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Von Corpon

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[54] **MIXING TAP**

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[52] **U.S. Cl.** **137/636.3,** 137/597, 137/625.41, 137/625.47, 251/286, 251/297, 251/315

[51] **Int. Cl.** **F16k 11/18,** F16k 5/20

[58] **Field of Search** ..... 137/609, 614.11, 614.16, 137/614.17, 614.18, 625.41, 636, 636.2, 636.3, 637.4; 251/268, 269, 315; 287/53 H

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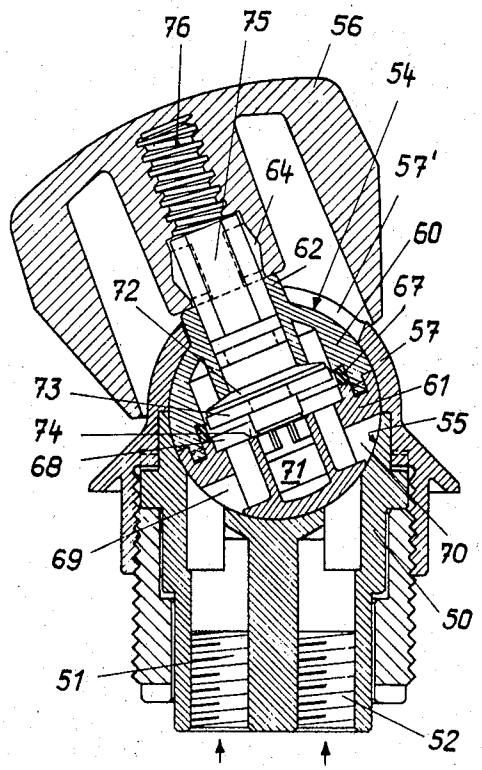
Assistant Examiner—Richard Gerard
Attorney, Agent, or Firm—Waters, Roditi, Schwartz & Nissen

[57] **ABSTRACT**

A mixing tap comprises a tap body with hot and cold water inlets and three outlets all communicating with an internal spherical housing in which a spherical control member with an external actuating handle is fluid-tightly swivelably mounted. Three peripheral openings in the control member communicate with an inner mixing chamber, the actuating handle serving as means for moving the control member between positions in which the said inlets and outlets selectively communicate with the peripheral openings corresponding to a desired hot/cold water mixture and selection of one of the outlets by means of a grid guiding the handle. A valve clapper in the mixing chamber can be actuated to adjust the rate of flow of the desired mixture from the selected outlet by screw operated means on the handle.

3 Claims, 10 Drawing Figures



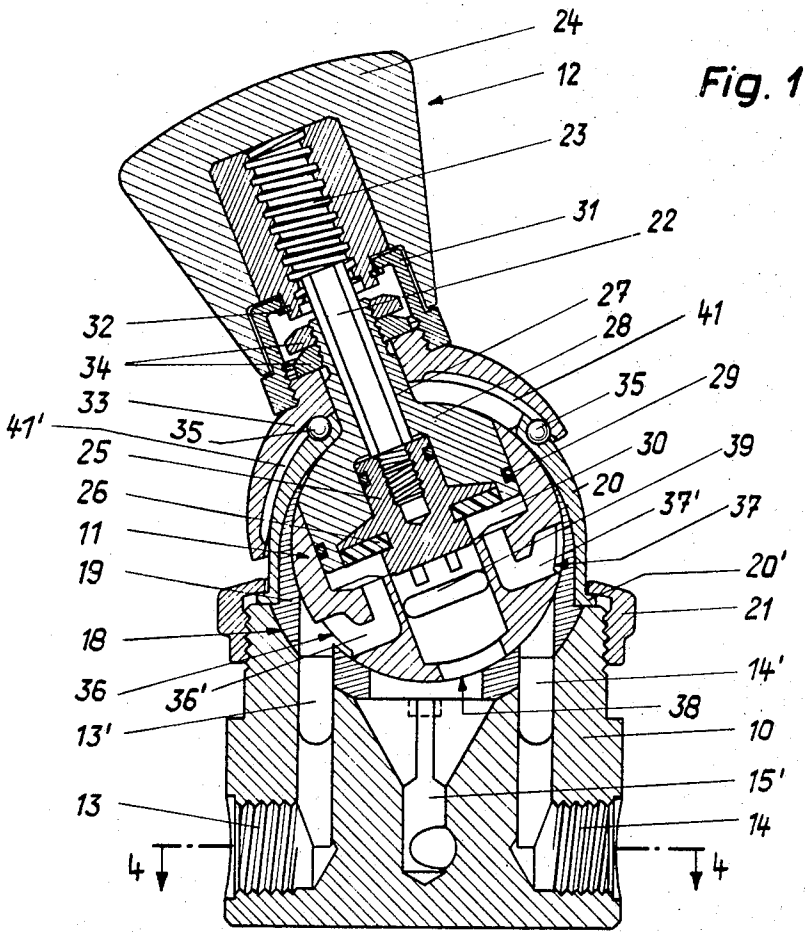

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Fig. 1

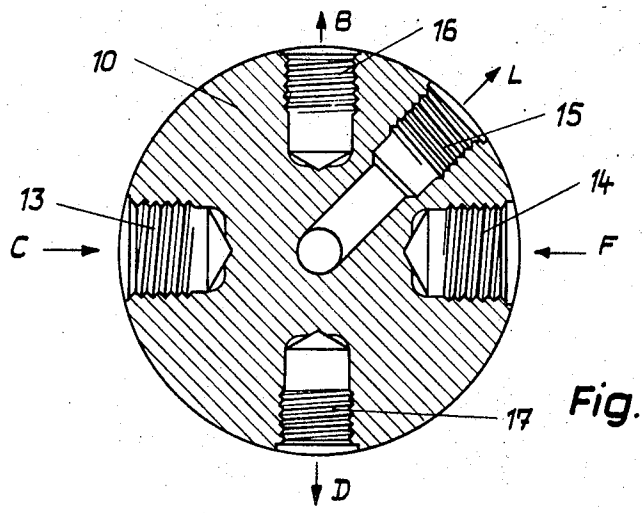
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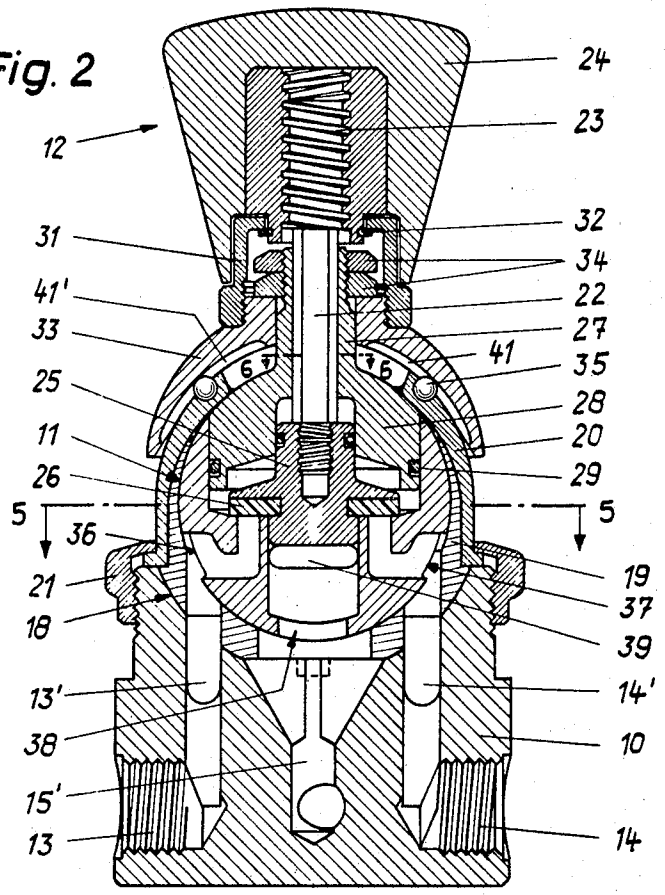
Fig. 4

Fig. 2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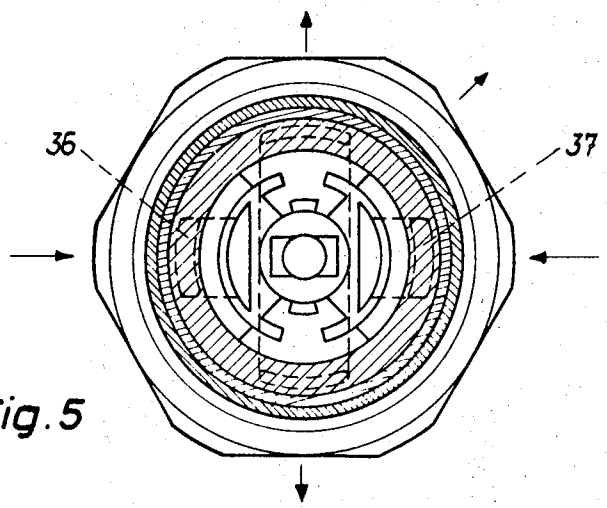
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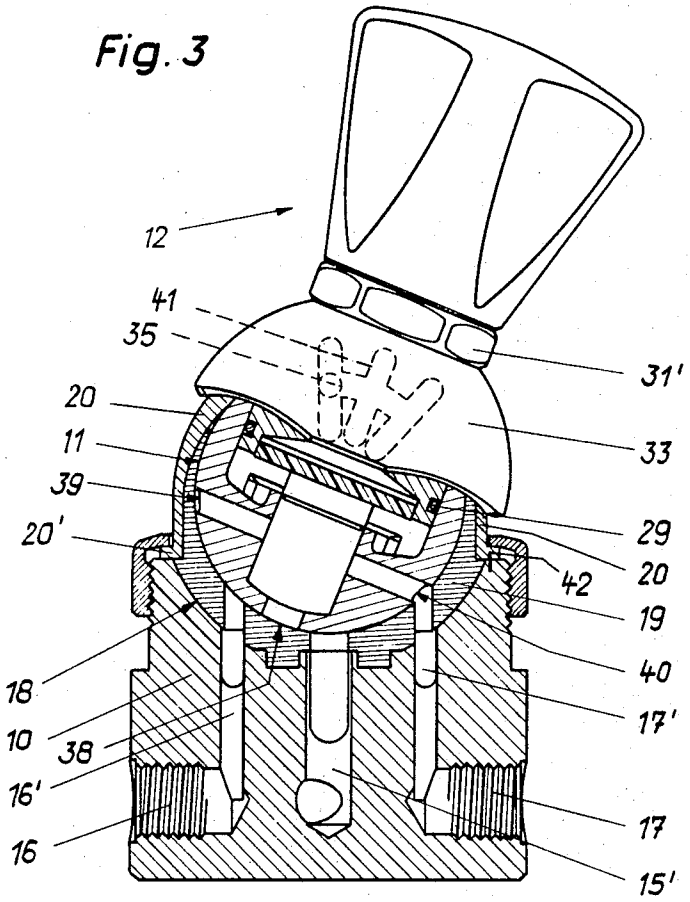
Fig. 5

Fig. 3



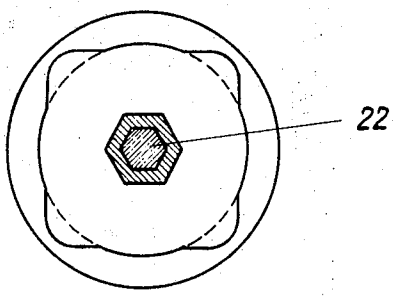


Fig. 6

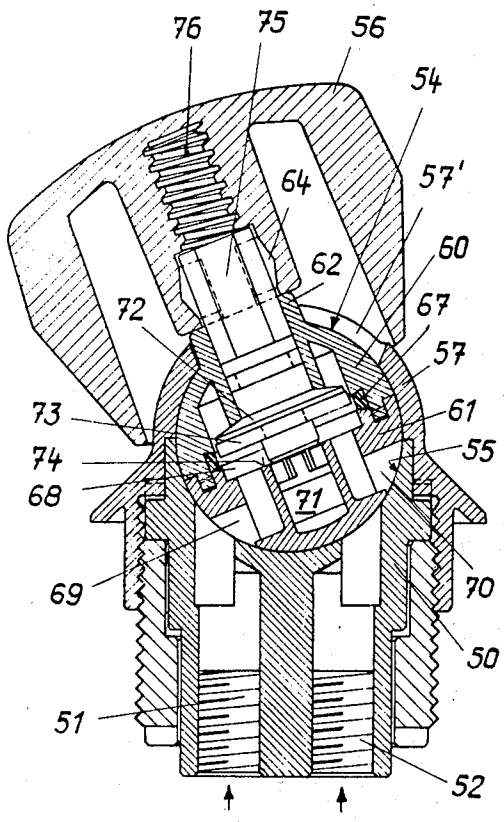


Fig. 7

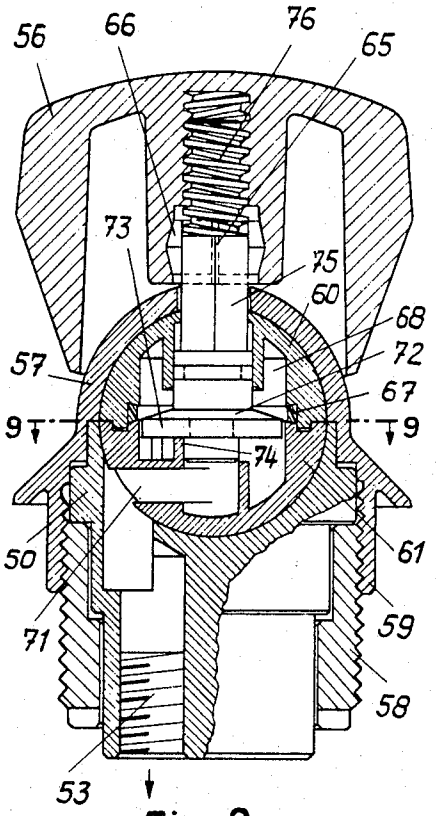


Fig. 8

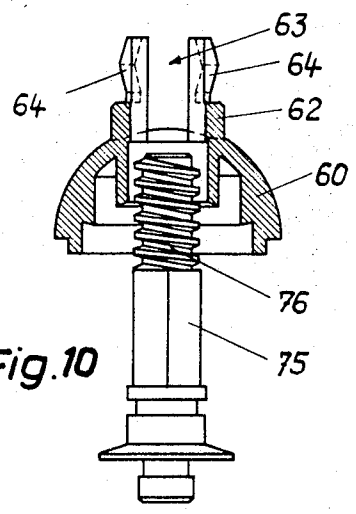
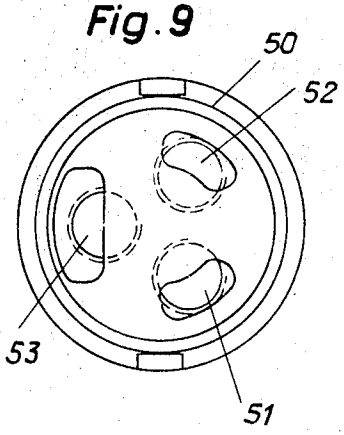


Fig. 10

Fig. 9



MIXING TAP

The present invention concerns manually adjustable mechanical mixing taps of the type comprising a tap body with two liquid inlets and at least one outlet, a control member mounted inside the tap body, and a single actuating or manoeuvring handle fixed to the control member.

In a known tap of this type, the control member has spherical headed valve clappers cooperating with elastic seats to control the passage of water through these seats which communicate with water inlet and outlet conduits. The construction of such a tap is, however, complicated and its operation is not entirely satisfactory.

The present invention aims to provide an improved mixing tap, i.e., of simpler construction and with a reliable operation.

The mixing tap according to the invention is characterised in that: the control member is spherical and comprises at least three peripheral openings for the inlet and outlet of fluids, these openings communicating with a mixing chamber inside the spherical control member; a valve clapper is mounted in this mixing chamber to adjust the rate of outlet of liquid therefrom, the actuating handle carrying a screw-operated member for actuating this clapper in any position of the spherical control member; and the tap body comprises a concave spherical housing in which the spherical control member is mounted in a fluidtight manner and having means (namely slot-like openings) for establishing, in cooperation with the peripheral openings of the control member, the desired communication with said liquid inlets and said at least one liquid outlet of the tap body according to the position given to the control member.

In a preferred embodiment, the control member is formed of two hemispherical parts, an elastic joint being disposed between these two parts to press them against the concave housing of the tap body in a manner to enable the taking up of play.

The accompanying drawings show, by way of example, two embodiments of taps according to the invention. In the drawings:

FIGS. **1** to **3** are axial cross sections of a first embodiment of mixing tap in three different positions;

FIG. **4** is a cross section taken along line **4—4** of FIG. **1**;

FIG. **5** is a cross-section taken along line **5—5** of FIG. **2**;

FIG. **6** is a cross-section taken along line **6—6** of FIG. **2**;

FIG. **7** is an axial cross sectional view of the second embodiment of mixing tap in a particular position;

FIG. **8** is a cross section similar to FIG. **7**, but taken at 90°,

FIG. **9** is a view from above the tap body looking along the direction indicated by arrows **9** in FIG. **8**; and

FIG. **10** is a cross section of a detail of FIG. **7**.

The mixing tap shown in FIGS. **1** to **6** is of the manually adjustable mechanical type and comprises a tap body **10**, a spherical control member **11** mounted inside the body **10** and a single handle, designated generally by **12**, fixed to the control member **11**. The tap body, as shown in FIG. **4**, comprises an inlet **13** for hot water (arrow C), an inlet **14** for cold water (arrow F),

and three outlets **15**, **16** and **17** respectively for a wash basin (arrow L), a bath (arrow B) and a shower (arrow D).

Of course, it would be possible to have a tap body with only a single outlet, for example for a wash basin, or with two outlets.

The hot and cold water inlets **13** and **14** are respectively connected to conduits **13'** and **14'** in the body **10**. Similarly, the outlets **15**, **16** and **17** are connected to respective conduits **15'**, **16'** and **17'**.

The tap body **10** additionally comprises a substantially frusto-spherical recess **18** in which a joint **19** in plastics material is arranged. The control member **11** is mounted in the joint **19** and a substantially hemispherical cover **20** is fixed to the body **10** by means of a nut **21** threadably engaging the body **10** and gripping a flange **20'** of the cover **20**, the inner surfaces of the joint **18** and cover **20** forming a concave spherical housing fluidtightly receiving the spherical control member **11**. A pin **42** (FIG. **3**) angularly locks the cover **20** on the body **10**.

The handle **12** is fixed to the control member **11** by means of a rod **22** of hexagonal cross section having at one end a screw thread **23** engaging in a corresponding tapped bore of an actuating knob **24** carried by the handle **12**. To the other end of the rod **22** is screwed a valve clapper **25** provided with a sealing ring **26**. The rod **22** is slidably mounted in a tubular projection **27**, also of hexagonal cross section (FIG. **6**), made in one piece with a part **28** fixed in a fluidtight manner to the control member **11**, an O-ring **29** being arranged between the two for this purpose. The part **28** is of square cross-section over a portion of its length and of circular cross-section over another portion of its length (FIG. **6**). The clapper **25** is movable in a mixing chamber **30** inside the spherical member **11** from an open position (shown in FIG. **1**) to a closed position (shown in FIG. **2**) in which the ring **26** is applied against a seat formed in the member **11**. This clapper **25** serves for adjustment of the rate of outflow of liquid, as will be described further on.

The knob **24** is retained on an internally threaded sleeve **31** with an outer hexagonal portion by means of a ring **32**. This sleeve **31** is screwed onto a part-spherical dome **33** itself fixed on the tubular projection **27** by means of nuts **34**. Two balls **35** are disposed between the inner surface of the dome **33** and the cover **20** and serve to guide the handle **12**, as will be described hereinafter.

The spherical part of control member **11** comprises five slot-like openings for the inlet and outlet of liquids, namely: an opening **36** for the inlet of hot water, an opening **37** for the inlet of cold water, an opening **38** for outlet to a wash basin, an opening **39** for outlet to a bath, and an opening **40** for outlet to a shower. The hot and cold water openings **36**, **37** communicate with the mixing chamber **30** by passages **36'** and **37'** respectively leading into the seat of clapper **25**.

Additionally, the conduits **13'**, **14'**, **15'**, **16'** and **17'** are all extended through the joint **19** to lead to inner slot-like openings in this joint adapted to cooperate with the peripheral openings **36** to **40** of the spherical control member **11** to set up desired communications with either or both of the hot and cold water inlets as well as with a selected outlet according to the position given to the control member **11** by means of the handle **12**.

To guide this handle **12** in the positions corresponding to the different settings of the mixture of liquids, the tap body **10** or, as shown, the underside of the dome **33** has two symmetrical grids, each formed by three grooves (shown in dashed lines in FIG. **3**) only a single one of these grooves, **41, 41'** being shown in FIGS. **1** and **2.** The balls **35** of the cover **20** each cooperate with the grooves of one of the grids. Each groove corresponds to the adjustment of the tap on one of the three outlets **15', 16',** and **17'** and the handle **12** can be moved along any groove into any position corresponding to a given setting of the mixture of hot and cold water passing out via the chosen outlet. For example, in FIG. **1** the balls **35** are each in a groove **41, 41'** of the two symmetrical grids and the handle is located in the position corresponding to the wash basin outlet **15, 15'.** The hot water opening **36** is aligned with the inlet conduit **13',** the cold water opening **37** is closed by the joint **19** and the opening **38** is aligned with the wash basin outlet conduit **15'.** In this extreme position, in which the balls **35** are each at a respective end of the respective groove **41, 41',** only hot water will be supplied.

In FIG. **2,** the handle **12** is located in the mid-way position with the openings **36** and **37** aligned with the hot and cold water inlets **13'** and **14'** respectively, the opening **38** still being aligned with the conduit **15'.** In this position, there is an equal mixture of hot and cold water. However, in the position shown in FIG. **2,** this mixture would not leave by the conduit **15'** since the valve clapper **25** is closed. To open the clapper **25** and allow the mixture to flow through the conduit **15',** the user turns the knob **24** to screw the thread **23** of the rod **22** into its nut thereby lifting up the clapper **25** from its seat.

In the other extreme position with the handle **12** fully inclined towards the right (looking at FIG. **1**), each of the balls **35** is located at the other end of the grooves **41, 41',** and only cold water will flow through the conduit **15'.** The mixture of hot and cold water can therefore be set at will by choosing the inclination of the handle **12** along the selected pair of grooves.

In the position shown in FIG. **3,** the handle **12** is placed with the balls **35** in the groove of the guide grids corresponding to supply of the mixture to the outlet conduit **17'** for the shower. The handle **12** is shown, as for FIG. **1,** with the balls **35** in the middle of their respective grooves, so that the control member **11** has its hot and cold water inlets equally uncovered, whilst the opening **40** is permanently in communication with the outlet conduit **17'** for the shower. By moving the handle **12** into the appropriate extreme position of the balls **35** in their grooves, solely hot or cold water is delivered through the slot **40** to the conduit **17'.**

The same operation is obtained when the balls **35** are positioned in the third grooves, corresponding to supplying the mixture in the outlet conduit **16'** for the bath. The three grooves of each grid are joined by a centrally located through-groove (FIG. **3**), so that the balls **35** can be moved from one groove to another by firstly placing the handle with the balls **35** in the middle of the grooves, for example as shown in FIG. **2,** and then inclining the handle to move the ball from one groove to another, for example to the FIG. **3** position.

In a variant, the tap body or a part integral therewith may comprise a grid with slots each corresponding to one outlet, any position of the handle in a slot corresponding to a given setting of the mixture of liquids in the respective outlet.

The described mixing tap is advantageous in that it comprises a single handle simultaneously enabling: (1) adjustment of the rate as well as the mixture of the delivered liquid: (2) selection of the apparatus to be used (bath, shower, or wash basin); and (3) assurance of a reliable shutting of the tap for any position of this handle.

The mechanical mixing tap shown in FIGS. **7** to **10** comprises a tap body **50** with two hot and cold water inlets **51, 52** and an outlet **53,** indicated by the arrows in FIGS. **7** and **8.** A spherical control member **54** is mounted in a hemispherical housing **55** of the tap body **50** and an actuating handle **56** is fixed to the control member **54.**

A corresponding upper half for the hemispherical housing **55** is formed in a dome **57** fixed on the tap body **50** by means of a threaded sleeve **58** screwed into a cylindrical extension **59** to the dome **57** surrounding the said body **50.**

The control member **54** is formed of two hollow hemispherical parts **60, 61,** the part **60,** shown in detail in FIG. **10,** being integral with a tube **62** slotted at **63** and whose inner section is hexagonal. The tube **62** passes through an elongate opening **57'** in the upper part of the dome **57** and is provided with outer protuberances **64** slotted at **65,** as indicated in FIG. **8.** These protuberances **64** are adapted to engage in a corresponding housing **66** provided in the handle **56,** as will be described in detail hereinafter.

An elastic joint **67** is disposed between the two hemispherical parts **60, 61** of the control member **54** and serves to urge these parts against the inner wall of the spherical housing comprised between the tap body **50** and the dome **57.**

The hollow interior of the spherical control member **54** forms a chamber **68** having hot and cold water inlet openings **69** and **70** respectively and an outlet opening **71,** all provided in the hemispherical part **61.**

A valve clapper **72** is mounted in the chamber **68** to adjust the rate of outlet of water through the opening **71.** This clapper **72** comprises, on the one hand, a sealing joint **73** adapted to come to bear against a seat **74** of the clapper and, on the other hand, a rod **75** of hexagonal section mating with the internal shape of the tube **62** and terminating with a screw **76** screwing into the knob **56.**

The described tap is assembled as follows:

The hemispherical part **60** is placed in the dome **57** with its tube **62** passing through the opening **57'.**

The handle **56** is forced onto the tube **62** which deforms elastically to allow the protuberances **64** to pass into the housing **66** where they axially retain the handle on the part **60.**

The screw **76** of the clapper **72** is then introduced into the tube **62** with the hexagonal rod **75** in engagement with the inner wall of corresponding shape of the tube **62.**

Next, the handle **56** is screwed onto the screw **76** so that the clapper **72** is brought inside the part **60** into the position shown in FIG. **7.**

The hemispherical part **61** is then mounted on the part **60;** the tap body **50** is brought against the part **61** and the sleeve **58** is finally screwed into the extension **59** of the dome **57** to hold the various parts of the de-

scribed tap in place. The joint **67** disposed between the hemispherical parts **60** and **61** is compressed so that it elastically holds these parts pressed against the spherical inner surface of the hemispherical housing **55** and of the dome **57**, thus ensuring fluidtightness of the control member **54** in its housing as well as taking up any play.

Operation of the described tap is as follows:

In the position shown in FIG. **7**, the axis of the handle **56** is inclined in relation to the axis of the tap body **50** so that the tube **62** of the control member **54** is located at the extreme left of the opening **57'** and the cold water inlet opening **70** is obturated by the inner wall of the hemispherical housing **55** of the tap body **50**. The hot water inlet opening **69** is in communication with the hot water supply conduit **51** of the tap body. Hot water thus passes into the chamber **68** and, the clapper **72** being open, passes out through the opening **71** which communicates with the outlet conduit **53**.

In FIG. **8**, the clapper **72** is shown applied against its seat **74**, this position being reached by turning the handle **56** in the clockwise direction.

By placing the handle **56** in the mid-way position along the opening **57'**, the inlet openings **69** and **70** are each located partly facing the hot and cold water inlets respectively. Mixing thus takes place in the chamber **68** and, when the clapper **72** is in the open position, the mixture passes out through the opening **71** which is facing the outlet conduit **53**.

A feature of the latter described mixing tap is that by turning the handle **56** to close the clapper **72** against its seat **74**, this handle tends to lift up in relation to the rod **75** if turning is continued whilst the sealing joint **73** is applied against the seat **74**. This relative movement of the handle **56** results in gripping the slotted end of the tube **62** against the clapper rod **75** by means of the protuberances **64** cooperating with the inclined walls of the housing **66** for the handle. This rod **75**, as well as the handle **56**, is therefore locked in position by a self-gripping effect and the material of joint **73** is consequently not squashed against the seat, which increases its useful life.

What is claimed is:

1. A manually adjustable mechanical mixing tap, comprising a tap body having two inlets and at least one outlet for the passage of liquids; a spherical housing in said tap body and communicating with said inlets and outlet; a spherical control member fluidtightly swivelably mounted in said housing and movable in all directions within said spherical housing; said control member comprising an inner mixing chamber with at least three peripheral openings for the inlet and outlet of liquids, and two spherical elements with an elastic ring between said two elements for pressing said two spherical elements against said spherical housing to render said tap fluid-tight; a single external actuating handle fixed to said control member, said handle being means for moving said control member between positions in which said inlets and said at least one outlet of said tap body selectively communicated with said peripheral openings of the control member; means in said chamber for setting the rate of outlet flow of liquid from said chamber and having a closing member and seat against which said closing member is bearable, said handle including screw-operated means for adjustably controlling all positions of said means for setting the rate of outlet flow of liquid from said chamber; and means for limiting the pressure of said closing member against said seat and thereby limit the pressure of said spherical elements against said housing.

2. A tap according to claim **1**, in which the said inlets and outlet communicate with said spherical housing by slot-like openings.

3. A tap according to claim **1**, in which said means for setting the rate of outlet of liquid from the chamber comprise a valve clapper having an elastic sealing joint which can be applied against a seat in said chamber delimiting an outlet opening of the chamber, said limiting means further comprising self-gripping means for rotationally locking said screw-operated means when the handle is turned to a position corresponding to closing of the clapper against its seat.

* * * * *