Oct. 19, 1943. W. J. ROBB 2,332,114

VALVE AND STRAINER CONSTRUCTION

Filed June 3, 1942 2 Sheets-Sheet 1

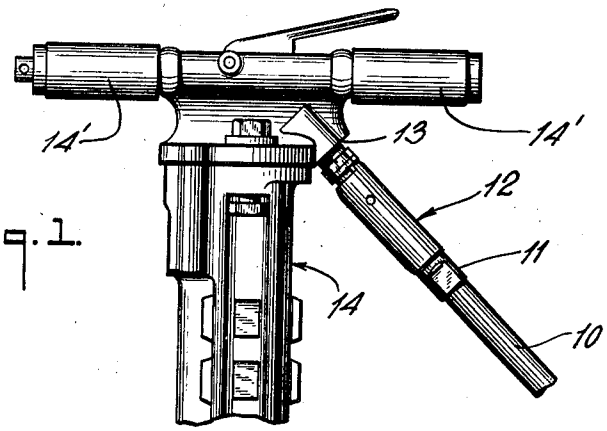

Fig. 1.

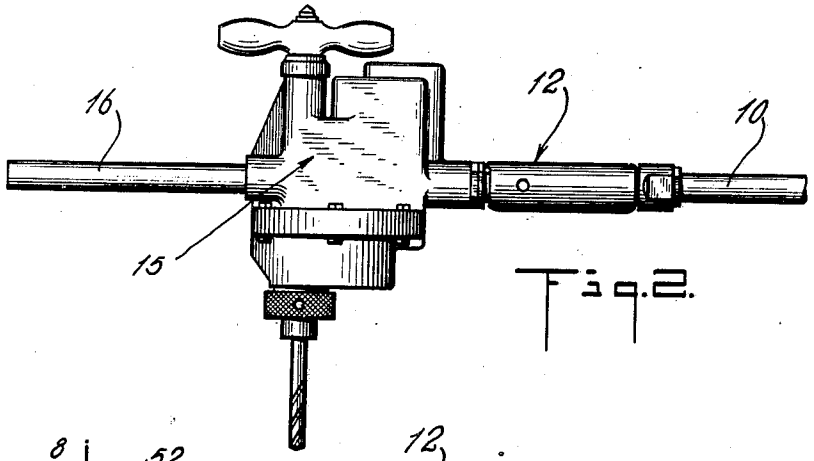

Fig. 2.

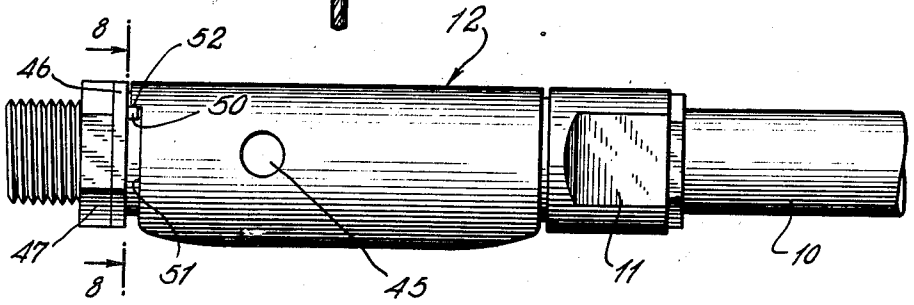

Fig. 3.

INVENTOR
WILLIAM J. ROBB
BY
Ward, Crosby & Neal
ATTORNEYS

Oct. 19, 1943. W. J. ROBB 2,332,114

VALVE AND STRAINER CONSTRUCTION

Filed June 3, 1942 2 Sheets-Sheet 2

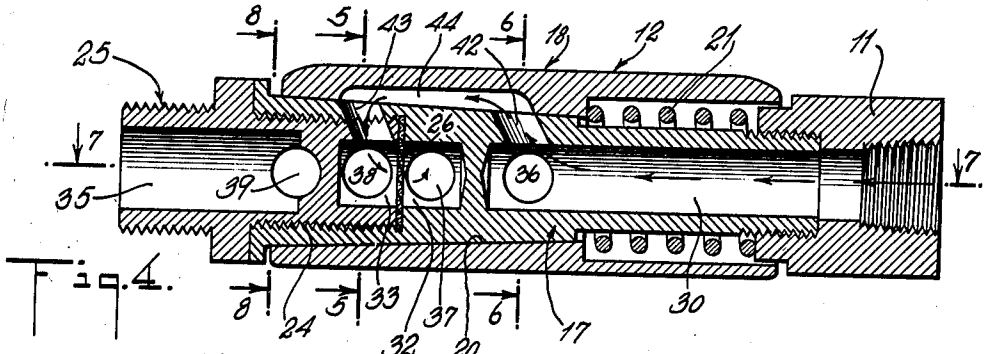

Fig. 4.

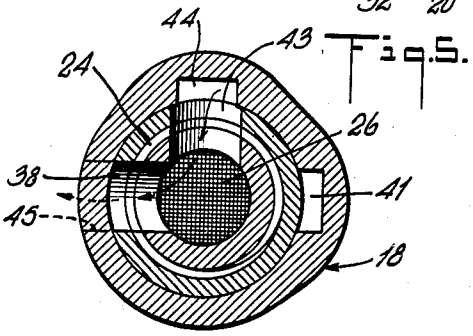

Fig. 5.

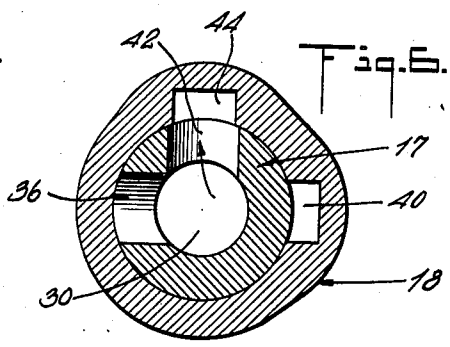

Fig. 6.

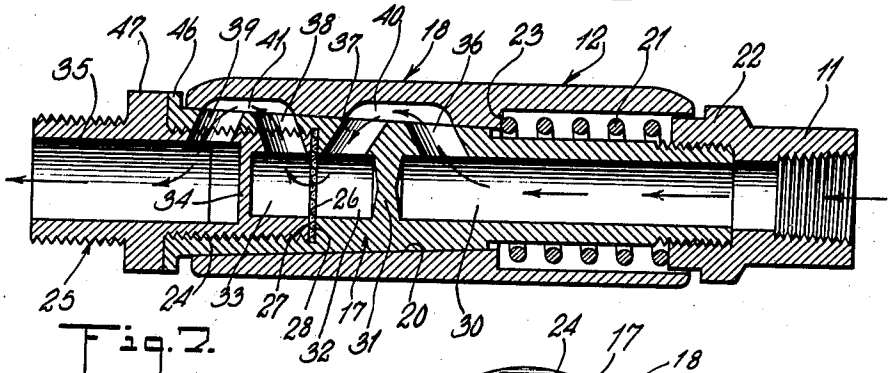

Fig. 7.

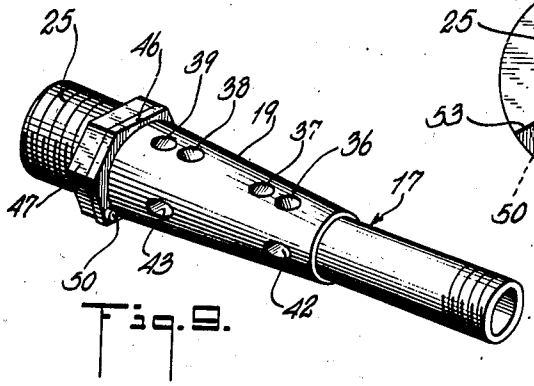

Fig. 9.

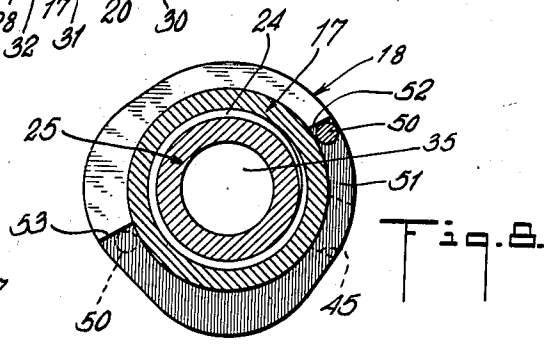

Fig. 8.

INVENTOR
WILLIAM J. ROBB
BY
Ward, Crosby & Neal
ATTORNEYS

Patented Oct. 19, 1943 2,332,114

UNITED STATES PATENT OFFICE

2,332,114

VALVE AND STRAINER CONSTRUCTION

William J. Robb, Brooklyn, N. Y.

Application June 3, 1942, Serial No. 445,647

5 Claims. (Cl. 210—166)

This invention relates to combined valve and strainer constructions for fluid conduits, the valve means being adapted to permit the fluid to pass through the strainer in a normal way, or alternatively, to pass through the strainer in the reverse direction and thence to a by-pass dirt outlet, when it is desired to clean the strainer.

The invention is particularly useful in air supply lines for portable pneumatic tools such as riveting hammers, drills and the like. The accumulation of rust in such air lines and the introduction of dirt particles from various sources, makes it ordinarily necessary to provide some form of strainer means to prevent rust, scale and dirt from entering and injuring the operating parts of pneumatic tools. Such strainers often become clogged and the types which have heretofore been in general use, either in the air lines or in the tools themselves, cannot be very easily or quickly cleaned by the operator. Consequently much time is lost in either carrying the tools to the tool room for cleaning or replacement, or in waiting while air line strainers are disconnected, cleaned and replaced. Also the use of some types of such strainers is so troublesome, and the construction is such that workmen are able to easily puncture or remove the same, and do so to save time at the risk of ruining a valuable pneumatic tool.

With the present invention, the strainer and accompanying valve structure may be inserted in the air intake connection to a pneumatic tool and in fact if desired, the structure itself may comprise one of the handles for the tool. Then with the valve adapted to operate in the alternative ways above indicated, whenever the workman finds that the air line is obstructed due to clogging of the strainer, it is merely necessary for him to turn the valve in his hand to blow out the strainer, and to then quickly turn the valve back to normal position and proceed with his work. It will be apparent that the structure is also well adapted for use in various types of fluid conduits other than air lines, for example, oil lines, water pipes or other liquid or gas supply lines.

More specifically, the invention provides a valve arrangement for the above indicated purposes which is of a simple, durable and easily operated construction, in which any of the parts if broken, may be quickly replaced by an unskilled workman, the valve parts also being free of any liability of substantial leakage due to wear.

Various further and more specific objects, features and advantages will more clearly appear from the detailed description given below taken in connection with the accompanying drawings which form a part of this specification and illustrate merely by way of example, preferred forms of the invention. The invention consists in such novel features, arrangements and combinations of parts as may be shown and described in connection with the apparatus herein disclosed.

In the drawings:

Figs. 1 and 2 show one form of the invention as applied respectively to a portable pneumatic hammer, and as applied to a portable pneumatic drill;

Fig. 3 is a side view of said embodiment of the invention;

Fig. 4 is a longitudinal sectional view, with the valve parts in position for blowing out or cleaning the strainer;

Figs. 5 and 6 respectively are transverse sectional views taken along the lines 5—5 and 6—6 of Fig. 4;

Fig. 7 is a longitudinal sectional view showing the valve parts in position for using the strainer in the normal way;

Fig. 8 is a transverse sectional view taken along the line 8—8 of Fig. 4; and

Fig. 9 is a perspective view of the body portion of the device showing the various valve ports.

Referring now to the drawings more specifically, in Fig. 1 an air line hose is indicated at 10 provided with a threaded inlet coupling connection at 11, to the valve and strainer construction 12, the latter in turn being provided with a threaded connection at 13 to a portable pneumatic hammer of any suitable known type, the upper portions of which are shown at 14, with handles 14'. In Fig. 2 the device 12 is shown as inserted in the air inlet of a portable pneumatic drill 15. In this case the device 12 as shown may serve also as one of the handles for the drill, the other handle being indicated at 16.

Referring now to Figs. 4–9, the device 12 as shown may comprise a generally tubular body portion 17 which is embraced by a rotatable sleeve valve member 18. A part of the member 17 is tapered to provide a somewhat conical valve seat area 19 against which a correspondingly tapered portion 20 on the inside of the valve sleeve member 18 is adapted to bear. The tapered areas 19 and 20 may be pressed together axially of the device, to assure a firm seating of the valve parts, by a helical spring as at 21 encircling a shank portion of the member 17 and interposed between an inlet coupling member 22

and an annular flanged area 23 formed on the inside of the valve sleeve 18.

The outlet end of the body portion 17 may be internally threaded as at 24 for receiving an outlet coupling member 25 which in the example shown, may be also integrally formed with certain of the valve parts as hereinafter described.

A strainer or filter member as at 26 comprising for example a circular piece of metal screen cloth, may be interposed and clamped in position between the inner end 27 of the member 25 and an annular flange 28 formed on the inside of the member 17.

The inlet end of the member 17 may be formed with an unobstructed bore 30 extending in as far as a barrier 31. Beyond this barrier the bore is resumed as at 32 to form a small chamber in front of the screen 26. At the other side of the screen or strainer the member 25 is formed with a bore providing a small chamber 33 extending as far as a barrier 34 also formed in member 25. Beyond the barrier 34 the member 25 is hollow to provide an outlet passage 35.

The valve seat areas 19 may be formed with four ports, 36–39 inclusive, for cooperating with two cavities 40, 41 on the inside walls of the valve sleeve 12. When the valve sleeve 18 is in the position shown in Fig. 7, these ports and cavities will serve to provide a passage extending from the inlet connection past the barrier 31, through the strainer in the direction of normal flow, then past the barrier 34 to the outlet connection, all in a manner which will be readily understood from Fig. 7.

The valve seat areas 19 may also be formed with two additional ports as at 42, 43 which, with the valve in the position shown in Fig. 4, are adapted to cooperate with a cavity 44 formed on the inside walls of the valve sleeve 18, to thereby provide a passage from the inlet connection of the device, thence through the strainer in the reverse direction, to the small chamber 32, then out through port 37, and thence through a dirt bypass outlet 45 extending through the walls of the valve sleeve 18 (Figs. 3, 5). Thus merely by grasping the exterior of the valve sleeve member as a hand grip, and by turning same through a suitable angle, the parts may be adjusted from the normal operating conditions with the strainer in use as in Fig. 7, to the relative positions shown in Fig. 4, whereby the fluid will flow in the reverse direction through the strainer or screen and thus forcibly blow or wash any dirt which has accumulated on the screen, back into the small chamber 32 and out through the port 37 and dirt outlet 45. The strainer may thus be thoroughly cleaned in a moment, whereupon the valve may be quickly restored for normal operation as in Fig. 7.

As shown in Fig. 9, the outlet end of the body portion 17 may be formed with a flange as at 46, the periphery of which may be shaped hexagonally, for example, to correspond with a hexagonal portion 47 on the outlet connection member 25, so that the latter member may be screwed into place by a wrench, while holding the body portion against turning by a vise or wrench applied to the portion 46. From Fig. 7 it will be noted that the ports 38 and 39 necessarily extend not only through the walls of the valve seat portion 19, but also through the walls of the inner end of the outlet connection member 25. The threaded engagement between the inner end of the member 25 and the body portion of the valve is preferably so made that when the ports 38, 39 are drilled, the hexagonal portions 46 and 47 will coincide and be firmly clamped together. Hence thereafter, if the outlet connection 25 is removed for any reason, and then reassembled, on screwing the same firmly into place and so that the hexagonal areas will again coincide, one may be assured that the outlet connection is at a proper angular position for the two portions of each of the ports 38 and 39 to properly coincide.

A stop pin as at 50 may be mounted in the hexagonal flange 46 as shown in Figs. 8 and 9. To accommodate this stop pin, the adjacent circumferential edge of the valve sleeve member 18, for about 180°, may be cut away as at 51, this cut-away portion terminating at stop areas 52, 53. Thus to move the valve to the position shown in Fig. 7, the valve sleeve is turned until the stop pin 50 engages the stop area 52 as shown in Fig. 8. Then to move the valve sleeve to strainer cleaning position, it is rotated until stop pin 50 engages stop area 53 as shown by dotted lines in Fig. 8. When the valve sleeve is turned to an intermediate position, for example, at any point in the neighborhood of half way between the two positions indicated in Fig. 8, then all of the valve ports will be closed and the device will function as a stop valve.

It will thus be apparent that in a single device which may be readily gripped as a handle by the workman when using the tool, a strainer or filter may be contained, as well as a shut-off valve, and also means for by-passing fluid directed in a reverse direction through the strainer for cleaning purposes. Thus the moment the air or other fluid supply is obstructed, the strainer may be quickly cleaned and the parts then immediately restored to normal operating condition, with the loss of no appreciable amount of time. In case the device is used as a handle, the operator does not even have to remove his hand from the tool in order to clean the strainer or to start and stop the operation of the tool.

If the device comprises one of the necessary handles for the tool, the workman is of course unable to use the tool until the device is coupled in place. Thus the tool is protected against misuse and damage for lack of a strainer. Since the strainer is so easily and quickly cleaned, the workmen will not tend to become prejudiced against the use of strainers, nor can a meddlesome person insert any article for puncturing the strainer, in view of the barriers.

The internally tapered valve sleeve and tapered valve seat, in conjunction with the spring 21, insure that the valve will be firmly seated and thus free from leakage despite possible wear of the tapered areas after long use. In the case of any irregular wear such as might make possible any substantial leakage between the tapered surfaces, the valve may be readily ground to restore a tight fit, by applying a valve grinding compound to the valve seat areas and then rotating or oscillating back and forth, the valve sleeve upon the valve seat.

The spring 21 should preferably be made strong enough to normally thrust the valve sleeve very firmly toward the outlet of the device when no air pressure is being applied. Under this condition, the valve sleeve will be frictionally retained against movement accidentally or by anything less than a very strong turning force. Then when the air or fluid pressure is applied, because of the opposed tapered valve areas, the pressure will tend to thrust the valve sleeve toward the inlet end and against the force of the spring. The spring should be strong enough to

somewhat more than overcome this effect of the pressure, while still allowing rather easy turning of the valve by hand when the pressure is on. In this way, in whatever position the valve is left, it will remain in such position with a high degree of certainty when the pressure is cut off, while operating quite easily when the fluid pressure is on.

While the invention has been described in detail with respect to particular preferred examples, it will be understood by those skilled in the art after understanding the invention, that various changes and further modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore in the appended claims to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent is:

1. A valve and strainer construction for fluid conduits comprising a body portion, exterior side surfaces of which comprise an annular valve seat, a strainer within said portion, fluid inlet and outlet connections respectively at the ends of said portion, a valve sleeve embracing said valve seat and rotatable thereon, said sleeve being formed with a plurality of cavities on its inside surface and a by-pass outlet, a plurality of cavities also being formed in said body portion for cooperating with said valve sleeve cavities, said cavities being so constructed and arranged that with the valve sleeve in one angular position a passage is provided from the inlet, through the strainer, to said outlet connection, and with the valve sleeve in another angular position, a passage is provided from the inlet, through the strainer in the reverse direction and thence through said by-pass outlet.

2. A valve and strainer construction for fluid conduits comprising a tubular body member formed with a flange at one end, exterior surfaces of which comprise a valve seat formed with a plurality of ports communicating with the interior of the member, fluid barriers within said member at spaced positions, a strainer within said member intermediate said barriers, inlet and outlet couplings at the respective ends of said body member, a valve sleeve rotatably embracing said seat and retained against longitudinal displacement in one direction by said flange and in the other direction by one of said couplings, said sleeve being formed with a plurality of cavities on its inside surface for normally cooperating with certain of said ports to provide a passage from said inlet connection, past the first barrier, through the strainer, thence past the other barrier to said outlet connection, said valve sleeve also being formed with another cavity and a by-pass dirt outlet, for providing, when the sleeve is at a different angular position, a passage from the inlet connection past said first barrier and past the strainer, thence through the strainer in the reverse direction, to said dirt outlet.

3. A valve and strainer construction for fluid conduits, comprising an elongated body member with annular outer valve seat areas tapered longitudinally of the member, a rotatable valve sleeve embracing said areas, means for retaining said areas and interior surfaces of the sleeve in contact, and a strainer mounted within said member, said sleeve and member being constructed with cooperating valve ports and passages, for normally directing fluid through the strainer in one direction to a normal outlet opening, and upon rotation of the sleeve to another angular position, for directing the fluid through the strainer in the reverse direction and to a by-pass outlet opening.

4. A valve and strainer construction for fluid conduits, comprising an elongated body member with annular outer valve seat areas tapered longitudinally of the member, a rotatable valve sleeve embracing said areas, spring means surrounding a portion of said member and acting to retain said sleeve with its interior surfaces under pressure longitudinally against said areas, a strainer mounted within said member, said sleeve and member being constructed with cooperating valve ports and passages, for normally directing fluid through the strainer in one direction to a normal outlet opening, and upon rotation of the sleeve to another angular position, for directing the fluid through the strainer in the reverse direction and to a by-pass outlet opening.

5. A valve and strainer construction for fluid conduits, comprising an elongated body member with annular outer valve seat areas tapered longitudinally of the member, a rotatable valve sleeve embracing said areas, a strainer mounted within said member, said sleeve and member being constructed with cooperating valve ports and passages, for normally directing fluid through the strainer in one direction to a normal outlet opening, and upon rotation of the sleeve to another angular position, for directing the fluid through the strainer in the reverse direction and to a by-pass outlet opening, and spring means interposed between said member and sleeve and acting to retain said sleeve with its interior surfaces under sufficient pressure longitudinally against said areas to retain the sleeve against being readily turned except when the spring pressure is opposed by a substantial fluid pressure acting between said tapered areas and the interior sleeve surfaces.

WILLIAM J. ROBB.