Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2167568 C 2005/04/05

(11)(21) 2 167 568

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 1996/01/18

(41) Mise à la disp. pub./Open to Public Insp.: 1997/07/19

(45) Date de délivrance/Issue Date: 2005/04/05

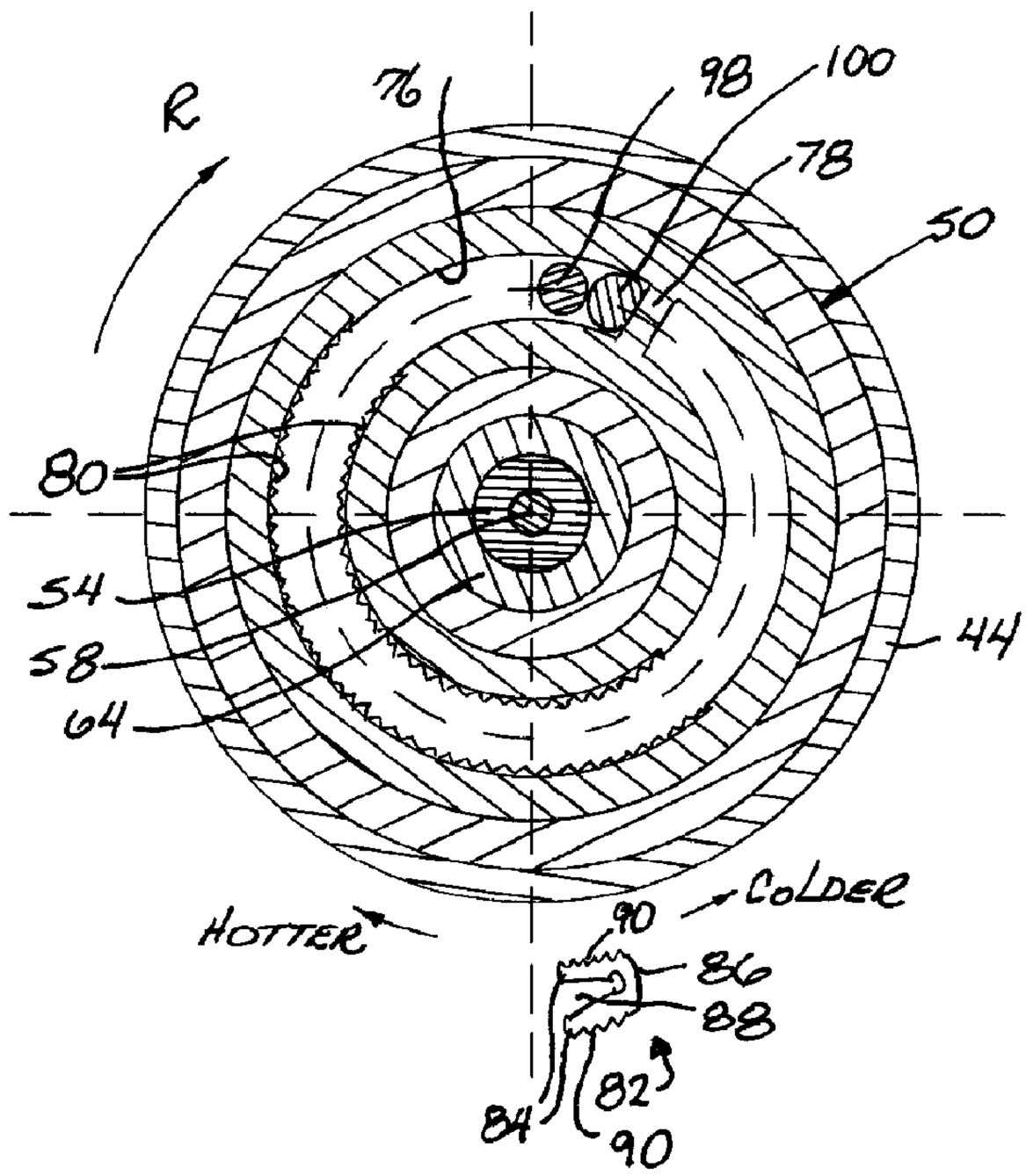
(51) Cl.Int.^{6}/Int.Cl.^{6} F16K 11/10, F16K 31/64

(72) Inventeur/Inventor:
CLARE, MANAMOHAN, CA

(73) Propriétaire/Owner:
FRIEDRICH GROHE AG & CO. KG, DE

(74) Agent: MACRAE & CO.

(54) Titre : VANNE D'EQUILIBRAGE DE PRESSION AVEC REGULATION DE LA TEMPERATURE ET DU DEBIT
(54) Title: TEMPERATURE AND VOLUME CONTROL PRESSURE BALANCING VALVE



(57) Abrégé/Abstract:
An arrangement for temperature control and volume control of a pressure balancing valve used in tub/shower installations includes a temperature control handle that controls the mix of hot and cold water issuing from a pressure balancing cartridge within the valve and a volume control handle that controls the volume of the hot and cold water issuing from the cartridge. The volume control

CA 2167568 C 2005/04/05

(11)(21) 2 167 568

(13) C

(57) Abrégé(suite)/Abstract(continued):
handle is connected to three lobes extending radially about the end of a shaft to which that handle is attached, the lobes being closely adjacent the face of the cartridge from which the water flows. The cartridge has a hot water outlet and a cold water outlet and in the neutral position of the volume control handle one of the lobes is located between the cartridge outlets and the other lobes do not block the outlets. When the valve is in operation one can rotate the temperature control handle to set the desired water temperature and one can rotate the volume control handle to set the desired water volume flowing from the cartridge. The two control handles are interconnected for conjoint movement so that when the temperature control handle is rotated to its "off" position to stop water flow the volume control handle is rotated back to its neutral position.

ABSTRACT

An arrangement for temperature control and volume control of a pressure balancing valve used in tub/shower installations includes a temperature control handle that controls the mix of hot and cold water issuing from a pressure balancing cartridge within the valve and a volume control handle that controls the volume of the hot and cold water issuing from the cartridge. The volume control handle is connected to three lobes extending radially about the end of a shaft to which that handle is attached, the lobes being closely adjacent the face of the cartridge from which the water flows. The cartridge has a hot water outlet and a cold water outlet and in the neutral position of the volume control handle one of the lobes is located between the cartridge outlets and the other lobes do not block the outlets. When the valve is in operation one can rotate the temperature control handle to set the desired water temperature and one can rotate the volume control handle to set the desired water volume flowing from the cartridge. The two control handles are interconnected for conjoint movement so that when the temperature control handle is rotated to its "off" position to stop water flow the volume control handle is rotated back to its neutral position.

TEMPERATURE AND VOLUME CONTROL PRESSURE BALANCING VALVE

The present invention relates to pressure balancing water mixing valves in general and to a volume and temperature control arrangement therefor in particular.

BACKGROUND OF THE INVENTION

Pressure balancing valves are known for bath and shower installations, most using a single handle to control the pressure and temperature of the water issuing from the valve. Typically, there will be a diverter, either integral with the valve or separately provided, which is used to divert water of the desired temperature to the bathtub or to the shower, respectively. Many such valves have a valve casing into which a valve cartridge can be placed, the cartridge containing components which serve to equalize the pressure of water issuing therefrom, to compensate for pressure fluctuations in the hot and cold water inlet lines. These cartridges are especially useful in multi-unit installations such as hotels or other institutions where the tub/shower for one living unit may be adjacent a wall that is common with the tub/shower of an adjacent living unit. In such installations the living units may share the hot and cold water lines feeding water to the units and the cartridge may be positioned in differently oriented positions to compensate for the fact that the hot water line may be on the left in one unit and on the right in the other unit. Water coming from the hot and cold outlets of the cartridge is pressure compensated by the internal components of the cartridge and

enters a mixing chamber from which the mixed water flows to the diverter and then to the tub or to the shower as desired.

Commonly owned Canadian Patent Applications Nos. 2,076,924; 2,109,034; and 2,114,855 describe typical pressure balancing mixing valves which accommodate a mixing cartridge such as is described above. The mixing valves described and claimed in the above-identified patents do not adequately permit control of the volume of water issuing from the valve to either the tub or the shower. There is a need for a separate control mechanism to allow the user to select the volume of water at the desired temperature that flows to the tub or shower. There is also a need for such an arrangement whereby the volume control means is connected to the temperature control means so that the volume control is returned to a neutral or full flow condition whenever the valve is shut off.

SUMMARY OF THE INVENTION

The present invention addresses the above needs, providing a separate means for controlling the volume of water issuing from a pressure balancing valve, which means is connected to the temperature control mechanism so as to provide maximum flow at the off position of the temperature control mechanism.

In its broadest form the present invention may be considered as providing a volume and temperature control arrangement for a pressure balancing water mixing valve having a valve casing, hot and cold water inlets to the casing, a pressure

balancing cartridge in the casing, hot and cold water outlets from the cartridge leading to a mixing chamber within the casing, a mixed water outlet leading from the mixing chamber, a diverter downstream of the mixed water outlet, and conduits leading from the diverter to a tub and to a shower respectively, the arrangement comprising: first control means connected to the cartridge for controlling the temperature of water exiting the cartridge outlets to the mixing chamber and for adjusting the valve between off or on conditions thereof; and second control means for controlling the volume of water issuing from the cartridge to the mixing chamber, the first and second control means being interconnected for conjoint interdependent operation.

Other features and advantages of the present invention will be described hereinafter with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a partial cross-section through a pressure balancing valve incorporating the present invention.

Figure 2 is a partial cross-section on the line 2-2 of Figure 1.

Figure 3 is a partial cross-section on the line 3-3 of Figure 1.

Figure 4 is a partial cross-section on the line 4-4 of Figure 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 illustrates in partial cross-section a pressure balancing valve incorporating the present invention. It should be understood that the valve of Figure 1 is merely typical of this type of valve and is not to be considered as restricting the application of the present invention to that type of valve.

The valve 10 of Figure 1 includes a generally cylindrical casing 12 having hot and cold water inlets (not shown), the centre-line of which would be perpendicular to the plane of Figure 1. A pressure balancing cartridge 14 is positioned within the casing 12 so as to receive hot and cold water coming from the inlets to the casing. The cartridge can be positioned within the casing in either of two orientations depending on the positioning of the inlets relative to the casing. The cartridge has two water outlets 16, 18 (Figure 4) one for hot water and the other for cold water, the outlets leading to a mixing chamber 20 within the casing. There is a mixed water outlet 22 leading from the casing 12 to a diverter 26 which, in one of its two positions, will permit mixed water to flow to a first conduit 28 leading to a tub (not shown), and in the other position thereof will permit water to flow through a bypass channel 30 to a second conduit 32 leading to a shower (not shown).

The casing 12 is located behind a wall W, with the opening in the wall being covered by an escutcheon plate 34. The escutcheon plate 34 has an opening 36 therethrough to receive the shaft 38 of the diverter 26, the opening 36 being sealed by a grommet or O-ring 40. The escutcheon plate is shown at two extreme positions

relative to the casing 12 as defined by the wall structure. A threaded collar 42 to which the escutcheon plate is attached is threadedly received on an externally threaded sleeve 44 which in turn is threadedly attached to the casing 12. At the upper part of Figure 1 the plate 34 is shown at the extreme left end of the sleeve 44 while at the lower part of Figure 1 the plate 34 is shown at the extreme right end of the sleeve 44. The threadedly adjustable collar and escutcheon plate can accommodate situations in which the casing 12 is not located at a standard or fixed position relative to the wall W.

Within the cartridge 14 there is a disc (not shown) which controls the relative quantity of hot and cold water exiting the cartridge so as to control the temperature of the resulting water flow. The disc within the cartridge will permit more hot water to exit the outlet 16, for example, than cold water exiting the other outlet 18, resulting in a warm or even hot water mix within the chamber 20. The cartridge disc is attached to a cylindrical stem 46 having a splined end 48. A temperature control handle 50 having a hollow interior 52 and an annular stem portion 54 is connected to the splined end 48 of the stem 46. The connection is achieved by an internally splined counterbore 56 within the stem portion 54 and a bolt or machine screw 58 which passes along the annular stem portion 54 to be threadedly received within a threaded counterbore in the spline end 48. The hollow interior of the handle 50 is covered by a removable decorator plate 60. A radially extending flange 61 projects from the handle 50 and cooperates with an indicating guide on the escutcheon plate to enable the desired temperature of water issuing from the casing to be set. The handle can

rotate between two limit positions representing the hottest and coldest water temperatures available, the coldest position also being an "off" position for the valve. Movement of the handle away from the "off" position will start water flowing with the degree of rotation determining the temperature of the flowing water.

In order to control the volume of water issuing from the valve the present invention provides a second control means which entails an annular volume control handle 62 which is preferably nested with the temperature control handle 50 as seen in Figure 1. The handle 62 is attached to an annular shaft 64 which surrounds the stem portion 54 and the cartridge stem 46. O-ring seals 66 are provided to seal the annular shaft 64 with respect to the casing 12 and the stem 46. At its inner end, within the mixing chamber 20, the annular shaft 64 carries three equally circumferentially spaced apertured lobes 68. As seen in Figure 4, each lobe 68 has a pair of radially extending side edges 70, an arcuate peripheral edge 72, and a plurality of apertures 74 extending therethrough. As seen in Figure 1, the lobes 68 are located closely adjacent the front face of the cartridge 14 so that there is little space between the cartridge and the lobes.

The two control handles are interconnected together for conjoint operation. In particular, the volume control handle is connected to the temperature control handle in such a manner that movement of the temperature control handle to the "off" position will move the volume control handle to a neutral position as seen in Figure 4, representing maximum water flow from the cartridge into the mixing chamber. The interconnection between the two handles is seen in Figures 1, 2 and 3.

As seen in Figure 2, the inner end of the temperature control handle 50 is provided with an arcuate slot 76 which is discontinuous at wall 78 which in turn defines one of the rotation limits mentioned above. A portion of the arcuate slot 76 is defined by axially extending serrated or splined edge walls 80 into which an adjustable limit stop member 82 can be inserted. The stop is moulded from plastic, has arcuate arms 84 extending from a head 86, and has a gap 88 between the arms 84. The outer edges of the arms are splined as at 90. The arms can be squeezed together to permit the limit stop 82 to be inserted into the splined portion of the slot 76 or to be removed therefrom. When the arms of the stop are released with the stop within the slot the splined edges 90 thereof will engage with the splined edge walls 80 of the slot 76 to hold the stop in the desired position representing the other limit for the temperature control handle. The limit stop 82 rotates with the temperature control handle 50 and limits the rotation angle of the handle by stopping against a fixed pin 98 projecting from casing 12.

The volume control handle 62, as mentioned above is nested with the temperature control handle 50 as seen in Figure 1. The volume control handle includes a plurality of splines 92 about the periphery thereof to enable a user to grip the handle securely for adjusting the volume of water. The inner wall 94 of the volume control handle also includes an arcuate slot 96 (Figure 3) which extends over less than 90°.

The fixed pin 98 projects from the casing 12 and extends through the slot 96 of the volume control handle 62 and into the adjacent slot 76 of the temperature control

handle 50. A post 102 at the end of slot 96 of the volume control handle extends through the slot 76 of the temperature control handle and interconnects the two handles at slot termination wall 78.

The operation of the valve incorporating the arrangement of this invention will now be described, starting with the assumption that the temperature control handle is at the "off" position and no water is flowing from the cartridge 14. In that condition the temperature control handle is at one of its limit positions with slot termination wall 78 in contact with post 100 of the volume control handle and with the fixed pin 98 projecting from casing 12 as seen in Figure 2. The volume control handle is at its neutral position with the volume control lobes 68 positioned as in Figure 4, one of the lobes being between the cartridge outlets and the other two lobes fully exposing the outlets. In this neutral position the post 100 will be in contact with the fixed pin 98 as seen in Figure 3.

Rotation of the temperature control handle away from the "off" position (arrow R, Figure 2) will start water flowing from the cartridge 14 via the outlets 16, 18 with appropriate quantities of hot and cold water mixing in the chamber 20 to achieve water of the desired temperature, i.e. water at the temperature set by the temperature control handle when its rotation is stopped. The maximum temperature is determined by the position of the adjustable stop 82. Rotation of the temperature control handle in the direction of the arrow R will have no effect on the post 100 as it remains stationary while the wall 78 moves away therefrom.

If one wants to reduce the volume of water flowing from the mixing chamber 20 to the diverter 26 and thence to the tub or shower, one need only rotate the volume control handle away from its neutral position as seen in Figure 4. Rotation of the volume control handle will move the central lobe and one of the other lobes 68 from the non-obstructing position of Figure 4 progressively in front of the adjacent outlets 16 and 18 so as to partially interrupt the water flowing therefrom and thereby reduce the volume of water issuing from the cartridge to the mixing chamber. The apertures 74 in the lobes 68 ensure that the water will never be completely interrupted and they also help to reduce the noise level of the issuing water by separating it into multiple streams.

When the user is finished and turns the temperature control handle back towards the "off" position the wall 78 of the temperature control handle will engage the post 100 on the volume control handle, causing the volume contra handle 62 to rotate with the temperature control handle 50. When the temperature control handle reaches the "off" position the volume control handle will have been rotated sufficiently to move it to its neutral position with the lobes 68 oriented as seen in Figure 4.

It is therefore seen that the present invention provides an arrangement that permits control of the volume of properly mixed water at the desired temperature issuing from a pressure balancing control valve. The maximum flow rate is that which would otherwise be achieved without the volume control valve in place. The minimum flow

rate is in the vicinity of 2 USGPM. At no time is the flow stopped by the volume control of the present invention.

The present invention has been described in relation to a particular configuration of pressure balancing valve but as indicated above the invention can be adapted to other valve configurations by any skilled workman. Such workmen should be able to modify the structure of the valve installation without excessive experimentation and without departing from the spirit of the invention. Accordingly the protection to be afforded this invention is to be determined from the scope of the claims appended hereto.

CLAIMS

1. A volume and temperature control arrangement for a pressure balancing water mixing valve having a valve casing, hot and cold water inlets to the casing, a pressure balancing cartridge in the casing, hot and cold water outlets leading from the cartridge to a mixing chamber within the casing, a mixed water outlet leading from the mixing chamber, a diverter downstream of the mixed water outlet, and conduits leading from the diverter to a tub and to a shower respectively, said arrangement comprising: first control means connected to said cartridge for controlling the temperature of water exiting said cartridge outlets to said mixing chamber and for adjusting said valve between off or on conditions thereof; and second control means for controlling the volume of water issuing from said cartridge to said mixing chamber, said first and second control means being interconnected for conjoint interdependent operation.

2. The arrangement of claim 1 wherein said first control means comprises a first handle member connected to said cartridge and rotatable between first and second limit positions, said first limit position coinciding with said off condition of said valve.

3. The arrangement of claim 2 wherein said second control means comprises a second handle member concentric with said first handle member, carrying

three apertured lobes located within said mixing chamber, and including post means extending therefrom into an arcuate discontinuous slot in said first handle member for movement therewith to a neutral position when said first handle member is moved to said first limit position.

4. The arrangement of claim 3 wherein said first handle member is secured to a first shaft which in turn is secured to a rotatable mixing control member within said cartridge and said second handle member is connected to a second shaft which is externally concentric to said first shaft.

5. The arrangement of claim 4 wherein each of said lobes is secured to an end of said second shaft within said mixing chamber, said lobes being equally circumferentially spaced about said end of said second shaft, and each having side edges extending radially from said end of said second shaft, an arcuate peripheral edge, and a plurality of apertures extending therethrough.

6. The arrangement of claim 5 wherein one of said three lobes is positioned between said cartridge outlets when said second handle member is at the neutral position thereof, said one lobe and one of the other lobes progressively interrupting the flow of water from said cartridge outlets as said second handle member is rotated away from said neutral position.

7. The arrangement of claim 5 wherein said arcuate discontinuous slot in said first handle member is alignable with a short arcuate slot in said second handle member, there being a fixed post extending from said cartridge through said slots.

8. The arrangement of claim 8 wherein one end of said discontinuous slot in conjunction with said fixed post defines said first limit position, said discontinuous slot includes a portion having splined side walls, and a removable stop member positionable within the splined portion of said discontinuous slot defines, in conjunction with said fixed post, said second limit position.

9. The arrangement of claim 8 wherein said stop member includes a pair of arms extending from a head portion and defining a gap therebetween, each arm having a splined outer edge that is arcuate and engageable with said splined edge walls of said discontinuous slot.

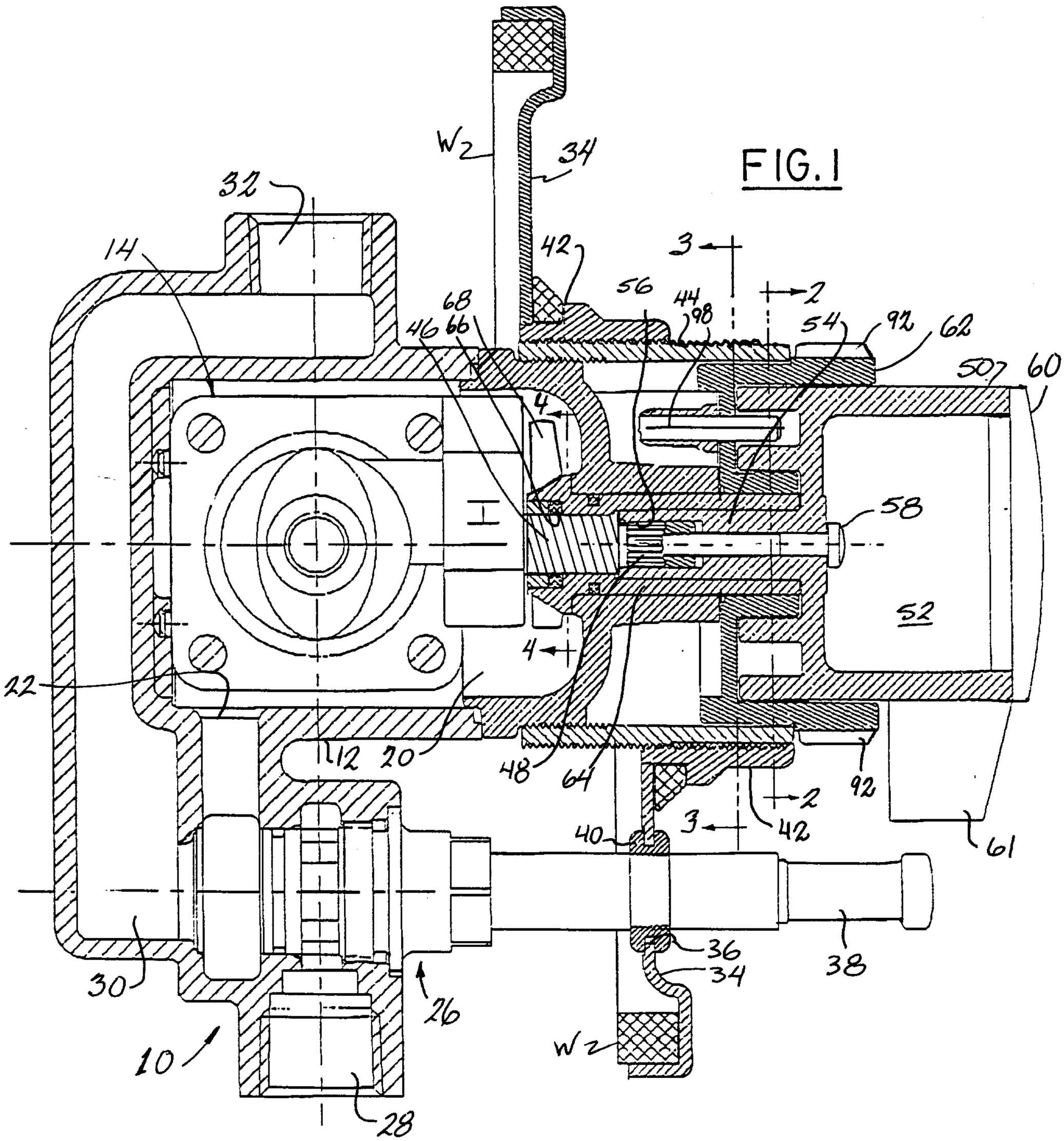

W2
34
32
14
42
3
56
44
2
68
46
66
98
54
92
62
50
60
4
58
52
4
22
12
20
48
64
2
92
3
42
40
61
36
34
38
30
26
10
W2
28

FIG. 1

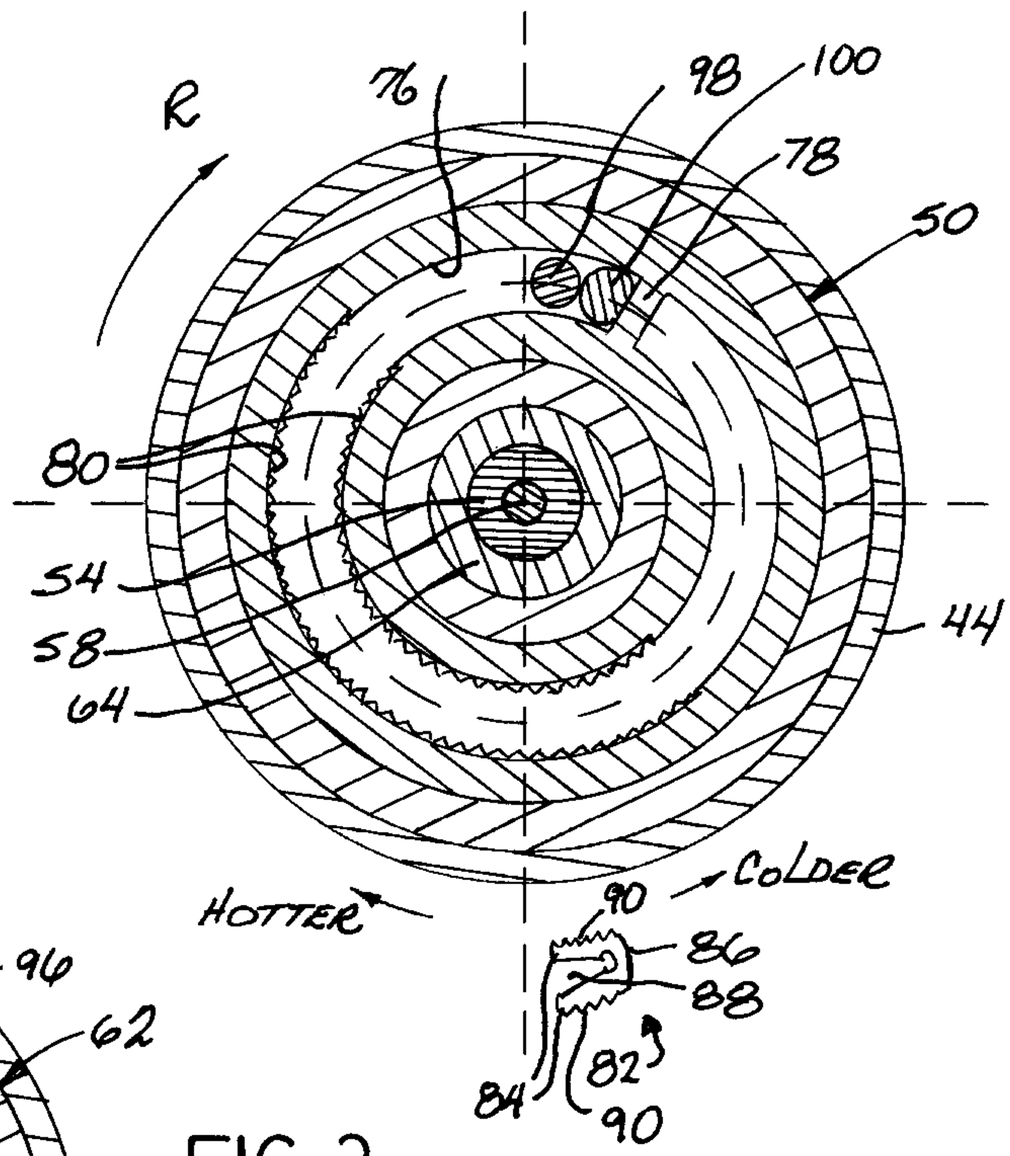


FIG. 2

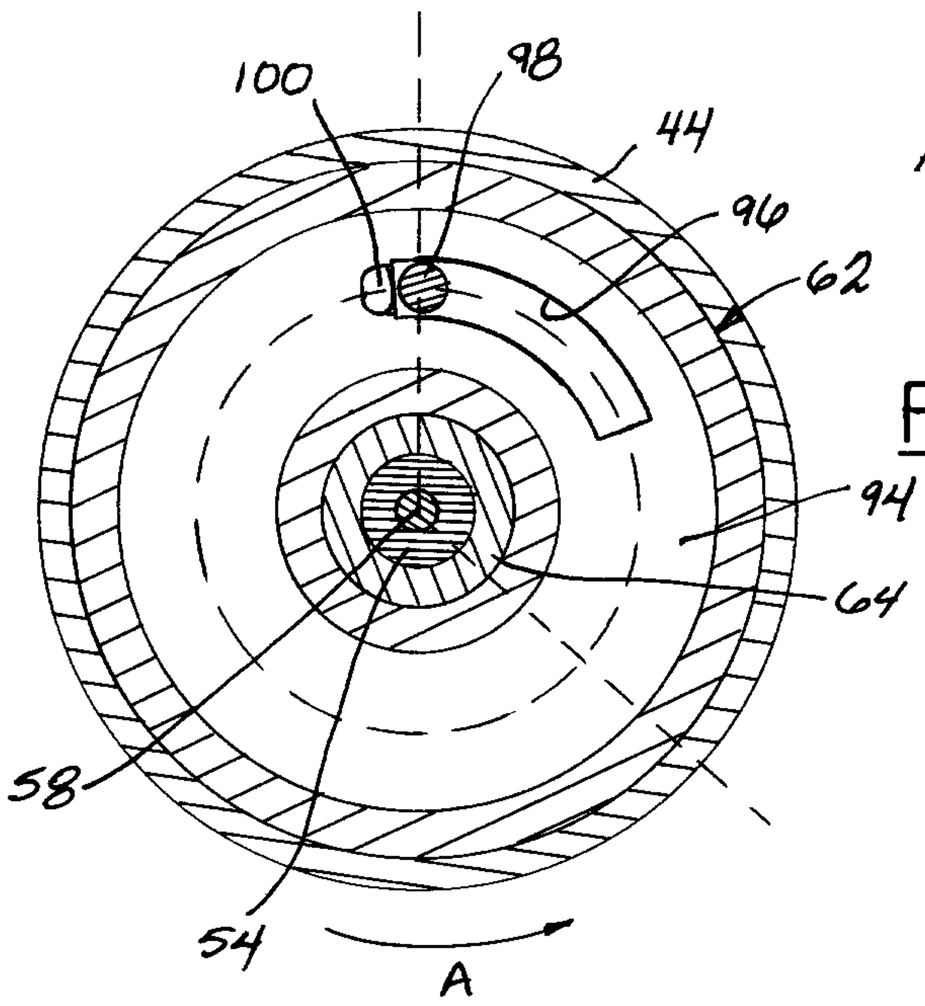


FIG. 3

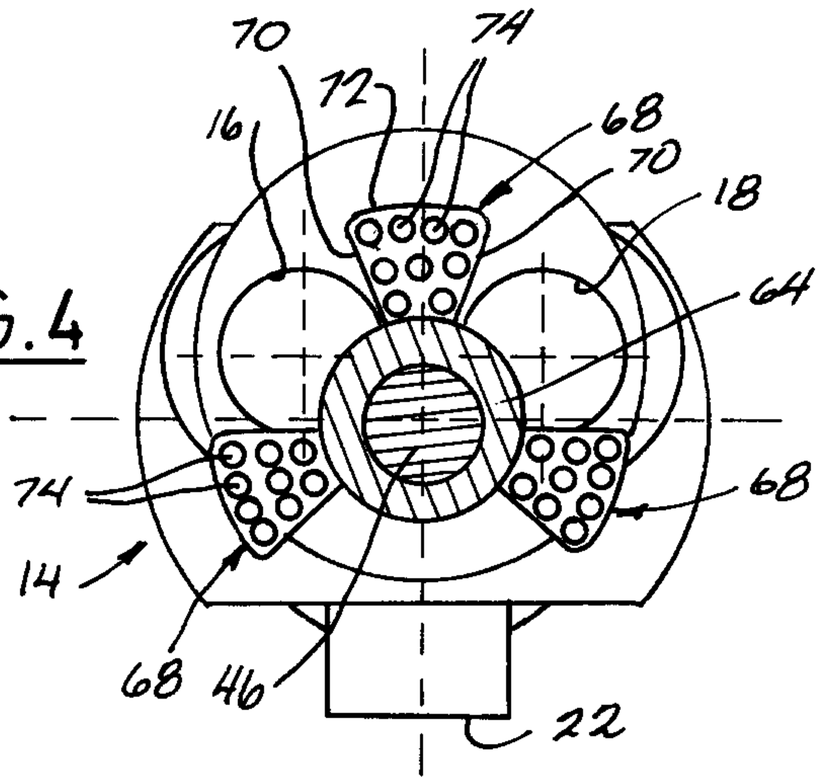
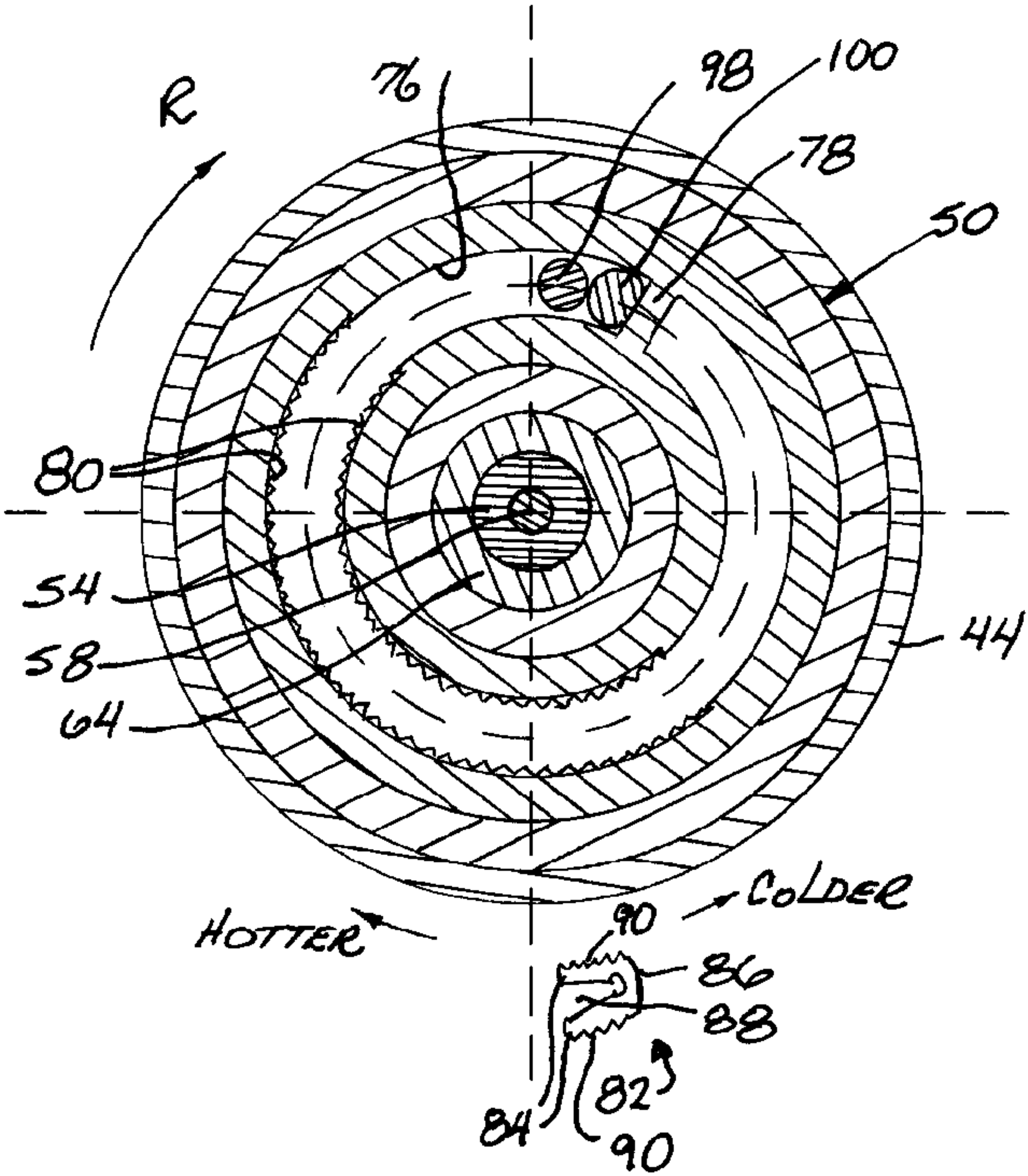


FIG. 4

manual #6


R
76
98
100
78
50
80
54
58
64
44
COLDER
HOTTER
90
86
88
84
82
90