March 10, 1959 R. H. J. MORNARD 2,876,988

FAUCETS

Filed Sept. 24, 1953 2 Sheets-Sheet 1

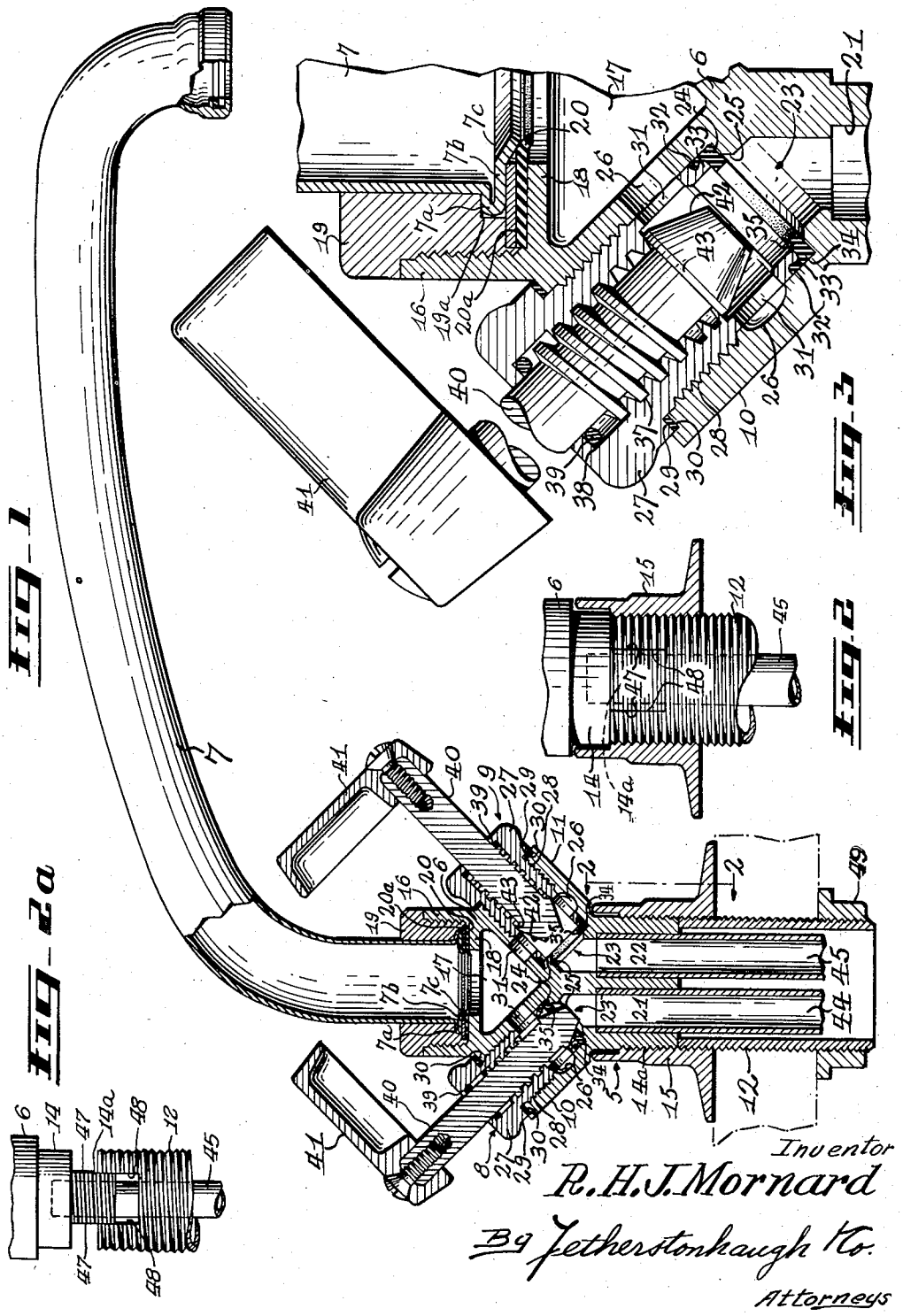


Fig. 1

Fig. 2a

Fig. 3

Fig. 2

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FAUCETS

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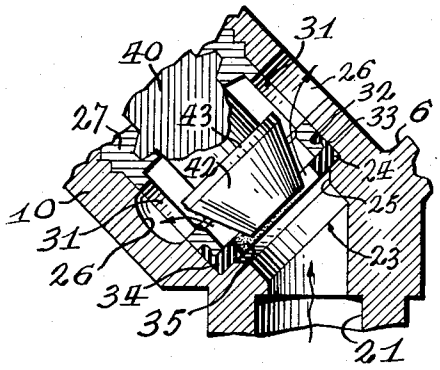


Fig. 4

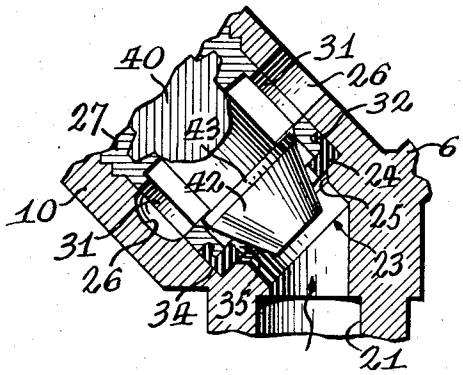


Fig. 5

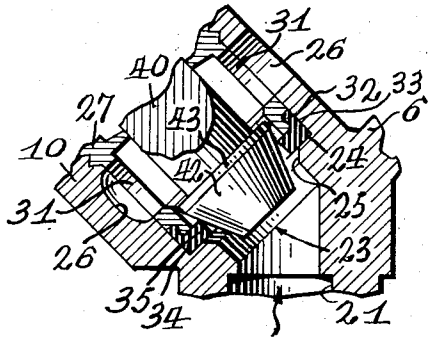


Fig. 6

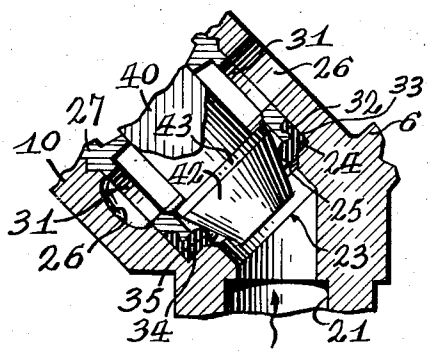


Fig. 7

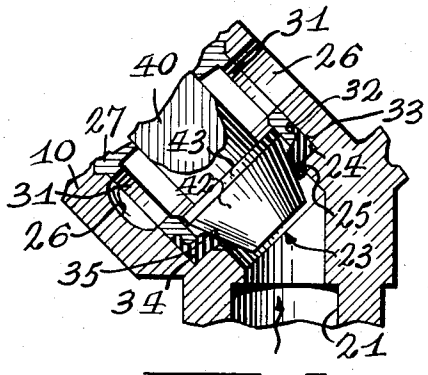


Fig. 8

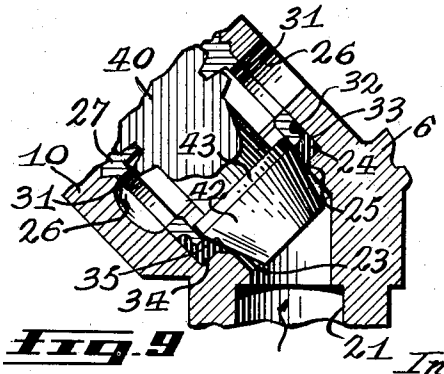


Fig. 9

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FAUCETS

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Application September 24, 1953, Serial No. 382,098

1 Claim. (Cl. 251—333)

This invention relates to improvements in faucets of the type known as "mixing faucets" to which hot and cold water are separately fed to a common chamber either singly to emerge in its original state or together to emerge as a mixture of hot and cold water through a single spout.

A particular object of this invention is to provide a faucet which comprises a body member having a mixing chamber in the upper portion thereof which is fed by separate inlet passages at one end to supply thereto hot and cold water, said body member having incorporated therein separately operable valve units for individual regulation of each supply to the chamber so as to regulate both the temperature and the volume of water to be discharged from the chamber through a single spout according to any desired temperature and in any proportionate quantities from a minimum to a maximum volume through the faucet spout.

Another object is to provide a faucet of the character described in which the intake passages to the mixing chamber are arranged to extend in parallel, close proximity through the lower portion of the body member to enable the intakes to extend through a single passage in a sink, basin, tub and the like, necessary for the installation of the faucet.

Heretofore, at least two separate passages through a sink, basin and the like are required for the hot and cold leads and sometimes a third passage for the central mixing unit as well. This is usually accompanied by additional fittings of an expensive nature for appearance sake because of their exposure. All of these additional fixtures have been eliminated in the present invention by the incorporation of the component parts in a single body member in a simplified and compact manner so that they may be mounted on a sink to extend through a single passage in the sink both for anchoring purposes and for connection to the hot and cold water supplies beneath the exposed surface of the sink.

A further object of this invention is to provide each inlet to the mixing chamber with a novel valve unit which operates to progressively reduce the inlet flow with a minimum of vibration.

A still further object is to provide a valve unit with a novel valve seating arrangement in which sealing is effected by pressure exerted from the inlet flow when contact is made between the moving valve and a flexible valve seat.

Still another object is to provide a mixing faucet of the character described with a swinging discharge spout having a flexible sealing arrangement induced by external pressure from the discharge of the water from the mixing chamber.

The above and other objects, advantages and characteristic features of this invention will be more readily understood from the following detailed description taken in connection with the accompanying drawings, in which—

Fig. 1 is a sectional view of a faucet embodying my invention.

Fig. 2 is a view taken along the lines 2—2 of Fig. 1.

Fig. 2*a* is a view similar to Fig. 2 but showing the assembly parts in partial telescopic relation.

Figs. 3 to 9 inclusive are fragmentary views of one of the valve units embodied in Fig. 1, each showing the component parts at successive stages from the fully open to closed positions.

Referring more particularly to the drawings, 5 generally indicates a mixing faucet comprising a body member 6 enclosing a mixing chamber, a spout 7 pivotally connected to the upper end of body member 6, a pair of valve units 8 and 9 receivable in inclined sockets 10 and 11 in the body member, and an externally threaded shank 12 having its upper end interfitted with the externally threaded extension 14*a* at the lower end 14 of body member 6 provided with a pair of inlet passages and secured together by means of a flanged coupling 15.

The upper end of body member 6 includes a mixing chamber 17 and an internally threaded central outlet 16 communicating with mixing chamber 17 through a restricted opening defined by an internal annular shoulder 18 at the upper end of mixing chamber 17. An externally threaded coupling 19, on the inner end of spout 7 is threadedly received in outlet 16. The inner end of spout 7 is shaped to provide a peripheral rib 7*a* which is received in an annular recess 19*a* in coupling 19. Spout 7 has a marginal portion bent inwardly from rib 7*a*, as indicated at 7*b*, and a marginal lip 7*c* bent downwardly at a slight angle from the inner edge of portion 7*b*. Lip 7*c* protrudes beyond the inner edge of shoulder 18. A ring washer 20 is seated on shoulder 18 with its inner annular edge protruding beyond the inner edge of shoulder 18 for a distance approximating that of lip 7*c*. A brass packing 20*a* is interposed between washer 20 and marginal portion 7*b*. With this arrangement spout 7, bearing against packing 20*a* is free to swivel in coupling 19. The flow of water from mixing chamber 17 serves to exert sealing pressure on the projecting portion of washer 20 against lip 7*c*.

The lower portion 14 of body member 6, which is solid, is drilled to provide two longitudinally extending inlet passages 21 and 22 having their upper ends communicating with valve sockets 10 and 11 respectively, through a restricted passage 23 at the inner end of each socket.

Sockets 10 and 11 are disposed on opposite sides of central outlet 16 in substantially V-shaped configuration with their axes intersecting the passages 21 and 22 in the lower portion 14 of the body member 6. Each passage 23 is formed by drilling into the upper end of the solid lower body portion 14 along the axis of each of the sockets 10 and 11 to provide a shoulder 24 and a throat 25 tapering from the shoulder 24 to meet the upper end of one of the passages 21 and 22. The lower portion of each socket is open at one side to the mixing chamber 17 and the remaining side wall of said lower portion is provided with an annular recess 26 communicating with the opening into said mixing chamber. The other end of each socket 10 and 11 is internally threaded to receive an externally threaded bonnet 27 of valve units 8 and 9 respectively, as indicated at 28.

Each bonnet 27 is provided with a peripheral shoulder 29 at the upper end of the external threading. A ring washer 30 is positioned between the outer end of each socket 10 and 11 and the shoulder 29 of the corresponding bonnet 27 when the latter is screw threaded into its socket. The side wall of the bonnet below the external threading is provided with a plurality of ports 31 which are in communication with mixing chamber 17 and the corresponding passages 21 and 22. The inner end of bonnet 27 has a peripheral groove 32 and a peripheral lip 33 beyond said groove, lip 33 being of slightly less diameter than the outside diameter of the lower bonnet portion. A seat washer 34, having its lower portion thickened to provide an internal annular shoulder 35 and its upper portion internally contoured complementary to the groove 32 and lip 33, is fitted about the lip and groove end of the bonnet. The inner wall of bonnet 27 above ports 31 is provided with spiral threads 37 up to a shoulder 38. An O ring 39 is fitted within the bonnet against shoulder 38. Each valve unit 8 and 9 includes a spindle 40 having external threads intermediate the length thereof corresponding to the threads 37 in the bonnet for spiral movement of the spindle within said bonnet. A handle 41 secured to the outer end of spindle 40 rotates said spindle for spiral movement of the spindle axially of the bonnet. The inner end of spindle 40 has a head which is tapered toward its unattached end, as indicated at 42, from a narrow cylindrical portion 43 adjacent the end which is attached to the stem.

Each bonnet 27 is screw threaded into one of the sockets 10 and 11 with the lower or base portion of seat washer 34 butted against the shoulder 24 in the restricted passage 23 at the inner end of the socket. Washer 30 between the peripheral shoulder 29 of bonnet 27 and the outer end of the socket ensures that the seat washer 34 will be firmly seated against shoulder 24 without unduly distorting the said seat washer.

The upper ends of a pair of flexible conduits 44 and 45 are fitted within the passages 21 and 22 respectively, of the lower portion 14 of the body member 6 and are secured in place by welding or other suitable means. The lower body portion 14 has a threaded extension 14*a*. On either sides, the lower threaded body extension 14*a* is inwardly offset to provide vertical, parallel side walls 47 which are fitted between the side walls defining a vertical slot 48 in the upper solid end of the externally threaded shank 12 so that the interrupted threads of extension 14*a* are aligned with the interrupted threads of the upper end of said shank. Shank 12 is hollow below the slotted section to permit extension of the flexible conduits 44 and 45 therethrough so that the latter may be suitably connected to hot and cold water leads (not shown). Shank 12 and the lower body portion 14 are secured in said interfitting relation by flanged coupling 15. The thus assembled faucet is then mounted on a sink or other vessel (indicated by dotted line) with the shank 12 projecting through a suitable opening in the vessel so that the flange of the coupling 15 rests on the outer surface of said vessel. A clamping nut 49 is then threaded on the lower end of shank 12 against the underside of the vessel.

Assuming, for example, that the flexible conduit 44 in passage 21 is connected to a hot water lead and that conduit 45 in passage 22 is connected to a cold water lead, valve unit 8 in valve socket 10 will control the flow of hot water to the mixing chamber 17 and valve unit 9 in socket 11 will control the flow of cold water to the mixing chamber. Inasmuch as the operation of each valve unit is identical, a detailed explanation of the operation of valve unit 8 is deemed to be sufficient for an understanding of both.

In operation, rotation of spindle 40 by handle 41 in one direction raises the tapered head of spindle 40 to a position illustrated in Fig. 3, which permits free flowing of the water from conduit 44 through the opening defined by the shoulder 35 of seat washer 34, into the interior of bonnet 27 through the end opening in said bonnet and thence through ports 31 into the mixing chamber 17. Rotation of spindle 40 in the opposite direction lowers the spindle head, as indicated in Fig. 4, so that passage of water through the opening in washer 34 and through ports 31 is restricted by the tapered head of the spindle. Further rotation in the same direction, as illustrated in Fig. 5, causes the tapered end 42 of the head to project into the restricted opening defined by the annular shoulder 35 of washer 34, and causes the cylindrical portion 43 to descend in the sleeve portion of bonnet 27 below ports 31 so that water flow passage to the mixing chamber 17 is reduced to the space between the bonnet sleeve and the cylindrical portion 43 of the spindle head. Continued rotation of the spindle affords contact between the tapered portion 42 of the spindle head and the inner edge of seat washer shoulder 35, as illustrated in Fig. 6. When said contact is made the pressure of water from the source of supply exerts a lifting pressure on the underside of shoulder 35 which projects beyond the inner edge of the restricted passage 23. This pressure causes a greater surface contact between the spindle head and the seat washer, as illustrated in Fig. 7.

If desired, rotation may be continued to cause the projecting portion of shoulder 35 to be compressed against the tapering wall of restricted throat 25, thus providing an elongation of the contact between the spindle head and the seat washer, as illustrated in Fig. 8. Still further rotation causes metal-to-metal contact between the spindle head and the restricted passage 23 at its juncture with the reduced end of throat 25. While the last two illustrated stages of rotation are not recommended because of the tendency to weaken the seat washer by excessive distortion of shoulder 35, it is pointed out that the angle of taper of throat 25 with respect to the taper of the spindle head is such that the projecting portion of seat washer shoulder 35 will be fully compressed in the throat area so as not to extend to a point which would cause shearing of the seat washer shoulder 35 when the spindle head has descended to its point of metal-to-metal contact with the passage 23 (see Fig. 9).

As the valve unit 9 is operable in an identical manner it will readily be appreciated that both volume and temperature of the water from the mixing chamber to the nozzle of the spout can be controlled by the manipulation of the valve units 8 and 9. Thus, if a small volume of water at a certain temperature is desired, independent partial closure of both valve units 8 and 9 may be effected to a point where the combined flows into the mixing chamber will produce the desired temperature as well as the desired volume of water. If the same or another temperature is required together with an increased volume of water, the valve units 8 and 9 may be adjusted proportionately to obtain the desired results.

I claim:

In a valve having a cylindrical socket provided with an outer opening at one end, an inner opening at the other end, an outlet opening in the side wall thereof and an annular shoulder surrounding said inner opening; a removable bonnet assembly comprising a cylindrical bonnet having an outlet opening in the side wall, a flexible seat washer carried by one end of said bonnet, said washer having an annular marginal portion projecting inwardly of the shoulder to provide a restricted passage therethrough and having a second annular portion fitted about a peripheral portion of the bonnet, and a spindle mounted in said bonnet for rotary and axial movement toward and away from the restricted opening in said washer, said spindle having a head tapered toward said opening in said washer, the largest diameter of said tapered head being greater than the inside diameter of said washer, said assembly being removably insertable as a unit in the outer

opening of said socket for seating of the washer against the annular shoulder at the inner opening of said socket whereby, when said spindle head engages said washer, fluid pressure will cause said marginal portion of said washer to force the latter against said spindle head to form a seal.

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