

1,330,445.

E. HAYES.  
MOTOR LUBRICATING SYSTEM.  
APPLICATION FILED JAN. 22, 1919.

Patented Feb. 10, 1920.  
2 SHEETS—SHEET 1.

*Fig. 1.*

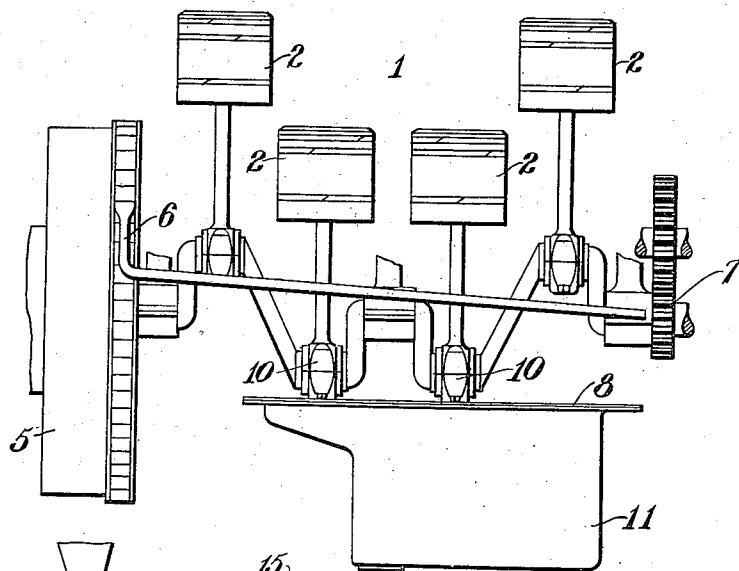


*Fig. 2.*

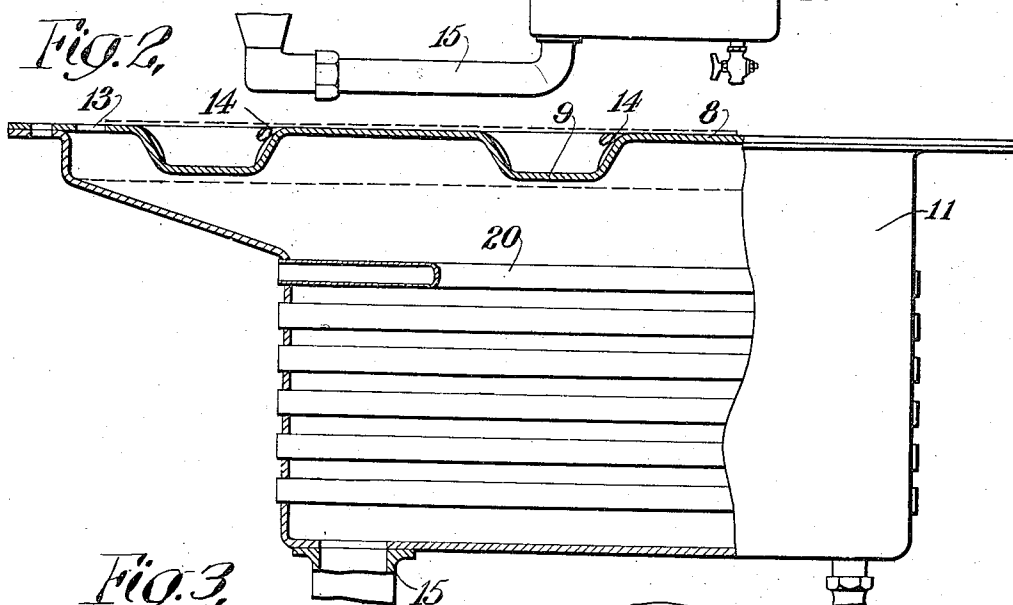
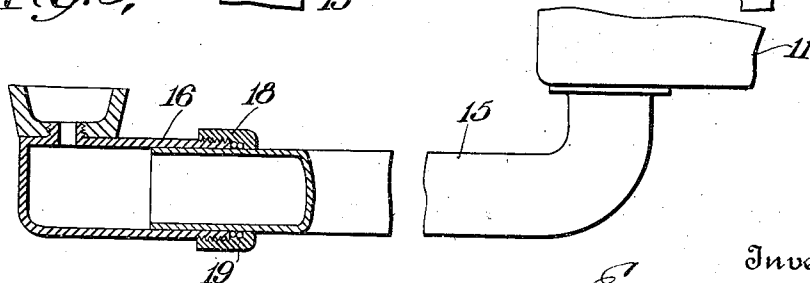


*Fig. 3.*



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2 SHEETS—SHEET 2.

*Fig. 4,*

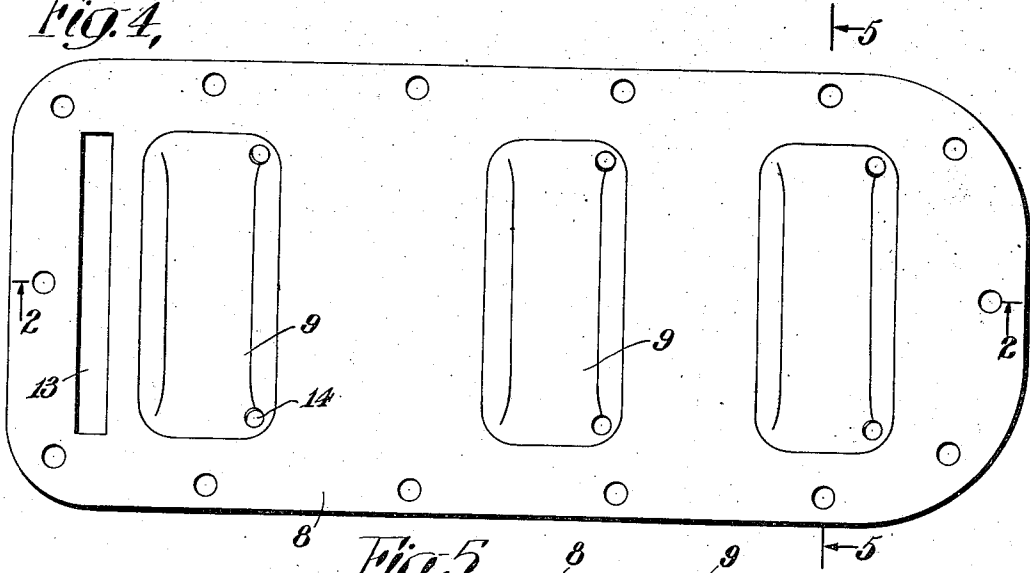


*Fig. 5,*

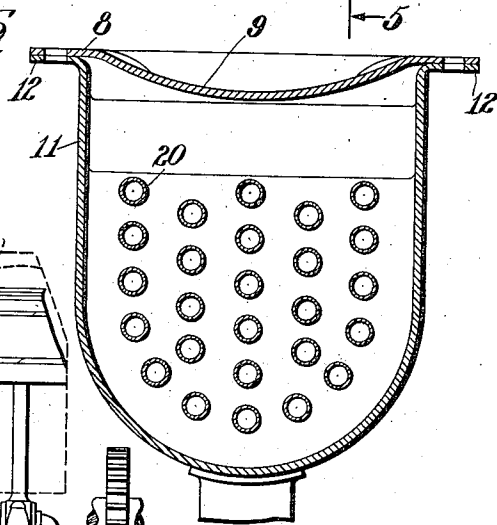


*Fig. 6,*

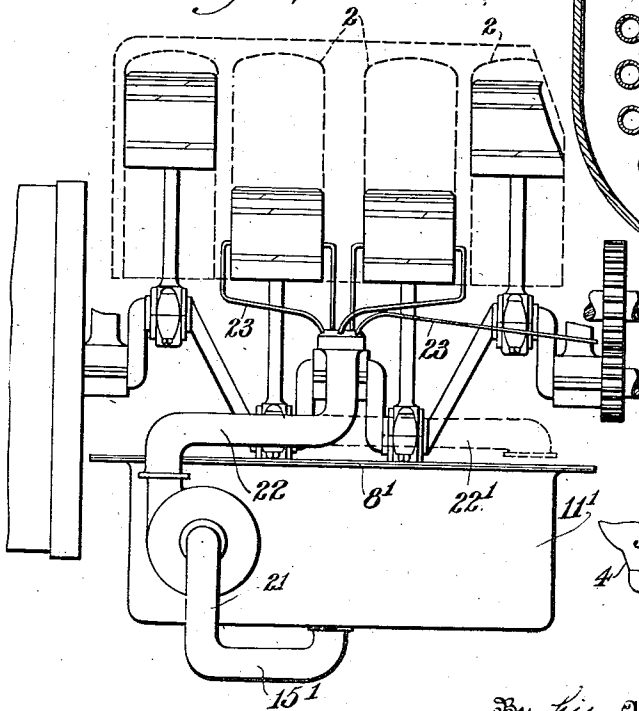
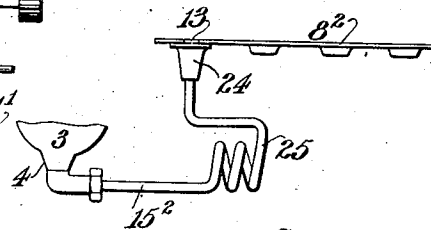


*Fig. 7,*



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# UNITED STATES PATENT OFFICE.

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## MOTOR-LUBRICATING SYSTEM.

1,330,445.

Specification of Letters Patent.

Patented Feb. 10, 1920.

Application filed January 22, 1919. Serial No. 272,449.

*To all whom it may concern:*

Be it known that I, EDWARD HAYES, a citizen of the United States, residing in Lawrence, county of Nassau, and State of New York, have invented certain new and useful Improvements in Motor-Lubricating Systems, of which the following is a specification.

My invention relates to means for cooling lubricating oil which is circulated through a closed system in internal combustion motors such as automobile motors for the purpose of lubricating the moving parts. In such systems as now used, the oil is considerably heated by its engagement with the cylinder walls, etc., and, the oil being used over and over without any particular mechanism for cooling the same, it is continually maintained at a considerable degree of heat. This results in the carbonizing of the oil and the necessity of frequently replacing same with fresh oil in order to maintain the efficiency of the motor. With the system now in use, not only is there a considerable consumption of oil, but the efficiency of the motor is adversely affected because of the deposit formed on valves, spark plugs, etc., by the carbonizing of the oil.

My invention overcomes these difficulties in an exceedingly simple and effective manner by providing devices whereby the oil is cooled to a point considerably below that at which it carbonizes, or is changed chemically, each time the oil returns from the cylinder walls and other points at which it is used. My improved device may be applied to the various systems for circulating oil in motor installations, such as the splash system and the forced feed systems, and comprises the provision of a considerably extended surface over or in contact with which the oil passes, during each return of the oil from the various points at which it has been subjected to heating effect, such surface or surfaces being so positioned as to radiate heat freely to a suitable cooling medium, air being the preferred cooling medium. By cooling the oil to a sufficient extent in each cycle of operation, I find that the same is never heated to a sufficient extent to carbonize or be deleteriously affected during its lubricating functions. I have found that this produces quite remarkable results in that the consumption

of oil is reduced to a small fraction of that which is necessary when my cooling system is not employed; also I find that when my device is used spark plugs and valves in the motor cylinders remain at all times quite clean, smoke from overheated oil is eliminated, and efficiency of the motor is increased. In my preferred device a cooling chamber is mounted below the crank case, which arrangement gives various advantages.

The object of my invention is to provide improved devices of the character referred to.

In order that a clearer understanding of my invention may be had, attention is hereby directed to the accompanying drawings forming part of this application and illustrating certain embodiments of my invention. The drawings are to a considerable extent diagrammatic. In the drawings Figure 1 represents a side elevation of my device applied to a four cylinder motor having a splash system of oil feed, Fig. 2 represents a side elevation on an enlarged scale of the cooling devices represented in Fig. 1 certain parts being shown in vertical section taken on line 2—2 of Fig. 4, Fig. 3, is an enlarged detail partly in section and partly in side elevation of the connection between the casing shown in Figs. 1 and 2 and the part of the motor casing which constitutes the starting point of the oiling system, Fig. 4 is a top plan view of the casing illustrated in Figs. 1 and 2, Fig. 5 is a cross section taken on line 5—5 of Fig. 4, Fig. 6 is a view similar to Fig. 1 of an installation having a forced oil feed and Fig. 7 is a partial front elevation of a modified form of an oil cooling device.

Referring first to Figs 1 to 5 of the drawings an installation is represented in which the motor 1 is provided with four cylinders 2, 2, 2, 2, it being understood that my invention may be applied to motors having any desired number of cylinders. In the system illustrated lubricating oil collects in the well 3 of the casing indicated at 4. In this system the oil is lifted from well 3 by the fly-wheel 5 and the parts which rotate therewith, the oil dropping from the upper part of the casing into a pipe 6 from which it is carried to the neighborhood of the timing gear 7 at the forward end of the motor casing. From this point the oil flows back over the plate

8 which is provided with a number of recesses or pockets 9. Cranks 10, 10, to which are connected the piston rods 11, 11 of the pistons within cylinders 2, dip into these  
 5 pockets 9 and splash the oil into the interiors of the cylinders and to the other places where lubricant is needed. In the system illustrated the three recesses 9 are provided to correspond to the first three  
 10 cylinders 2 of the motor, the fourth cylinder being provided with oil from the fly-wheel. The system so far described is old, and in the ordinary practice the oil flows over the bottom of the casing from the rear end of  
 15 plate 8, back to the well 3.

A box or casing 11 is secured beneath plate 8 in any suitable manner, such that the plate 8 will form the upper surface of the casing. Thus the casing 11 may be formed  
 20 at its upper edges with outwardly extending flanges 12 which may be suitably secured to the edge portion of the plate 8. Plate 8 is provided with a transverse opening 13 adjacent its rear end, beyond the rear-  
 25 most recess 9. Each of the recesses 9 is preferably provided with one or more small openings 14 adjacent its forward upper edge, preferably two of these openings being provided for each recess 9 adjacent the  
 30 upper edges of the forward corners of the recesses. The oil flowing rearwardly along plate 8 will fill the recesses 9 and run to a certain extent through the openings 14 into the casing 11. The greater part of the oil,  
 35 however, will continue past the last recess 9 and will run through the slot 13 into the casing 11. The lower rear end of the casing 11 is connected with the bottom of the oil reservoir 3 in casing 4 by means of a suitable  
 40 pipe connection 15. Preferably a short length of pipe 16 is provided which is adapted to aline with the pipe 15, pipe 16 having an upwardly directed elbow or connection 17 which is screw-threaded and may  
 45 be screwed into a suitable opening in the bottom of casing 4. Pipe 16 is provided at its forward end with a screw-thread, and after the rear end of pipe 15 has been slipped into the forward end of pipe 16 a  
 50 flanged nut 18 is screwed up on the screw-thread referred to, packing 19 preferably being interposed, to make the connection.

In the construction described a considerable number of tubes 20 are mounted in parallel arrangement within casing 11 to extend  
 55 through the front and rear walls of the casing. These tubes are preferably formed of thin metal having good heat radiating properties and are mounted in any suitable arrangement, the tubes being soldered or  
 60 otherwise secured in place to make oil-tight joints.

The tubes 20 connect with the atmosphere, and in the case of a motor used on an auto-  
 65 mobile, airplane or the like, the air will pass

rapidly through the same during operation so as to quickly carry off heat radiated to the air by the tubes. The oil returning to the well 3 over plate 8 passes over these tubes and gives up a considerable portion of  
 70 its heat to them, the casing 11 preferably being constantly filled to a considerable extent with oil. With this arrangement the temperature of the oil in the casing will decrease from the upper to the lower levels,  
 75 the coldest oil always being at the bottom of the casing from which point it is returned to the well 3. I have found that with such a system the temperature of the oil may be reduced very considerably, with the bene-  
 80 ficial results previously noted.

Fig. 6 is intended to illustrate the operation of my device in a forced feed oiling system. As is there illustrated a suitable  
 85 pump 21, located at any suitable point in the system forces oil through a pipe connection 22 from which it may be forced through the small pipes 23 into the interiors of the cylinders 2. Or the pipe 22 may  
 90 continue horizontally forwardly to the front end of the motor casing as is indicated in dotted lines at 22'. In the first case the plate 8' constituting the upper surface of the casing 11' need not have the recesses 9  
 95 as illustrated in Fig. 4 but will be provided with the transverse slot 13 adjacent its rear end to conduct the oil into the casing 11'. In case the pipe 22 is extended forwardly as illustrated in dotted lines at 22', the recesses 9 and openings 14 would be pro-  
 100 vided additionally, and the cylinders furnished with oil by the splash system, because of the dipping of the cranks into the recesses 9 as previously described. In either case the oil flows over the plate 8' to enter  
 105 and preferably fill the casing 11' from which it returns by way of the pipe 15' to the pump 21. In this case, as in that previously described the air tubes 20 should be provided to extend through the casing 11'  
 110 from front to rear.

A further modification of my invention is illustrated in Fig. 7 in which no casing, such as that illustrated at 11 or 11', is provided. In this case plate 8<sup>2</sup>, which corre-  
 115 sponds to the plate 8 or the plate 8' in Figs. 1 or 6 is provided with the transverse slot 13 adjacent its rear edge, through which the oil flows after passing over plate 8<sup>2</sup>. The oil which passes through slot 13 drops  
 120 into a funnel-like device 24 which is suitably secured to the under side of plate 8<sup>2</sup>. From the funnel 24 the oil passes through a coil 25, the convolutions of which are exposed to the air, a suitable length of coil  
 125 being provided to cool the oil during its passage therethrough to a considerable degree. From the coil 25 the oil passes through a suitable connection 15<sup>2</sup>, to the well 3 in casing 4. An increased radiating  
 130

surface may be provided, if desired, by forming a large number of flanges on the pipe 15<sup>2</sup> or the pipe 25.

I consider the form of my device employing a cooling casing, such as 11 in Fig. 2, below the crank-case, to be most advantageous. With this arrangement the pressure in the crank-case, caused by the downward strokes of the pistons at the times of the explosions in the cylinders, tends to force the oil on plate 8 through slot 13 and openings 14 into casing 11, in which the level of the oil is preferably maintained a slight distance below the bottoms of dipper recesses 9. Because of this pressure, and arrangement of casing 11, the oil on plate 8, that is, the bottom of the crank case, exists as a rather thin film at all times, except for the oil in recesses 9, and the amount of oil lifted or splashed by the cranks is regulated by the depth of recesses 9. Therefore no greater amount of oil need be lifted than is needed, and oil is largely kept from entering the upper ends of the cylinders above the pistons. This would seem to be largely instrumental in the prevention of smoke in installations embodying my invention.

It should be noted that my invention is not limited strictly to the details of construction described but is as broad as is indicated by the accompanying claims. I consider the air to be the best cooling medium for the desired purpose, but my invention is not necessarily limited to the use of air as the cooling fluid.

What I claim is:

1. The combination of a motor, means for causing oil to travel from a point to points at which lubricant is needed in the motor and to return to said first point, continuously, a plate over which the oil passes during each return thereof, a casing below said plate, into which the oil flows therefrom, a series of air tubes extending through said

casing, from front to rear, over which the oil flows, means for regulating the amount of oil on said plate, and a conduit for leading the oil from the lower portion of said casing to the starting point.

2. The combination of a motor, having one or more cylinders, a casing, including a plate beneath the cylinder or cylinders with dipper recesses therein, means for causing oil to pass from the rear to the forward portion of said casing, and to drop on said plate, a cooling casing beneath and secured to said plate, air tubes extending through said casing, and a connection from the bottom portion of said cooling casing to the rear portion of said motor casing, said plate having an opening therethrough into said cooling casing to the rear of said dipper recesses, and small openings into said cooling casing adjacent the upper edges of said recesses.

3. The combination of a motor, having one or more cylinders, a casing, including a plate beneath the cylinder or cylinders with dipper recesses therein, means for causing oil to pass from the rear to the forward portion of said casing, and to drop on said plate, a cooling casing beneath and secured to said plate, means for cooling the oil in said casing, and a connection from the bottom portion of said cooling casing to the rear portion of said motor casing, said plate having an opening therethrough into said cooling casing to the rear of said dipper recesses, and small openings into said cooling casing adjacent the upper edges of said recesses.

This specification signed and witnessed this 13th day of January, 1919.

EDWARD HAYES.

Witnesses:

DYER SMITH,  
I. McINTOSH.