C. G. KOPPITZ.

PRESSURE REGULATOR.

APPLICATION FILED MAY 26, 1910.

994,168.

Patented June 6, 1911.

2 SHEETS—SHEET 1.

FIG. 1.

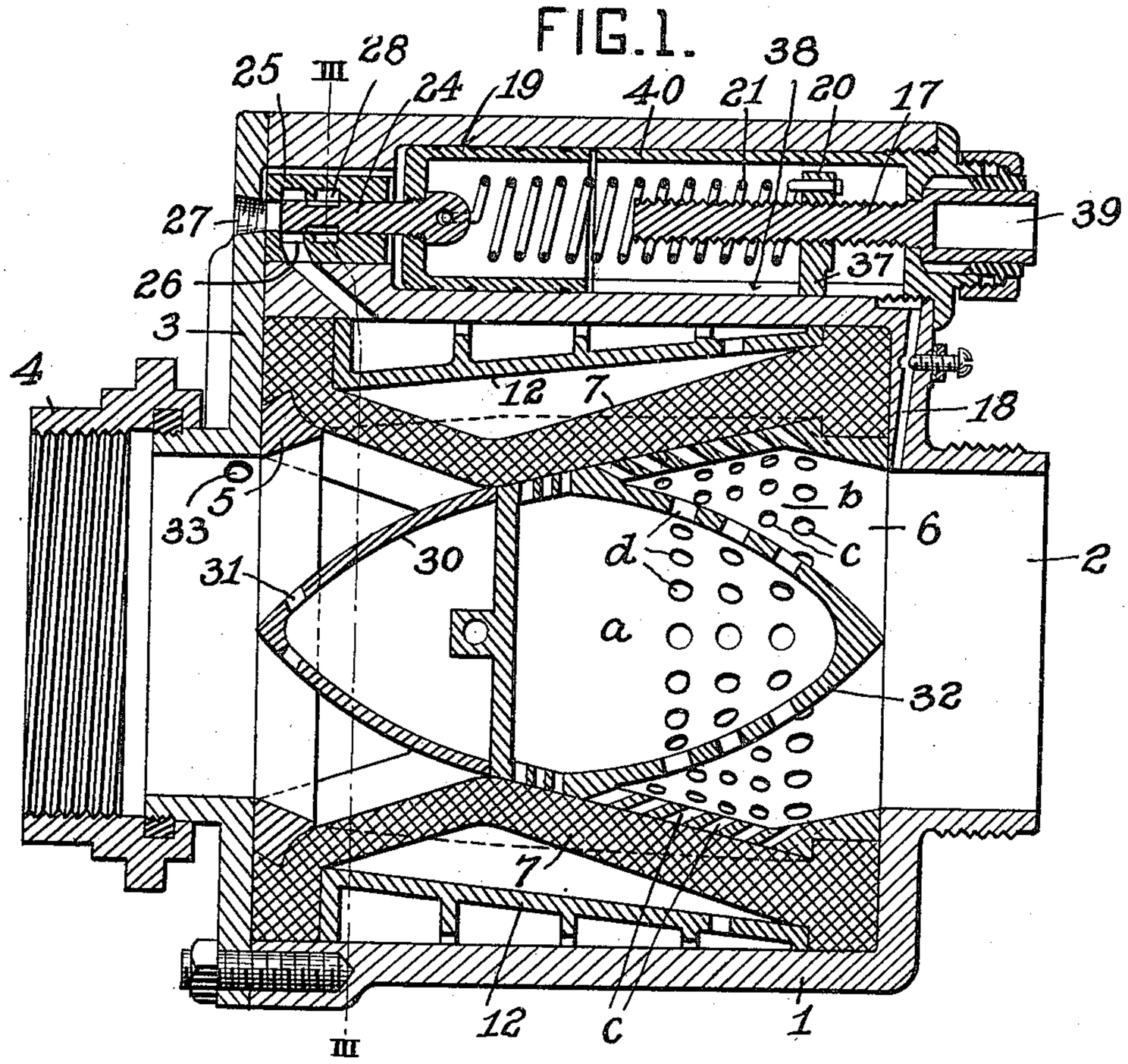
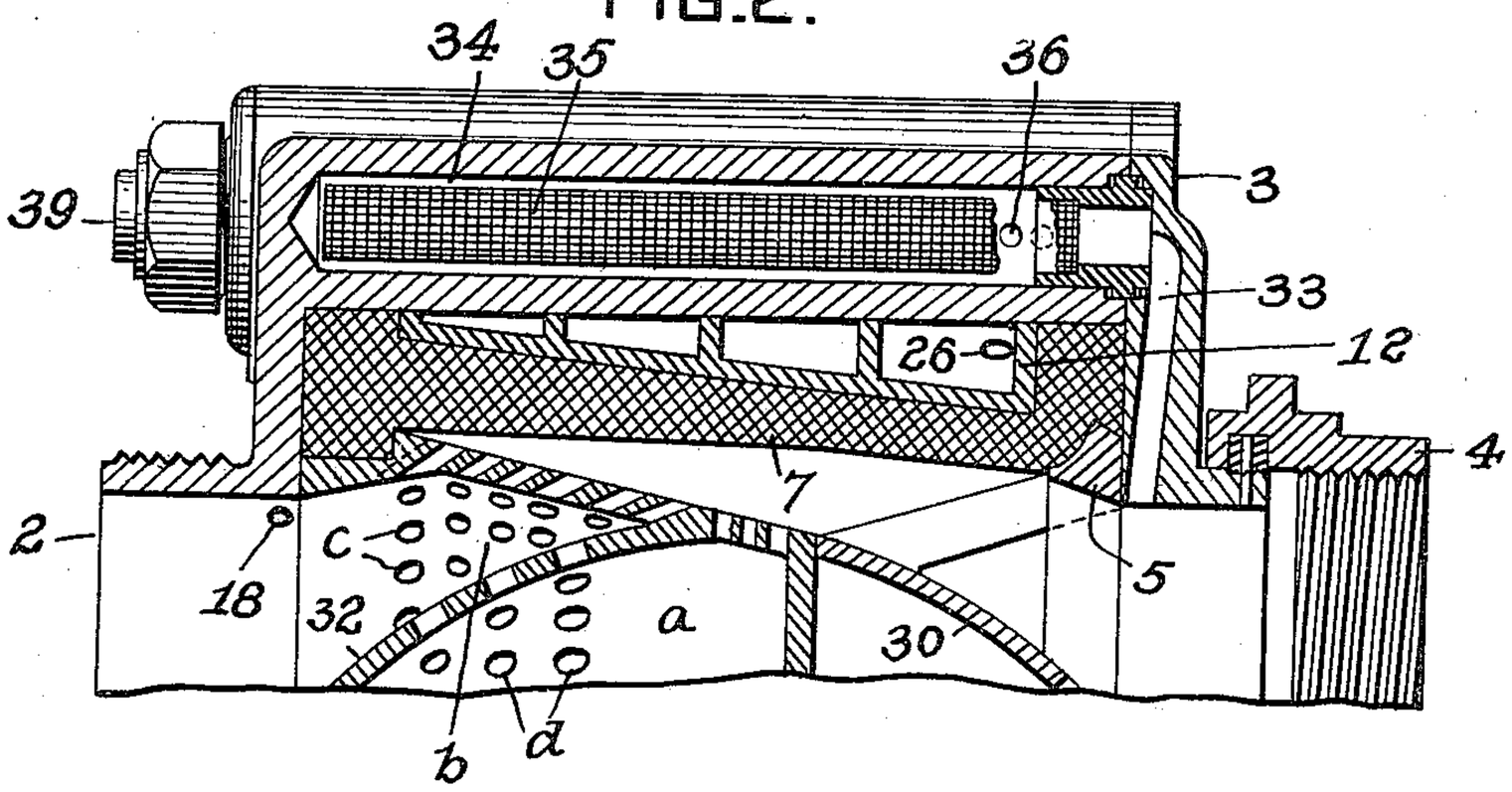


FIG. 2.



WITNESSES:

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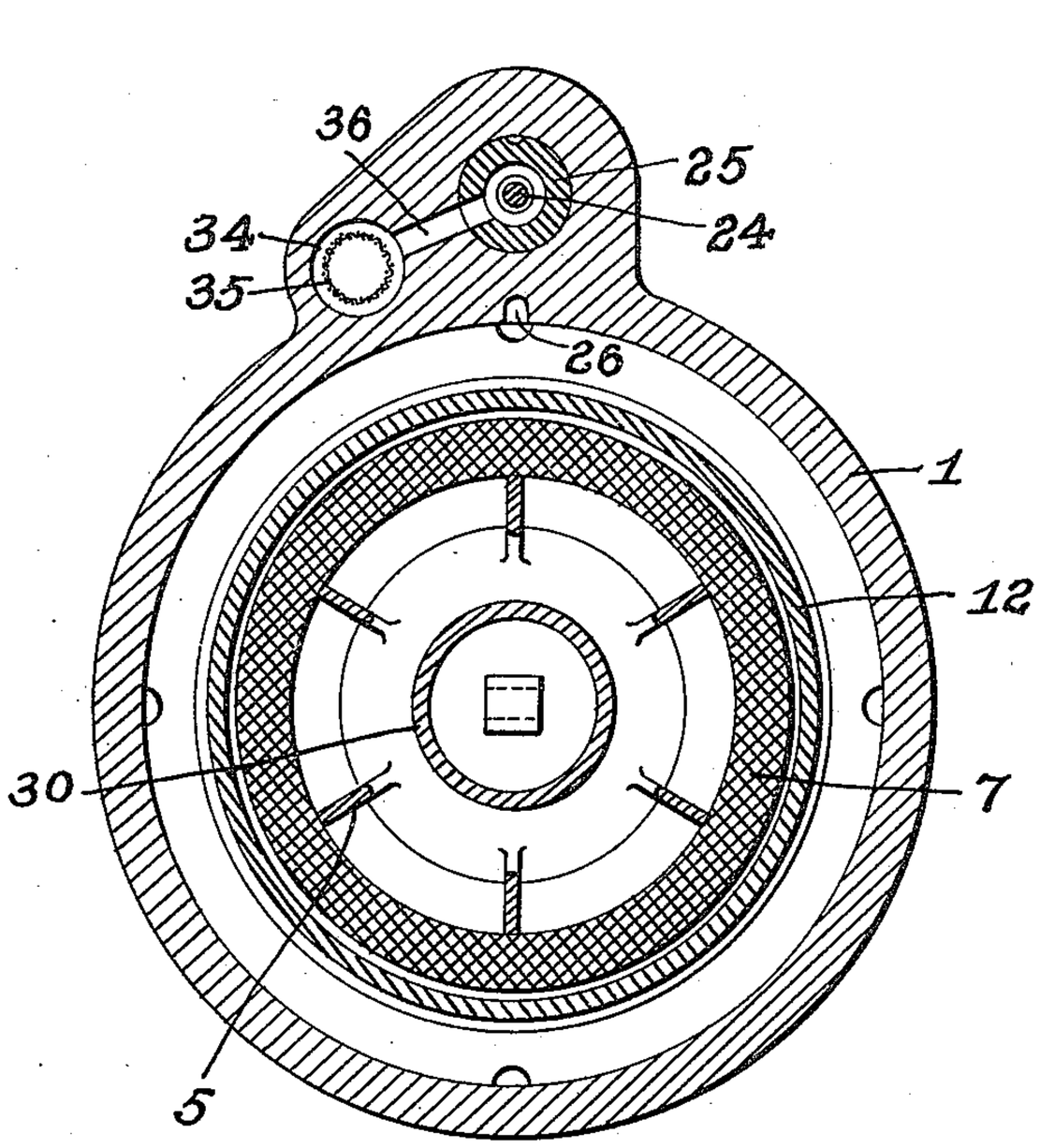
2 SHEETS—SHEET 2.

FIG. 3.



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UNITED STATES PATENT OFFICE.

CARL G. KOPPITZ, OF YOUNGSTOWN, OHIO.

PRESSURE-REGULATOR.

994,168. Specification of Letters Patent. Patented June 6, 1911.

Application filed May 26, 1910. Serial No. 563,626.

To all whom it may concern:

Be it known that I, CARL G. KOPPITZ, residing at Youngstown, in the county of Mahoning and State of Ohio, a citizen of the United States, have invented or discovered certain new and useful Improvements in Pressure-Regulators, of which improvements the following is a specification.

In an application filed July 23, 1909, Serial No. 509145 is described and shown a regulating mechanism whereby a predetermined pressure is maintained in the delivery lines, such mechanism consisting generally stated in providing a connection between said lines such connection being formed in part by a flexible and preferably resilient wall whereby the conducting capacity of such connection may be varied in accordance with changes of pressure in the delivery line.

The invention described herein relates to certain improvements in the mechanism shown and described in said application and hereinafter more fully described and claimed.

In the accompanying drawings forming a part of this specification, Figure 1 is a sectional elevation of my improved regulator, Fig. 2 is a sectional detail view showing the strainer and Fig. 3 is a transverse section on a plane indicated by the line 111—111 Fig. 1.

The shell 1 is preferably constructed as in the application referred to with one head integral with the shell or cylinder and the opposite head removable, said heads being provided respectively with nozzles 2 and 4 whereby the shell may be connected to the delivery and supply lines. The receiving member 5 of the controlling devices is made tapering as shown and has its side walls longitudinally slotted as shown in Figs. 1 and 3. A distributing cone 30 is arranged within this member 5 and projects from the inner end of the latter outwardly so that the inflowing fluid is directed outwardly through the slots in the receiving member. By the employment of this distributing or spreading member the formation of eddies or any currents opposing the flow of fluid through the receiving member is prevented. In order to facilitate the removal of this member, holes 31 are formed in the distributing cone for the reception of a suitable tool. The members 5 and 6 are arranged end to end, the delivery or discharge member 6 preferably having a taper opposite that of the member 5. The delivery or discharge member 6 is divided into two compartments or chambers *a* and *b* by a conically shaped diaphragm 32, the base of which is preferably integral with the wall of the delivery or discharge member 6. This diaphragm extends outwardly from its line of junction with the member thereby forming an annular chamber *b* having a gradually increasing capacity outwardly. The walls of the member 6 between its inner end and the line junction of the diaphragm therewith, are provided with openings *x* which will be first increased on the expansion of the sleeve. These openings *x* will form the principal path of the fluid when there is a large difference of pressure between the supply and delivery lines, and as the area of these openings is small compared with the transverse area of the nozzle 2 the diaphragm 32 will serve to prevent a too high velocity of flow through the delivery lines. The outer walls of the annular chamber *b* are perforated as at *c* the perforations are at angles less than right angles to the axis of the delivery or discharge member 6, in order that fluid passing through such perforations will be directed toward the open outer end of the member. The parts or members 5 and 6 are inclosed by a flexible and preferably resilient sheath or sleeve 7 which is caused to engage the parts or members adjacent to their outer ends not only by reason of the resilience of the material but also by the inclosing shell, a cylinder. A brace 12 is interposed between external shoulders on the sleeve or sheath, but it is so constructed *i. e.* with its inner surface inwardly inclined in a direction contrary to the flow of fluid, that it may so limit the expansion of the sleeve, that the carrying capacity of the passage formed in part by the sheath, will be approximately uniform at all points between the parts or members 5 and 6.

In addition to regulating the flow of fluid from the receiving member 5 to the member by the resilience of the sleeve or sheath, regulation is also obtained by fluid pressure operating on the outer surface of the sheath or sleeve, as in the application referred to. In the present construction a passage 33 is formed in the cap 3 extending from the receiving end of the regulator to a point in line with a pocket 34 in the wall of the shell on cylinder 1. The fluid from this passage

flows into a cylindrical strainer 35 arranged in the pocket to prevent any foreign substance entering the valve mechanism hereinafter described. From the pocket the fluid flows by a passage 36 to a port 28 in a valve casing 25, which is also provided with a port 26 connected to the interior of the shell on cylinder 1 and with an exhaust port 27. The valve 24 is so constructed that when shifted as hereinafter described the port 26 is connected either with the supply port 28 or with the exhaust port 27. The valve is connected to a piston 19 arranged in a cylinder formed in the wall of the shell. Suitable means are provided for shifting the piston to a position whereby the valve 24 will connect the port 26 with the exhaust port 27. In the construction shown a spring 21 has its ends connected to the piston and an adjustable abutment 20 preferably made in the form of a nut mounted on a threaded stem 17 extending into the cylinder. The nut can be held from rotation by any suitable means as for example by a projection 37 on the nut engaging a groove or slot 38 in the wall of the cylinder. The stem 17 is provided with a socket head 39 for the reception of a suitable turning tool.

The movement of the piston by the spring is preferably limited by a suitable stop which in this case is formed by a sleeve 40 inserted into the cylinder. When such construction is employed a groove, or slot for the reception of the projection 37, is formed in this sleeve. The cylinder or chamber in which the piston operates is connected by a passage 18 with the outlet of the regulator, so that the piston will be subject at all times to the outlet or delivery member pressure. When the pressure in the outlet exceeds that predetermined by the adjustment of the tension of the spring, the pressure will operate on the piston 19 to shift the valve 24 thereby close the exhaust and connect the supply port 28 with the port 26 and permitting the flow of fluid for the inlet into the chamber outside of the sheath or sleeve 7, thereby contracting the sheath and reducing the flow from the receiving member 5 to the delivery or discharge member 6.

I claim herein as my invention.

1. A pressure regulator having in combination hollow receiving and delivery parts or members having perforated walls, the receiving member being provided with means for directing the fluid outwardly through the perforations, and a flexible sheath or sleeve inclosing the parts or members and adapted to close the perforations therein.

2. A pressure regulator having in combination a hollow receiving part or member having perforated walls, a delivery part or member having perforated walls and provided with a transverse perforated diaphragm and a flexible sheath or sleeve inclosing the parts or members and adapted to close the perforations therein.

3. A pressure regulator having in combination a hollow receiving part or member having perforated walls, a delivery part or member provided with a conically shaped diaphragm, the walls of the part or member and the diaphragm being perforated, and a flexible sheath or sleeve inclosing the parts or members and adapted to close the perforations therein.

4. A pressure regulator having in combination hollow receiving and delivery parts or members having perforated walls a resilient sheath or sleeve inclosing said parts or members the portion of the sleeve inclosing one of the parts having approximately uniform resilience and the portion inclosing the other part having a progressively greater resilience toward its outer end and means for limiting the expansion of the more resilient portions of the sleeve.

5. A pressure regulator having in combination a shell or casing having inlet and discharge nozzles, hollow receiving and delivery parts or members having perforated walls arranged in said shell a resilient sheath or sleeve inclosing said parts or members and forming with the shell an annular chamber connected to the inlet of the shell a valve controlling the flow of the fluid to said chamber, a cylinder provided with a piston connected to said valve means for normally holding the piston and valve in position to close the connection to the annular chamber and a connection from the cylinder to the discharge nozzle.

6. A pressure regulator having in combination a shell or casing provided with inlet and discharge nozzles, hollow receiving and delivery parts or members having perforated walls a resilient sleeve or sheath inclosing said parts or members and engaging shoulders thereon, a brace inclosing the sleeve and interposed between shoulders thereon said brace having its inner wall outwardly inclined toward the discharge end of the regulator.

In testimony whereof, I have hereunto set my hand.

CARL G. KOPPITZ.

Witnesses:
G. G. TRILL,
THOS. J. ELBEL.