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PRESSURE REGULATOR

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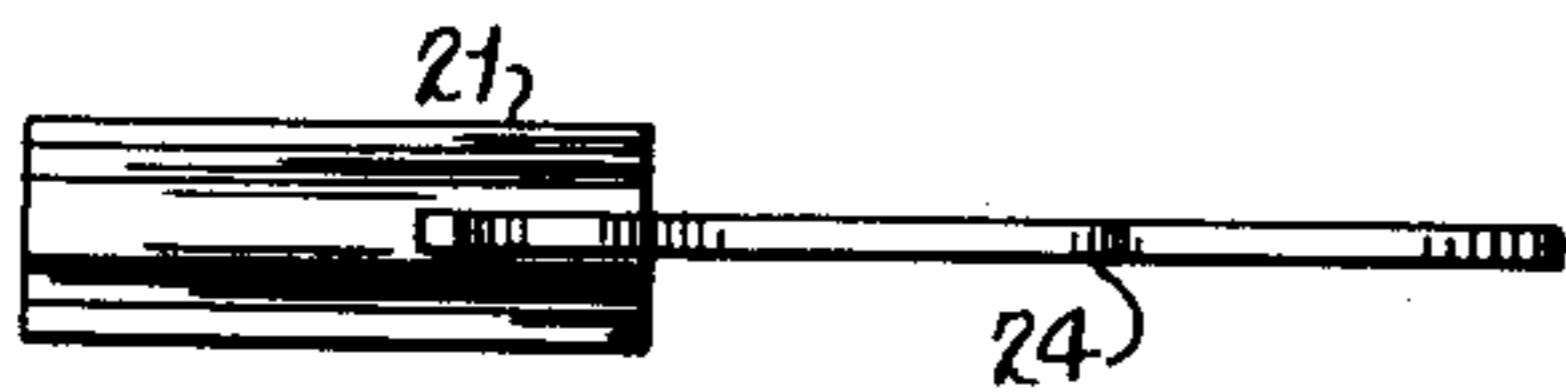
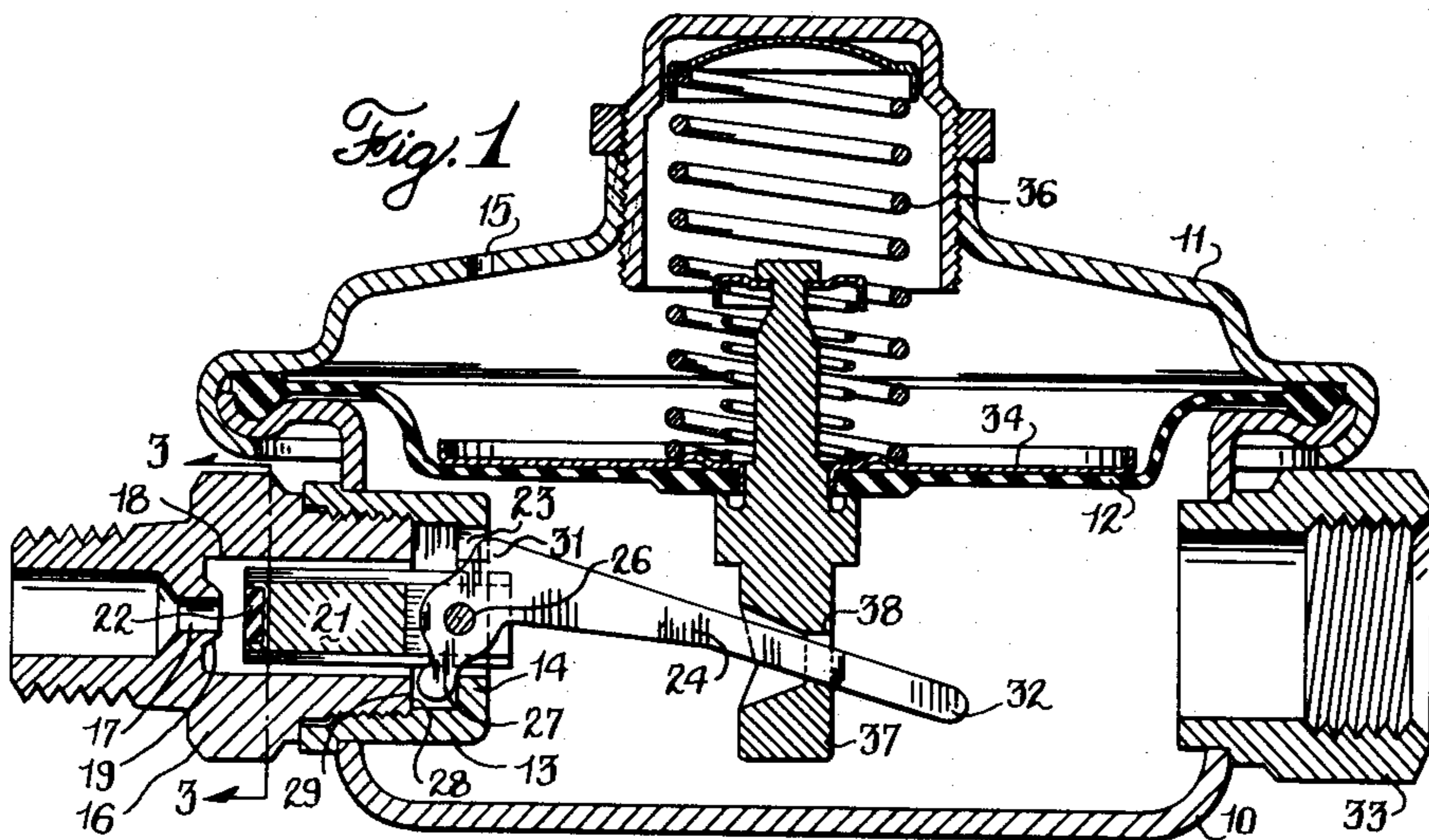


Fig. 2

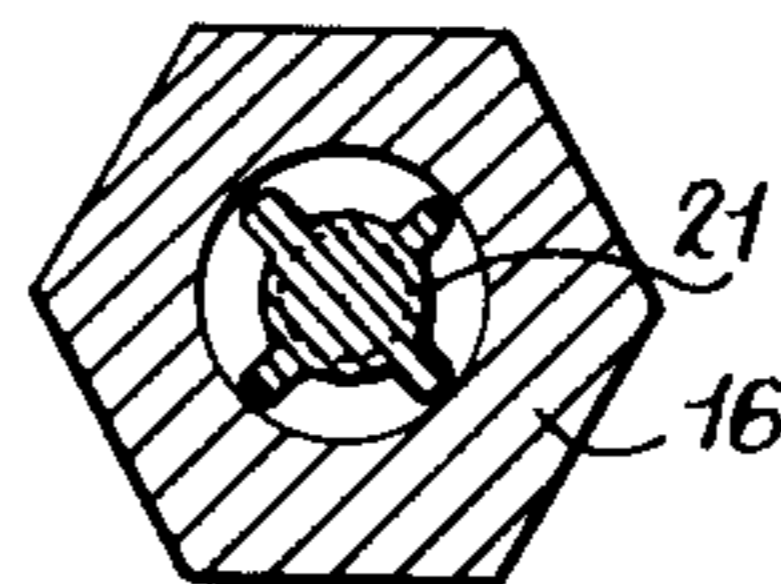


Fig. 3

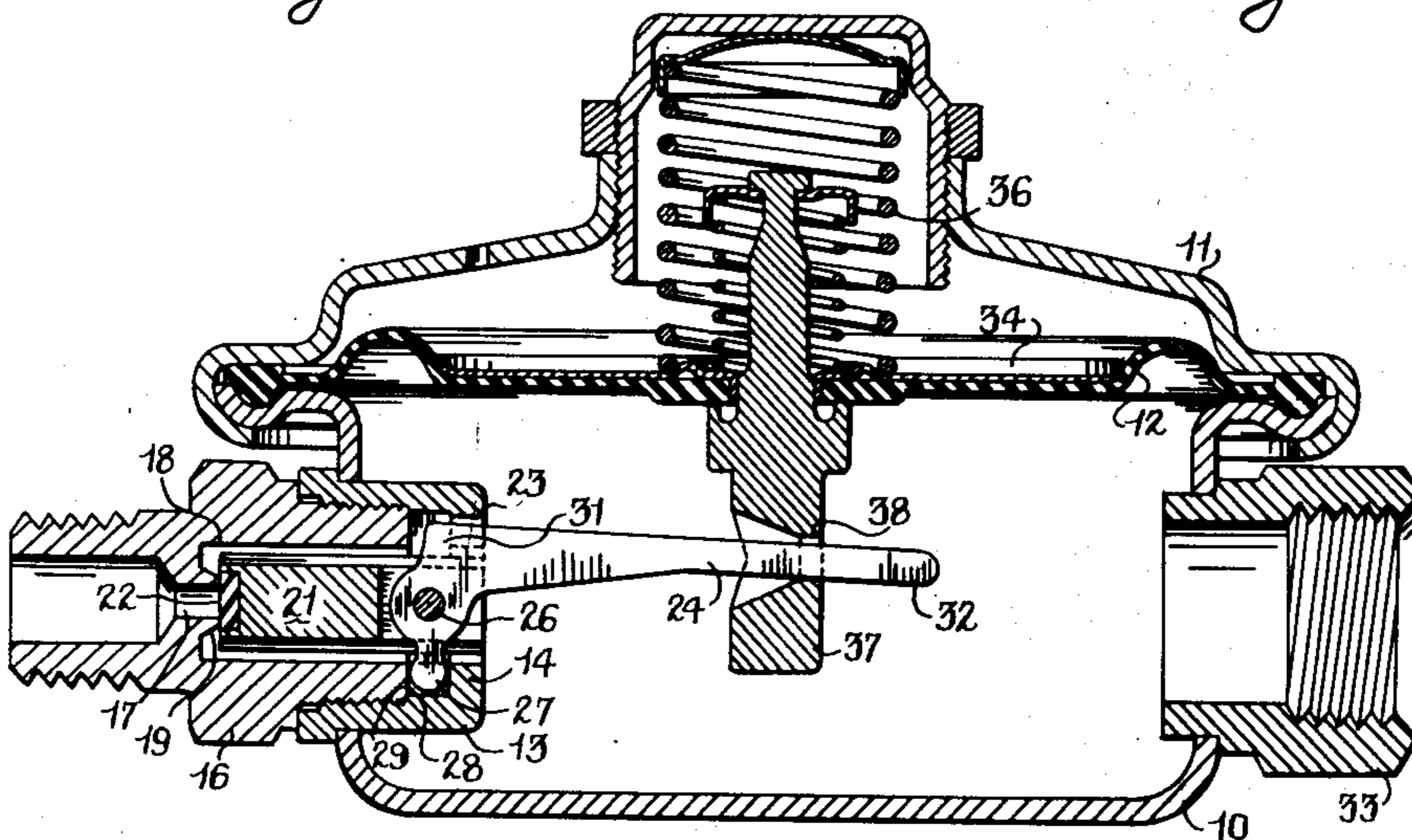


Fig. 4

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## PRESSURE REGULATOR

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9 Claims. (Cl. 251-133)

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This invention relates to a valve mounting assembly in general and is particularly adapted to poppet valve mounting assemblies employed in fluid pressure regulators or the like.

The valves adapted for use in fluid pressure regulators normally embody a construction wherein the closure or valve member is slidably mounted in a bore for motion toward or away from a valve seat in the bore. The valve member is usually actuated by a bellcrank lever assembly pivoted to the valve at one zone and to the body of the assembly at another zone and has an extension for engaging a diaphragm or other operating device.

The valve assembly disclosed herein is particularly adapted for use in conjunction with fluid pressure regulators wherein it is either undesirable or impossible to open the regulator body itself. One of the types of regulators wherein it is impossible to open the body is described in the co-pending application Serial No. 244,631, filed August 31, 1951.

The principal object of this invention is to provide a valve assembly and actuator which may be assembled through an opening or body inlet.

A further object of this invention is to provide simplified construction and assembly of a pivoted valve and more specifically a valve of the type employed in the fluid pressure regulator of the diaphragm variety.

Another object of the invention resides in the reduction of the weight of the moving valve parts which, in some applications such as pressure regulators, improves the sensitivity of the regulators. Such weight reduction is characteristic of the type of assembly just referred to as the preferred embodiment of the invention.

The advantages of economy of construction and simplicity of assembly are disclosed in a preferred embodiment of the invention which provides a quick attachable and detachable mounting for a pivoted lever mounted on the valve member which has opposed ears. One of the ears pivots in an internal groove formed in the valve housing and the other slides through a fixed slot which arrangement facilitates alignment, assembly and disassembly of the parts without the use of special tools.

In the drawings:

Fig. 1 is a vertical section through a complete regulator assembled in accordance with the invention showing the valve in the open position;

Fig. 2 is a top view of the valve member and lever unit;

Fig. 3 is a section taken at 3-3 of Fig. 1 showing

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a preferred cross section of the valve member; and

Fig. 4 is a vertical section through a complete regulator assembled in accordance with the invention wherein the valve is shown in its closed position.

As seen in Fig. 1, the invention is shown installed in a fluid pressure regulator having a main housing member 10 and a bonnet or cap 11 formed of sheet metal. A diaphragm 12 is clamped between these members forming the usual pressure or regulating chamber and the protected atmosphere chamber having a vent 15. Brazed or otherwise fastened to member 10 is a valve housing member 13 which is tubular in form having an internal flange 14 substantially radial to the axis of the tube at the internal end. Detachably attached to the valve housing 13 is the valve body 16 which has an axial bore for conduction of fluid into the pressure chamber. This bore is formed with a restricted nozzle 17 and an enlarged bore portion 18 for receiving the valve member. A valve seat 19 is formed within the bore 18. Slidably in the bore 18 is a non-circular poppet or valve member 21 which is arranged to permit fluid to flow past the member when the valve is open. A relatively soft sealing member 22 is carried by the valve member for making sealing engagement with the valve seat 19.

The valve housing is slotted as at 23 for reception of a thin lever member 24 pivoted to the valve member by a pin 26. In the assembled position a curved projection or ear 27 is formed on the lever 24 which fits within an annular groove 28 formed within the housing 13 by the end face 29 of the valve body 16 in cooperation with the flange 14. Rotation of the valve member 21 and lever about the axis of the valve member is prevented by a diametrically-opposed ear or prejection 31 which slides within the slot 23 formed in the flange 14 of the housing. The slot 23 is substantially equal in width to the thickness of the lever portion 31. The manner of assembly of these parts will be explained in detail presently.

In the illustrated embodiment of the invention, the lever 24 has an extension 32 for actuation by the regulator structure. As is customary, an outlet port 33 is provided in member 10. The actuating structure includes a backing plate 34 for protecting the diaphragm 12, the diaphragm being urged in a direction which opens the valve by means of a spring 36. A post 37 is mounted for motion with the diaphragm and serves to connect the latter to the valve actuating lever 24 by

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means of an aperture 38 through which the arm extension 32 is inserted.

In the embodiment illustrated it should be noted that no special tools are required to assemble and disassemble the valve assembly since the entire operation is performed by the mere removal of the valve body, which, in turn, permits the valve member and the bellcrank lever to be lifted out of the regulator. To assemble the valve one merely inserts the lever and valve member 21 in the valve housing so that the lever extension 32 is inserted through the aperture 38 in the post 37. Since the ear 31 must slide into the slot 23 in order to assemble this mechanism all the parts will be automatically oriented. The valve body is then screwed into place and assembly is complete.

Although the valve is particularly adapted for use in connection with pressure regulators wherein the diaphragm is permanently attached the assembly and disassembly is so simple that it is well suited to other types of pressure regulators or other types of valves.

Although one form of my invention is here disclosed in considerable detail it will be understood that those skilled in the art may vary such details without departing from the scope of the invention as set forth in the following claims.

What is claimed is:

1. A poppet valve comprised of a body assembly and a poppet assembly said body assembly composed of a valve housing formed with an axial passage and an internal substantially radial flange, and a valve body formed with an axial passage and an end face which in cooperation with said flange forms an internal recess with axially spaced substantially-radial walls, said body assembly being formed with a substantially radial slot providing circumferentially spaced substantially radial walls, said poppet assembly being composed of a valve poppet slidable in said body passage, and a poppet lever having a circumferentially spaced ear portion positioned between and axially located by said axially spaced substantially radial walls of said recess, said poppet assembly having a second circumferentially located ear portion positioned between and being circumferentially located by said circumferentially spaced substantially radial walls.

2. A poppet valve assembly comprising a housing member formed with an axial passage, an internal flange and a substantially radial slot in said flange providing circumferentially spaced substantially radial walls, a valve body with an end face which in cooperation with said flange forms an internal recess within the housing member providing axially spaced substantially radial walls, said valve body formed with an axial passage with a valve seat disposed therein, a valve poppet reciprocable in said passage for engaging said seat, and a valve lever pivoted to said poppet, said lever having circumferentially spaced ear portions, one of said ear portions being positioned between and axially located by the axially spaced substantially radial walls of said recess, the other ear portion extending between and being circumferentially located by the circumferentially spaced substantially radial walls of said slot.

3. A poppet valve assembly comprising an annular housing member formed with an internal flange and a substantially radial slot in said flange providing circumferentially spaced substantially radial walls, a valve body having an end wall which in cooperation with said flange forms an internal annular groove within the

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housing member providing axially spaced substantially radial walls, said valve body formed with an axial passage with a valve seat disposed therein, a valve poppet reciprocable in said passage for engaging said seat, and a valve lever pivoted to said poppet, said lever having circumferentially spaced ear portions, one of said ear portions being positioned between and axially located by the axially spaced substantially radial walls of said groove, the other ear portion extending between and being circumferentially located by the circumferentially spaced substantially radial walls of said slot.

4. A poppet valve assembly comprising an annular housing member formed with an internal flange and a substantially radial slot in said flange providing circumferentially spaced, substantially radial walls, a valve body having an end wall which in cooperation with said flange forms an internal annular groove within the housing member providing axially spaced substantially radial walls, said valve body formed with an axial bore with a valve seat disposed therein, a valve poppet reciprocable in said bore for engaging said seat, and a valve lever pivoted to said poppet, said lever having circumferentially spaced ear portions, one of said ear portions being positioned between and axially located by the axially spaced substantially radial walls of said groove, the other ear portion extending between and being circumferentially located by the circumferentially spaced substantially radial walls of said slot, said lever having an elongated shank generally parallel to the axis of said bore for engagement with a regulator diaphragm member.

5. For use in a regulator having a pressure chamber partially bounded by a spring-loaded diaphragm means, inlet and outlet ports for said chamber, a poppet valve assembly located in said inlet port comprising an annular housing member having an internal flange and a substantially radial slot in said flange providing circumferentially spaced substantially radial walls, a valve body having an end wall which in cooperation with said flange forms an internal annular groove within the housing member providing axially spaced substantially radial walls, said valve body having a bore with a valve seat disposed therein, a valve poppet reciprocable in said bore for engaging said seat, and a valve lever pivoted to said poppet, said lever having circumferentially spaced ear portions, one of said ear portions being positioned between and axially located by the axially spaced substantially radial walls of said groove, the other ear portion extending between and being circumferentially located by the circumferentially spaced substantially radial walls of said slot, said lever having an elongated shank generally parallel to the axis of said bore for engagement with a regulator diaphragm member.

6. A poppet valve assembly comprising an annular housing member having an internal flange and a substantially radial slot in said flange providing circumferentially spaced substantially radial walls, a valve body having an end wall which in cooperation with said flange forms an internal annular groove within the housing member providing axially spaced substantially radial walls, said valve body formed with a passage with a valve seat disposed therein, a valve poppet for controlling fluid flow through said passageway reciprocable in said passage for engaging said seat, and a valve lever pivoted to said poppet, said lever having circumferentially spaced ear portions, one of said ear portions being positioned

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between and axially located by the axially spaced substantially radial walls of said groove, the other ear portion extending between and being circumferentially located by the circumferentially spaced substantially radial walls of said slot.

7. A poppet valve assembly comprising an annular housing member having an internal flange and a substantially radial slot in said flange providing circumferentially spaced substantially radial walls, a valve body having an end face which in cooperation with said flange forms an internal annular groove within the housing member providing axially spaced substantially radial walls, said valve body formed with a passage with a valve seat disposed therein, a valve poppet reciprocable in said passage having means for engaging said seat, and a valve lever pivoted to said poppet, said lever having circumferentially spaced ear portions, one of said ear portions being positioned between and axially located by the axially spaced substantially radial walls of said groove, the other ear portion extending between and being circumferentially located by the circumferentially spaced substantially radial walls of said slot.

8. A poppet valve assembly comprising an annular housing member having an internal flange and a substantially radial slot in said flange providing circumferentially spaced substantially radial walls, a valve body with an end face which in cooperation with said flange forms an internal annular groove within the housing member providing axially spaced substantially radial walls, said valve body formed with an axial bore

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with a valve seat disposed therein, said bore having a diameter no greater than the diameter of the aperture formed by said flange, a valve poppet reciprocable in said bore for engaging said seat, and a valve lever pivoted to said poppet, said lever having circumferentially spaced ear portions, one of said ear portions being positioned between and axially located by the axially spaced substantially radial walls of said groove, the other ear portion extending between and being circumferentially located by the circumferentially spaced substantially radial walls of said slot.

9. A poppet valve assembly comprising an internally threaded housing member formed with an internal flange, said flange being provided with a slot, a valve body threaded into said housing member, a movable valve member in said body, an actuating lever pivoted to said member, said lever having a portion projecting through said slot and a portion engaging the end wall of said body and one side of said flange, said engagement of said lever, body and flange being radially spaced from the pivot of said lever and member.

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