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LUBRICATOR

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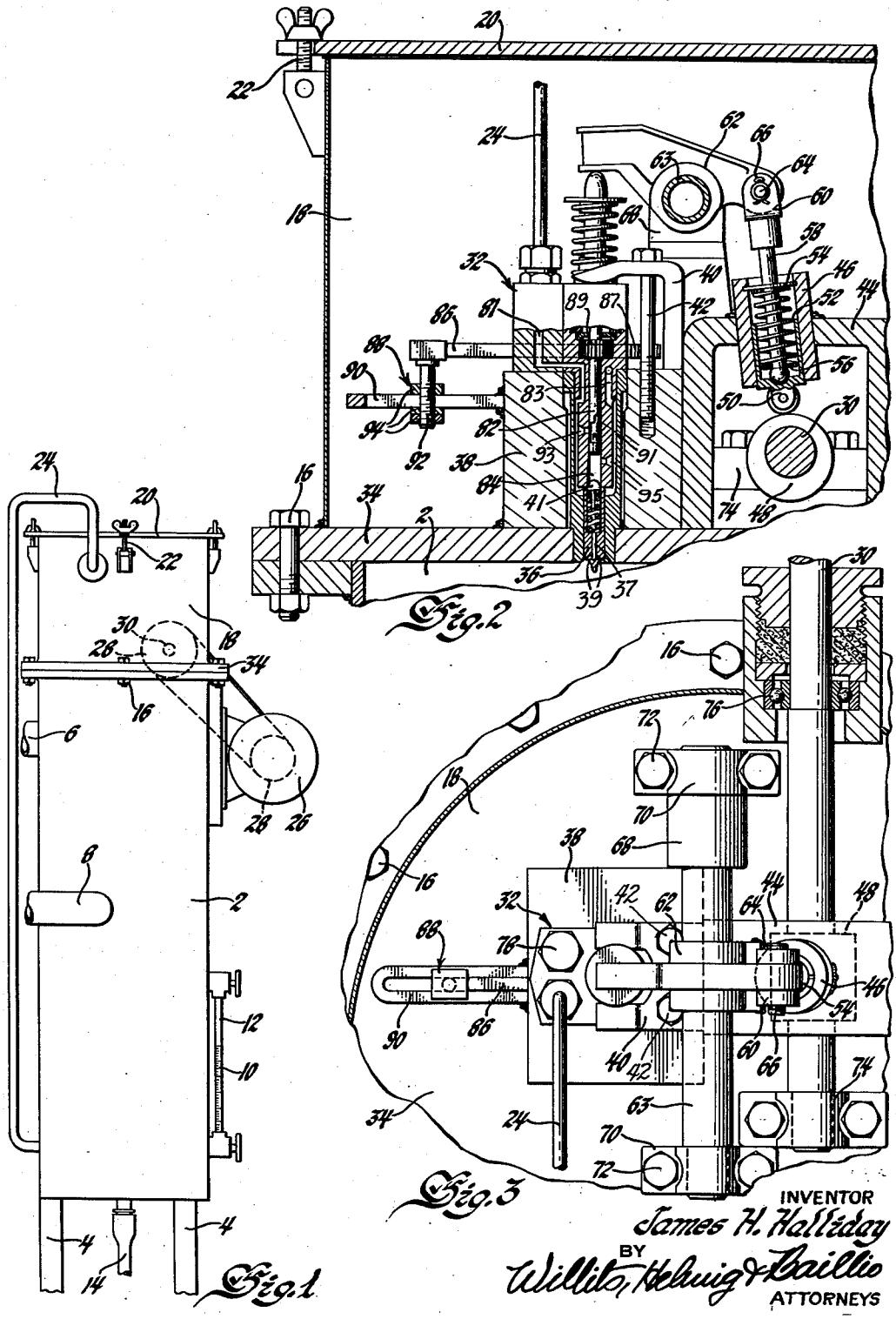


Fig. 1

Fig. 2

Fig. 3

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LUBRICATOR

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This invention relates generally to lubrication means and more particularly to lubrication means for pneumatically operated tools.

When using pneumatically operated tools it has been the practice to use unit or individual oil lubricators for lubricating each tool. These unit oilers have proven unsatisfactory for several reasons, but primarily because of their high cost due at least in part to the fact that a separate lubricator is required for each pneumatically operated tool.

It, therefore, is an object of this invention to provide a unique lubricating device which may be used to supply a plurality of pneumatic tools with adequate lubrication when the tools are operating either singly or in unison.

It is another object of this invention to incorporate known and easily assembled elements into a unique combination for an oil lubricating device which is easier and less expensive to manufacture than lubricating devices currently in use.

Another object of this invention is to utilize a lubricating oil injector in combination with a chamber containing an amount of oil in its lower portion to supply atomized oil to air under pressure contained in the upper portion of the chamber above the surface of the oil contained therein, the air in the chamber acting to operate one or more pneumatic tools.

In the drawings:

Fig. 1 is an exterior view of the lubricating device showing the air pressure chamber and the electric motor for operating the oil injector. Figure 1 also shows the manner in which oil is conducted from the lower portion of the chamber to the inlet of the oil injector.

Figure 2 is a section in elevation taken through a housmounted atop the chamber to show how the oil injector is operated and adjusted to inject varying amounts of lubricating oil into the air pressure chamber for supplying air under pressure to one or more pneumatically operated tools.

Figure 3 is a plan view of the housing with its cover removed to show the bearing and other supports for the oil injection operating means and the manner in which one side of the lubricating oil injector is plugged.

Referring now to Figure 1, the exterior of an air pressure and oil containing chamber 2 is shown suitably supported on a plurality of legs 4. An air inlet 6 communicates with the upper portion of the chamber 2 and acts as a fluid conductor for conducting air under pressure from a suitable air pressure source into the chamber 2. An air outlet 8 also communicates with the upper portion of the chamber 2 and acts to supply air under pressure from the chamber 2 to one or more pneumatically operated devices. In other words, inlet 6 and outlet 8 are in direct communication with each other by means of the upper portion of the interior of the chamber 2. The lower portion of the chamber 2 is constructed to contain an amount of oil 10 whose level is indicated by a sight gauge 12 suitably attached to the lower portion of the chamber 2. Oil may be introduced into the lower portion of the chamber 2 and removed therefrom by an oil conductor 14 located in the bottom thereof which acts to regulate the desired level of oil contained in the lower portion of the chamber 2 as indicated by the sight gauge

12. Secured to the top of the chamber 2 by means of bolt assemblies 16 (see Figure 2) is a housing 18 enclosing the lubricating oil injecting assembly later to be described. The housing 18 is covered by a cover plate 20 normally held in place by the wing nut and bolt assemblies 22, details of which may be seen in Figure 2. Communicating with the lower portion of the interior of the chamber 2 well below the oil level 10 is a fluid conductor 24 which enters a wall of the housing 18 and communicates with one side of the oil injector assembly 32, more particularly shown in Figures 2 and 3. Attached to the outer wall of the chamber 2 is a suitable power source such as an electrical motor 26 provided with a belt drive and sheave assembly 28 adapted to rotate a camshaft 30 for operating the oil injection means 32 shown in Figure 2.

Referring now to Figures 2 and 3, it will be noted that an oil injector assembly, indicated generally by the numeral 32, is suitably mounted to the lower wall or bottom 34 of housing 18 by means of a mounting support 38 welded or otherwise secured thereto, the wall 34 also serving as the upper wall or top of the chamber 2. The oil injection assembly 32 is rigidly secured atop the mounting support 38 by means of a crab 40 abutting upper surfaces on the injector assembly 32 and the mounting support 38, the crab 40 being secured by means of one or more threaded bolts 42 whose threads extend into and mate with threads tapped in the mounting support 38. It may be observed that the atomizing end or nozzle 36 of the oil injector 32 extends through the wall 34 and has a passage 37 which by means of small atomizing ports 39 communicates with the interior of the chamber 2. The passage 37 has positioned therein a spring-loaded one-way valve 41 which is opened by sufficient pressure being exerted on the upper surface thereof. Immediately adjacent the mounting support 38 is a mounting bracket 44 which acts as a support for a cam follower assembly guide 46 welded or otherwise secured thereto.

The mechanism for operating the oil injector assembly 32 includes a cam 48 secured to the camshaft 30 on whose surface the wheel of a cam follower assembly 50 rolls. The cam follower 50 is slidingly retained by the guide 46 and the wheel of the cam follower is biased against the cam 48 by means of a spring 52. The spring 52 has one end resting against a retaining washer 54 mounted in the guide 46 and the other end abutting a washer 56 restrained by the bulbous end of a push rod 58 which has a clevis 60 pivotally attached to a rocker arm 62 by means of a bolt 64 and a cotter pin 66. The rocker arm 62 is pivotally supported on a rocker arm shaft 63 by a pair of supports 68 resting on and secured to the wall 34. The rocker arm shaft 63 is secured to the supports 68 by means of straps 70 and bolts 72. Also suitably mounted on and secured to the top of the lower wall 34 of the housing 18 are bearing and bearing-sealing assemblies 74 and 76 which rotatably support the camshaft 30.

The oil injector assembly 32 is of conventional construction and therefore need not be described in detail here. If, however, information should be desired regarding such an injector, reference may be had to U. S. Patent No. 1,981,913—Fielden—which shows and describes in detail the type of injector which may be adapted for use with this new lubricator. It will, of course, be appreciated that other oil injector assemblies whose principle is similar to that disclosed in Fielden could also be adapted to operate with this new lubricator and, therefore, it is not intended to limit the use of this new oil lubricator only in combination with the injector exemplified in Fielden 1,981,913.

It should be mentioned here that fuel injector assem-

blies of the type intended for use with this new lubricator are often provided with two similar passages, one of which constitutes an inlet passage and is indicated in this case at 81. The second passage which is partially located behind passage 81 as viewed in Fig. 2 and is indicated by a reference character 83 usually constitutes an outlet passage for removing through a port such as 95 excess oil supplied to passage 84 and returning it to the low side of a separate fuel oil pump. Since a separate fuel oil pump is not used to supply oil to the fuel injector in the instant invention there will be no excess of oil to return to the low side of such a pump and there is no need for passage 83. In fact, if passage 83 were left open to the atmosphere the suction or partial vacuum created by the reciprocating action of plunger 82 which is relied on to induce oil into passage 84 could not be obtained. For this reason the upper end of passage 83 has been closed by a plug 78.

This new lubricator may be set up to operate and is operated as follows: A quantity of oil is first introduced into the lower portion of the chamber 2 until it reaches a desired level as indicated by the sight gauge 12. The electrical motor 26 may then be started which serves to turn the camshaft 30 and the cam 48. As the cam 48 rotates it causes the cam follower assembly and the push rod 58 to move the rocker arm 62 up and down, thereby periodically depressing an injector plunger 82. As the plunger 82 moves up and down it reduces the pressure in the chamber 84 below the pressure contained in the chamber 2 to thereby induce oil contained therein through the conductor 24 and passage 81 into the chamber 84 of injector assembly 32 from where it is forced by the plunger 82 to unseat valve 41 and pass through the small holes 39 in the end of nozle 36 and is injected in a fine spray into the upper portion of the chamber 2. It will now be appreciated that this lubricator can be operated continuously without any loss of oil as long as no air is being used. If no air is being used the oil will simply settle to the bottom of the chamber 2 from where it is again induced into the injector assembly 32.

It is well known that injectors such as that shown in the above mentioned Fielden patent may be adjusted to supply oil in different quantities by an adjusting rack of the type indicated in the injector assembly 32 by the numeral 86. The adjusting rack 86 is provided with teeth 87 meshing with those of a pinion 89 keyed to the upper portion of plunger 82 so that plunger 82 may move up and down relative to gear 89 but is rotated by gear 89 upon horizontal movement of rack 86. Plunger 82 is provided with the usual helical cut-out 91 which in conjunction with port 93 enables the effective stroke of plunger 82 to be varied in response to rotation thereof by rack 86 and pinion 89 so as to vary the amounts of atomized oil supplied to chamber 2 per injector stroke. By providing a locking nut assembly 88 or other suitable locking means thereto, the adjusting rack 86 may have its position changed to supply smaller or larger amounts of oil for each injector stroke depending upon the rack position. In the embodiment shown this locking means comprises a U-shaped bracket 90 welded or otherwise secured to the mounting support 38 and a threaded bolt 92 extending between the legs of the bracket, the bolt 92 having one or more locking nuts 94 threaded thereon which are adapted to frictionally engage surfaces on the bracket 90.

I claim:

1. A lubricating device for pneumatic tools comprising a pressure container, an air pressure supply inlet in direct communication with the interior of said container, an air pressure supply outlet in direct communication with the interior of said container, said inlet and outlet being in direct communication with each other through said interior, said inlet and outlet and interior being relatively large so that substantially no pressure drop occurs in the air flowing therethrough, a quantity of lubricating oil in said container, an oil outlet in communication with the interior of said container below the surface of said lubricating oil, an atomizing nozzle dischargeable directly into said interior above the surface of said lubricating oil, a chamber in communication with said nozzle, an oil conduit in communication with said oil outlet and said chamber, a movable plunger in said chamber having a variable effective stroke, adjusting means operably connected to said plunger to vary the effective stroke of said plunger, and means to reciprocate said plunger whereby atomized oil is injected into said container.

2. A lubricating device for pneumatic tools comprising a pressure container having upper and lower interior regions in direct communication with each other, an air pressure supply inlet in direct communication with said upper region, an air pressure supply outlet in direct communication with said upper region, said inlet and outlet being in direct communication with each other through said upper region, said inlet and outlet and upper region being relatively large so that substantially no pressure drop occurs in the air flowing therethrough, a quantity of lubricating oil in said lower region, an oil outlet in communication with said lower region below the surface of said lubricating oil, an oil atomizer supported on said container and including an atomizing nozzle dischargeable directly into said upper region, said oil atomizer having a chamber in communication with said nozzle, an oil conduit in communication with said oil outlet and said chamber, a movable plunger in said chamber, a rocker arm assembly supported on said container and engageable with said movable plunger, a drivable cam and camshaft assembly supported on said container and engageable with said rocker arm assembly, and a power source drivingly connected to said cam and camshaft assembly.

3. A lubricating device for pneumatic tools comprising a pressure container having upper and lower interior regions in direct communication with each other, an air pressure supply inlet in direct communication with said upper region, an air pressure supply outlet in direct communication with said upper region, said inlet and outlet being in direct communication with each other through said upper region, said inlet and outlet and upper region being of relatively large size so that substantially no pressure drop occurs in the air flowing therethrough, a quantity of lubricating oil in said lower region, an oil outlet in communication with said lower region below the surface of said lubricating oil, an oil atomizer supported on said container and including an atomizing nozzle dischargeable directly into said upper region, said oil atomizer having a chamber in communication with said nozzle, an oil conduit in communication with said oil outlet and said chamber, a movable plunger having a variable effective stroke in said chamber, a rocker arm assembly supported on said container and engageable with said movable plunger, a drivable cam and camshaft assembly supported on said container and engageable with said rocker arm assembly, a power source drivingly connected to said cam and camshaft assembly, and adjustable effective stroke varying means connected to said plunger whereby regulated amounts of oil are removed, and resupplied to said container in an atomized state.

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