This invention relates to fluid pressure-saving devices, and more particularly to devices for atomizing liquids by a gaseous fluid under pressure. The invention relates specifically to a spraying or atomizing device of the type known to the trade as "air guns" and which are used, among other purposes, for atomizing kerosene or similar liquids for cleaning purposes. For convenience of description, and without any intention of limiting the invention thereto, the fluid under pressure will be assumed hereinafter to be air.

It is the general object of the invention to provide a device of this character with a self-contained valve mechanism which, when the instrument is not in use, will operate efficiently to prevent the leakage of the air therethrough and which, when the instrument is to be used, may be operated in a very convenient manner to open such valve and permit the escape of the air only at the point at which the liquid is atomized. A further object of the invention is to improve generally the valve mechanism for instruments or devices of this character; also, generally, to render such devices convenient and efficient in operation.

I accomplish the foregoing objects in and through the construction and arrangement of parts shown in the drawing, wherein Fig. 1 represents a side elevation of a spraying device or instrument embodying my invention; Fig. 2 a longitudinal sectional view through the device shown in Fig. 1, the air valve parts being shown in its closed position; Fig. 3 a detail in section through thevalved portion of the said instrument, showing the valve parts in open position; and Fig. 4 a detail in cross section corresponding to the line 4—4 of Fig. 2.

The instrument shown herein comprises one member of a valve-block assembly from which there extend two concentric tubes, the said tubes communicating with and supporting a head at their forward ends, similar to a blow pipe head. The said member is provided with a passage through which liquid is supplied through an outer tube to an annular passage in said head and thence through an outer nozzle connected thereto. The said member is also provided with a valve-controlled passage communicating with the inner tube which in turn delivers air (or other suitable fluid) under pressure to an inner atomizing tube or nozzle carried by said head. Pivoted to the said member is a second member comprising a fitting having a chamber carrying a valve and provided with a connection through which air or similar fluid under pressure is conveyed to said valve and thence to the inner tube and nozzle of the head.

Describing the aforesaid parts by reference characters, A denotes the first member, B the atomizing head, and C the fitting, which is pivoted to A and which carries the valve parts referred to hereinbefore and set forth specifically hereinafter.

The member A is provided with a substantially central bore 1 providing a passage into the rear end of which is threaded the reduced end 2 of a valve body D, the said body having a flange 3 abutting against the rear face A of the member A. Rearwardly of said flange, the body is rounded, forming an approximately frusto-conical seating shoulder 4 near the rear end thereof, from which seat the reduced unseating portion 5 is projected rearwardly and provided with a reduced closed end 5', between which and the part 4, ports 6 are provided communicating with the bore 7.

Threaded into the front end of the bore 1 is the central tube 8 which conducts the air or other fluid under pressure to a chamber 9 in the head B. Communicating with this chamber is an inner nozzle member 10, which projects beyond the end of the head B.

Threaded into a bore 11 surrounding the tube 8 is a tube 12, the front end of the tube being secured to and within the rear end of the head B and discharging into a chamber 13 surrounding the front end of the tube 8, from which chamber a port 14 leads into a chamber 15 surrounding the nozzle 10. The chamber 15 in turn communicates with an annular space 16 provided between an outer nozzle 16' which is threaded into the front end of the head (and the inner nozzle 10).

The member A is provided with an integral extension A' having a projection a en-
abling it to be conveniently grasped by the fingers of the operator. This projection is provided with a bore 17 into the rear end of which is fitted a tube 18 to which in turn is applied a flexible tube or hose 19 for supplying the liquid to be atomized to such bore. At its front end, the bore 17 is enlarged into a valve chamber 20 from which a bore 21 leads to the annular space between the pipes 8 and 12. A needle valve 22 mounted in the front end of the chamber 20 serves to control the supply of liquid through the passage provided by the bores 17 and 21 and the chamber 20 to such annular space.

The member C is pivotally mounted upon the member A by means of a lug 23 on the former, extending between lugs 24 on the latter, and a pin 25 passing through the said lugs. This member C is provided with an annular seat 26, the rear end of which is overhung by the wall 27 of a chamber 27. 28 denotes an annular resilient valve body mounted in the said seat and locked therein by means of an annular metallic lock washer 29 having in its front face a concave recess 29b adapted to receive, without engagement, the convex part of the body D.

The chamber 27 is shown as cylindrical, with its rear end reduced in diameter, as shown at 27b. Reciprocally mounted within said chamber is a valve, the said valve comprising a central stem 29b, a rear hexagonal head 30 and a front hexagonal head 31, the head 31 being provided with an annular seat 31b in the front face thereof adapted to engage the rear face of the valve body 28 when the parts are in the position shown in Fig. 2. From the chamber 27 there projects a connection 32 having a nipple 33 threaded thereinto, to which nipple there is attached the hose or other flexible supply pipe 34.

With the parts arranged as shown and described herein, and with the pipe or hose 19 connected with a source of liquid supply, which may be located either above or below the field of operation of the instrument, the valve 22 will be opened to permit the liquid to flow to the nozzle 16, the air meanwhile being shut off by the pressure of the same upon the rear of the valve 29b—31, which holds the valve firmly seated against the rear of the body 28 and with the front face of the said valve barely engaging the unseating projection 5. The operator then grasps the parts C, 32, A2 and a in his hand, with the fingers beneath the parts A2 and a. The reactive pressure of the air normally holds the member C and the attached parts in the position shown in Fig. 2, with the valve 29b—31 seated against the body 28; and further displacement of the fitting with reference to the member A is prevented by means of a projection 35 on the fitting and a lug 36 on the part A2. By closing the hand, the part C is swung downwardly and forwardly on the hinge 25, thereby not only causing the projection 5 to unseat the valve 29b—31 and expose the ports 6 to the air passing by said valve, but causing the inner circular edge of the body 28 to engage the surface 4, thereby preventing any leakage of the air or other fluid beyond said body and to the atmosphere, the fluid being compelled to pass into the bore 7 and thence to the inner nozzle 10.

The air, striking the oil or other liquid surrounding the end of the nozzle 10 causes such liquid to be atomized in a well known manner; and, where there is no material head of liquid, the air serves to feed the liquid to the point of atomization by an aspirating action.

Among the advantages possessed by the construction disclosed herein are the following:

a. Extreme ease and convenience of operation, due to the hinging of the parts A and C and to the nicely balanced condition of the parts; also to the arrangement of the connections whereby both the air and the liquid hose lead rearwardly.

b. The elimination of stuffing boxes.

c. The automatic operation. The air is turned on by merely grasping the fitting and the part of the valve block therebeneath; while the reaction of the air upon the valve, when the grasp is released, rocks the fitting C rearwardly and closes the valve against its seat upon the washer.

d. The body 28 performs the double function of forming a seat for the valve 29b—31 when the air is cut off by releasing the grasp and also serves, when the valve is unseated, as a seat to form a leak-proof joint with the conical valve-seat surface 4, thereby preventing leakage of air to the atmosphere at this time. In other words, it operates as a stuffing box to prevent leakage when the instrument is not being operated, and it also seals against the escape of air by contact with the surface 4 when the instrument is being operated.

While the instrument shown herein is designed with special reference to the atomizing of liquids for the purpose of cleaning various objects, it will be evident that it is capable of use for the mixing and atomizing of fluids for other purposes; hence I do not propose to be limited to the exact use of my invention as set forth herein.

Having thus described my invention, what I claim is:

1. A valve mechanism for atomizing nozzles of the character described for controlling the flow of the atomizing fluid comprising a valve member having a bore for conducting atomizing fluid to said nozzle, a valve body having a bore therethrough for conducting fluid to the said bore and projecting rearwardly from said member, the said body having a closed rear end and one or more ports communicating with the bore thereof and
located forward of such rear end, the said body having a seat located forward of said ports, a second member movably connected to the first member and having a resilient valve body adapted in one position to engage the first body forward of such ports, the second member having a chamber at the rear of said resilient valve body, a movable valve mounted in said chamber and adapted to engage the resilient valve body, and means for supplying fluid under pressure to said chamber, the parts being arranged to unseat said valve by its engagement with the end of the first valve body when one of said members is moved toward the other member.

2. A valve mechanism for atomizing nozzles of the character described for controlling the flow of the atomizing fluid comprising a valve member having a bore, a valve body having a bore therethrough for conducting fluid to the said bore and projecting rearwardly from said member, the said body having a closed rear end and one or more ports communicating with the bore thereof and located forward of such rear end, the said body having a seat located forward of such ports, a second member pivoted to the first member and having a resilient annular valve body adapted in one position to engage the first body forward of such ports, the second member having a chamber at the rear of said annular valve body, a movable valve mounted in said chamber and adapted to engage the second body, and means for supplying fluid under pressure to said chamber, the parts being arranged to unseat said valve when the second member is rocked toward the first member.

3. A valve mechanism for atomizing nozzles of the character described for controlling the flow of the atomizing fluid comprising a member having a port adapted for connection with the nozzle, a valve body mounted in said port and extending rearwardly therefrom and having a bore, the rear end of said body being closed and the said body being provided with one or more transverse ports communicating with the said port thereof and having a conical surface located forwardly of such transverse port or ports, a second member movably connected to the first member and having an annular resilient valve body adapted to engage the conical portion of the first body at the front of such transverse port or ports, the second member having a chamber at the rear of the annular valve body, a valve movably mounted in said chamber and adapted, when the second member is moved away from the first member to engage the annular valve body and form a seat therewith, there being one or more passages formed between the periphery of said valve and the surrounding wall of said chamber, and means extending rearwardly from said chamber for conducting fluid under pressure thereto.

4. A valve mechanism for nozzles of the character described comprising a delivery member having a passage, a valve body projecting from said member and having a continuation of said passage therein, and a valve-uneating portion remote from said member and having one or more ports between such portion and said member and communicating with the passage in said body, a second member attached to and movable toward and from the delivery member and having a passage adapted to form a continuous passageway with the first mentioned passages and port or ports and provided at the end adjacent the first-mentioned member with a resilient valve body having a central opening therethrough for the valve-uneating portion of the first body, a valve in the passage of the second member adapted to seat against the second valve body, one of said members being movable toward the other thereby to unseat the said valve and to bring the inner wall of the second valve body into engagement with the surface of the first mentioned valve body between the said ports and the first member.

5. A valve mechanism for nozzles of the character described comprising a member having a passage, of a valve body projecting from said member and having at the end remote therefrom a central valve unseating portion and having a passage forming a continuation of the passage in said member, the end of the said body which is remote from the member being closed and the portion of the body in front of said end being provided with one or more ports communicating with the passage in said body, the said valve body having an enlarged seat between such end and the said member, and a second member permanently attached to the said member and movable toward and from the same and having a passage adapted to form with the first mentioned passages and port or ports a continuous passageway for fluid and having in the front portion thereof a resilient annular valve body the central opening of which is adapted to receive the projection of the first mentioned valve body and to seat against the seating portion of the first mentioned valve body, and a valve movably mounted in the front portion of the second member at the rear of the annular valve body therein and having an annular seat adapted to engage such body around the central opening therethrough.

6. In a valve mechanism of the character described the combination of two pivotally connected relatively movable members having passageways therethrough adapted to be brought into communication with each other by the relative movement of said members, one of said members having a chambered portion having a reciprocable valve carried
therein, and a tapered valve member in the other member, said chambered portion having an annular resilient member mounted therein having an opening therethrough, one face of said resilient member being straight and the opposite face thereof being concave adjacent the opening therein, said resilient member forming a seat for said valve and valve member.

7. In a valve mechanism of the character described the combination of two pivotally connected relatively movable members having passageways therethrough adapted to be brought into communication with each other by the relative movement of said members, one of said members having a chambered portion having a reciprocable valve carried therein, and a tapered valve member in the other member, said chambered portion having an annular resilient member mounted therein having an opening therethrough, said resilient member forming a seat for said valve and valve member.

8. In an atomizing nozzle of the character described, means for controlling the delivery of atomizing fluid thereto comprising a chambered member having a bore, a valve body mounted within said bore provided with a convex portion closed at its end and having ports forwardly of said closed end, a second member pivoted to the first member and having a chambered portion, said chambered portion having mounted therein an annular resilient member having an opening therethrough adapted to receive therein the convex portion of said first named valve body, the rear face of said opening being concave, a reciprocable valve member carried in said chambered portion adapted to engage the concave face of said resilient member, whereby said resilient member forms a seat for said valve and valve body, and means for supplying fluid under pressure to said chamber.

9. A valve mechanism for atomizing nozzles of the character described comprising two pivotally connected movable members, a valve portion in each member, and a single resilient member carried by one of said members adapted to form a seat for said portions, said portions adapted to be opened by the relative movement of said members.

10. In a device of the class described, a valve mechanism comprising a member having a bore therein for the passage of fluid under pressure, a valve member arranged within one end of said bore, a second member pivotally secured to said first mentioned member and having a chamber therein, a valve disposed within said chamber and freely movable therein, said chamber opening outwardly toward said valve member, an outer member arranged adjacent the open end of said chamber and adapted to form a seat for said valve and valve member, both said valve and said outer member adapted to be opened by the relative movement of said members.

11. In a device of the class described, a valve mechanism comprising two members pivotally secured to each other, one of said members having a bore therein for the passage of fluid, the other of said members having a chamber therein, a valve disposed in said chamber and freely movable therein, a valve member arranged within said bore and projecting outwardly therefrom and adapted to engage said valve when said members are moved toward each other, means arranged within said chamber adapted to be engaged by and to form a seat for said valve and valve member.

In testimony whereof, I hereunto affix my signature.

FRED E. HANSEN.