P. MUELLER & A. C. SCHUERMANN.

REGULATING VALVE.

APPLICATION FILED NOV. 22, 1912.

1,100,761. Patented June 23, 1914.

Fig 1

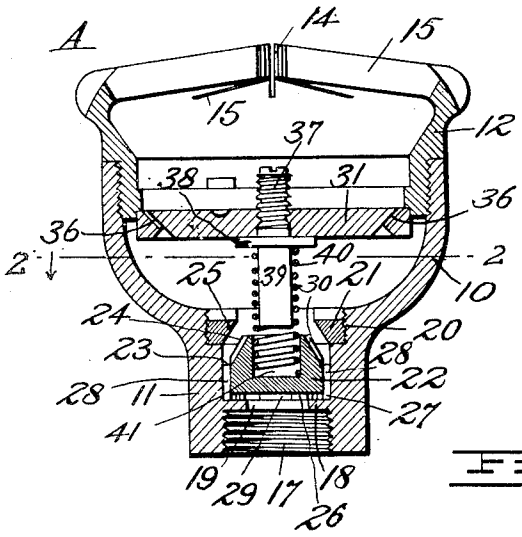


Fig 2

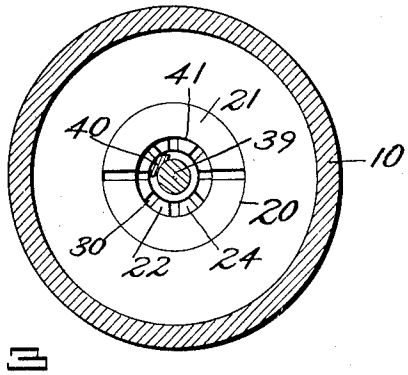


Fig 3

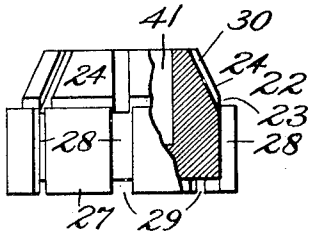


Fig 4

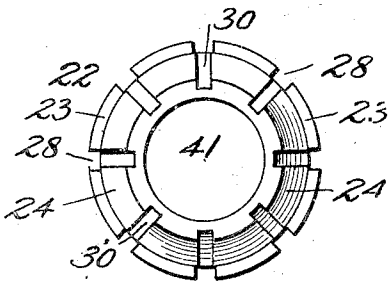


Fig 5

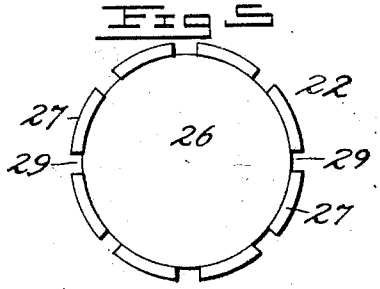
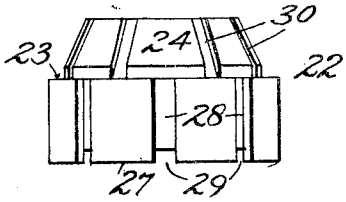


Fig 6



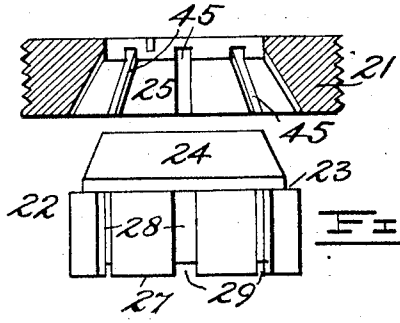


Fig 7

Witnesses

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UNITED STATES PATENT OFFICE.

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REGULATING-VALVE.

1,100,761. Specification of Letters Patent. Patented June 23, 1914.

Application filed November 22, 1912. Serial No. 732,940.

To all whom it may concern:

Be it known that we, PHILIP MUELLER and ANTON C. SCHUERMANN, citizens of the United States, residing at Decatur, in the county of Macon and State of Illinois, have invented new and useful Improvements in Regulating-Valves, of which the following is a specification.

This invention relates to regulating valves designed primarily for use with drinking fountains, but which may be used with equal advantage wherever it is desired to maintain a gentle and constant flow of water from a nozzle.

The object of the invention is to provide a nozzle with a simple pressure regulating device. This is accomplished by placing within the nozzle an adjustable automatic valve through the use of which the flow of water from the nozzle will be practically constant under varying changes of water pressure, thus enabling the drinking fountain or other outlet to be connected to a main in which the water pressure varies between more or less extreme limits with but slight effect on the outflowing stream and that effect only momentarily and at the instant of change of pressures, the stream quickly resuming its normal flow as soon as the regulating valve has adjusted itself to the change.

In the accompanying drawing, Figure 1. is vertical central section of a drinking fountain nozzle provided with the improved regulating valve. Fig. 2 is a horizontal sectional view on the line 2—2, Fig. 1. Fig. 3 is a side view partly in section of the regulating valve enlarged. Fig. 4 is a top plan view of the same. Fig. 5 is a bottom plan view. Fig. 6 is a side view of a modified form of the regulating valve. Fig. 7 is a further modified view of the regulating valve and valve seat.

In the drawings, which for illustrative purposes show the invention in connection with a drinking fountain, and wherein like reference characters are used to designate the same parts in all the figures, A indicates a drinking nozzle, here shown as hollow and provided at one end with an extension or neck 11 for the attachment of a supply pipe. The opposite end of the body is closed by a cap 12 having a central opening 14 and narrow slots 15 radiating therefrom for the passage of the drinking stream.

Through the inlet neck 11 is a central bore 17 communicating with the interior of the body 10 and divided by a transverse diaphragh 18 having a central opening 19 therethrough. Below the diaphragm 18 the bore 17 is screw-threaded for attaching the nozzle A to an inlet pipe. The upper end of the bore 17 is counterbored from within the body or otherwise enlarged downwardly at 20 for a suitable distance and interiorly screw-threaded for the reception of a removable annular valve seat 21 having an exterior peripheral screw-thread as represented in Fig. 1.

Within the bore 17 between the perforated diaphragm 18 and the valve seat 21 is placed a regulating valve plug 22 of such diameter and length as to fit snugly within said bore and move freely therein for a limited distance in an axial direction. The regulating valve plug, or valve 22, as it will be hereinafter called, is cylindrical from its lower end nearly to its upper end where it is reduced in diameter for a short distance, making a shoulder 23 and then tapers inwardly to form a frusto-conical end 24 which, when the valve is raised, contacts with a similarly shaped surface 25 on the valve seat 21. The bottom of the valve is recessed at 26 to form a flange 27 that rests on the diaphragm 18 when no water is flowing through the nozzle. A number of parallel longitudinal grooves 28 are cut in the outer periphery of the valve body from its bottom to the shoulder 23, said grooves extending through the bottom flange 27 and forming a series of notches 29 therein. The frusto-conical upper end 24 is also grooved at 30 in line with and forming a continuation of the grooves 28, but these grooves 30 are narrower and shallower than the latter grooves. The purpose of the grooves will be described later.

To limit the flow of water through the nozzle, a baffle plate 31 may be placed across the interior of the body 10 and secured thereto or to the inner end of the cap 12. Perforations 36 are formed through the baffle plate 31 for the passage of water. Through the center of the baffle plate 31 is threaded a regulating screw 37 provided with a disk or collar 38 below the baffle plate from which projects downwardly a pin 39 surrounded by a compression spring 40 one end of which bears against said collar 38, while the other end is seated in a recess 41 in the top of the regulating valve 22. By means of this screw

the tension of the spring 40 may be adjusted.

Water entering through the bore 17 strikes the bottom of the regulating valve 22 and raises it more or less depending on the water pressure, against the resistance of the spring 40. All water entering the bore passes through the notches 29 in the flange 27 of the valve, thence up along the grooves 28 and 30 to and through the valve seat 21 into the body 10 of the nozzle, thence through the perforations in the baffle plate and out through the openings 14 and 15 in the cap 12. Under ordinary low pressure the valve 22 is raised only a short distance above the diaphragm 18 not sufficient to cause the valve to contact with its seat 21, hence there is no impediment to the flow of such water as passes through the grooves 28 around the valve. Should, however, the pressure be greatly increased the force of the spring 40 would be overcome and the valve closed against the seat, preventing any water from passing to the outlet except through the narrow and shallow grooves 30 in the frusto-conical top of the valve, but this amount under the greater pressure is sufficient for all purposes. With a water pressure intermediate the extremes, the valve, under the action of the spring 40, will be forced from its seat a distance proportional to the water pressure thereby regulating the volume of water passing through the nozzle outlet to the pressure.

From the above it will be apparent that under high pressure conditions the area of the water passage around the valve is decreased while under low pressure conditions this area is increased, so that practically the same amount of water will flow from the nozzle under all conditions, the position of the valve with relation to its seat being automatically regulated by two opposing forces, that of the spring and the pressure of the water. The tension of the spring is adjusted by the screw 37 to regulate the movement of the valve, and is determined by the pressure of the water under normal and extreme conditions. The spring is tensioned to regulate the quantity of water necessary to form a constantly running stream under normal conditions and as the pressure increases or decreases either gradually or quickly the valve will respond to the change of pressure and reduce or increase the flow of water passing the valve.

Instead of forming the regulating valve as in Figs. 1, 3 and 4 with the grooves 30 in the frusto-conical end of the valve in line with the grooves 28 in the body of the valve, these grooves 30 may be made between the grooves 28 as shown in Fig. 6 for the purpose of reducing the force and speed of the water in its passage to the outlet especially when the valve is in contact with its seat. By positioning the grooves 30 intermediate the grooves 28, the water instead of flowing in a direct line through the grooves 28 and 30 will be deflected laterally more or less after escaping from the grooves 28 in order to pass on through the grooves 30 and in this way be impeded, which retardation of its flow assists in maintaining the steadiness of the drinking stream.

In Fig. 7 a further modification is shown wherein the frusto-conical end of the valve is left smooth, and grooves 45 formed in the surface of the valve seat against which the valve abuts. These grooves 45 may be in line with the grooves 28 in the valve body, or offset, as desired.

What we claim is:—

1. A regulating valve for fluid outlets comprising a casing having an inlet passage, a perforated diaphragm in said passage, a valve seat also in said passage, a valve plug snugly fitting said passage between the diaphragm and the valve seat movable toward said seat by the pressure of the incoming fluid, resilient means for forcing the valve plug from its seat toward the diaphragm, a flange or skirt on the underside of said valve plug to bear on said diaphragm through which flange notches are formed to prevent closure of the diaphragm, superficial longitudinal passages surrounding the valve plug communicating with said notches and extending over the seating surface in the valve plug to provide a passage around the valve plug at all times for a limited quantity of fluid.

2. A regulating valve for fluid outlets comprising a casing having an inlet passage, a valve seat in said passage, a valve plug snugly fitting said passage movable toward said seat by the pressure of incoming fluid, said valve plug having a cylindrical body with a tapering head at one end forming a seating for the valve plug, and a projecting notched flange at its other end, a series of longitudinal grooves formed in the body continuous with said notches, a series of longitudinal grooves also formed in said tapering head, and a circumferential groove at the base of the tapering head connecting said longitudinal grooves to form a continuous passage for fluid around the valve, a spring tending to hold said valve plug from its seat against the pressure fluid, tension adjusting means for said spring, and a stop in the inlet passage to limit the movement of said valve plug.

3. A valve plug for regulating valves comprising a cylindrical body having a tapering head of less diameter than said body and shouldered therefrom, said head forming a valve seating, a depending peripheral flange at the end opposite said head through which is formed a plurality of notches, said body being provided with peripheral grooves ex-

tending from said notches to the shouldered head, and grooves in said head in line with the body grooves, and a circumferential groove formed by said shoulder connecting the grooves in the body with the grooves in the head to permit intercommunication between all of said grooves.

4. A valve plug for regulating valves comprising a cylindrical body having a tapering head of less diameter than said body and shouldered therefrom to form a circumferential groove around the valve plug, said head forming a valve seating, a dependent peripheral flange on the end of said body opposite said head through which are formed a plurality of notches, said body being provided with a plurality of longitudinal peripheral grooves extending from said notches to the circumferential groove by which said longitudinal grooves are connected one to the other, and passages extending from said circumferential groove around the valve head when seated to permit at such times a limited flow of fluid past the valve.

5. A valve plug for regulating valves comprising a cylindrical body having a tapering head of less diameter than said body and shouldered therefrom to form a circumferential groove around the valve plug, said head forming a valve seating, a dependent peripheral flange on said body at the end opposite the head through which are formed a plurality of notches, said body being provided with a plurality of longitudinal peripheral grooves extending from said notches to the circumferential groove by which said longitudinal grooves are connected one to the other, and a plurality of by-passes around said valve seating and communicating with said circumferential groove to permit a limited flow of fluid past the valve plug when the latter is closed.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

PHILIP MUELLER.
ANTON C. SCHUERMANN.

Witnesses:
WILLIAM R. BIDDLE,
CATHERINE E. MCKEOWN.