Nov. 28, 1961 L. M. STRUNK 3,010,538

CHAIN SAW LUBRICATING SYSTEM

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Fig. 1.

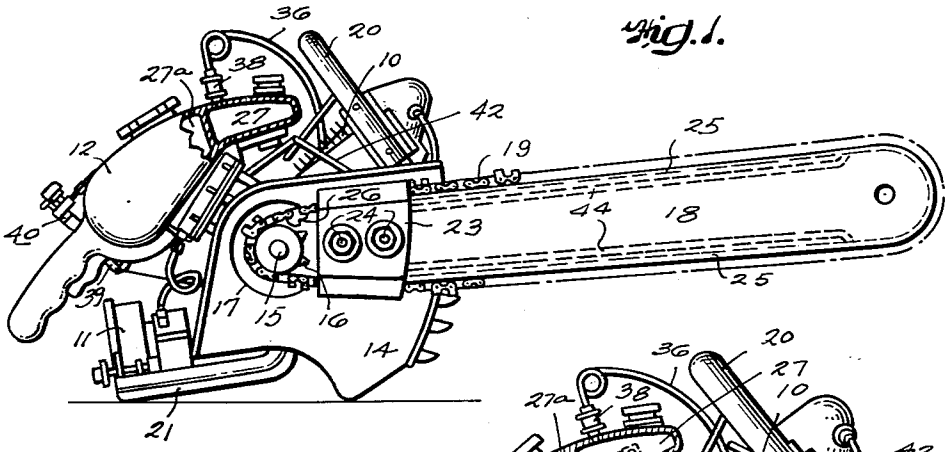


Fig. 2.

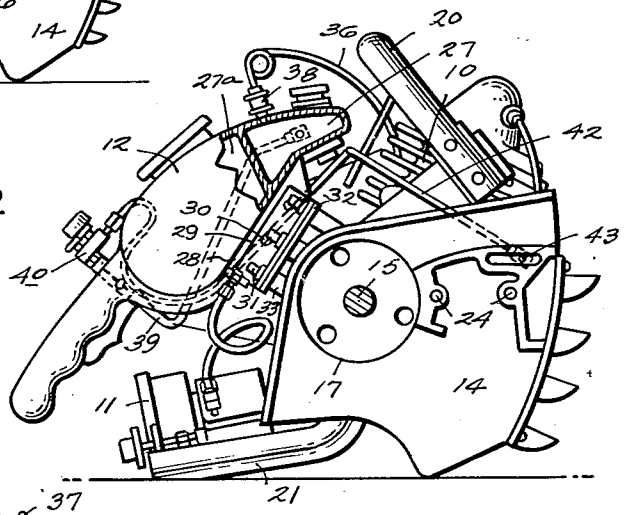
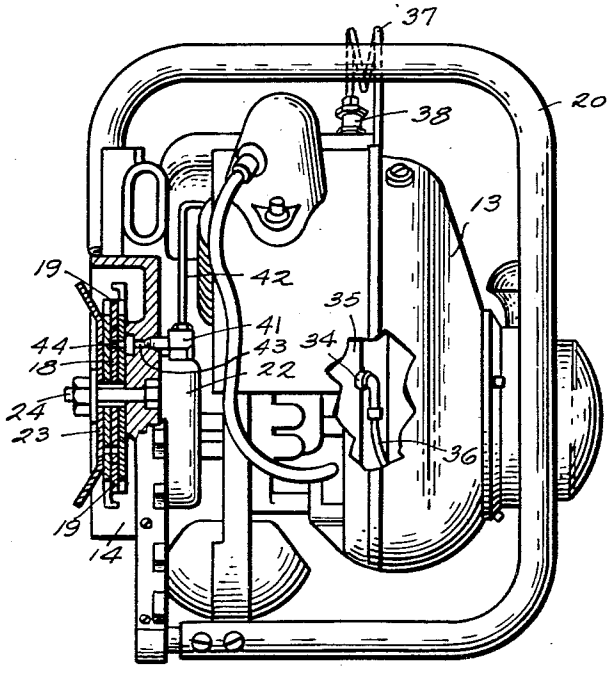


Fig. 3.



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Fig. 4.

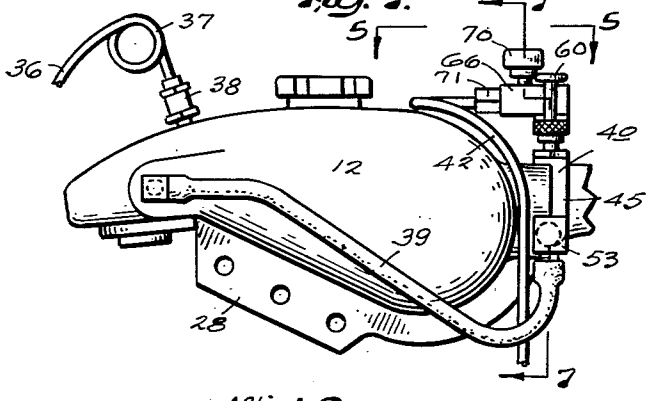


Fig. 5.

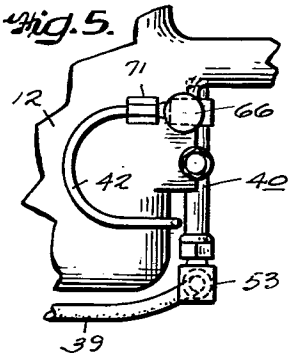


Fig. 6.

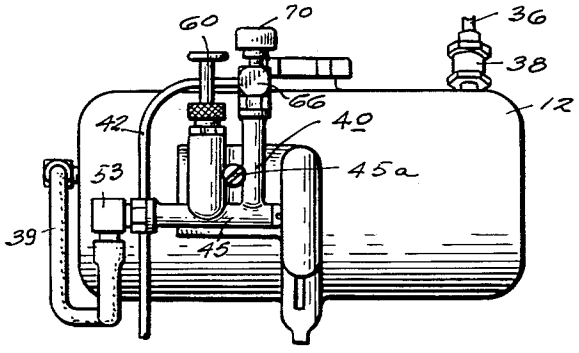


Fig. 7.

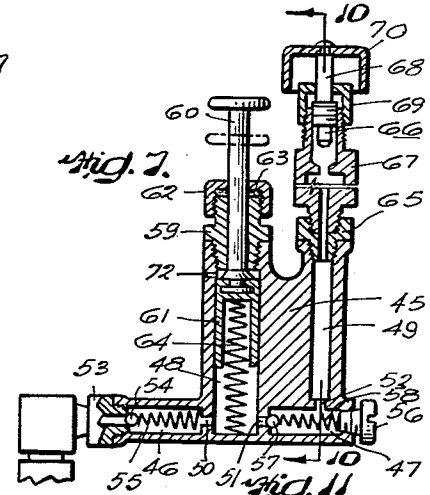


Fig. 8.

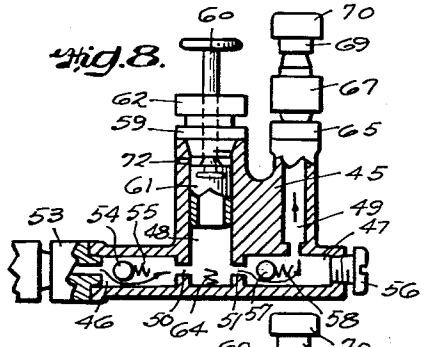


Fig. 9.

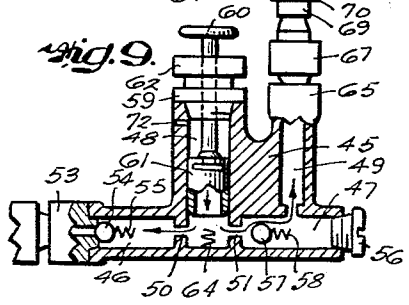


Fig. 10.

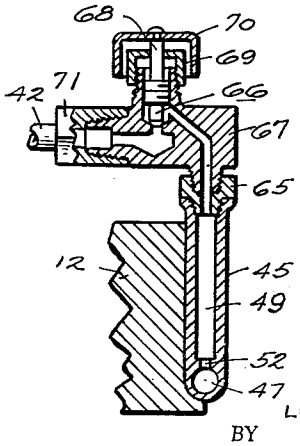
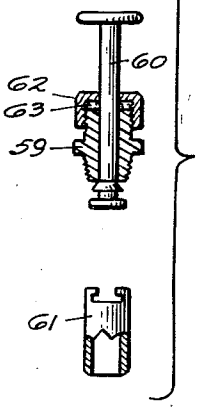


Fig. 11.



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United States Patent Office 3,010,538 Patented Nov. 28, 1961

3,010,538
CHAIN SAW LUBRICATING SYSTEM

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Filed Jan. 6, 1958, Ser. No. 707,321
1 Claim. (Cl. 184—15)

This invention relates generally to power-driven hand-supported chain saws used primarily for felling and bucking trees, and more particularly to certain improvements in that type of chain saw which is the subject of United States Letters Patent No. 2,748,810, issued to Leonard M. Strunk on June 5, 1956.

A principal object of the present invention is to provide for a chain saw of the type aforesaid improved means for delivering a lubricant to the saw bar.

Another object of the present invention is to provide for a chain saw of the type aforesaid a lubricating system including a pump operable for clearing the channel through which the lubricant is delivered to the saw bar should the same become clogged with saw dust or dirt.

Other objects and advantages of the present invention will appear more fully hereinafter, it being understood that the present invention consists substantially in the combination, construction, location and relative arrangement of parts, all as described in detail in the following specification, as shown in the drawings and as finally pointed out in the appended claim.

In the accompanying drawings:

FIGURE 1 is a side elevation of a chain saw constructed in accordance with and embodying the principles of the present invention.

FIGURE 2 is an enlarged view of the saw chain side of the saw, the saw bar and the saw chain being omitted.

FIGURE 3 is a front elevation of the saw with part in section, showing details of the arrangement for lubricating the chain.

FIGURE 4 is a side elevation of the fuel and oil tank.

FIGURE 5 is a fragmentary plan view as indicated by line 5—5 of FIGURE 4.

FIGURE 6 is a rear elevation of the fuel and oil tank.

FIGURE 7 is an enlarged section on line 7—7 of FIGURE 4.

FIGURES 8 and 9 are similar to FIGURE 7 but respectively show the condition of parts when there is a normal flow of oil and when the pump is being used to restore a normal flow of oil.

FIGURE 10 is a section on line 10—10 of FIGURE 7, showing the metering valve closed.

FIGURE 11 is an exploded view of the pump plunger and its head.

Referring to the drawings, the exemplary chain saw constructed in accordance with and embodying the principles of the present invention comprises an internal combustion engine **10**, a conventional carburator **11** positioned to the rear of and connected to the engine, a top-mounted compartmented fuel and oil tank **12**, a conventional magneto and engine starter within an air shroud **13** at one side of the engine, a side frame casting **14** at the opposite side of the engine, a power shaft **15** extending through the side frame casting, a sprocket **16** and a clutch **17** mounted upon the power shaft, a forwardly projecting saw bar **18** supported by the side frame casting, a saw chain **19** trained over the sprocket and the saw bar, an encircling handle **20**, and a rear supporting leg **21** disposed beneath the carburator.

The power shaft **15**, which preferably is an extension of the engine crankshaft, projects through a centrally apertured well **22** formed on the inner or engine side of the side frame casting **14**. The saw bar **18** is secured in flatwise assembly relation with the side frame casting **14** by a retainer plate **23** and a pair of studs **24—24**.

The saw bar **18** is provided along its upper and lower longitudinally extending edges and along its rounded front edge with a continuously extending chain guiding channel, groove or slot **25**, which slot is of a depth sufficient to accommodate therein the chain guide wings conventionally provided on the inner edges of the chain links and which guide wings, designated **26**, are adapted for engagement with the teeth of the sprocket **16** for driving of the saw chain **19** about the saw bar **18**. It will be appreciated that efficient operation of the saw requires that adequate provision be made for abundantly supplying the saw chain **19** and the guiding groove **25**, in which the saw chain runs, with a suitable lubricant. The present invention meets this requirement in the manner now to be described.

The compartmented fuel and oil tank **12** includes, in addition to an oil reservoir, designated **27**, for supplying lubricating oil to the chain-traversed saw bar **18**, a compartment **27***a* in which is stored fuel for the engine **10**. This tank is mounted so that the oil compartment **27** is elevated above the upper run of the saw chain during all normal positions of use of the saw. To this end, the tank **12** is provided along its bottom with a longitudinally extending supporting rib **28** which is embraced by a pair of angle members **29—29** suitably secured together by bolts **30**. The oppositely extending base flanges of the angle members **29—29** are respectively secured, as by bolts **31** to a flat plate **32**, which in turn is suitably secured to the engine body also by the bolts **31**, the plate **32** being supported in suitably spaced relation to the engine body by spacers designated **33**, embracing the shanks of the bolts **31** below the plate **32**. Preferably, the tank mounting is such that the tank **12** is spaced from and generally parallels the top side of the engine **10**.

A fitting **34** is threaded into the front of the crankcase body, designated **35**, of the engine, and a pressure line **36** extends from the fitting **34** rearwardly under and then upwardly around the back of the crankcase body **35**, within the air shroud **13**. Then the line **36** extends through the air shroud **13**, makes a loop **37** and connects to a check valve **38**, which latter is threaded into the roof of the oil reservoir **27**, near the partition which separates the oil and fuel compartments. The line **36** serves to place the interior of the engine casing in communication with the oil reservoir **27**. Since, in the normal operation of the engine **10**, the interior of the engine casing is under pressure, in the order of 5 p.s.i., the oil reservoir **27** is likewise under pressure, in consequence of which oil is discharged from the oil reservoir **27** under pressure through an oil line section **39** connected into one side of the oil reservoir **27** and extending to the rear of the tank **12** for connection to unitary means, generally designated **40**, adapted for controlling the flow of oil.

Extending from the unitary control means **40** forwardly between the tank **12** and the engine **10**, then transversely over the engine **10** and finally forwardly to a fitting **41** is a second oil line section **42**. The fitting **41** is threaded into the inner end of a passage **43**, which passage extends through the casting **14** and communicates with the chain guide groove **25**, as by suitable passages **44** formed in the saw bar **18**.

The unitary control means **40** comprises a main body **45** fitted to the rear of the tank **12** and secured thereto by a screw **45***a* and having formed therein an upstream oil passage **46**, a downstream oil passage **47** axially aligned with the passage **46**, a bore **48** normal to and extending laterally from between the passages aforesaid, and an oil passage **49** normal to and extending laterally from the downstream oil passage **47** in parallel spaced relation to the bore **48**. The upstream and downstream oil passages **46** and **47** communicate with the inner end of the bore **48** respectively through constricted passage por-

tions 50 and 51, and the downstream oil passage 47 communicates with the inner end of the oil passage 49 through a constricted passage portion 52.

Threaded into the outer end of the upstream oil passage 46 is a fitting 53, to which fitting the oil line section 39 is connected. Within this passage is a valve 54, which valve is seated over the outlet end of the fitting 53, being yieldably secured in position by a compression coil spring 55. Threaded into the outer end of the downstream oil passage 47 is a plug 56, and within the oil passage 47 is a valve 57, which valve is seated over the constriction 51, being yieldably secured in position by a coil spring 58.

Threaded into the outer end of the bore 48 is a sleeve 59, through which sleeve slidably projects a plunger 60 that is provided with a head 61 slidably fitted in the bore 48. The sleeve 59 is provided with a bonnet 62 that overlies a suitable packing 63. Under the head 61 is a compression coil spring 64 that acts to bias the plunger 60 outwardly.

Threaded into the outer end of the oil passage 49 is an adapter 65, and threaded into the latter is a needle valve 66, which needle valve includes a main body 67, a stem 68, a bonnet 69, and an operating knob 70. The outlet end of the valve 66 is connected with the oil line section 42 through the medium of a fitting 71.

In the operation of the chain saw, the oil reservoir 27 is pressurized in the manner already described, in consequence of which oil flows from the oil reservoir and courses successively through oil line section 39, unitary control means 40, the second oil line section 42, the oil passage 43, and the oil passage 44 to the chain guide groove 25 of the saw bar 18. It will be noted, of course, that the oil delivered to the chain guide groove 25 is not returned to the reservoir 27, and hence the lubricating system is of the open-loop or non-return type. The flow of oil may be regulated by manipulating the needle valve 66.

Normally, the pressure exerted by the oil upon the valves 54 and 57 is sufficient for unseating the same against the influence of the coil springs 55 and 58, in consequence of which oil courses freely from the tank 12 to the saw bar 18 in the manner aforesaid. However, it frequently happens that the oil passage upon the downstream side of the unitary control means 40 becomes clogged with dirt, saw dust or other foreign matter, choking off the supply of oil. In this event, the plunger 60 is depressed to thereby clear the oil line of the obstruction.

Initial movement of the plunger 60 removes the pressure from the valve 54, which latter then closes under the influence of the spring 55. Continued movement of the plunger 60 then forces the column of oil under the head 61 of the plunger downstream past the valve 57, in consequence of which the obstruction is dislodged and ejected from the oil channel.

When the plunger 60 is released, it is moved outwardly under the influence of the coil spring 64. Initial movement of the plunger 60 causes a suction that tends to draw oil back through the valve 57, which is precluded by the suction and coil spring 58 action upon the valve 57 to close the same. Simultaneously, the suction and the pressurized oil from the tank 12 conjointly cause the valve 54 to open against the influence of the coil spring 55, in consequence of which a fresh column of oil is drawn up into the bore 48. Of course, it may be necessary to depress the plunger more than once to clear the oil line. In order to provide the necessary freedom of movement for the plunger 60, a bleeder opening 72 for air is furnished in the main body 45, just above the head 61 of the plunger.

It will be understood that the present invention is susceptible of various changes and modifications which may be made from time to time without departing from the real spirit or general principles of the invention. For example, while preferably the oil supply is pressurized, oil could be delivered from the oil reservoir to the saw bar simply by gravity flow. In addition, hinged type check valves could be utilized instead of the ball and coil spring type check valves shown and described. Furthermore, the metering valve 66 and the check valve 57, while desirable, are not essential. Still further both check valves 54 and 57 could be eliminated and an ordinary manually operated valve substituted for the check valve 54. Accordingly, it is intended to claim the same broadly as well as specifically as indicated by the appended claim.

What is claimed as new and useful is:

In a portable chain saw of the type powered by an internal combustion engine having a laterally projecting power take-off shaft adapted for driving an endless saw chain trained about a drive sprocket and a saw bar extending freely beyond the front end of said engine, an open-loop lubricating system for lubricating the saw chain and saw bar comprising, an oil reservoir, a pressurizing line communicating between said reservoir above the oil level and the interior of the engine housing to place the oil in the reservoir under greater than atmospheric pressure when the engine is operating, an oil line operatively connecting said reservoir with said saw bar for delivery of oil to the latter, a pair of spring biased check valves series connected in said oil line to permit oil flow therethrough in the same direction, said valves automatically closing under spring bias to prevent delivery of oil from said reservoir to the saw bar when the engine is not operating and opening to permit oil flow therethrough responsive to the increased oil pressure when the engine is operating, and a single action plunger reciprocable within a cylinder connected in said oil line between said unidirectional valves, said plunger being operative upon each working stroke to close the upstream valve against the valve-opening force of the pressurized oil and simultaneously to force oil through the downstream valve and the portion of said oil line upon the downstream side of the latter to thereby clear the same of any obstruction that may be impeding the free flow of oil, and being operative upon each return stroke to close the downstream valve against the valve-opening force of the pressurized oil to thereby avoid drawing oil back into the cylinder and simultaneously to open the upstream valve to thereby draw a fresh supply of oil into the cylinder.

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