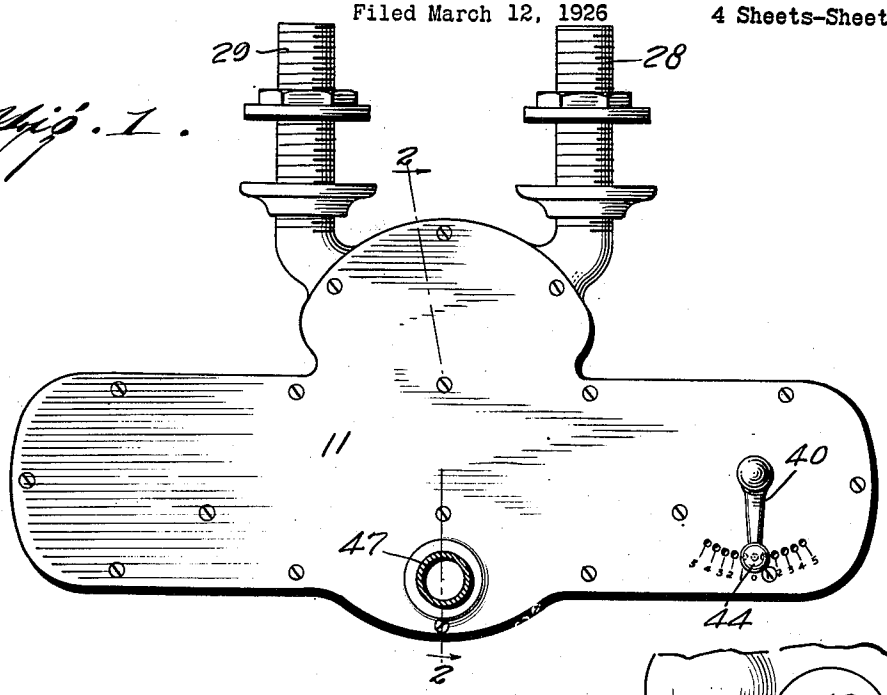
Feb. 28, 1928. 1,660,637

C. M. UPDEGRAFF

THERMOSTATICALLY CONTROLLED FLUID VALVE

Filed March 12, 1926 4 Sheets-Sheet 1

Fig. 1.



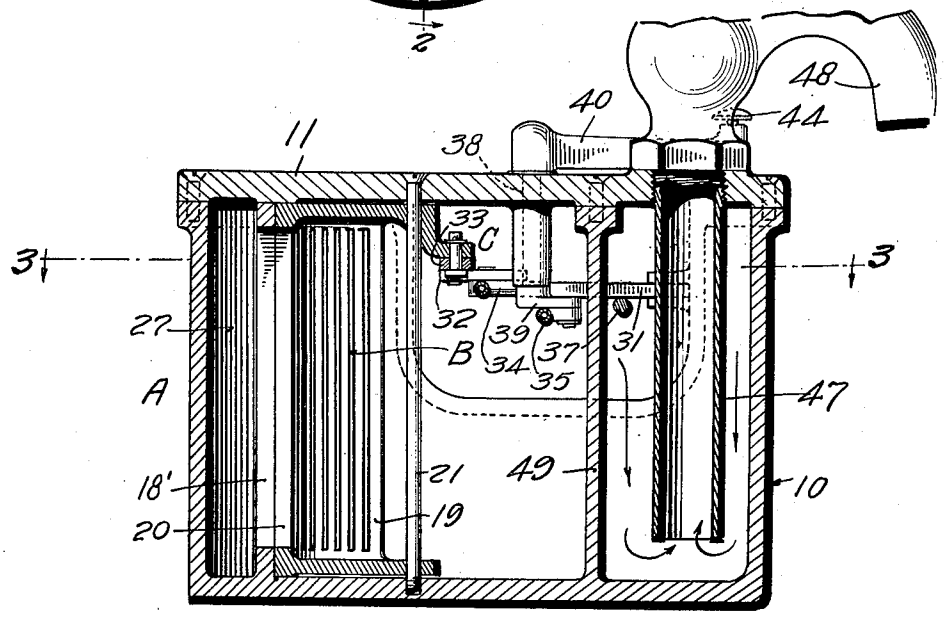


Fig. 2.

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THERMOSTATICALLY CONTROLLED FLUID VALVE

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Fig. 3.

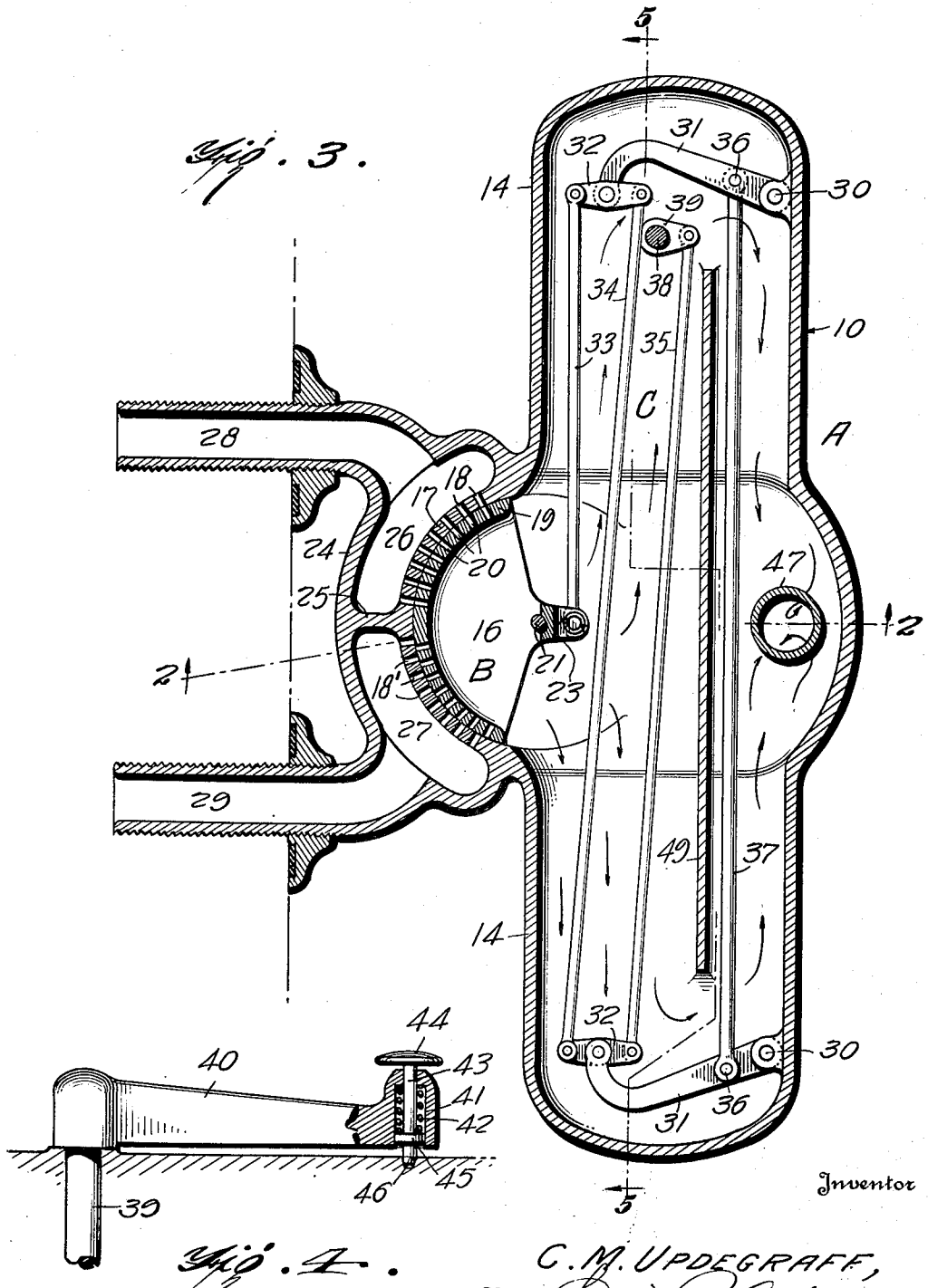


Fig. 4.

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THERMOSTATICALLY CONTROLLED FLUID VALVE

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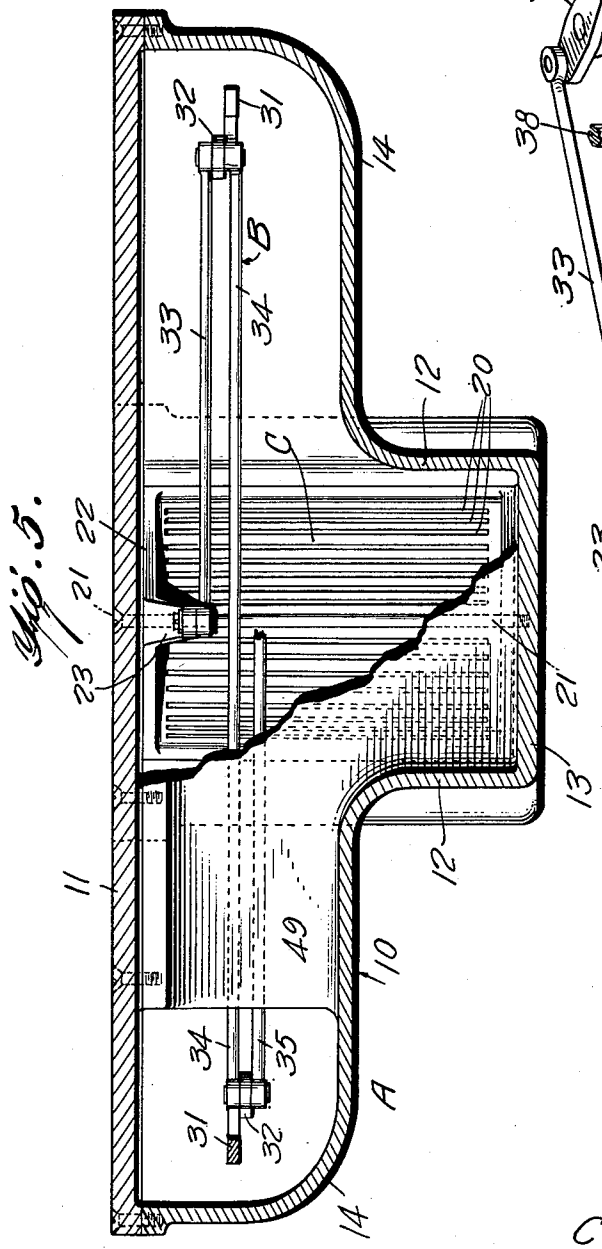


Fig. 5.

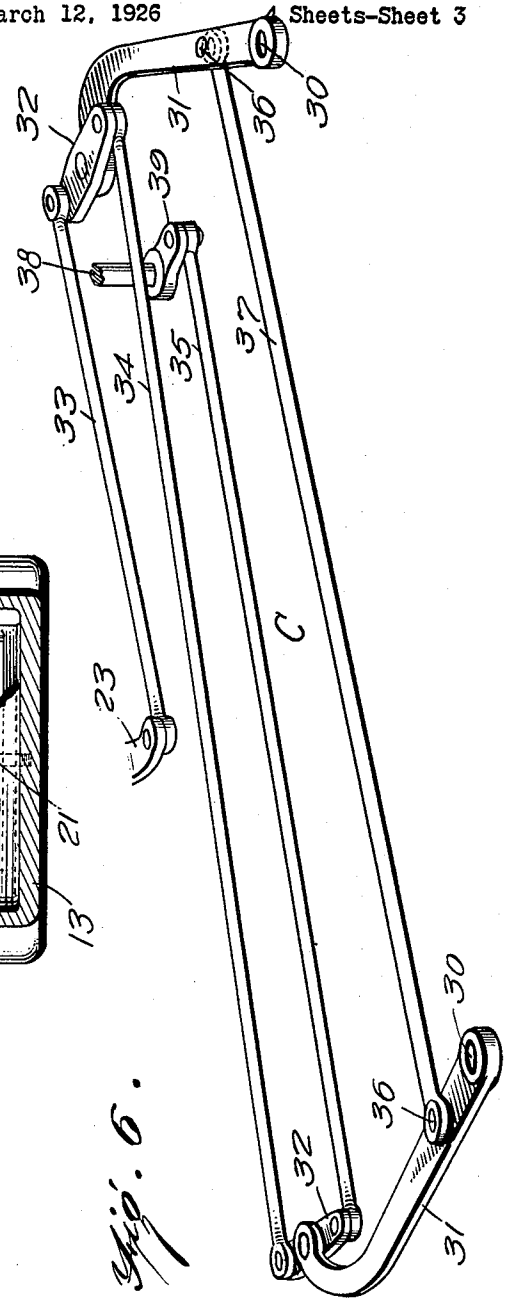


Fig. 6.

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THERMOSTATICALLY CONTROLLED FLUID VALVE

Filed March 12, 1926 4 Sheets-Sheet 4

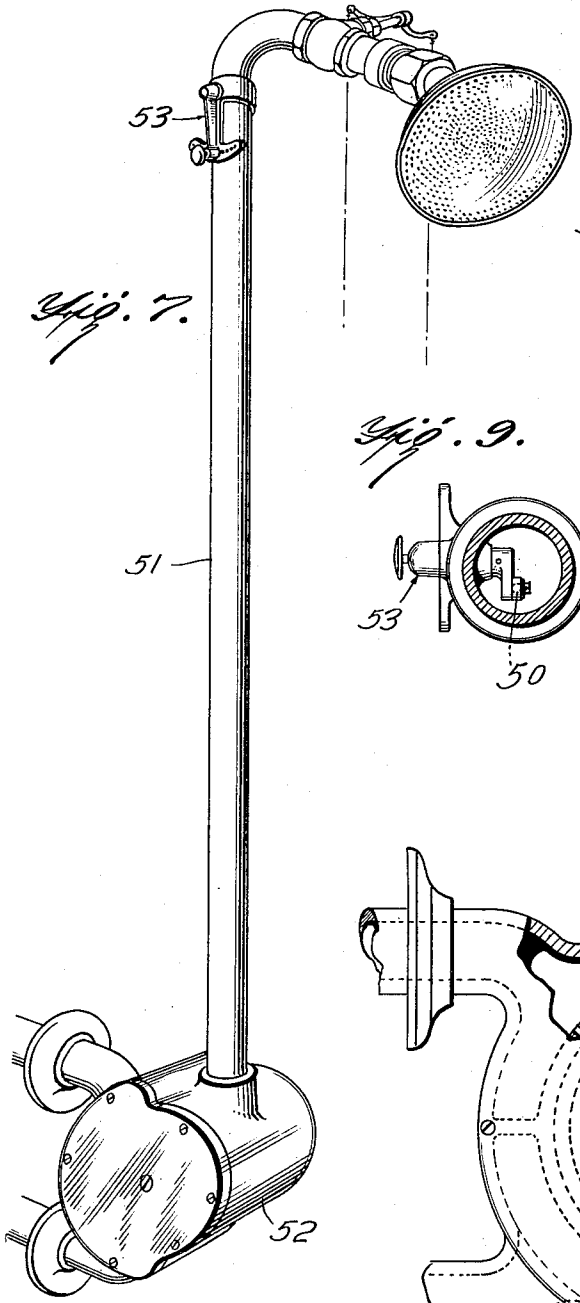


Fig. 7.

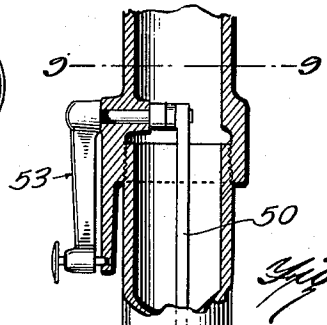


Fig. 8.

Fig. 9.

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Patented Feb. 28, 1928. 1,660,637

UNITED STATES PATENT OFFICE.

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THERMOSTATICALLY-CONTROLLED FLUID VALVE.

Application filed March 12, 1926. Serial No. 94,293.

My invention relates generally to valves and more particularly to thermostatic valves wherein I mount a novel thermostatic means in such a manner and associate it with a movable fluid regulating means whereby a highly efficient and extremely sensitive and automatically controlled valve is produced. The scope of my invention extends to whatever constructions may be defined by or included within the terms or language of the appended claims.

In the drawings:

Figure 1 is a top plan view illustrating one form of valve constructed in accordance with my invention;

Figure 2 is a transverse sectional view on the line 2—2 of Figures 1 and 4;

Figure 3 is a horizontal sectional view taken on the line 3—3 of Figure 2 and looking in the direction of the arrows;

Figure 4 is a detailed view of the manually operated temperature controlling means;

Figure 5 is a vertical sectional view taken on the line 5—5 of Figure 3;

Figure 6 is a view in perspective of the valve operating rods;

Figure 7 is a view in perspective of another embodiment of my invention;

Figure 8 is a side elevation partially broken away and shown in section thereof, and

Figure 9 is a transverse sectional view taken on the line 9—9 of Figure 8.

My invention, in the form or embodiment shown in the drawings and briefly described, comprises a substantially elongated valve casing or body "A", an oscillatory valve "B", and thermostatically controlled means "C".

The valve casing, "A" which is cast preferably of relatively thin metal, consists of a main body portion, 10, and a cover plate, 11, secured thereto by means of suitable screws. As illustrated in several figures of the accompanying drawings the central portion of the casing or body "A" is enlarged at its front and rear ends for the purpose hereinafter described.

With particular reference to Figure 5, it will be noted that the top portion or the plate, 11, is flat, and the valve casing near the center thereof is formed with downwardly extending walls, 12, and an integrally formed body, 13. In this manner the central portion of the body is formed substantially square and is further provided with a pair of oppositely disposed wing portions, 14.

The rear inner wall of the enlarged central portion of the casing, 10, is provided with a substantially semi-cylindrical or arcuate surface, 15, for the purpose of receiving a vertically mounted oscillating valve, 16, as is clearly shown in Figure 3. The curved wall, 17, which forms the seat for the valve, 16, is provided with a plurality of radially extending, and relatively thin slots, 18. These slots, 18, extend vertically substantially the entire height of the wall, 17.

The curved wall, 19, of the valve is likewise provided with vertically extending slots, 20, which are adapted to align with the slots, 18, of the wall, 17, when the valve is in its fully opened position. The opposing surfaces between the adjacent walls, 17 and 19, are, of course, ground in to prevent leakage. As is clearly shown in Figures 3 and 5, the valve, 16, is mounted to oscillate by means of a vertically extending rod or screw, 21, and is connected between the top plate, 11, and the bottom, 13, of the casing, 10. Integrally formed with the upper plate, 22, of the valve, 16, is a forwardly extending arm or lug, 23, for a purpose to be hereinafter described.

The rear portion of the compartment is provided with an integrally cast curved wall, 24, and a central partition wall, 25, for the purpose of providing a pair of chambers or spaces, 26 and 27. The chambers, 26 and 27, extend completely across and cover the narrow slots, 18 and 18′, and are provided with rearwardly extending tubular portions, 28 and 29. The tubular portions, 28 and 29, are exteriorly screw threaded for receiving the usual washers and nuts for connecting purposes.

One of the principal features of my invention resides in a novel construction and arrangement of the thermostatic controlling means, "C", and comprises a plurality of rods or tubes having a high coefficient of expansion, as for example, aluminum, and a

rod of invar, or similar metal, having a very low coefficient of expansion and pivotally mounted connecting means between them.

To obtain the maximum results from my improved valve the thermostatically controlled means are formed comparatively long, are placed in a direct path of the inflowing water and are preferably centrally disposed with respect to the wing portions of the valve body, 10. Pivotally connected on the inner side of the casing, 10, and near the extreme ends thereof, as indicated at, 30, is a pair of arms, 31. The outer or free end of the arms, 31, are provided with a relatively short and pivotally mounted rocker arm, 32, for the purpose of pivotally connecting the adjacent ends of the highly expansible rods or tubes, 33, 34 and 35. The arms 31, are further provided with pins, 36, relatively close to the pivots, 30, for the purpose of receiving the extreme ends of the invar rod, 37.

A vertically extending rod, 38, is mounted in one end of one of the wings, 14, and is supported from the plate, 11, as is clearly indicated at Figure 2, for the purpose of manually adjusting or controlling the desired temperature of the liquid. A relatively short arm, 39, is secured to the lower end of the rod, 38, for the purpose of receiving one of the extreme ends of the highly expansible rod or tube, 35, whereas the upper end of the rod, 38, is provided with a securely mounted arm, 40. Referring now particularly to Figure 4, it will be noted that the outer or free end of the operating arm, 40, is provided with an enlarged head, having a vertically extending bore or opening, 41, for the purpose of receiving a coil spring, 42. A reduced opening is centrally located near the upper end of the bore for the purpose of receiving a vertically mounted pin, 43, which is provided with an enlarged rod, 44, at its upper end and a rim or collar, 45, near the lower end thereof. The lowermost end of the rod, 43, is slightly tapered so that it may more snugly fit within the radially extending openings or depressions, 46. The spring, 42, being located between the upper portion of the collar, 45, and the upper end of the bore, 41, will assure the positive engagement of the locking pin, 43, within opening or recess, 46, when set.

The centrally or enlarged portion of the casing, 10, is preferably bulged or curved for the purpose of housing the outlet pipe or tube, 47. The tube, 47, is preferably screw threaded at its upper end through the cover plate, 11, and is extended downwardly to within a relatively short distance of the bottom plate, 13. The upper end of the pipe, 47, is, of course, in communication with the valve, 48, or any other desired means of regulating the properly mixed liquid.

A partition plate, 49, is preferably formed integrally with the main body of the valve and is adapted to be secured at its upper end to the plate, 11, as is clearly shown in Figure 2. This partition plate, 49, extends longitudinally with respect to the casing, 10, and terminates a relatively short distance from the extreme ends of the wings, 14, for the purpose of directing the fluid from the central or inlet portions toward both of the end portions, and not only compelling the fluid of extreme temperatures to more thoroughly mix, but exposes the fluid to substantially the entire length of the highly expansible tubes. Maximum results will be thus obtained from the expansible tubes, 33, 34, and 35. To obtain the best results, the several expansible tubes should be comparatively as thin as possible so that they will readily respond and quickly act with the minimum changes of temperature. It is to be understood, of course, that if a greater movement of the valve is desired a larger number of expansible tubes would be employed to produce the desired result.

Having thus described the details of construction of my invention, the operation will now be readily understood. If, for example, cold water enters the pipe, 28, and hot water the pipe, 29, they will enter the central portion of the valve casing, 10, through their respective elongated slots, 18 and 18'. By reason of the fact that the slots, 18 and 18' are radially extending, the hot and cold water will, of course, flow toward a central point where it will thoroughly mix. This mixture will now divert and flow toward the extreme outer ends of the wings, 14, through the passages or spaces cast between the extreme ends of the partition wall, 49, and the ends of the wings from which point it will again flow toward the center and upwardly through the outlet pipe, 47. Should the hot water, for example, be slightly cooled during the course of operation of the valve, the expansible tubes will be quickly affected and automatically alter the position of the valve, 16, to permit a greater flow of hot water. When it is desired to alter the temperature of the water from the supply pipe, 47, it is merely necessary to lift the rod, 43, against the tension of the spring, 42, and adjust the arm, 40, in the desired direction for moving the plurality of expansion tubes.

In the embodiment of my invention illustrated in Figures 7, 8 and 9, a slightly different form of thermostatically controlled valve is shown. This form is particularly adapted for use in connection with shower baths or the like, wherein I employ a single highly expansible rod or tube, 50, and mount it within the pipe, 51, which should, of course, be formed of a metal having a very low co-efficient of expansion, for example, steel or nickel steel, such as invar.

The lower end of the pipe, 51, is threaded with respect to the valve body, 52, whereas

the upper end of the pipe, 51, is connected with the manually operating means indicated generally as at 53, for varying the temperature of the valve. Inasmuch as I have fully described the details of construction and operation of the preferred embodiment of my invention, it is but necessary to briefly describe this particular form. In view of the fact that the co-efficient of expansion of metals between extreme temperatures is so slight, a relatively long and highly expansible tube mounted within a pipe, provides a very satisfactory and highly effective thermostatically controlled means in connection with my novel valve, 54.

I claim:

1. A thermostatically controlled valve, comprising a casing having a pair of intake openings in communication with elongated compartments and having a plurality of equidistantly spaced elongated and relatively narrow slots, a pivotally mounted valve having elongated openings adapted to register with said first-named openings, an outlet pipe mounted within the casing, and a thermostat consisting of a rod of substantially uniform cross section for actuating the valve for causing said slots in the valve to register with the relatively narrow slots in said body portion, one end of the thermostatic rod being pivotally connected to said valve.

2. A thermostatically controlled valve, comprising a casing having a pair of intake openings in communication with elongated compartments and having a plurality of equidistantly spaced elongated and relatively narrow slots, a pivotally mounted valve having elongated openings adapted to register with said first-named openings, an outlet pipe mounted within the casing, and a thermostat consisting of a rod of substantially uniform cross section for actuating the valve for causing said slots in the valve to register with the relatively narrow slots in said body portion, said thermostat centrally disposed with respect to the fluid chamber and having one end thereof pivotally connected to said valve.

3. A thermostatically controlled fluid valve, comprising a substantially semicircular casing having a centrally located partition wall therein and a pair of intake openings and an outlet opening, the interior of said casing provided with a substantially semi-cylindrical seat having a plurality of radially extending and relatively narrow slots, a movably mounted valve having a plurality of relatively narrow slots and adapted for engagement with said first-named slots in the seat, and a thermostat mounted in the casing for actuating said valve.

4. A thermostatically controlled fluid valve, comprising a substantially semicircular casing having a centrally located partition wall therein and a pair of intake openings and an outlet opening, the interior of said casing provided with a substantially semi-cylindrical seat having a plurality of radially extending and relatively narrow slots, a movably mounted valve having a plurality of relatively narrow slots and adapted for engagement with said first-named slots in the seat, and a thermostat mounted in the casing for actuating said valve, said thermostat centrally disposed with respect to the fluid chamber.

5. A thermostatically controlled fluid valve, comprising a substantially semicircular casing having a centrally located partition wall therein and a substantially enlarged central portion and a pair of diametrically opposed reduced portions, a pair of feed pipes and an outlet pipe in communication with said casing, a valve for varying the amount of fluid flowing through each of said inlet pipes and a thermostat consisting of a rod of substantially uniform cross section located within the casing.

6. A thermostatically controlled fluid valve, comprising a substantially semicircular casing having a centrally located partition wall therein and a substantially enlarged central portion and a pair of diametrically opposed reduced portions, a pair of feed pipes and an outlet pipe in communication with said casing, a valve for varying the amount of fluid flowing through each of said inlet pipes and a thermostat consisting of a rod of substantially uniform cross section located within the casing and extending transversely through the casing and located within said diametrically opposed reduced portions of the body.

7. A thermostatically controlled fluid valve comprising a substantially semicircular casing having a centrally located partition wall therein and an enlarged central portion, a valve vertically mounted within the casing, and a thermostat consisting of a rod of substantially uniform cross section for actuating the valve, mounted within the casing and extending transversely, substantially the entire length thereof.

8. A thermostatically controlled fluid valve comprising a casing having an enlarged central portion, a valve vertically mounted within the casing, and a thermostat consisting of a rod of substantially uniform cross section for actuating the valve, mounted within the casing and extending transversely, substantially the entire length thereof, a pair of spaced inlet openings and an outlet opening in communication with the casing and a partition plate interposed between said thermostat and the outlet pipe.

9. A thermostatically controlled fluid valve comprising a casing having an enlarged central portion, a valve vertically

mounted within the casing, and a thermostat consisting of a rod of substantially uniform cross section for actuating the valve, mounted within the casing and extending transversely, substantially the entire length thereof, a pair of spaced inlet openings and an outlet opening in communication with the casing and a partition plate interposed between said thermostat and the outlet pipe, and means for manually adjusting said thermostat.

10. A thermostatically controlled fluid valve, comprising a substantially semicircular casing having a centrally located partition wall therein and a pair of intake openings and an outlet opening, a valve movably mounted within the casing and a thermostat consisting of a rod of substantially uniform cross section mounted within the casing for actuating the valve, one end of the thermostat having a loose connection with respect to said valve and means for manually adjusting said thermostat.

11. A thermostatically controlled fluid valve, comprising a substantially semicircular casing having a centrally located partition wall therein and a pair of intake openings and an outlet opening, a valve movably mounted within the casing and a thermostat consisting of a rod of substantially uniform cross section mounted within the casing for actuating the valve, one end of the thermostat having a loose connection with respect to said valve, said thermostat centrally disposed with respect to the fluid chamber, and manually operable means for predeterminedly adjusting said thermostat.

12. A thermostatically controlled valve, comprising a substantially semicircular casing having a centrally located partition wall therein and a pair of intake openings in communication with elongated compartments and having a plurality of equidistantly spaced elongated and relatively narrow slots, a movably mounted valve having elongated openings adapted to register with said first-named openings, an outlet pipe mounted within the casing, and a thermostat for actuating the valve for causing said slots in the valve to register with the relatively narrow slots in said body portion one end of said thermostat having pivotal connection with respect to the valve, and means for manually adjusting said thermostat.

13. A thermostatically controlled fluid valve, comprising a casing having an enlarged central portion, a valve vertically mounted within the casing, and a thermostat for actuating the valve, said thermostat being flexibly connected with respect to the valve mounted within the casing and extending transversely, substantially the entire length thereof, and manually operable means for predeterminedly adjusting said thermostat.

14. A thermostatically controlled fluid valve, comprising a casing having an enlarged central portion, a valve vertically mounted within the casing, and a thermostat for actuating the valve, mounted within the casing and extending transversely, substantially the entire length thereof, a pair of spaced inlet openings and an outlet opening in communication with the casing and a partition plate interposed between said thermostat and the outlet pipe.

15. A thermostatically controlled fluid valve, comprising a semicircular casing having a centrally located partition wall therein, a substantially enlarged central portion and a pair of diametrically opposed reduced portions, a pair of feed pipes and an outlet pipe in communication with said casing, a valve for varying the amount of fluid through each of said inlet pipes and a thermostat located within the casing and extending transversely through the casing and located within said diametrically opposed reduced portions of the body.

16. A thermostatically controlled valve, comprising a casing having a pair of intake openings in communication with elongated compartments and having a plurality of equidistantly spaced elongated and relatively narrow slots, a movably mounted valve having elongated openings adapted to register with said first-named openings, an outlet pipe mounted within the casing, and a thermostat having pivotal connection with the valve whereby the valve will be freely actuated for causing said slots in the valve to register with the relatively narrow slots in said body portion, said thermostatic means centrally disposed with respect to the fluid chamber.

17. A thermostatically controlled fluid valve, comprising a casing having a pair of intake openings and an outlet opening, the interior of said casing provided with a substantially semi-cylindrical seat having a plurality of radially extending and relatively narrow slots, a movably mounted valve having a plurality of relatively narrow slots and adapted for engagement with said first-named slots in the seat, and a thermostat mounted in the casing for actuating said valve.

18. A thermostatically controlled fluid valve, comprising a casing having a substantially enlarged central portion and a pair of diametrically opposed reduced portions, a pair of feed pipes and an outlet pipe in communication with said casing, a valve for varying the amount of fluid flowing through each of said inlet pipes and a thermostat having pivotal connection with respect to said valve located within the casing, and means for manually adjusting said thermostat.

19. A thermostatically controlled fluid valve, comprising a casing having a pair of

intake openings and an outlet opening, the interior of said casing provided with a substantially semi-cylindrical seat having a plurality of radially extending and relatively narrow slots, a movably mounted valve having a plurality of relatively narrow slots and adapted for engagement with said first-named slots in the seat, and a thermostat mounted in the casing for actuating said valve, said thermostat having pivotal connection with respect to the valve, said thermostat centrally disposed with respect to the fluid chamber.

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