluid can be achieved by the visual alignment of the marker **23** with the scale indicators **24**.

In FIGURE 5, it can be seen that the button **33** may readily restrict the orifice immediately adjacent thereto in tube **13** by the up-and-down pivotal movement of arm **30**. The up-and-down movement of arm **30** is under the control and in response to the rectilinear sliding movement of the member **18** having element **27** which bears between the undersurface of wall **21** and the arm **30**.

Another embodiment of the present invention is shown in FIGURE 6 as indicated in the direction of numeral **34** which includes a housing **35** which is hollow so as to accommodate the passage of tube **13** therethrough. The embodiment of the invention **34** is modified from the embodiment shown in FIGURES 2–5 inclusive in that the housing includes opposite walls **36** and **37** which are substantially parallel in fixed spaced-apart relationship with regard to each other and wherein the opposing side walls **38** include a pair of slots **41** extending in the same plane.

Each of the opposite slots **41** formed in the opposing side walls are configured similarly to the slot **20** in that a plurality of alternate reduced and enlarged areas are provided so as to provide a detent action for a rotatable member **40** as it is moved throughout the length of the slots. The member **40** is a knurled wheel having rotatable axle shaft **42** adapted to be rotated through the slots **41**. However, an additional slot **43** is provided in the wall **36** of the housing to accommodate the movement of the body to wheel **40**.

The periphery of the wheel **40** rides on a pivoted arm **44** which is similar in construction to arm **30** in the previous embodiment. Therefore, as the wheel **40** is rotated, arm **44** will be pivoted downwardly so that its closure button **45** will depress the flexible wall of tube **13** to form a restricted orifice through which the fluid is metered. The closure action is cooperated with by the internal surface of wall **37** against which the closure button **45** will ultimately press the tube **13**. Furthermore, a visual scale is provided in that the axle shafts **42** on the wheel **40** may serve as markers cooperating with visual indicators **46** providing a scale indicative of the orifice closure by button **45**. In this embodiment, the closure wheel **40** moves in a rectilinear direction through the slots **41** and **43** while the closure arm **44** pivots in an up-and-down direction in accordance therewith.

Referring now in detail to FIGURE 7, still another embodiment of the present invention is shown as indicated in the direction of arrow **50**. The device **50** includes opposite walls **52** and **53** of a housing **51** which are arranged in fixed parallel spaced relationship so as to be separated by the passage of the tube **13** through the hollow of the housing. The device includes a rotary member **54** having a marker **55** adapted to be registered with a selected one of a plurality of scale indications **56** arranged in a circle about the annular member **54**.

In FIGURE 8, it can be seen that the rotary member **54** includes a shank **57** in the threadable engagement with a member **58** provided in the wall **52**. The extreme terminating end of shank **57** is disposed in a receiver **60** and is connected to an annular flange in grooved arrangement **61** so as to permit the shank to be rotated within the receiver **60** while simultaneously moving a closure member **62** in an up-and-down direction depending upon the direction of rotation of the member **54**. Consequently, by means of the coupling **61** between the receiver **60** and the shank **57**, the rotary movement of member **54** is translated into a vertical rectilinear movement of the closure member **62**. Located immediately beneath the closure member **62** and separating member **62** from the wall **53**, is a portion of the tube **13** intended to be collapsed so as to meter the fluid therethrough.

In FIGURE 9, it can be seen that the closure member **62** has its opposite ends slidably mounted in guides provided by projections **63** and **64** carried on the inside surface of the opposite side walls of the housing **51**. Therefore, as the closure member **62** moves in an up-and-down direction in response to the rotation of member **54**, the member **62** is guided and stabilized so that the closure of the portion of tube **13** forming a restrictive orifice will be positive and not susceptible to dislodgement by inadvertent tugging of tube **13**. Although detent means may be provided for the embodiment shown in FIGURES 7–9, it is not considered a necessity inasmuch as the member **58** may be suitably binding in its threadable connection with shank **57** so as to provide the positive action required by the present inventive concept.

Still another embodiment of the present invention is shown in FIGURES 10–12 inclusive, as indicated in the general direction of arrow **70**, which may be referred to as a cylindrical device having rotary telescopic closure action. The device includes a central sleeve **71** carried in fixed relationship with respect to a base member **72** disposed at one end of the sleeve. At the other end of the sleeve, and in threadable engagement therewith, is a rotating member **73** which includes a marker **74** adapted to be registered or indexed with a selected one of a plurality of visual indications **75** provided on the exterior surface of the sleeve **71** adjacent the rotatable member **73**. It is to be noted that the member **73** includes a central opening **76** through which the tube **13** passes. A similar opening is provided in base member **72** so that a portion of the tube **13** is surrounded by the device **70**.

In FIGURES 11 and 12, it can be seen that the base member **72** includes a plurality of cantilevered fingered members **77** which project into the hollow of sleeve **71** about the portion of tube **13** enclosed therein and which termintae in arcuate elements **78** that engage about the periphery of tube **13** at a common location representative of the restricted orifice. The cantilevered members **77** are flexible or resilient in that each of the members **77** can be flexed about its connection with the base **72** so that the elements **78** may be moved in unison to con-

verge at the location of the tube **13** to restrict the fluid flow therethrough. The members **77** are moved in unison by means of a shank portion **80** carried by the rotary member **73** wherein the external surface of the shank portion is in threadable engagement with the inside diameter of the sleeve **71** via a plurality of threads **81**. The shank portion **80** is provided with an internal bore through which the tube **13** is disposed wherein the bore includes a tapered conical surface **82** which engages with the curved portion of the arcuate elements **78** of the members **77**. Therefore, it can be seen that as the member **73** is rotated by means of the threadable connection with the sleeve **71**, the tapered surface **82** will bear against the members **77** to cause the members to come together about the tube **13** or to resiliently expand about the tube **13** depending upon the direction of rotation of the member **73**. It is also to be noted that the plurality of members **77** are arranged in spaced relationship with respect to the annular wall of sleeve **71** so as to accommodate the insertion of the annular body portion **80** as the member **73** is rotated counterclockwise to forcibly urge the arcuate finger elements **78** to restrict the orifice of tube **13**

A feature resides in the provision of a recess **83** in the body portion **80** which may be filled with a resilient material **84** adapted to provide a detent action during the rotation of members **73**. The material **84** may be of any suitable composition such as plastic, fiber board, elastomeric material or the like which will permit a reduced degree of restriction to the rotation by member **73**. Therefore, the setting of the member **73** with respect to sleeve **71** will be maintained regardless of any tugging or adverse dislodgement forces which may be placed on the tube **13**.

Therefore, in view of the foregoing, it can be seen that the novel fluid regulator and metering device of the present invention provides an improved closure means for controlling and restricting the flow of fluid through a flexible thin-walled tube. Once the closure means has been set by the attendant to a particular setting indicated by the marker and scale, dislodgement of the setting member cannot be achieved inadvertently. Dislodgement is repelled by not only the detent means provided on the housing of the device but by the positive closure action of the closure means with the selected portion of the tube to be collapsed. This fail-safe feature of the present invention is not only advantageous to the attendant monitoring the dispensing of fluids to a patient, but more importantly protects the patient from unauthorized and inadvertent dispensing of fluid into the patient's system which may be dangerous to the health and life of the patient.

The device of the present invention may be readily used in connection with the dispensing of a fluid such as a liquid medication to a patient by a procedure known by those skilled in the art as the drip method. The regulator and metering device is readily attached to a plastic tube such as may be employed during the administration of intravenous fluids, any irrigating fluids or the like. The regulating device will allow a measured amount of fluid drops to flow through the plastic tubing in a designated period of time. This is readily accomplished by the use of the calibrated scale or visual dial indications from which it is possible to select a number on the dial corresponding to a determined precise measurement of the amount of fluid desired to be passed through the tube in a given time. It is to be understood that the inventive concept is employable in either a dispensing system using gravitational force for dispensing the fluid or using an applied pressurized force therefor.

What is claimed is:

1. A fluid regulator and metering device for controlling the volume of fluid being dispensed through a flexible thin-walled tube comprising:

a hollow housing through which a portion of the tube extends and having a pair of opposite walls wherein one wall of said pair is slotted and inclined with respect to the other wall of said pair;

closure means movably carried on said housing and adapted to engage with said tube portion to produce a restricted orifice for controllably metering the flow of fluid therethrough, said closure means including a movable arm pivotally connected to said housing within the hollow thereof, said closure member further including a slide member movably carried on said inclined wall having an element arranged in sliding engagement with said arm whereby rectilinear movement of said slide member forcibly urges a selected end of said arm into and out of engagement with said tube portion so as to vary the opening size of said tube restrictive orifice; and

an indexing means cooperatively carried on said closure means and said housing respectively whereby said closure means may be registered to said housing so that the size of said restricted orifice may be selected in order to permit a predetermined volume of fluid to pass through said restricted orifice, said indexing means including a marker carried on said closure means and graduated scale indications carried on said housing wherein alignment of said marker with a selected one of said scale indications permits a predetermined number of fluid drops to pass through said restricted orifice.

2. The invention as defined in claim **1** including

detent means carried by said housing releasably coupled to said closure means and adapted to maintain said closure means in its set position in selected engagement with said tube portion.

3. A fluid regulator and metering device for controlling the volume of fluid being dispensed through a flexible thin-walled tube comprising:

a hollow housing through which a portion of the tube extends and having a pair of opposite sidewalls formed with elongated slots lying in the same plane parallel to the tube axis and a top and bottom wall arranged in parallel fixed spaced apart relationship, said top wall being formed with an elongated slot;

closure means movably carried on said housing and adapted to engage with said tube portion to produce a restricted orifice for controllably metering the flow of fluid therethrough including a movable arm pivotally connected to said housing within the hollow thereof and normally biased away from said tube portion to an inclined position relative to the tube axis;

said closure means further including a rotatable wheel disposed to travel through said top wall slot to a selected settable position and having an axle carried on its opposite ends in said pair of sidewall slots so that the periphery of said wheel rides on said movable arm causing said arm to forcibly engage with said tube portion to effect said restrictive orifice in response to travel of said wheel lengthwise said top wall slot; and

an indexing means cooperatively carried on said closure means and said housing respectively whereby said closure means may be registered to said housing so that the size of said restricted orifice may be selected in order to permit a predetermined volume of fluid to pass through said restricted orifice.

4. The invention as defined in claim **3** wherein said indexing means includes a marker carried on said closure means and graduated scale indications carried on said housing wherein alignment of said marker with a selected one of said scale indications permits a predetermined number of fluid drops to pass through said restricted orifice

5. The invention as defined in claim **3** wherein said closure means and housing include detent means to maintain said closure means non-responsive to move-

ment of the tube which would otherwise normally cause dislodgement of said closure means from its engagement with the tube as set by said indexing means.

6. The invention as defined in claim 3 wherein each of said sidewall slots includes successive and alternate reduced widths and widened widths providing detent action in cooperation with said axle to maintain said wheel in its set position.

References Cited

UNITED STATES PATENTS

1,337,247	4/1920	Maier	251—8
1,580,649	4/1926	Christiansen	251—10
2,092,401	9/1937	Miller	251—7
2,595,511	5/1952	Butler	251—6
2,825,333	3/1958	Broman	251—9 XR
3,299,904	1/1967	Burke	251—9 XR
3,301,296	1/1967	Meyer	24—217 XR
3,332,439	7/1967	Burke	251—8 XR

WILLIAM F. O'DEA, Primary Examiner

RICHARD GERARD, Assistant Examiner

U.S. Cl. X.R.

24—132; 251—8