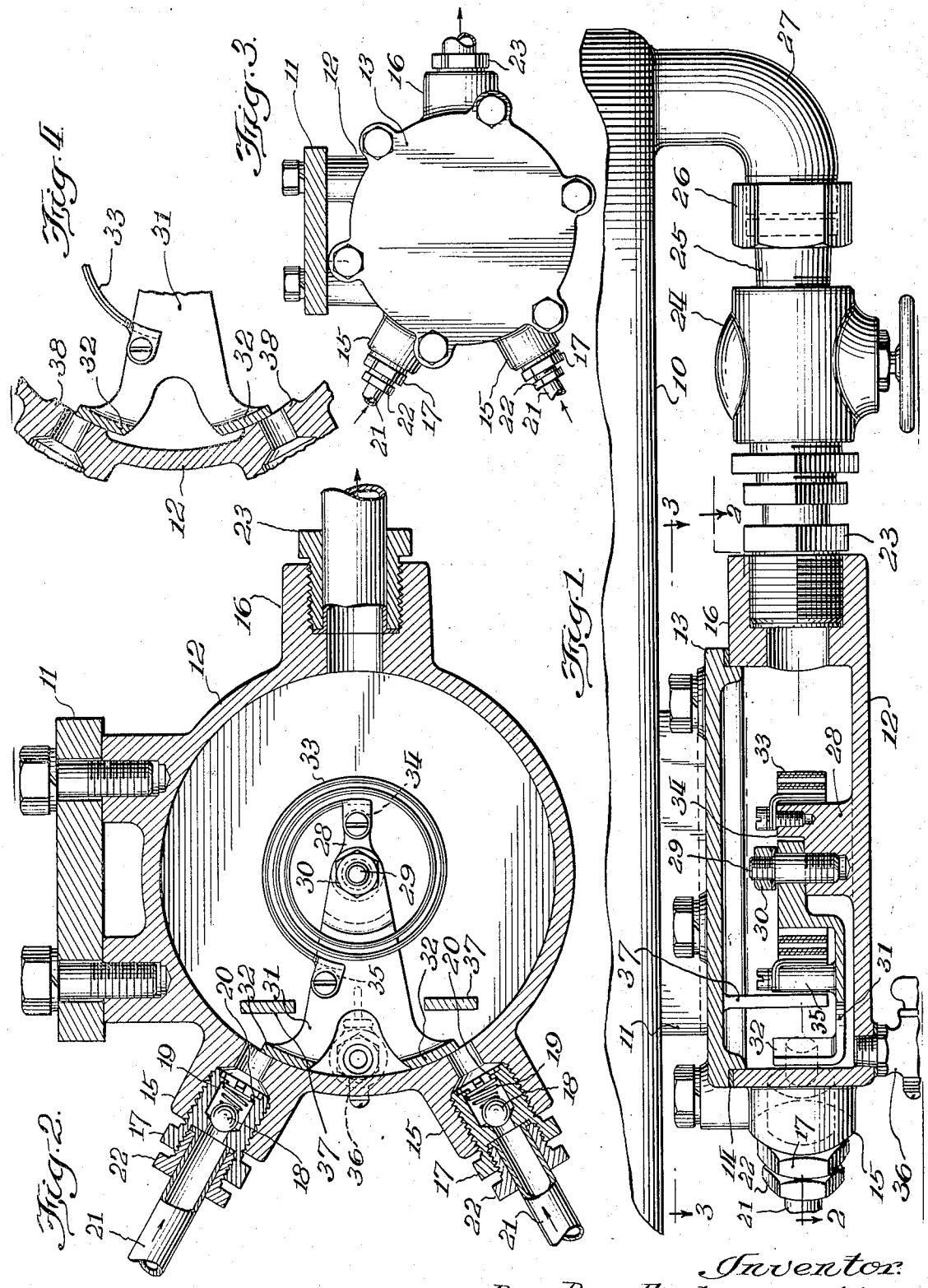
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LIQUID-PROPORTIONING DEVICE

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LIQUID-PROPORTIONING DEVICE

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1 Claim. (Cl. 236—12)

In the washing and rinsing of textiles, it is important that the wash and rinse water be at a proper temperature. Woolen fabrics suffer excessive shrinkage when they are washed or rinsed in water of an improper temperature, and other fabrics can be washed more efficiently at certain temperatures. A device for proportioning the water taken from the hot and cold water supplies, to provide wash and rinse water of a proper temperature, is therefore a highly desirable accessory for a washing machine.

The principal object of the invention is to provide an efficient and reliable proportioning device for use in washing machines and in other devices requiring water of a certain constant temperature.

More specific objects and advantages are apparent from the description, in which reference is had to the accompanying drawing illustrating a preferred form of liquid-proportioning device.

Fig. 1 of the drawing is an elevation, partly in section, showing the liquid-proportioning device attached to the bottom of the tub of a washing machine;

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1;

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 1, showing the top of the liquid-proportioning device, and

Fig. 4 is a fragmentary horizontal section showing a modification.

This specific drawing and the specific description which follows are to disclose and illustrate the invention and are not to impose limitations upon the claim.

The liquid-proportioning device of the present invention comprises a proportioning chamber supplied by two lines carrying liquids at different temperatures. The chamber has an outlet from which an outlet line may lead to the tub of a washing machine, to a shower-bath, or to any desired device. To regulate the flow of a liquid from the two lines into the chamber there is provided a proportioning device that is controlled by a means responsive to the temperature in the chamber.

When a shut-off valve or other controlling device is provided in the outlet line, it is desirable that a check valve be provided in one or both of the incoming lines in order to prevent water from flowing out of one of the lines and back into the other line in case the flow from the outlet is restricted and the pressure in one line, provided with a check valve, is less than the pressure in the other line.

The device for proportioning the flow of liquid into the chamber from the two lines is preferably in the form of a gate pivoted in the chamber for selectively blocking the inlets. For positioning the gate, there is preferably provided a thermostat, mounted in the chamber to hold the gate against deflection by water pressure. It is desirable for the flow from each of the incoming lines to be substantially restricted whenever water is permitted to flow simultaneously through both of the lines. If one of the inlets is always restricted to the same degree that the other is opened, so that the combined exposed area of the two inlets remains constant, and if the outlet passage from the chamber is of sufficient length, a steady, even flow is obtained.

In the embodiment illustrated in the drawing there is welded to the bottom of a tub 10 of a washing machine an angle bracket 11 to which is screwed a substantially cylindrical proportioning chamber 12. The chamber, which is preferably a bronze casting, is open at the top and is provided with a cast bronze cover 13 secured by machine screws. Between the chamber and the cover is a fiber gasket 14.

Two inlet openings on one side of the chamber are surrounded by external bosses 15, and an outlet opening on the opposite side is surrounded by a similar external boss 16. Threaded into each of the bosses 15 is a nipple 17 forming the body and seat of a check valve. The valve comprises a steel ball 18 held outward against its seat by a spring 19. Tongues 20 may be turned down from the metal of the nipple to retain the spring 19. The end of the copper tubing 21, through which the incoming water flows, is joined with the nipple 17 in a water-tight manner by means of a secondary nipple 22.

A similar nipple 23 is used to seal the joint between the outlet copper tubing and the outlet boss 16. The outlet copper tubing may be connected in a similar manner with a shut-off valve 24, from which a nipple 25 leads to a union 26 that connects it with an elbow 27 welded to the inlet at the bottom of the washing machine tub 10.

A stud 28 is provided integral with the bottom of the chamber 12, and has a pivot pin 29 screwed into it. This pin is provided with a nut 30 holding a washer against a shoulder on the pin to retain a substantially sector-shaped gate 31 on the pin. This gate is preferably a bronze die casting.

At the outer end of the gate 31 there is provided an arcuate flange 32 that covers one or the

other of the inlet openings as the gate moves from side to side. The middle portion of the outer end of the gate, together with the middle portion of the flange 32, may be cut away. A bimetallic coiled thermostat 33 has its inner end secured to a lug 34 on the stud 28 and its outer end secured to a lug 35 on the gate. The coils of the thermostat 33 should be spaced far enough apart so that any deposit that forms on the coils cannot seal them together.

A drain cock 36 may be provided at the bottom of the chamber beneath the outer end of the gate. Depending baffle plates 37 integral with the cover 13 prevent the water from impinging directly upon the thermostat as it enters each of the inlets, and cause it to become mixed with the other water in the chamber as soon as it enters. The inside of the chamber 12 need not be machined because a slight clearance may be provided between the flange 32 and the wall of the chamber. The proportioning device is, in general, self-cleaning. However, internal bosses 38 may be provided around the inlets, as shown in Fig. 4, to make it less likely that deposits on the interior of the chamber will interfere with the operation of the device.

In order that changes in temperature may not cause binding, the gate is preferably made of the same metal as the chamber, or of a metal having the same coefficient of expansion. The thermostat does not need to be adjusted after it has been installed, if it is made of the proper dimensions and of the proper materials to give the desired temperature of the outgoing water.

The thermostat should be sensitive enough so that it moves the gate from the position in which one inlet is wholly open to the position in which the other inlet is wholly open as the temperature in the chamber varies within the permissible range of fluctuation. Then, if a slight variation in the temperature or pressure of the water in one of the lines occurs during the operation of the device, the gate will be moved a slight amount into a new position of equilibrium.

A proportioning device constructed substantially in accordance with Figs. 1, 2 and 3 was found to be capable of delivering water having a temperature that remained almost exactly constant at 115° F., when it was supplied from hot and cold water lines at ordinary city water pressure in which the water temperatures were 180° F. and 38° F. respectively. The internal diameter of the proportioning chamber was about 3½ inches. For the thermostat a bimetallic strip was used which was 5/100ths of an inch thick, ½ inch wide and 28 inches long, wound into a coil about 2 inches in diameter. The outer layer of the metal consisted of 22% nickel, 3% chromium and 75% iron, and the inner layer was made of 36% nickel and 64% iron. Cadmium plating was necessary to make this thermostat non-corrosive.

The proportioning gate remained in a fixed position so long as the water pressure did not vary. Fluctuations in the pressure of the water caused momentary oscillation of the gate, but no variation of more than 2° F. in the temperature of the delivered water. With the outgoing line ½ inch in diameter, and 2 feet long, there was no pulsation of the flow of the delivered water, even during oscillation of the gate.

The device illustrated in the drawing may be modified, and various embodiments of the substance of the invention may be devised to meet various requirements.

I claim:

A liquid proportioning device comprising a support having rigidly mounted thereon a casing section formed with projecting baffles, a second casing section detachably connected to the first casing section and forming jointly therewith a mixing chamber having a cylindrical wall provided with inlet ports arranged respectively opposite said baffles, a swinging gate between said baffles movable about the axis of said wall selectively to open and close said inlet ports and which is carried by the detachable casing section independently of the first section so that it may be removed and replaced as a unit with said second section, and thermostatic means in said chamber connected to operate said gate and which is also mounted on said second section as a unit therewith independently of the first section.

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