Dec. 12, 1950 F. H. ANDERSON 2,533,907

PRESSURE REDUCER AND AIR STRAINER

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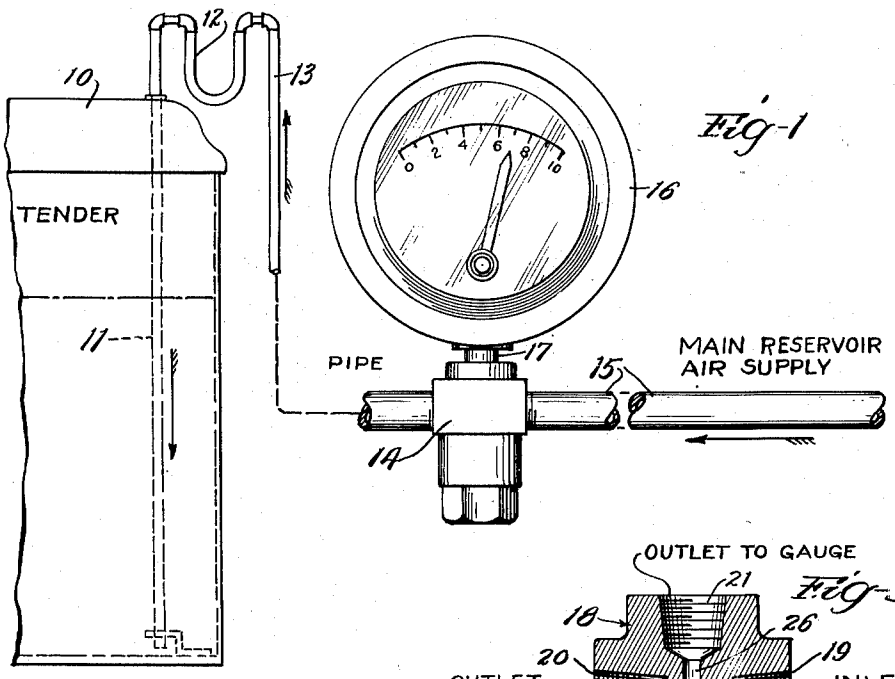


Fig-1

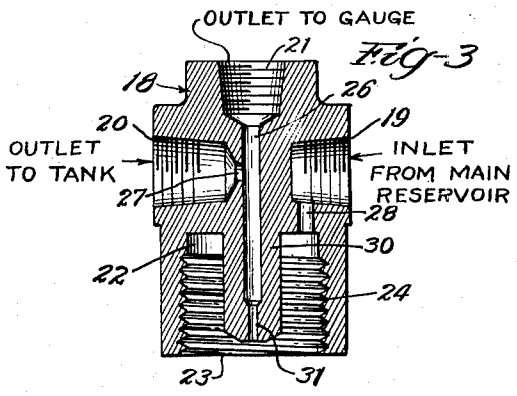
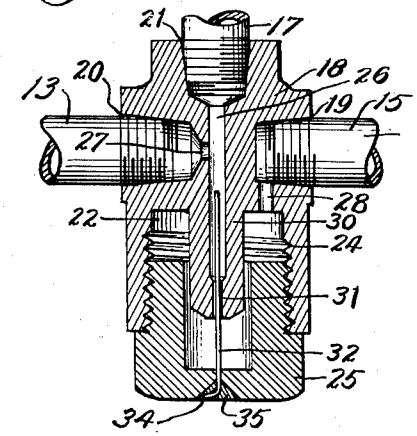


Fig-3

Fig-2



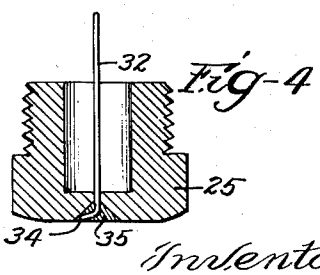


Fig-4

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PRESSURE REDUCER AND AIR STRAINER

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2 Claims. (Cl. 138—45)

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Under Interstate Commerce Commission orders each steam locomotive must be equipped with a "tank water level indicator" to show on a gauge, that is readily visible in the cab of the locomotive, the height of water in the tender tank. Many of these indicators operate by air pressure acting against the head of water in a pipe extending down to within about 2" of the bottom of the tender tank and open at its lower end. The higher the water in the tank the greater the pressure required to force air down through the pipe to escape at the lower end and bubble up through the water. That pressure on a suitable gauge will indicate the depth of the water in feet and inches.

Many large tender tanks, when full of water, have a depth on the order of eight feet, and hence present a hydraulic head, in the mentioned pipe, on the order of three and one-half pounds. The source of compressed air on the locomotive is the main reservoir with a pressure of one hundred and forty pounds, which pressure must be reduced to less than five pounds and delivered to a certainty, regardless of the unavoidable presence of oil, dirt, etc., in the compressed air.

Pressure reducers and air strainers heretofore used in these devices have been the cause of a great deal of difficulty and expense; and the principal object of this invention is to provide a suitable device that will be substantially free from those objections. Generally speaking, this is accomplished by providing a pressure reducer and air strainer including an orifice and a co-operating pin or needle, to reduce that orifice to the correct size, and to automatically clean it by the operation of removing or inserting a pin or needle.

In the drawings:

Fig. 1 is a diagram of a portion of a tender, a gauge on the locomotive, a pressure reducer, air strainer embodying this invention, and appropriate pipe connections;

Fig. 2 is an enlarged section through the pressure reducer and air strainer in assembled condition;

Fig. 3 is a similar section of the body portion of that device; and

Fig. 4 is a similar section through a clean-out plug and clean-out needle that has been found satisfactory.

In Fig. 1 the tender is indicated by 10, equipped with a pipe 11 open at its lower end to the water in the tender tank, and flexibly connected at 12 to a pipe 13 leading to a pressure reducer and air strainer, generally indicated at 14, connected to

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the main reservoir of air supply by a pipe 15 and to a gauge 16 by a pipe 17.

The pressure reducer and air strainer includes a valve body, generally indicated by 18, having a pipe-threaded high pressure inlet 19, a pipe-threaded low pressure outlet 20, and a pipe-threaded outlet 21 to the gauge 16. It also includes a high pressure chamber 22 ending in a clean-out opening 23, threaded at 24 to receive a clean-out plug 25. In use the chamber 22 is filled with cotton waste and serves as a primary strainer.

The valve body 18 has a central bore 26 forming a low pressure chamber or passage extending vertically through it from the high pressure chamber to the outlet 21. It is connected with the outlet to the tank 20 by a port 27. The high pressure inlet 19 is connected to the high pressure chamber by a similar port 28.

The low pressure passage 26 extends downwardly into a cylindrical column 30, and is there connected with the high pressure chamber through a reducing orifice 31. That orifice is much larger than is necessary to pass the appropriate amount of air, and is reduced to the correct dimensions by a pin or needle 32 carried by the clean-out plug 25 and extending through the orifice, substantially as indicated in Fig. 2.

In the form that has been found satisfactory in use, the low pressure chamber or passage 26 and the ports 27 and 28 are formed with a 1/8" drill. The orifice 31 is formed with a 3/32" drill, reamed out with a piece of No. 14 gauge (.033" diameter music wire) having one end ground to a chisel edge having a 60° angle. The wire is set in the chuck of a drill press and used after the fashion of a reamer in the orifice formed by the 3/32" drill.

The clean-out needle or pin 32 is made of No. 14 gauge music wire (.033" in diameter). If it slides easily in the orifice the latter has been enlarged too much. The clearance is right when not more than twelve bubbles per second pass through the outlet pipe to the tender when its end is inserted in water contained in a quart milk bottle.

The needle or pin 32 is made fast to the clean-out plug 25 by bending over its end portion 34, as indicated in Figs. 2 and 4, and making it fast by solder 35.

In the assembly shown the pressure from the main reservoir to the pipe 15 enters the inlet 19, goes through the port 28 into the high pressure chamber 22, filters through the orifice 31 into the passage 26, thence through the pipe 17

to the gauge 16, and through the orifice 27 and the pipe 13 and connection 12 to the pipe 11 in the tank.

The minute passage around the needle or pin 32 through the nozzle 31 reduces the one hundred and forty pounds pressure to something less than five pounds, and also serves as a strainer for any dirt, grease, etc., that may be entrained in the air. Any tendency to clog is cleared by the simple operation of screwing the clean-out plug out and in. This operation is performed at regular testing intervals.

I claim as my invention:

1. In a pressure-reducing valve for effecting large reductions in gas pressures, a valve body having inlet and outlet openings with a reducing orifice intermediate said openings, said reducing orifice having at least a portion thereof of circular cross section, and a throttling and clean-out needle of substantially uniform, circular, cross-sectional area normally occupying and projecting through said circular portion of the orifice, said needle being of a diameter substantially equal to the diameter of said circular orifice portion, and fitting into said orifice with a near tight fit, whereby the effective size of the orifice is defined by the infinitesimal area of the annular space between the needle and the orifice, and means for rotating said needle within said orifice.

2. In a pressure-reducing valve for effecting large reductions in gas pressures, a valve body having inlet and outlet openings with a reducing orifice intermediate said openings, said reducing orifice having at least a portion thereof of circular cross section, and a throttling and clean-out needle of substantially uniform, circular, cross-sectional area normally occupying and projecting through said circular portion of the orifice, said needle being of a diameter substantially equal to the diameter of said circular orifice portion, and fitting into said orifice with a near tight fit, whereby the effective size of the orifice is defined by the infinitesimal area of the annular space between the needle and the orifice, and means for rotating said needle within said orifice, said last-named means including a plug screwed into the body and rigidly secured to one end of said needle.

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