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R. W. STENZEL ET AL
STOPCOCK CONTROL DEVICE

2,320,482

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Fig. 1.

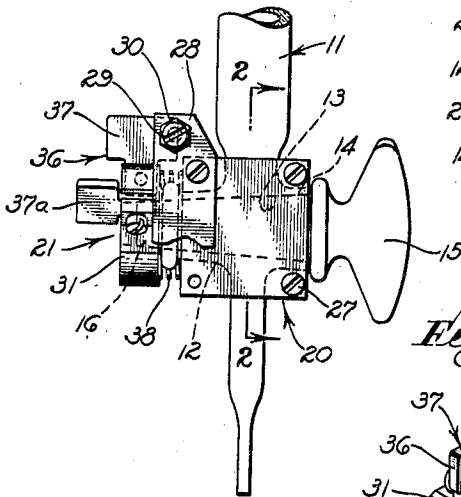


Fig. 2.

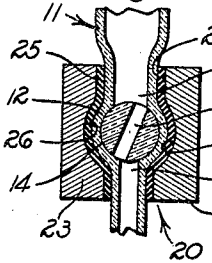


Fig. 3.

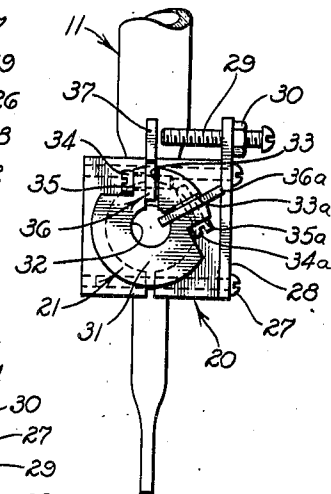


Fig. 4.

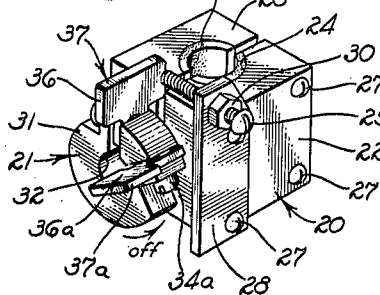


Fig. 5.

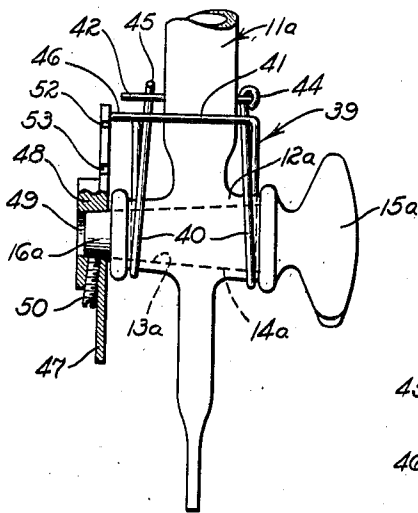


Fig. 6.

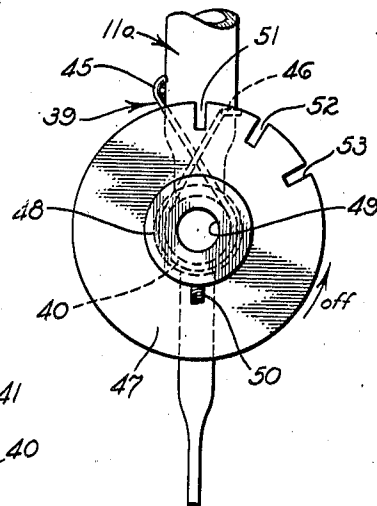
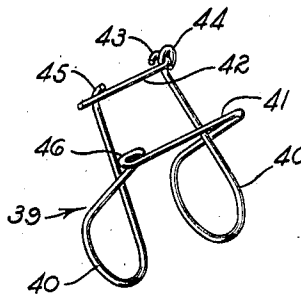


Fig. 7.



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STOPCOCK CONTROL DEVICE

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Application March 5, 1941, Serial No. 381,866

11 Claims. (Cl. 251—152)

Our invention relates to a control device for valves and more particularly to a control means for a burette stopcock.

In the use of the conventional burette for titra-
tions the titrant is permitted to run from the bu-
rette through the stopcock into the solution being
titrated at a rapid rate until the end point is ap-
proached. From this point to the end point the
titrant is added one drop or a few drops at a time,
requiring the laboratory technician to cautiously
open the stopcock only sufficiently to permit a
very small flow to pass therethrough into the so-
lution, whereupon the stopcock is closed and the
solution being titrated is stirred and observed.
This operation must frequently be repeated with
the utmost constant care on the part of the tech-
nician as often as a dozen or more times. Fre-
quently, even with the most diligent attention and
the steadiest hand, the technician permits more
than the desired small increment of titrant to
pass through the stopcock of the burette into the
solution at the crucial stage of titration, vitiating
the results and requiring a repetition of the titra-
tion.

It is an object of our invention to provide a
control device for a burette stopcock which re-
strains the rotation of the valve body at that po-
sition in the valve barrel required to deliver drops
of the titrant from the burette at the desired
rate.

It is sometimes desirable to permit the titrant
to run from the burette to the solution being ti-
trated in a stream instead of in drops and at a
rate less than the flow when the stopcock is in
its fully opened position.

It is the corresponding object of our invention
to provide a control device for a burette stopcock
operative to restrain the rotation of the valve
plug or body at a plurality of positions in the
valve barrel, one position being that at which the
titrant is delivered in drops at the desired rate
and another position being that at which the ti-
trant is delivered in a stream at a rate of flow
greater than the rate of drop delivery and less
than the rate of flow when the stopcock is fully
opened.

It is another object of our invention to provide
such a control device, which is adjustable to per-
mit the easy and quick variation of the positions
of the valve body at which its rotation is re-
strained. Such a device is of great utility when
attached to a stopcock having a multiplicity of
passages in the barrel and one or more passages
in the valve body, making it possible to set the
valve body with certainty at any position caus-

ing communication between any of the passages
corresponding to the rate of flow desired.

In the laboratory use of a burette it is some-
times desirable to turn the valve body of the
stopcock to its fully open position and thereafter
to turn the valve body to an intermediate posi-
tion, permitting the discharge of the titrant in a
stream at a rate of flow less than the maximum
rate of flow or to a position permitting the deliv-
ery of the titrant in drops. It is an object of our
invention to provide a control device for such a
stopcock, permitting such an operation to be per-
formed by virtue of its inclusion of a stop imped-
ing, but not preventing, rotation of the valve body
beyond a predetermined position, or by virtue of
its including elements interengaging to restrain
rotation of the valve body at a predetermined po-
sition, one of which elements is easily movable
to non-engaging position to free the valve body
for rotation beyond such predetermined position.

Still another object of our invention is to pro-
vide a control device of the character described
which does not interfere with the manipulation
of or contact the handle of the stopcock.

The valve body or valve plug of a burette stop-
cock is most frequently made frusto-conical in
form and seated within a frusto-conical valve
barrel in sealing relationship therewith. Care
must be taken not to exert a pressure upon the
valve body or plug in a direction urging it out of
the valve barrel or out of its seated position. It
is an object of our invention to provide a con-
trol device for a stopcock which does not urge the
valve plug or body out of the barrel, but on the
contrary resiliently urges it into seated position
and sealing engagement with the valve barrel at
all stages of its rotation relative thereto.

Other objects of our invention include the pro-
vision of a control device for a burette stopcock
which may be easily installed upon and removed
from the stopcock or burette without unseating
the valve body of such stopcock and the provi-
sion of such a control device which is inexpensive
to manufacture and positive in its operation.

Embodiments of our invention capable of per-
forming the foregoing objects and providing the
described advantages are disclosed in the follow-
ing specification, which may be better understood
by reference to the accompanying drawing.

In the drawing, which is for illustrative pur-
poses only,

Fig. 1 is a side elevational view of one embodi-
ment of our invention installed upon a burette
stopcock;

Fig. 2 is a fragmentary sectional view taken as indicated by the line 2—2 of Fig. 1;

Fig. 3 is an end elevational view of the apparatus illustrated in Fig. 1;

Fig. 4 is a perspective view of that embodiment illustrated in Figs. 1 to 3 removed from the burette stopcock;

Fig. 5 is a side elevational view, partially in section, of another embodiment of the control device of our invention;

Fig. 6 is an end elevational view of the apparatus illustrated in Fig. 5; and

Fig. 7 is a perspective view of the detachable engaging means shown in Figs. 5 and 6.

Referring to the embodiment illustrated in Figs. 1 to 4, inclusive, the numeral 11 indicates a burette of conventional form, having integral therewith a valve barrel 12 with a frusto-conical cavity 13 therein, as indicated by the dotted lines of Fig. 1. Seated in the cavity 13 and in sealing relation with the walls thereof is a frusto-conical valve body or valve plug 14, provided with a handle 15 at that one of its ends of larger diameter. The end portion of the valve body 14 of lesser diameter, indicated by the numeral 16 of Fig. 1, projects outwardly from the valve barrel 12. The valve barrel 12 has inlet and outlet openings 17 and 18 therein, and the valve body 14 has a passage 19 therethrough, adapted to fully register with the inlet and outlet openings 17 and 18 when the valve body 14 is in its fully open position and to be fully out of registry with one or both of the openings 17 and 18 when the valve body 14 is rotated to fully closed position.

While the drawing illustrates a single passage stopcock on a burette, the invention is capable of use with a stopcock in any flow-line, and to a stopcock having a plurality of outlet openings in the barrel and one or more passages in the valve body.

This embodiment of the control device of our invention includes a first means, which may be described as an engaging or detachable means, indicated by the numeral 20 and a second means, which may be described as engaging means, or detachable means, or stop-supporting means, indicated by the numeral 21. The first engaging means 20 includes two blocks 22 and 23, which may be formed of metal or of a plastic or the like, which blocks are provided on their inner faces with substantially semi-cylindrical cavities 24 adjacent each other. Lining the cavities 24 is a pad means 25 in the form of a sheet or layer of cork, rubber, or other suitable cushioning or resilient material.

Each of the blocks 22 and 23 is also provided with a transversely or horizontally extending cavity 26, shaped to conform to the valve barrel 12. The pad means 25 may extend throughout the length of the cavities 24 and across the cavity 26, or the pad means 25 may extend throughout the length of the cavity 26 and across the cavities 24, or, if desired, the pad means 25 may cover such portions of the walls defining the cavities 24 and 26 as required to provide the desired cushioning or resilient effect when clamped between the blocks 22 and 23 and the burette 11 and valve barrel 14.

The blocks 22 and 23 are retained in engagement with the valve barrel 14 by screws 27, illustrated in the drawings as four in number, passing through the block 22 and threaded into the block 23. Suitably secured to the block 22, as by two of the screws 27, is an arm 28, which extends horizontally beyond and vertically above the

block 22. Threaded through the arm 28, adjacent its upper end, is an engager element or first interengaging means in the form of an adjusting screw 29, having thereon a lock nut 30, adapted by its bearing against the arm 28 to hold the adjusting screw 29 in the desired position.

The second engaging means 21 includes a collar 31, having therein a central opening 32 of a form and diameter to accommodate therein the projecting end portion 16 of the valve body 14. The collar 31 is provided with a radial opening 33, and a lock screw 34 bearing against a shoulder 35 in the periphery of the collar on one side of the opening extends across such opening and is threaded into the collar on the opposite side thereof. By tightening the lock screw 34, the radial opening 33 is reduced, and the collar 31 is clamped to the projecting end portion 16 of the valve body 14, the lock screw 34 thus acting as a means for mounting or adjustably clamping the second engaging means 21 to the valve body 14. A coil spring 38 is positioned around the projecting end portion 16 of the valve body 14 with one end bearing against the collar 31 and the other end bearing against the blocks 22 and 23. If desired, a pad means similar to the pad means 25 previously described may be positioned between the wall of the central opening 32 in the collar 31 and the projecting end portion 16 of the valve body 14.

Mounted upon the lock screw 34 within the radial opening 33, so as to be capable of swinging movement relative thereto, is a second interengaging means or stop element 36. As is best illustrated in Fig. 4, the stop element 36 has a projecting portion 37 at its outer end extending towards the blocks 22 and 23 in position to contact the adjusting screw 29 when the valve body 14 is rotated. Illustrated in Figs. 1, 3, and 4 is a second stop element or member 36^a, mounted upon a lock screw 34^a so as to be swingable in a radial opening 33^a in the collar 31, in all respects like the elements 33 to 36 previously described. If desired, a light coil spring 38 may be interposed between the ends of the blocks 22 and 23 or the adjacent end of the valve barrel 12 and the inner side of the collar 31, as illustrated in Fig. 1.

With this embodiment of our invention it will be apparent that the blocks 22 and 23 may be readily clamped upon the valve barrel 12 by threading the screws 27 into the block 23, and the second engaging means 21 may also be readily clamped upon the projecting portion 16 of the valve body 14 by tightening one of the screws 34 or 34^a. The second engaging means 21 is thus clamped in such a position upon the valve body 14, and the adjusting screw 29 is so adjusted and locked in position by the lock nut 30 that, when the projecting portion 37^a of the stop element 36^a contacts the end of the adjusting screw 29, the passage 19 in the valve body 14 communicates with the inlet and outlet openings 17 and 18 in the valve barrel 12, so that liquid is delivered from the burette 11 in drops at the desired rate during titration. Both the stops 36 and 36^a may be moved to positions avoiding contact with the adjusting screw 29, so that the valve plug 14 may be rotated to fully open position, causing the delivery of titrant from the burette 11 at the maximum rate of flow. If desired, either at the beginning or at an intermediate stage of the titrating process the valve body 14, with the stop element 36 in operative position, may be rotated from its nearly closed position to a position in

which the projecting portion 37 thereof engages the adjusting screw 29, restraining the rotation of the valve body 14 at a position of communication of its passage 19 with the inlet and outlet openings 17 and 18, permitting the discharge 5 from the burette 11 of liquid at an intermediate rate of flow.

It will be seen that the installation or removal of the control device of our invention does not require the removal of the valve body 14 10 from the valve barrel 12 or its movement relative thereto into unseated position. It will further be seen that our control device does not interfere with the manipulation of or contact the handle 15. At all positions of the valve body 14 15 the coil spring 38 acts to resiliently urge the valve body 14 into the cavity 13 of the valve barrel 12 and thus into seated position by virtue of its pressure upon the second engaging means 21 secured to the projecting end portion 16 of 20 the valve body 14.

Referring to the embodiment of our invention illustrated in Figs. 5 to 7, inclusive, the numeral 11^a indicates a burette having a valve barrel 12^a with a frusto-conical cavity 13^a in which the valve body 14^a is seated. The valve body 14^a 25 has on its end of larger diameter a handle 15^a, and its end portion of lesser diameter 16^a projects from the valve barrel. The elements indicated by the elements 12^a to 16^a correspond to the elements 12 to 16 previously described. The valve barrel 12^a has inlet and outlet openings, and the valve body 14^a has a passage therethrough like the openings 17 and 18 and passage 19, 30 respectively, in the embodiment earlier described.

In this embodiment of our invention the first engaging means or detachable means is in the form of a wire element or clamping member, indicated by the numeral 39. The wire element 39 includes central looped portions 40 formed to encircle and be supported upon the valve barrel 12^a and end portions 41 and 42 resiliently engaging the burette 11^a and clamping the wire element 39 in position. The end portion 42 is provided at one end with an eye 43, swingably mounted in an eye 44 at one end of one of the central portions 40. The other end of the end portion 42 is retained in position resiliently engaging the burette 11^a by an inwardly curved portion 45 at one end of the other central portion 40. The wire element 39 is formed of resilient material, so that the end portion 42 and that one of the central portions 40 engaging its free end may be deformed to permit the end portion 42 to be swung free of the curved portion 45 and released from the burette 11^a. The central portions 40 of the wire element 39 may then be moved apart axially of the valve barrel 12^a, permitting these central portions 40 to be freed of the valve barrel 12^a. 50

At the juncture of the end portion 41 and the central portion 40 opposite the handle 15^a is provided an engaging portion or first interengaging means 46 formed by bending the end portion 41 upon itself in a U-shape, so that the projecting end of the first interengaging means is rounded. 60

The numeral 47 indicates a second engaging or detachable means, or stop-supporting means, or stop member in the form of a disc having a hub 48 and a central opening 49 formed to accommodate the projecting portion 16^a of the valve plug 14^a. Means for adjustably clamping the disc 47 to the valve plug 14^a is provided in the form of a set screw 50 threaded through the hub 48 70

into engagement with the projecting portions 16^a of the valve plug 14^a. The disc 47 is formed of a diameter such that its inner surface will engage the first interengaging means 46 of the wire element 39 at all positions of the valve plug 14^a during its rotation. One or more second interengaging means, or stop elements, or stops are provided upon the disc 47 at locations in which they will be contacted by the first interengaging means 46 at desired positions of the valve body 14^a. These stops may be in the form of indentations, projections, or slots. In the drawing we have illustrated three such stops, 51, 52, and 53, in the form of slots extending radially inwardly from the periphery of the disc 47. The slots 51, 52, and 53 are formed of a width less than the width of the first interengaging means 46, so that only the rounded end thereof may extend into the slots. Thus, when the first interengaging means 46 contacts one of the slots 51, 52, or 53 the rotation of the disc 47 and valve body 14^a is resisted, but not prevented, and the disc 47 and valve body 14^a may be further rotated by an increase in rotative force upon the handle 15^a. 25

If desired, a pad means, such as the pad means 25 of the embodiment previously described, may be positioned between the walls of the central opening 49 in the disc 47 and the projecting portion 16^a of the valve body 14^a. Likewise, the contact between the wire element 39 and the valve barrel 12^a and burette 11^a, or either of them, may be cushioned by surrounding the wire element or desired portions thereof with a layer of rubber, silk wrapping, or other resilient, or cushioning material. 30

The stops 51, 52, and 53 may be so located in the disc 47 and the disc 47 so positioned upon the valve body 14^a that, when the valve body 14^a is rotated in a clockwise direction, as viewed in Fig. 40 6, the first interengaging means moves into contact first with stop 53, then with stop 52, and finally with stop 51 to permit delivery of titrant from the burette in a stream at a rate of flow less than that permitted when the stopcock is in its fully opened position. At the desired point in the titration process the valve body 14^a may be rotated until the first interengaging means 46 contacts the stop 52, restraining the rotation of the valve body 14^a in position where the titrant is delivered from the burette in a stream at a lesser rate of flow. Subsequently in the process the valve body may be further rotated until the first interengaging means 46 contacts the stop element 53, at which time the titrant is delivered in drops at the desired rate. 45

The wire element 39, being formed of resilient material, the first interengaging means 46 is constantly urged into resilient contact with the inner surface of the disc 47, thus exerting upon the disc 47 and the valve plug 14^a a force urging the valve body 14^a into seated engagement with the valve barrel 12^a. The resiliency of the wire element 39 permits movement of the first interengaging means 46 towards the handle 15^a when additional rotative force is applied to the handle 15^a to move the valve plug out of that position in which the first interengaging means 46 contacts one of the stops 51, 52, or 53. Likewise, this resiliency permits the operator to manually move the end portion 41 towards the handle 15^a if he wishes to free the disc 47 from contact with the first interengaging means 46 to facilitate the more rapid rotation of the valve body. 65

In both embodiments of our invention, when the end point is approached, the handle of the 75

valve body is rotated from the fully closed position of the valve body until the first interengaging means 29 or 45 contacts the nearest stop or stop elements 36^a or 53, respectively. As soon as the desired number of drops of the titrant are delivered from the burette, the valve body is moved back to its fully closed position until the effect of the drops delivered may be observed. Thus the technician is enabled to very quickly and with certainty move the valve body to that position at which only a single drop at a time is delivered, thereby greatly reducing the time required for the titration and eliminating the possibility of a vitiating of the titration by the involuntary delivery of an excess of the titrant.

From the foregoing description of this embodiment of our invention it will be seen that there is provided a control device restraining the rotation of the stopcock at a plurality of positions in the valve barrel, one position being that at which the titrant is delivered in drops at the desired rate and another position being that at which the titrant is delivered in a stream at a rate of flow less than the rate of flow when the stopcock is in its fully open position. It will be seen also that by virtue of the resilience of the wire element 39, this embodiment provides a control device in which the movement of the valve body of the stopcock is impeded, but not prevented, at a predetermined position in the valve barrel and a device in which such predetermined positions may be quickly and easily changed by loosening the set screw 50, rotating the disc 47 relative to the valve body 14^a, and again clamping the set screw 50 to the valve body. The resilience of the wire element 39 has the further effect of urging the valve body 14^a into seated relationship with the valve barrel 12^a at all stages of the rotation of the valve body 14^a by virtue of the pressure of the first interengaging means 46 upon the disc 47.

In accordance with the objects first herein stated, it will be obvious that both embodiments of our invention may be quickly and easily installed upon the burette without removing or unseating the valve body and that both forms of our invention may be inexpensively manufactured.

While those embodiments of our invention herein particularly illustrated and described are fully capable of performing the objects and accomplishing the advantages primarily stated, and while our invention has been illustrated and described as applied to a burette stopcock, it is to be understood that there are various other embodiments of our invention also capable of performing these objects and accomplishing these advantages and that our invention is capable of application to valves other than burette stopcocks and to stopcocks having a plurality of passages, and is, therefore, not restricted to the specific embodiments or use hereinbefore described.

We claim as our invention:

1. A device for controlling the rate of flow of fluid through a burette stopcock including a valve barrel having a frusto-conical cavity with inlet and outlet openings communicating therewith, and a frusto-conical valve body rotatable in said cavity in sealing relationship with its walls and having ends projecting from said cavity, said valve body having passage means so disposed that said valve body may be rotated to provide maximum and reduced rates of flow therethrough and to entirely shut off the flow therethrough, which device includes in combination: a clamping means

detachably secured to said burette adjacent said valve barrel; a first engaging means carried by said clamping means at a position near said valve barrel; a second engaging means detachably clamped to that protruding end of said valve body which is of smaller diameter, said first and second engaging means contacting at a predetermined position of said valve body relative to said valve barrel; and means pressing against said second means to exert a force thereon in a direction tending to prevent unseating of said valve body relative to said cavity.

2. In a control device for a stopcock, having a valve barrel with inlet and outlet openings and a valve body rotatable in said barrel to control the flow of fluid therethrough, said valve having a handle at one end thereof, the combination of: detachable means adapted to be secured to said valve barrel and providing an engager element adjustably mounted on said means and projecting therefrom out of the path of travel of said handle; stop-supporting means adjustably secured to said valve body at that end thereof opposite said handle; a plurality of stop elements mounted on said stop-supporting means, each of said stop elements being movable independently of the other stop elements between a position avoiding contact with said engager element to a position contacting said engager element at a predetermined position of said valve body relative to said valve barrel; and resilient means between said stop-supporting means and said valve barrel urging said valve body into sealing engagement with said barrel.

3. In a control device for a valve on a burette including a barrel with inlet and outlet openings and a plug therein, said plug having a handle at one end and having a passage therein and being rotatable between fully open position with said passage in complete registry with said openings and fully closed position with said passage completely out of registry with said openings, the combination of: a clamping member around said barrel and resiliently engaging said burette, said member having an engaging portion projecting therefrom and resiliently urged by said member in a direction away from said burette; and a disc mounted on said plug adjacent that end opposite said handle, said disc being of such diameter as to be resiliently engaged by said engaging portion during rotation of said plug, and said disc being provided with a stop thereon engageable with said engaging portion at a predetermined position of said plug relative to said barrel.

4. In a device adapted to be connected to a stopcock of a burette to restrain the valve body thereof in a predetermined position, the combination of: a wire element disposed around said stopcock and providing an engaging portion, a central portion looped around said stopcock and two end portions cooperating to grip said burette from opposite sides; and a stop member detachably connected to said valve body and providing means thereon contacting said engaging portion of said wire element at said predetermined position of said valve body.

5. In a control device for a stopcock on a burette including a barrel with inlet and outlet openings therein and a frusto-conical valve body seated therein and having a passage therein in registry with said openings in the fully open position of said valve body and out of registry with said openings in the fully closed position of said valve body, the combination of: a stop member releasably and adjustably secured to the reduced end

of said valve body; a plurality of stops carried by said member; a clamping member having portions supported upon said barrel and portions resiliently engaging said burette, one of said burette-engaging portions being swingable relative to said clamping member out of contact with said burette; and an engaging portion carried by said clamping member and resiliently engaging said stop member at all positions of said valve body and urging said valve body into seated position in said barrel and contacting said stops at predetermined positions of said valve body.

6. In a device adapted to be connected to a stopcock of a burette, said stopcock having a valve barrel providing protruding ends and having inlet and outlet openings and a ported valve body in the barrel, said valve body having a handle at one end, the combination of: detachable means adapted to be secured to said valve barrel, said means providing two spaced portions shaped to conform generally to the periphery of said protruding ends, said two spaced portions extending at least partially around said protruding ends in encompassing relation; a yieldable engaging portion carried by said detachable means at a position on the side opposite said handle; a stop-supporting member releasably secured to the valve body at the end opposite said handle; and a plurality of stop means provided by said stop-supporting member for engagement with said yieldable engaging portion thereby to cause perceptible but yielding resistance to rotation of the valve body at a predetermined position of the valve body to facilitate adjustment of the valve body to said position.

7. In a control device for a burette providing a valve arrangement including a valve barrel having a frusto-conical cavity and a frusto-conical valve body rotatably mounted in said cavity, the smaller end of said valve body projecting from the barrel, the combination of: a clamping means detachably secured to said burette adjacent said valve barrel and providing surfaces generally conforming in shape to the exterior of a portion of said burette; a first means mounted on said projecting end of the valve body; and a second means mounted on said clamping means, one of said means being in pressural cooperation with the other to urge said valve body toward the smaller end of said cavity, one of said means cooperating with the other to resist rotation of said valve body at a predetermined position of the valve body to facilitate adjustment of the valve body to said predetermined position.

8. As a new article of manufacture, a flow-control device for use on a valve having a valve barrel with a frusto-conical seat and a frusto-conical valve body mounted therein with the smaller end of the valve body projecting from the valve barrel, said flow-control device comprising: a first means for mounting on said projecting end of the valve body; and a second means for mounting on said barrel, one of said means being adapted for pressural cooperation with the other to urge said valve body into said seat, one of said means being adjustable between a non-controlling position and a controlling position at which controlling position it is effective to cooperate with the other means to resist rotation of the valve body at a selected rotary position of the valve body thereby to facilitate adjustment of the valve body to said position.

9. An attachment for a burette comprising a fluid-containing tube and a transverse valve barrel providing exposed ends protruding on oppo-

site sides of said tube, there being a tapered valve body rotatable in a tapered bore of said barrel and providing a passage registerable with passages of said barrel to pass fluid from said tube, said valve body having a handle at one end and positioned beyond one of said exposed ends of said barrel, said attachment including in combination: a clamping means detachably connected to said burette and providing two spaced portions shaped to conform generally to the periphery of said exposed ends of said valve barrel, said two spaced portions at least partially encompassing said exposed end; a first inter-engaging means carried by said clamping means and presenting an engaging surface disposed adjacent one end of said barrel; a member releasably secured to said valve body adjacent said one end of said barrel; a second inter-engaging means provided by said member for inter-engagement with said first interengaging means at a predetermined position of said valve body with respect to said valve barrel; and means for movably mounting one of said inter-engaging means for retraction from engagement with the other inter-engaging means during the time that said member is secured to said valve body.

10. An attachment for a burette comprising a fluid-containing tube and a transverse valve barrel providing exposed ends protruding on opposite sides of said tube, there being a tapered valve body rotatable in a tapered bore of said barrel and providing a passage registerable with passages of said barrel to pass fluid from said tube, said valve body having a handle at one end and positioned beyond one of said exposed ends of said barrel, said attachment including in combination: a clamping means detachably connected to said burette and providing two spaced portions shaped to conform generally to the periphery of said exposed ends of said valve barrel, said two spaced portions at least partially encompassing said exposed ends; a first inter-engaging means carried by said clamping means and presenting an engaging surface disposed adjacent one end of said barrel; a member releasably secured to said valve body adjacent said one end of said barrel; a second inter-engaging means provided by said member for inter-engagement with said first inter-engaging means at a predetermined position of said valve body with respect to said valve barrel; and resilient means for urging one of said inter-engaging means into yieldable engagement with the other of said inter-engaging means at said predetermined position of said valve body with respect to said valve barrel to cause perceptible but yielding resistance to rotation of said valve body at said predetermined position to facilitate adjustment of the valve body to said position, said resilient means being mounted to exert a force against said member in a direction tending to draw said tapered valve body into said tapered bore of said valve barrel.

11. A combination as defined in claim 9, in which one of said inter-engaging means comprises a stop element engageable with the other of said inter-engaging means at said predetermined position, and in which said means for movably mounting one of said inter-engaging means comprises pivot means for pivoting said stop element to a position at which it will not engage said other inter-engaging means at said predetermined position.

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