Jan. 12, 1960 J. J. SHADA 2,920,716

AIR LINE FILTER

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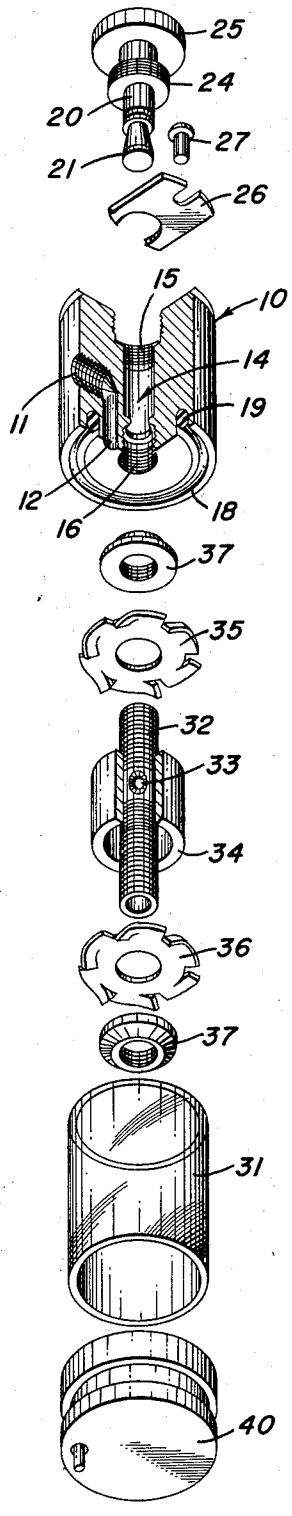


Fig. 2

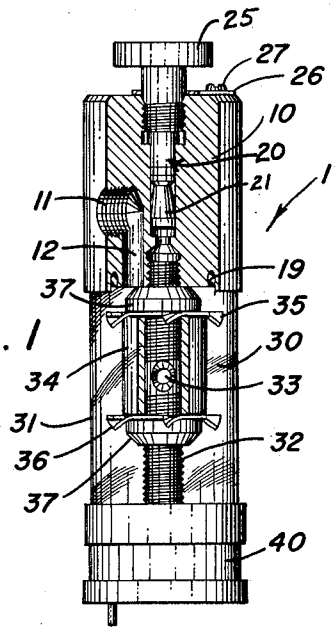


Fig. 1

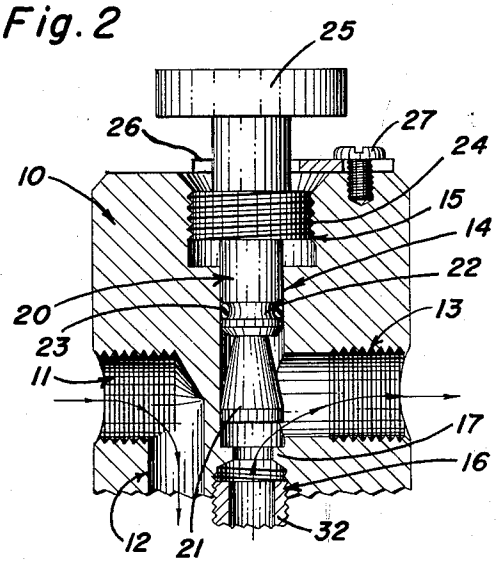


Fig. 3

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AIR LINE FILTER

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2 Claims. (Cl. 183—41)

This invention relates to a filter for pneumatic air lines, and more particularly to a filter having a novel type valve means for completely shutting off the supply of air to the lubricator and pneumatic tools of the air line.

In the pneumatic tool field it is conventional practice to provide in the air line ahead of the penumatic tool a lubricator-filter unit comprising separate lubricator and filter. The filter serves the purpose of filtering out all waste material such as water. The lubricator introduces a fine mist or fog of lubricant into the air stream. Most commonly a regulator is located between the filter and lubricator for regulating the air pressure supplied to the pneumatic tool.

Some combination units have been developed in which the filter and regulator is combined in one unit. In either of these assemblies, it has been necessary to provide a separate shut-off valve located ahead of the filter-lubricator unit for completely shutting off the air line in order to fill the lubricator. The object of this invention is to provide a novel type combined filter and shut-off valve unit that eliminates the need for a separate shut-off valve in the line.

My invention will be described in conjunction with the accompanied drawings wherein:

Fig. 1 is an elevational view of my assembled filter unit, certain parts being in section to better show certain features of this invention.

Fig. 2 is an oblique, exploded view of the component parts of my filter as shown in Fig. 1.

Fig. 3 is an elevational, partial, cross-sectional view of the head of my filter.

Referring to the drawings, reference numeral 1 denotes the entire filter unit which includes the basic components of a head 10, a filter chamber 30, and a bottom cap member 40.

The head 10 is an elongated cylindrical member having an inlet passageway 11 extending transversely through a portion thereof and communicating with the filter chamber by a bore 12. Aligned with the inlet passageway is the outlet passageway 13 which is separate and apart and not directly communicative with the inlet passageway. A central bore 14 extends downwardly through the head 10. It has a central portion communicating with the outlet passageway 13, an enlarged threaded top portion 15, and a threaded lower portion 16. A valve seat 17 formed by a reduced diameter portion is located in the bore 14 below the outlet passageway 13.

A valve stem 20 is slidably adjustable in the central bore 14. The valve stem 20 has at its lower end a valve element 21 that cooperates with the valve seat 17 to shut off the communication through the central bore. The stem 20 has an annular recess 22 located immediately above the valve element 21 and receiving an O-ring seal that provides an air-tight seal between the wall of the central bore 14 and the stem 20. At its upper end the

stem has an enlarged threaded portion 24 engaging the threaded top portion 15 of the central bore. A knob 25 is provided at the extreme top end of the stem. This knob is located exteriorly of the head permitting an operator to adjust the position of the stem. A retainer plate 26 is secured to the top of the head 10 for preventing the stem from being accidentally removed from the head. This retainer plate is secured in place by a removable screw 27.

The filter chamber 30 includes a cylindrical bowl 31 seated against an O-ring seal 19 located in an annular recess 18 on the bottom surface of head 10. This structure provides an air-tight seal between the bowl 31 and the head 10. The bowl 31 is held in place by the bottom cap 40 and the threaded tube 32. The top end of the threaded tube 32 engages the threads of the threaded lower portion 16 of the central bore 14. The lower end of the tube 32 engages a threaded hole (not shown) in the bottom cap 40. The lower edge of bowl 31 seats in annular recess in the cap 40 in a similar manner to that previously described in relation to the annular recess 18. This provides an air-tight seal at the lower edge of bowl 31.

The bore of tube 32 with opening 33 provides communication between the filter chamber 30 and the outlet passageway 13. The filter element 34 is circumposed about the tube 32 at the opening 33.

On each side of the filter element 34 are the flow direction plates or baffles 35 and 36 which in turn are held in place by the retainer elements 37. The retainer elements 37 are screwed on the tube 32 tightly against the plates 35 and 36, thus clinching the plates and filter element between them for holding them securely in place.

The flow direction plates or baffles 35 and 36 are of the type described in my co-pending application Serial No. 590,896, entitled Filter for Pneumatic Air Lines, and filed June 12, 1956, and now abandoned. The only difference is their position and the means for support. In this invention the top plate is located beneath the head, whereas in my co-pending application it is located against the head which has an annular passageway through which the air flows. These filter elements accomplish the same results as previously described in my co-pending application. They form the air into cyclonic streams which are carried down into a condensation zone located beneath the lower plate. A detailed description of the construction and operation of these plates is not considerd necessary. Reference in regard to such construction and operation is made to my co-pending application Serial No. 590,896.

Assembly

The component parts of my filter are individually shown in the exploded view of Fig. 2. The assembly is shown in Figs. 1 and 3.

The assembling of the parts is simple. The stem is inserted into the head in such a manner that the enlarged threaded portion 24 engages the threads of the portion 15 of bore 14. The plate 26 is secured in place by inserting and tightening the screw 27. The filter element 34 and plates 35 and 36 are then positioned on the tube 32. The retainer elements are screwed on each end of the plates securing the filter and plates in the proper position. The tube 32 is then screwed into the threaded opening 16 of the bore 14. The bowl 31 is placed over the filter element and inserted into the annular recess 18 against the O-ring seal 19. Then the cap is inserted on the end of the bowl and threaded on to the tube 32. The cap 40 is tightened, thus securely holding the bowl on the head and providing an air-tight filter chamber.

Operation

The filtering operation of this filter is similar to that described in my co-pending application Serial No. 590,896. A complete detailed description of such operation is not considered necessary. Briefly the air enters inlet passageway **11** and passes through passageway **12** into the chamber **30**. As the air is forced against the top plate or baffle **35**, the air is formed into cyclonic streams which by centrifugal force are forced against the inside of the bowl **31**. These streams follow a path downwardly to the bottom plate from which said streams continue to flow into the condensation zone beneath the bottom plate. As the air reaches the condensation zone, the streams by necessity have to reverse their direction in order to pass upwardly and contact the filter element **34**. Having reversed their direction they drop any moisture or other material they are carrying.

As the air passes upwardly and contacts the filter element **34** the air is forced through the filter element into the interior thereof. The air then passes through the aperture **33** upwardly through the bore of tube **32** and into the central bore **14**. In the open position of the valve **21** the air passes out of the outlet passageway **13**.

In many instances for which this invention is particularly adapted, it is desirable to cut off the flow of air through the filter in order to fill the reservoir of the lubricator. In such cases the knob **25** is turned causing the valve stem **20** and the valve element **21** to move downwardly. Eventually the valve element seats on the valve seat **17**. This cuts offs the communication between the outlet passageway **13** and the lower end of the central bore. As a result air is prevented from passing through the unit and the supply of air to the pneumatic tool or to the lubricator is completely shut off.

It should be evident that this invention completely eliminates the need of a shut-off valve located in the line at another location ahead of the lubricator-filter unit. The unit of this invention is simple and easy to construct making it relatively inexpensive.

Having described my invention it should become obvious that other modifications are possible within its broadest aspect. Therefore, although I have only shown one modification, other modifications and embodiments should be considered covered by this invention except that the following claims expressly state otherwise.

I claim:

1. A filter unit for compressed air lines comprising a head having inlet and outlet passageways, a filtering chamber below said head, said chamber communicating with said inlet and outlet passageways by means of separate bores extending from said passageways through the bottom of said head; one of said bores being centrally located in said head and extending upwardly past said outlet passageway and through the top and bottom surfaces of said head; a hollow elongated filter element in said filtering chamber; a tubular member at least partially inside said filter element and secured in said one bore and supporting said filter element at the bottom face of said head; said tubular member having an aperture for permitting air passing through and into said filter element to pass through said tubular member, and into said one bore and outlet passageway; a stem adjustably mounted axially in said one bore; a valve element on the end of said stem; said stem and valve element being adapted to extend past said outlet passageway to completely shut off communication between said chamber and said outlet passageway; and exterior means for adjusting said stem and valve element.

2. A filter assembly for compressed air lines comprising a head; a bowl depending from said head and forming a filter chamber; said head having an inlet port and an outlet port both leading into said bowl and communicating with each other by a centrally located bore extending downwardly through the entire length of said head; said bore having a threaded upper portion and a threaded lower portion; a threaded tubular member in said bowl engaging said lower threaded portion and depending from said head; a hollow filter unit surrounding said tubular member and supported thereby; said tubular member having an aperture providing communication between the inside of said filter unit and said bore and outlet port; a stem adjustable in said bore; a valve element on one end of said stem; an adjustment means on the other end of said stem exteriorly of said head; said valve element being adapted to be adjusted to a position above or below said outlet port permitting communication between said outlet port and said bore to be opened or closed depending upon the adjustment of said adjustment means.

References Cited in the file of this patent

UNITED STATES PATENTS

1,177,262	O'Donnell	Mar. 28, 1916
1,592,835	Mock et al.	July 20, 1926
1,854,010	Woodford	Apr. 12, 1932
2,036,106	Stuard	Mar. 31, 1936
2,074,245	Williamson	Mar. 16, 1937
2,208,261	Jackson	July 16, 1940
2,462,220	Parker	Feb. 22, 1949
2,692,655	Peep	Oct. 26, 1954
2,707,051	Mailhot et al.	Apr. 26, 1955