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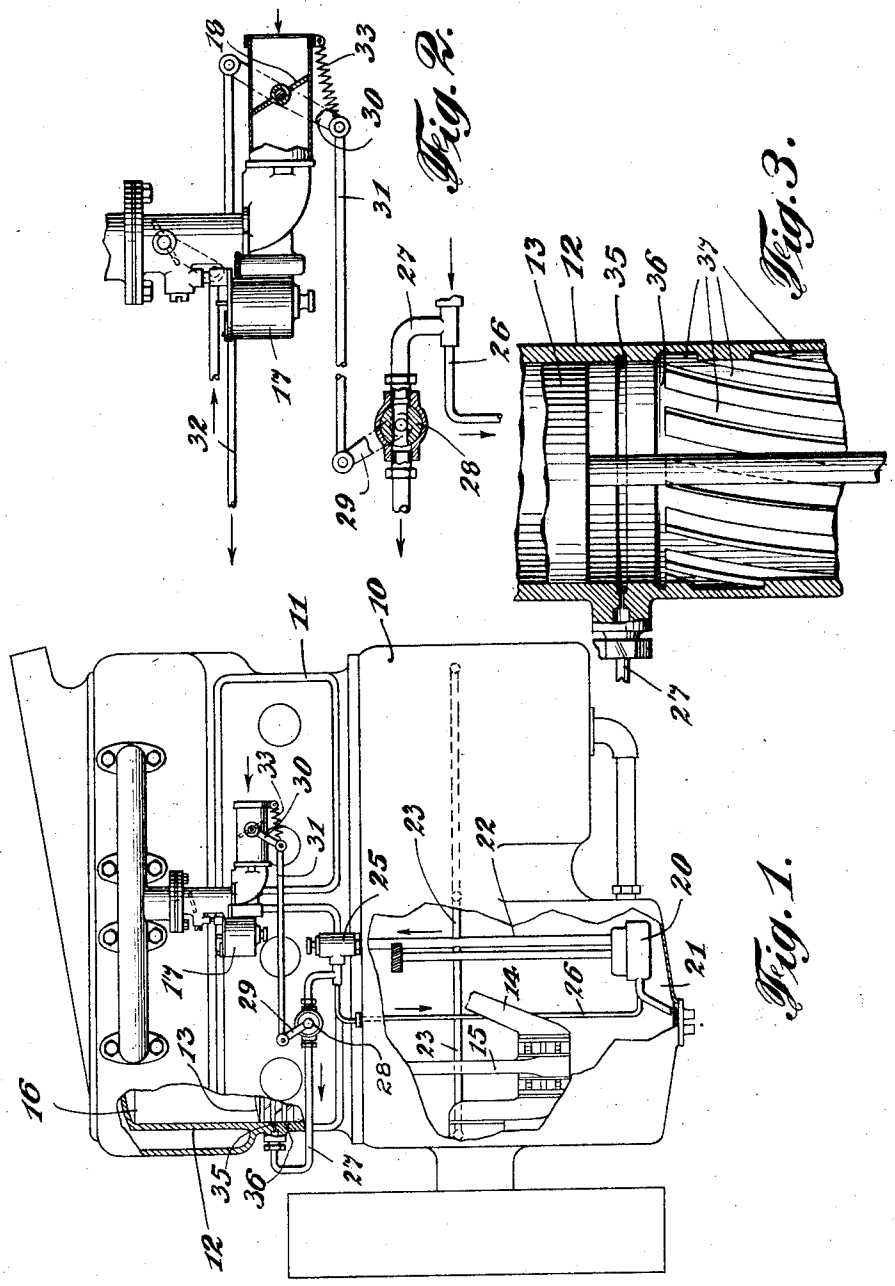


Fig. 2.

Fig. 3.

Fig. 1.

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LUBRICATING SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

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The object of the present invention is to provide improved means for insuring correct lubrication for cylinders and pistons of internal combustion engines, particularly at the time that the engine is started. It is customary in starting the engine to make use of a hand operated, carbureter choke valve, or a flooder, or a supplemental gasoline duct, or similar device to supply the cylinders with an excess of gasoline, a large part of which is unevaporated.

This liquid gasoline serves to quickly wash the lubricating oil from the cylinder walls thereby preventing proper lubrication of the pistons. A contributing factor to the harmful effect of operating the choke valve is the fact that when the engine is cold it takes several minutes for a pressure feed lubricating system to get the cold sluggish oil into circulation and for it to become fluid enough to be splashed on the cylinder walls. In other words, the oil must be first warmed up sufficiently to flow freely through the crank and connecting rod bearings.

Under ordinary conditions, the pressure feed system builds up a very abnormal pressure for the first few minutes after starting the engine, such pressure obtaining until the oil begins to flow freely. It will thus be evident that the action of the excessive supply of liquid gasoline in washing the oil from the cylinder walls, occurs at the very time, when the piston lubrication depends mainly on the oil which is left on the cylinder walls from a previous operation of the engine.

In accordance with the present invention, I obviate the danger of scuffing or scoring the pistons during the first few minutes of a run by arranging an auxiliary oil line between the main reservoir pipe of the feed system and the interior of the cylinders. The valve which controls this oil is connected directly or indirectly to the operating means for the carbureter choke valve or other "richener" or "flooder" so that whenever the latter is operated to flood gasoline into the cylinders such flooding is also accompanied by an excessive flow of lubricating oil which will in large measure counteract the tendency of the gasoline to prevent proper lubrication.

The invention may be better understood from following detailed description in connection with the accompanying drawings in which—

Figure 1 is a view in side elevation of an engine embodying the invention, parts being broken away and in section for clearness.

Figure 2 is an enlarged detail view showing the choke and auxiliary oil valves and their common operating means.

Figure 3 is an enlarged detail showing the interior cylinder grooving.

The crank case 10 of the engine supports the usual cylinder block 11 in which are bored the cylinders 12. Pistons 13 working in the cylinders are connected to a crank shaft 14 by the usual connecting rods 15. Combustion chambers 16 in the upper ends of the cylinders receive a fuel mixture from the carbureter 17. For purposes of starting the engine the usual choke valve 18 is provided in the air passage to the carbureter, said valve being adapted to throttle the air supply and to cause a very heavy mixture, largely of unevaporated gasoline, to be drawn into the combustion chambers.

The pressure feed lubricating system may include a circulating pump 20 drawing oil from a sump 21 in the bottom of the crank case and delivering oil to a reservoir pipe 22 from which leads 23 are taken off to the crank and connecting rod bearings. A pressure relief valve 25 in the end of the reservoir pipe is operable to by-pass lubricating oil directly back to the sump through a return pipe 26. When the cold engine is started, a very high pressure is built up in the reservoir pipe due to the sluggishness of the cold oil and such high-pressure takes effect in the relatively small by-pass pipe 26, and is greatest in the upper part thereof where back pressure of flow resistance is greatest.

In accordance with my invention I connect the interior of all of the cylinders with the by-pass return pipe 26 preferably just beyond the by-pass valve, by means of pipe 27 of relatively small diameter controlled by a valve 28 which is preferably in the nature of a rotary plug valve equipped with an operating arm 29. The arm 29 is directly coupled with the operating arm 30 of the choke valve or other flooder, by link 31 so that closing the choke valve through lever 32 against the action of spring 33 opens the lubricant supply valve to the cylinders and vice versa.

As above noted the sluggish flow of cold oil often results in the engine running for several minutes before any splash from the crank connecting rod bearings reaches the cylinder walls and consequently the cylinders

must rely for lubrication merely on the oil which is caked therein during a previous run of the engine. Said caked oil is very readily washed away by the liquid gasoline which is flooded into the cylinders when the choke valve is operated. By the construction above described however, said inrush of liquid gasoline is accompanied by a corresponding emergency supply of lubricating oil through the pipe 27 and proper lubrication of the pistons during the time that the choke is closed is assured. The small cross section of the return pipe 26 and the cylinder supply pipe 27 insures adequate pressure for forcing oil into the cylinders.

In accordance with a preferred embodiment of the invention each cylinder is provided with an annular oil distributing groove 35 just below the lowest portion of the cylinder swept by the uppermost of the piston rings and it is into these grooves that the supply line delivers. Annular grooves 35 provide oil collecting chambers which are of material assistance in effecting proper lubrication of the pistons in case the engine is started without using the choke.

Under normal conditions, a considerable quantity of oil will be flooded into the cylinder through the distributing groove 35 and in order to relieve this excess I preferably provide other annular grooves 36 just below the grooves 35, the former communicating directly with a series of spiral drainage grooves 37 which extend to the bottom of the cylinder. The spiral grooves have a shearing effect on the oil film with which the piston is coated, scraping excess oil from the pistons and carrying it off to the crank case. The circumferential projection of these grooves is preferably such that the entire surface of the piston below the uppermost piston rings is subjected to a scraping action.

I claim:

1. In an internal combustion engine, a carbureter, gasoline flooding means associated therewith, and a pressure feed lubricating system comprising an oil supply conduit, pipes communicating therewith for supplying oil to the bearings, a pipe also communicating therewith for supplying oil to the cylinder walls, a pressure controlled valve in said cylinder wall supply pipe, and flow control means in said cylinder wall supply pipe operatively connected to said flooding means, whereby lubricating oil is supplied to the cylinder walls under abnormal pressure conditions, during the operation of said flooding means.

2. In an internal combustion engine, a carbureter, a choke valve, and a pressure feed lubricating system comprising an oil supply conduit, pipes communicating therewith for supplying oil to the bearings, a pipe also communicating therewith for supplying oil to the cylinder walls, a pressure controlled valve in said cylinder wall supply pipe, and a flow control valve in said cylinder wall supply pipe operatively connected to said choke valve, whereby lubricating oil is supplied to the cylinder walls under abnormal pressure conditions, during the operation of said choke valve.

Signed at Plainfield, in the county of Union and State of New Jersey, this 6th day of October, A. D. 1924.

SAMUEL W. RUSHMORE.