Dec. 23, 1958 F. J. LYDEN 2,865,469

AIR LINE OILERS

Filed May 13, 1955

FIG. 1

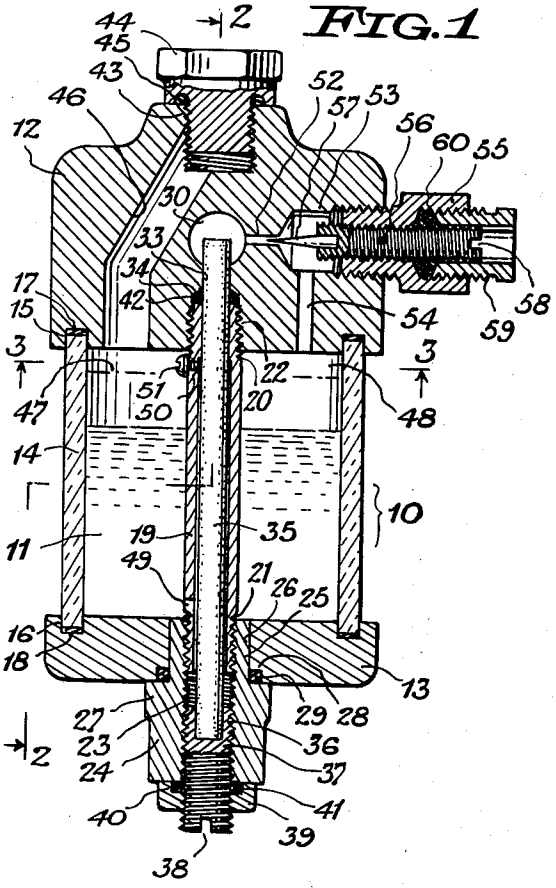


FIG. 2

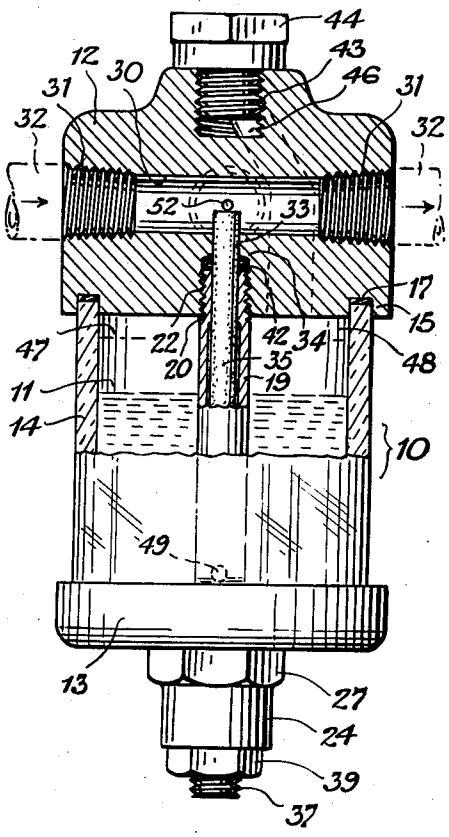


FIG. 3

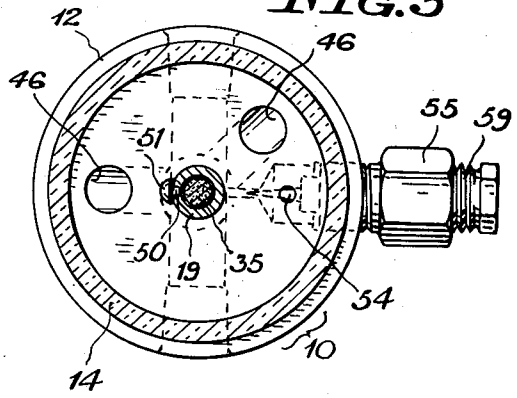
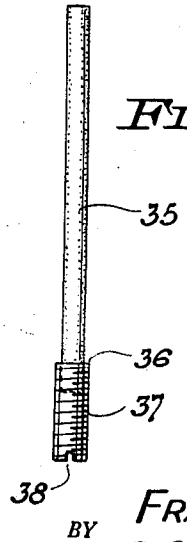


FIG. 4



INVENTOR.
FRANK J. LYDEN
BY Christopher L. Waal
ATTORNEY

United States Patent Office

2,865,469

Patented Dec. 23, 1958

2,865,469

AIR LINE OILERS

Frank J. Lyden, Manitowoc, Wis.

Application May 13, 1955, Serial No. 508,033

10 Claims. (Cl. 184—55)

The present invention relates to oiling devices, and more particularly to oilers adapted for connection in a compressed air line to supply oil in the form of a fine mist or vapor to pneumatic tools and other air-operated apparatus.

An object of the invention is to provide an improved air line oiler which is so arranged as to effect good regulation of oil delivery into an air supply stream, and to permit ready adjustment of the rate of oil delivery.

Another object is to provide an air line oiler including improved means for adjusting the projection of a porous oil feeder into an air supply conduit, and which will permit such adjustment while the oiler is in operation.

Still another object is to provide an air line oiler which includes an accurately adjustable air vent or by-pass between the air supply conduit and an oil reservoir of the device to vary the differential air pressure on the porous feeder.

A further object is to provide an air line oiler which is of simple and rugged construction, which is capable of inexpensive manufacture, and which is reliable in operation.

The invention further consists in the several features hereinafter described and claimed.

In the accompanying drawing,

Fig. 1 is a vertical sectional view of an air line oiler constructed in accordance with the invention;

Fig. 2 is another vertical sectional view of the oiler, taken generally on the line 2—2 of Fig. 1;

Fig. 3 is a transverse sectional view taken generally on the line 3—3 of Fig. 1, and

Fig. 4 is a detail view of a feeder member of the oiler.

In the drawing, 10 designates a casing or container forming therein an oil reservoir or chamber 11. The casing comprises an oiler body or upper head 12, a disk-like lower head 13, and an interposed transparent cylindrical shell or tube 14 axially aligned with the heads. The transparent shell is formed of plastic material or glass, and the casing heads are preferably formed of metal, such as aluminum. The casing is normally supported by its upper head 12, and the transparent shell and lower head form an oil-receiving bowl or receptacle carried by the upper head. The heads 12 and 13 are provided with respective annular seat-forming grooves 15 and 16 receiving respective gasket rings 17 and 18 against which bear the opposite ends of the transparent shell 11. The casing heads and the interposed transparent shell are secured or clamped in assembled relation by means including a vertical connector tube or pipe 19 which extends axially in the shell and has threaded upper and lower ends 20 and 21, the connector tube being under longitudinal tension. The threaded tube end 20 is screwed into a threaded bore 22 formed centrally in the lower portion of the upper casing head 12. The threaded tube end 21 is screwed into a threaded bore 23 formed axially through a clamping bushing 24 engaging the lower casing head. The bushing has a reduced cylindrical upper

end portion 25 which slidably fits in a vertical bore 26 formed axially through the lower casing head. The bushing further includes a hexagonal head 27 bearing against the flat bottom face of the lower head. A counterbore 28 is formed in the bottom face of the lower head at the lower end of the bore 26 and receives a sealing O-ring 29 which bears on the bushing head 27. In some instances, the connector tube may be formed integrally with the bushing 24.

Formed diametrically through the upper casing head 12 is a horizontal bore 30 providing an air supply passage or conduit, the bore having opposite screw-threaded ends 31 adapted to be connected to aligned sections of a compressed air line 32. The upper casing head has formed therein a central vertical bore 33 which is coaxial with the threaded bore 22 and extends upwardly from the threaded bore 22 to the air conduit bore 30. The bore 33 is of smaller diameter than the threaded bore 22, forming an annular shoulder 34 at their junction.

A porous filter-forming feeder rod or wick 35, such as of sintered bronze or other suitable rigid material, extends longitudinally in the vertical connector tube 19 and has its upper portion extending through the bore 33 and into the air conduit or passage 30. The lower end of the porous rod extends below the lower end of the connector tube and is soldered, cemented, or pressed in the cupped upper end 36 of a cylindrical holder 37 which is screw-threaded in the bushing bore 23. The lower end of the rod holder has a screw-driver slot 38 by which the porous rod can be axially shifted to vary the exposure of the upper end of the rod in the air passage 30. A lock nut or packing nut 39 is threaded onto the rod holder 37 below the bushing 24 and bears against the bottom face of the bushing. A counterbore 40 is formed in the upper face of the lock nut and houses an O-ring 41 engaging the threads of the rod holder to form a fluid-tight seal or joint and to constitute a friction lock for retaining the holder in adjusted position. The screw-threaded rod holder 37 can be rotatively adjusted while the casing is under internal pressure and without loosening the lock nut or packing nut if the air pressure is low, as is sometimes the case. However, if the applied air pressure is high, the lock nut may require a slight loosening before rotatively adjusting the rod holder.

The porous filter-forming feeder rod has a reasonably close sliding fit in the vertical bore 33 of the upper casing head. However, in some instances an O-ring 42 of neoprene or the like may surround the rod between the annular casing shoulder 34 and the upper end of the connector tube 19, the O-ring being confined between the shoulder and the tube.

The projection of the porous rod into the air passage 30 reduces the cross sectional area of this passage and produces a Venturi effect. Axial adjustment of the rod varies the rod exposure and also varies the Venturi effect.

The upper casing head 12 has a central screw-threaded filler opening 43 which is normally closed by a screw plug 44 having a sealing O-ring 45. One or more angular filling passages 46 extend downwardly in the upper casing head from the filler opening to the bottom face of this head. In the present instance two filling passages are shown and are disposed at opposite sides of the air supply passage 30. Oil is introduced into the bowl to a maximum level indicated by the line 47. An air chamber 48 is formed in the bowl above the oil body. Near the lower casing head 13 the connector tube 19 has a side port 49 for admitting oil to the porous rod. In some instances, a small-diameter air port 50 is formed through the wall of the connector tube near the bottom face of the upper casing head. The upper port 50 is not always used and is here shown to be closed by a screw plug 51.

To effect additional control of the oil delivery from the feeder rod to the air stream in the passage 30, an adjustable air vent or by-pass is provided between this air passage and the air chamber 48 in the bowl. The air vent comprises a horizontal bore 52 extending in the upper casing head laterally from the air passage 30 and communicating with a larger coaxial bore 53, the latter communicating with a vertical bore 54 which extends downwardly to the bottom face of the upper casing head. A headed bushing 55 is screwed into the bore 53 and has threaded therein an axially extending valve stem 56 provided with a needle valve 57 at its inner end. The needle valve enters the bore 52 for variably restricting the flow of air in either direction in this bore. The outer end of the valve stem is provided with a screw-driver slot 58. A gland sleeve 59 is screwed into the outer end of the headed bushing 55 and confines a packing 60 engaging the valve stem 56. The vent bore 52 is here shown to communicate with the air passage 30 at the middle of this air passage and near the porous feeder rod, although other locations of the bore along the passage may be provided. The compressed air may flow through the air passage 30 in either direction.

When the oiler is to be placed in service, it is connected in the compressed air line 32, as indicated in Fig. 2. The porous rod 35 is vertically shifted by its screw-threaded holder 37 to obtain the desired projection of the rod into the air line passage 30, the position of this rod being gauged by the position of the holder with respect to the lock nut 39. A quantity of suitable lubricating oil, such as a light spindle oil, is admitted into the bowl or reservoir 11 through the filler opening 43, the oil level being spaced below the bottom face of the upper casing head 12. The oil enters the lower port 49 in the connector tube 19 and soaks into the porous rod 35, the oil rising in the rod by capillary action and reaching the upper end of the rod. The oil will also rise in the narrow annular clearance space between the rod and the inner walls of the connector tube to about the level of the main body of the oil outside of the tube.

In operation, when air pressure is applied to the air line, compressed air will flow into the oil reservoir 11 through the by-pass or vent controlled by the needle valve 56, 57, thus tending to equalize the air pressure in the air passage 30 and in the air chamber 48 above the oil level. However, the air pressure in the air passage 30 will not remain constant but will fluctuate slightly, particularly during operation of the pneumatic tool or other air-operated device (not shown) connected to the air line and during starting and stopping of this device. If the air pressure in the air supply passage 30 falls, the air pressure in the reservoir tends to remain at its previous value, and the resulting differential air pressure will force additional oil upwardly through the porous rod 35. During flow of air through the air passage 30 to the air-operated device, the air stream will pick up oil in the form of a fine mist or fog from the oil film on the exposed surface of the porous rod, this oil film being renewed as the oil is dispersed or diffused in the air stream. If the valve-controlled by-pass or vent is fully open, a lowering of the air pressure in the air supply passage 30 will be quickly reflected in the bowl so that upward flow of oil through the porous rod will be minimized and oil delivery to the air stream will be reduced. If the by-pass needle valve 56, 57 is moved toward closed position, the effective differential air pressure is increased, thus increasing the upward flow of oil through the porous rod. The lowering of the oil level in the bowl incident to consumption of the oil will not appreciably affect the oil feeding operation since the differential pressure action will force oil upwardly within the connector tube in the narrow clearance space surrounding the rod.

The rate of oil delivery to the air stream can be further controlled by varying the exposure of the axially shiftable porous rod in the air supply passage 30, so that adjustment of the rod and adjustment of the by-pass or vent will provide a wide range of oil delivery.

The porous feeder rod resists erosion by the air stream and can readily be removed and cleaned when required. It is not necessary to dismantle the casing when removing or adjusting the feeder rod.

The air vent bore 52 is here shown to open into the middle portion of the air supply passage 30 near the porous rod, permitting either end of this passage to be used as the air inlet. However, in some instances the air vent bore 52 may open into the air line passage either upstream or downstream from the porous rod.

In some cases, as where the air pressure in the air line is subject to wide fluctuations, it may be desirable to open the upper port 50 in the connector tube by removing the screw plug 51, so as to avoid excessive downward forcing of accumulated oil in the porous rod by differential air pressure during pressure equalizing periods.

I claim:

1. An air line oiler, comprising a casing providing an oil reservoir, said casing having an air passage for flow of compressed air therethrough and having a bore between said reservoir and passage, said casing further having a bottom wall with an aperture aligned with said bore, oil feeding means including a rigid porous rod disposed in said bore and extending into said air passage, and adjusting means exteriorly accessible from below said bottom wall for longitudinally shifting said rod, said adjusting means extending in said apertured bottom wall and having a fluid-tight joint therewith to permit manipulation of said adjusting means while said casing is under internal pressure.

2. An air line oiler, comprising a casing providing an oil reservoir, said casing having an air passage for flow of compressed air therethrough and having a bore extending downwardly from said passage to said reservoir, oil feeding means including a rigid porous rod having its upper portion disposed in said bore and extending into said air passage, and a screw-threaded holder secured to the lower end of said rod, said holder being exteriorly accessible from below said casing and having a screw connection with said casing for axially shifting said rod to thereby adjust the projection of the upper end of said rod in said air passage, and said holder having a fluid-tight joint with said casing to permit adjustment of said rod while said casing is under internal pressure.

3. An air line oiler, comprising a casing including upper and lower heads and a transparent tubular member interposed between said heads in sealing engagement therewith to form an oil reservoir, a longitudinally tensioned tubular connector member extending between said heads within said tubular member and joining said heads, said upper head having an air passage for flow of compressed air therethrough, a porous metal rod shiftable lengthwise in said tubular connector member and retained therein in longitudinally adjusted position, said rod having its upper end portion extending into said air passage, said lower head having an opening therethrough aligned with said connector, and said tubular connector being axially open at its lower end for insertion and removal of said porous rod, and adjusting means exteriorly accessible from below said lower head for longitudinally shifting said porous rod.

4. An air line oiler, comprising an upper head having a transverse air passage for flow of compressed air therethrough, a bowl having transparent side walls and a bottom wall, a longitudinally tensioned tubular connector in said bowl joining said upper head and bottom wall, and a porous rod longitudinally movable in said tubular connector and retained therein in longitudinally adjusted position, said rod having its upper end portion extending into said air passage, said bottom wall having an opening therethrough aligned with said connector, and said tubular connector being axially open at its lower end

for insertion and removal of said porous rod and to permit longitudinal adjustment of said rod.

5. An air line oiler, comprising a casing providing an oil reservoir, said casing having a bottom wall with an opening and further having an upper casing member with an air passage, a tubular connector in said casing extending downwardly from said upper casing member, a clamping bushing extending into said bottom wall opening and having a screw-threaded longitudinal bore, the lower end of said connector being threaded in said bore, a porous rod shiftable lengthwise in said connector and having its upper portion extending into said air passage, the lower portion of said rod being exposed to oil in said reservoir, and a holder secured to the lower end of said porous rod and threaded in said bushing bore for axially adjusting said rod.

6. An air line oiler, comprising a casing having an air passage and an oil reservoir below said passage, a rigid porous feeder rod extending upwardly from said reservoir to said air passage for pick-up of oil from said rod by air flowing in said passage, the lower portion of said feeder rod extending below the liquid level in said reservoir, said casing having a vent passage connecting said air passage and said reservoir, and valve means for said vent passage adjustably restricting the flow of air in either direction through said vent passage to vary the differential air pressure in said reservoir.

7. An air line oiler, comprising a casing providing an oil reservoir, said casing having an air passage for flow of compressed air therethrough and having a bore between said passage and reservoir, oil feeding means including a rigid porous rod disposed in said bore and extending into said air passage, the lower portion of said feeder rod extending below the liquid level in said reservoir, said casing further having a vent passage connecting said air passage and reservoir, and an exteriorly adjustable valve for said vent passage carried by said casing for vriably restricting flow of air in either direction in said vent passage, said valve including a portion adjustably blocking said vent passage.

8. An air line oiler, comprising a casing providing an oil reservoir, said casing having an air passage for flow of compressed air therethrough and having a bore between said passage and reservoir, oil feeding means including a rigid porous rod disposed in said bore and extending into said air passage, said casing further having a vent passage connecting said air passage and reservoir, a valve member adjustably restricting said vent passage for controlling the flow of air in either direction in said vent passage, means accessible at the exterior

of said casing for adjusting said valve member while said casing is under internal pressure, and means accessible at the exterior of said casing for longitudinally adjusting said porous rod to vary the projection of said rod in said air passage while said casing is under internal pressure.

9. An air line oiler, comprising a casing providing an oil reservoir, said casing having a bottom wall and having an upper portion with an air passage for flow of compressed air therethrough, said upper casing portion further having a bore extending downwardly from said air passage to said oil reservoir, oil feeding means including a porous rod disposed in said bore and extending into said air passage, a bushing extending in said bottom wall and having a screw-threaded bore aligned with said first-named bore, a tubular member connecting said bushing and said upper casing portion and housing said porous rod, and a holder secured to the lower end of said porous rod and threaded in said bushing bore for longitudinally adjusting said porous rod.

10. An air line oiler, comprising a casing providing an oil reservoir, said casing having an air passage for flow of compressed air therethrough and having a bore extending downwardly from said passage to said reservoir, oil feeding means including a porous rod having its upper portion disposed in said bore and extending into said air passage, a screw-threaded holder secured to the lower end of said rod and having a lower end accessible exteriorly from below said casing, said casing having a bottom wall portion with a threaded bore in which said holder is screwed for raising and lowering said rod, and packing means for sealing said screw-threaded holder with respect to said casing.

References Cited in the file of this patent

UNITED STATES PATENTS

1,336,984	Wood	Apr. 13, 1920
1,438,926	Leet	Dec. 12, 1922
1,504,341	Hansen	Aug. 12, 1924
2,229,176	Kehle	Jan. 21, 1941
2,515,417	Myers	July 18, 1950
2,656,899	Ketelsen	Oct. 27, 1953
2,680,496	Johnson	June 8, 1954
2,730,269	Earle	Jan. 10, 1956
2,767,807	Booth	Oct. 23, 1956

FOREIGN PATENTS

466,172	France	Feb. 23, 1914
517,638	Germany	Feb. 6, 1931