

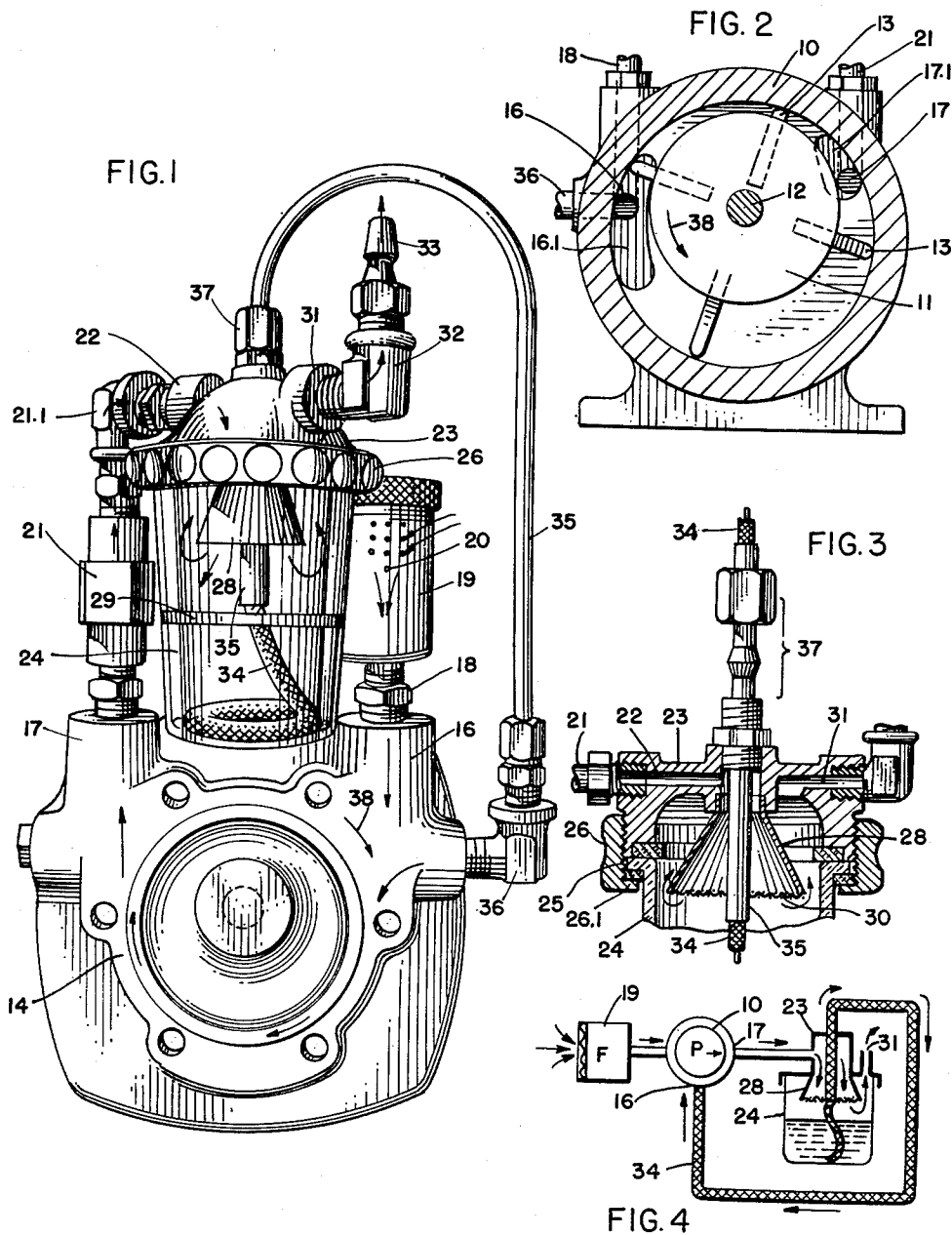
Sept. 14, 1954

W. PREISS

2,689,080

ROTARY AIR PUMP LUBRICATOR

Filed May 18, 1953



INVENTOR:

WILLY PREISS

BY

Sumner Sumner & Snow,

ATT'YS

UNITED STATES PATENT OFFICE

2,689,080

ROTARY AIR PUMP LUBRICATOR

Willy Preiss, Chicago, Ill., assignor to V. Mueller & Co., Chicago, Ill., a corporation of Illinois

Application May 18, 1953, Serial No. 355,763

5 Claims. (Cl. 230—207)

1

This invention relates to lubricating systems for vacuum and pressure pumps of the rotary type, such as are used in hospital operating rooms and elsewhere.

One of the most serious problems in operating such pumps is that of lubrication. Too little lubrication means that the pump develops excessive heat, and would not operate efficiently because of lack of an adequate oil seal. Too much lubricant on the other hand results in oil vapor being carried along with the air as it is exhausted from the pump, which is particularly serious in hospital operating rooms where rotary type pumps are used for administering ether as an anesthetic. Oil vapor combined with ether vapor can be dangerous to the patient being anesthetized.

Most of the present day pumps are provided with one or more oil cups which must be attended to at fairly short intervals, usually every twenty to fifty running hours, or even more frequently. When this responsibility is left to the nurses in an operating room it is commonly found that the pump received too little or too much oil.

The main objects of the present invention are to provide an improved form of lubricating system in which the oil is recirculated in proper amount to lubricate the pump and in which the used oil is trapped so as to virtually eliminate all oil vapor from the air discharged from the pump; to provide improved means for assuring an adequate supply of oil to suit requirements of the pump by continuously supplying minute quantities of oil at the inlet port, exhausting any surplus at the exhaust port and filtering out such surplus of oil before the air is discharged to the outside through whatever mechanical gadget is attached to the pressure side of the pump; to provide an improved form of oil supply vessel adapted to serve as a trap for collecting any particles of oil suspended in the air exhausted from the pump, and also to serve as a feed supply and indicator; and to provide an improved form of oil feed whereby the oil is supplied to the pump in regulated amount by means of a wick of which the fluid conveying action is increased by the siphoning effect of gravity assisted by the vacuum produced by the pump.

A specific embodiment of this invention is shown in the accompanying drawings in which:

Figure 1 is a perspective front elevation of the lubricating system as applied to one of the cylinder heads of a rotary pump.

Fig. 2 is a sectional diagram of a usual form of rotary pressure and vacuum pump, they view corresponding to a section through the pump cylinder behind the parts shown in Fig. 1, and viewed from the rear of Fig. 1.

2

Fig. 3 is a fragmentary sectional view of the closure cap and oil trapping and feeding vessel of Fig. 1, the section being taken on a vertical plane through the axis of the oil vessel and through the inlet and outlet passages of its closure cap.

Fig. 4 is a schematic diagram showing the relation of the air flow and oil flow through the pump and its lubricating system.

In the drawings, the pump is assumed to be a rotary pump of the general type shown in Fig. 2, in which the cylinder 10 has a rotor body 11 fast on a shaft 12 that is eccentrically journaled with respect to the cylinder walls, and that carries vanes 13, that slide radially in the rotor body 11, and are urged against the cylinder walls by centrifugal force so that they act as pistons producing a vacuum at the inlet port and pressure at the outlet port, in a gaseous medium that is circulated through the pump.

In the form shown, the cylinder head 14, at one end of the cylinder, is bored to provide an inlet port 16 expanded by a groove 16.1 in the inner face of the cylinder head, and an exhaust port 17 which is also expanded to a lesser extent by a groove 17.1. The inlet port 16 is connected by a nipple 18 with an air filter 19, which comprises a hollow shell with minute bores 20 in its outer wall. The exhaust port 17 is connected by a standpipe 21 and elbow 21.1 to an inlet passage 22 in the cap 23 that forms the top closure and suspension means for supporting an oil supply bottle or vessel 24.

The oil vessel 24, as shown in Figs. 1 and 3, is preferably a glass jar open at the top, with an outwardly flanged rim 25, that is connected to the closure cap 23 by a union ring 26 that is threaded on the rim of the cap 23 and has an annular flange 26.1 directed inwardly at its lower end to grip the flange 25 of the vessel with interposed gaskets as shown. The outer periphery of the ring 26 is embossed or otherwise formed so as to be easily rotated by an operator for removing the bottle 24 from the cap for the purpose of cleaning or filling it. The piping 21 and elbow 21.1 hold the cap 23 in a position in front of the cylinder head 14 so that the bottle 24 may be easily removed or replaced. The inlet passage 22 in the cap 23, that is connected to the exhaust port 17 by the piping 21 leads transversely into the upper end of a downwardly flared bell mouth member 28, which provides an expanded and downwardly directed air passage, spaced above the level of the surface of the oil in the vessel 24. A mark 29 on the bottle 24 indicates the normal level of a proper oil supply so that there is adequate room for the air to flow downwardly

3

and upwardly around the lower end of the bell mouth 28 without picking up oil from the vessel 24. A fine mesh wire screen 30 extends across the lower end of the bell mouth to catch and filter out of the air any droplets of oil that are carried over from the exhaust of the pump. The cap 23 has an outlet passage 31 that communicates with the interior of the vessel 24 at the top of the space outside of the bell mouth 28. This outlet port 31 communicates with an elbow fitting 32 supporting a hose nipple 33 that connects the pump with any desired pressure actuated device.

A wick 34 leads upwardly from the bottom of the vessel 24 upwardly through the bell mouth and the top of the cap 23 to the inlet port 16 of the pump. This wick is of uniform circular cross-section with a wire core and is supported and protected by a close fitting housing comprising a curved pipe 35 with appropriate fittings 36 at the inlet port 16 and 37 at the cap 23. The pipe 35 preferably extends from a point below the screen 30 of the bell mouth 28 upward through the cap 23 and then curves upward and downward in syphon fashion to the pump inlet port which is some distance below the bottom of the oil vessel 24. The portion of the pipe 35 that runs through the bell mouth 28 separates the wick 34 from exposure to the air flowing through the bell mouth and thus protects that air from contamination by oil in the wick.

The operation of the device is as follows:

The electric motor drives the rotor of the pump in the direction indicated by the arrows 38 in Figs. 1 and 2, and the rotation of the vanes produces a vacuum at the inlet port 16 and pressure at the outlet port 17, as is well known with respect to this type of pump. In practice a $\frac{1}{4}$ horsepower motor operated by a 60 cycle A. C. current of 115 volts delivers a vacuum up to 25 inches of mercury and an air pressure up to 25 pounds per square inch, which are ample for surgical procedures. Usually one such pump is employed to produce a suction while another is employed to produce pressure.

The normal oil level in the vessel 24 is indicated by the line 29 in Fig. 1. Lubricating oil to be used when the device shown is intended for operation in connection with surgical apparatus should not contain a petroleum base product. A suitable lubricant is one known as Prestone 200 oil. The vacuum produced at the inlet port 16 assists the wick 34 in conducting oil from the vessel 24 through the pipe 35. There is also some syphon effect. The wick thus delivers sufficient lubricant to the pump to assure its proper operation. Any excess droplets of oil that might be carried by the exhaust air through the piping 21 and inlet 27 are discharged into the interior of the bell mouth 28 and returned to the vessel 24. The expanding bell mouth and the upward flow of the air around the lower edge of the bell mouth and the filter 30 provide additional safeguards to free the air from oil vapor, so that the air that is discharged at the outlet 31 for use in the operation of surgical apparatus is practically freed from the presence of oil vapor therein.

Air entering the port 16 is filtered by the screening device 19 with its minute apertures 20, so as to be practically freed from dust and lint. It is to be understood that the pump when used in connection with surgical operations operates only on air as the fluid medium. The accessory vacuum controlled apparatus is arranged

4

to trap the products handled without any chance of contaminating the interior of the pump. The oiling system is practically automatic in causing a circulation of the oil and thus requires attention only three or four times a year, as for example, only after every two-hundred running hours, and no other lubrication is required.

The air flowing from the pump to the vessel 24 flows through the inlet 22 and must turn abruptly through an angle 90 degrees to flow downward through the bell mouth 28, and then turns abruptly through an angle of 180 degrees to pass upwardly around the bell mouth 28 to the outlet 31 where it again turns through an angle of 90 degrees. This movement of the air effectively throws out any particles of oil that may have been entrained by the air and this oil impinging on the walls of the tube 35, the bell mouth 28, the walls of the vessel 24 and its cap flows downward into the oil reservoir at the bottom of the vessel 24. Thus the air issuing from the outlet 31 is completely freed of any contamination by the lubricant.

Although but one specific embodiment of this invention is herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims:

I claim:

1. In an air pump having inlet and outlet ports, a lubricator comprising an oil supply vessel open at the top, a closure cap thereon, a wick extending from the bottom of said vessel upward through said cap and then to said inlet port, a tubular housing enclosing said wick from said vessel to said inlet port, said cap having an air inlet connected to said outlet port and having an air outlet, and an oil trap in said cap interposed between said air inlet and outlet thereof and adapted to drain into said vessel.

2. In an air pump having inlet and outlet ports, a lubricator comprising an oil supply vessel, a closure cap on said vessel, an air inlet passage leading from said pump outlet port into said closure cap and terminating in a flared bell mouth extending downward in said vessel, an air outlet passage in said cap outside of and adjacent the top of said bell mouth, a wick extending from said vessel upward through said cap and then into said pump inlet port, and a tubular housing enclosing and supporting said wick between said cap and inlet port, said housing being extended into said vessel to separate said wick from exposure to the air flow between said air inlet and outlet passages.

3. The combination of an air pump having inlet and outlet ports with a lubricator, comprising an oil supply vessel open at the top, a closure cap thereon, a wick housing tube attached to said cap communicating with the inlet port of said pump and extending downwardly into said vessel, a downwardly flared air pipe secured to said cap and having walls spaced outwardly around said housing tube and inwardly of the walls of said vessel, an air inlet in said cap communicating with the outlet port of said pump and directed laterally into the upper end of the space enclosed by said air pipe, and an air outlet in said cap directed laterally from the space between said pipe and the side walls of said vessel, and a wick extending from the bottom of said vessel through said housing tube.

4. The combination specified in claim 3 and

5

including a fine mesh screen extending across the lower end of said downwardly flared pipe.

5. In an air pump, a cylinder head having inlet and outlet ports, a standpipe on said head, an elbow on said standpipe, an oil vessel closure cap connected to said elbow, an oil supply vessel suspended from said cap, a bell mouth depending from said cap in said vessel and defining a downwardly directed passage communicating with said outlet port through said elbow and standpipe, 10 said cap having an air outlet adjacent and outside of the top of said bell mouth, a wick of uniform circular cross-section leading from the bot-

6

tom of said oil vessel upwardly through said bell mouth and cap and then downwardly to the interior of said inlet port, and a tubular housing snugly fitting said wick and enclosing the same against exposure to air from said inlet port to a point adjacent the lower end of said bell mouth.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,272,926	Squiller	Feb. 10, 1942