Jan. 7, 1930. A. S. LA FOLLETTE 1,743,041

COOLING APPARATUS FOR MOTORS

Filed April 25, 1927 2 Sheets-Sheet 1

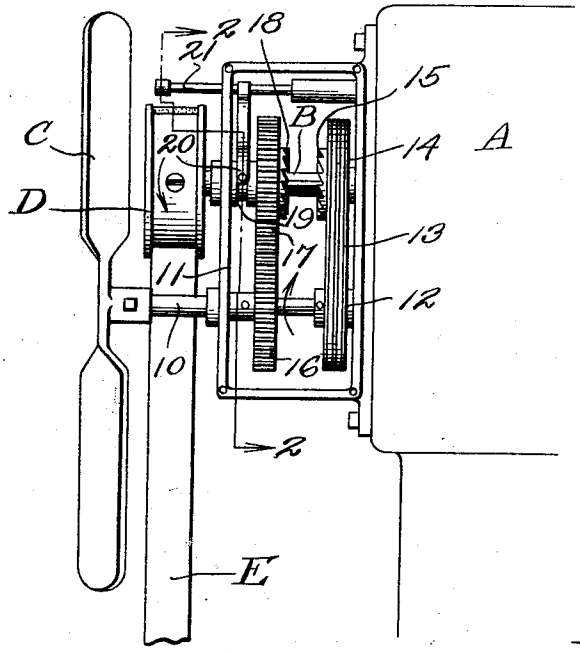
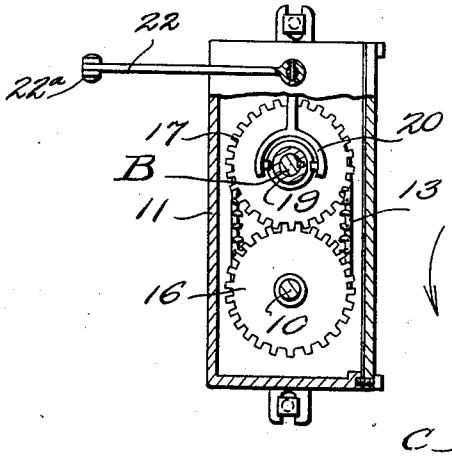
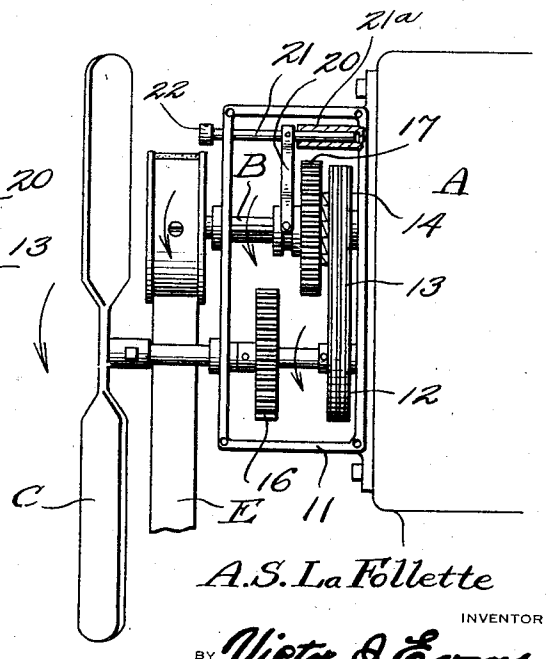


Fig. 1.

Fig. 3.

Fig. 2.





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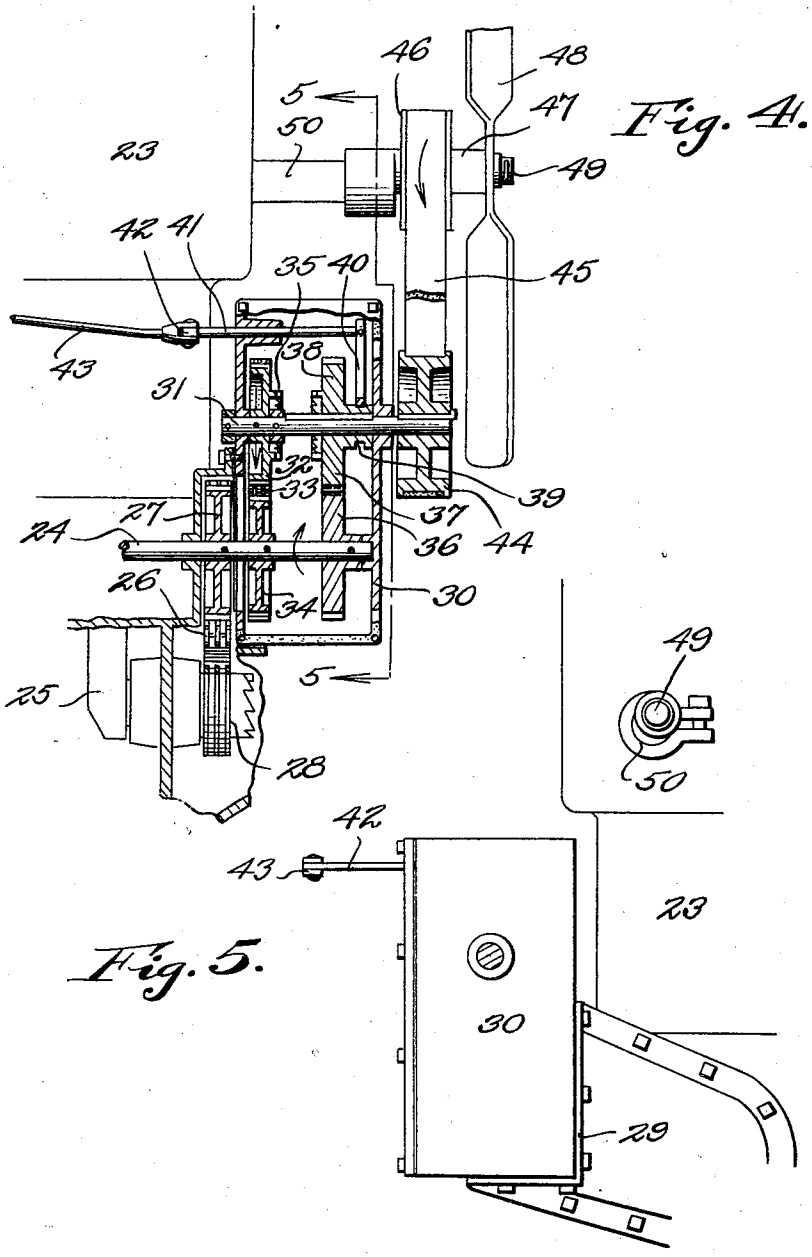


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE

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COOLING APPARATUS FOR MOTORS

Application filed April 25, 1927. Serial No. 186,551.

This invention relates to cooling apparatus for internal combustion engines, particularly those used in automobiles, and has for its object the provision of a fan arrangement and a drive mechanism therefor so constructed and arranged that cold air may be drawn into the radiator to effect cooling or warm air from the vicinity of the motor forced outwardly through the radiator to permit the motor and the water in the cooling system to become heated, the selected uses depending upon the temperature and other circumstances.

Another object of the invention is to provide a fan mechanism and drive therefor so arranged that the fan may be rotated in either direction, at the will of the operator, not only for the above specified purpose but also, when the fan is operated to drive a current of air outwardly through the radiator, to prevent rain or other water from passing through the radiator and possibly wetting parts of the ignition system.

Still another object is to provide a drive mechanism for such a fan combination which may be easily installed, it being a feature of the invention that the fan may be driven either by intermediate means connected with the usual fan shaft, or from the cam shaft and even conceivably from the crank shaft, depending upon the wishes of the manufacturer.

Yet another object is to provide a mechanism of this character which is readily controllable from the dash of the vehicle so that the operator may very quickly and easily and at will change the direction of rotation of the fan to meet different conditions or circumstances.

An additional object of the invention is to provide a structure and mechanism of this character which will be simple and inexpensive in manufacture, easy to install, positive in action, efficient and durable in service, and a general improvement in the art.

With the above and other objects and advantages in view, the invention preferably consists in the details of construction, the arrangement and combination of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which:

Figure 1 is a fragmentary side elevation of an engine and fan showing one form of the invention by means of which the fan may be caused to rotate in a selected direction.

Figure 2 is a cross sectional view taken substantially along the line 2—2 of Figure 1.

Figure 3 is a view similar to Figure 1 but showing the gears shifted to reverse the direction of rotation of the fan.

Figure 4 is a vertical longitudinal sectional view of the invention showing a form thereof in which a different drive mechanism is provided for the fan, and

Figure 5 is a sectional view taken on the line 5—5 of Figure 4.

Referring more particularly to the drawings, the letter A designates a portion of an internal combustion engine, and B designates a driven shaft which may be the one ordinarily provided for carrying the fan C, the shaft B carrying a pulley D engaged by a belt E driven from a suitable pulley, not shown, on the crank shaft or other rotary part of the motor or engine.

In accordance with the present invention, the fan C is not mounted upon the shaft B but is suitably secured upon a counter shaft 10 which is journaled at the front portion of the motor A as for instance within a casing or housing 11 equipped of course with suitable bearings. The shaft 10 carries a sprocket 12 fixed thereto and peripherally engaged by a chain 13 which is also trained about a sprocket 14 rotatably mounted upon the shaft B. This sprocket 14 carries a clutch face 15 for a purpose to be described. Also fixed upon the shaft 10 is a spur gear 16 adapted to mesh with a similar gear 17 splined upon the shaft B and carrying a clutch face or member 18 adapted to be brought into cooperative relation to the clutch face or member 15 in a manner to be described. The gear 17 also carries a grooved collar 19 engaged by a shifting fork 20 on one end of a rod 21 suitably slidably mounted in any preferred guide 21^a and extending through the housing. The rod 21 carries an arm 22 with which may be connected a reach rod 22^a or the like extend-

ing to a point near the driver so that the device can be readily controlled by the operator without his leaving the seat.

In the operation of this form of the invention, it will be seen that when it is desired to draw in air through the radiator, not shown, and cause the air to flow against the motor, the parts are arranged as disclosed in Figure 3 of the drawings. When this is done, it will be apparent that the gear 17 is out of mesh with the gear 16 but in such position that the clutch face 18 is in engagement with the clutch face 15. The engagement of these clutch faces lock the sprocket 14 onto the shaft B, which is of course constantly driven as long as the motor is in operation, and the result is that the sprocket 12 will be correspondingly driven through the instrumentality of the chain 13, the shaft 10 and fan C being rotated in such direction that the air will be drawn in through the radiator, thus cooling the radiator. However, in case there should be rain storms driving the rain through the radiator or in case the temperature is extremely low and it is desired to permit the motor to heat up quickly to the proper running temperature, it is merely necessary for the operator to move the rod 21 lengthwise and shift the position of the fork 20 engaging the grooved collar 19, so that the gear 17 will be brought into mesh with the gear 16. When this occurs, it is of course apparent that the sprocket 14, being idle upon the shaft B, cannot act to rotate the shaft 10. However, the gear 17 being splined upon the shaft C will be rotated constantly as long as the shaft is in operation, and the movement of the gear 17 meshing with the gear 16 will cause the shaft 10 and the fan C to be rotated, but in the reverse direction. This reverse rotation of the fan will cause the heated air about the motor or engine to be forced outwardly through the radiator, this action of course resulting in warming the water in the radiator and permitting the motor to come to a much higher temperature than would otherwise be the case. This outrushing stream of air passing through the radiator acts not only to heat or permit heating of the water but counteracts any tendency of rain, snow or even simply cold air to pass through the radiator to the engine. This exclusion of rain or other moisture will naturally prevent the ignition part from becoming wet and there will be much less danger of short circuiting than is the case under ordinary circumstances.

Referring to the form of the invention illustrated in Figures 4 and 5, the numeral 23 designates an engine having a cam or distributor shaft 24 driven in the usual manner from the crank shaft 25 as for instance by means of a chain 26 trained about sprockets 27 and 28 on the timer or distributor shaft and crank shaft respectively. Mounted in advance of the motor block and held in place as for instance by suitable brackets 29 is a housing 30 formed of any desired or necessary number of parts and into which extends the prolongation or continuation of the timer or distributor shaft 24 as clearly indicated in Figure 4. Also journaled through the housing or casing 30 is a counter shaft 31 carrying a sprocket 32 engaged by a chain 33 which is in turn trained about a sprocket 34 on the timer shaft 24. The sprocket 34 is fast upon the shaft 24 whereas the sprocket 32 is loose or rotatable with respect to the shaft 31, and the sprocket 32 carries a cam face or element 35. The shaft 24 also carries a spur gear 36 fixedly secured thereto for a purpose to be described. Splined upon the shaft 31 is a spur gear 37 carrying a cam face 38 and formed with a grooved collar 39 engaged by a shifting fork 40 on a rock shaft 41 which is in turn provided with a crank arm 42 having connected therewith a reach or pull rod 43 extending back to the instrument board or dash of the vehicle so as to be within ready control of the operator thereof.

Exteriorly of the housing 30 the counter shaft 31 carries a pulley 44 peripherally engaged by a belt 45 which is in turn trained about a pulley 46 having a hub portion 47 carrying a fan 48, the fan being rotatable upon a shaft 49 carried by a bracket arm 50 secured upon the engine or other support in the usual or any preferred manner. The ordinary equipment is thus used with the addition of only a few parts.

In the operation of this form of the device, it will be apparent that whenever the motor is in operation the shaft 24 is rotating and the sprocket 32 is likewise constantly rotating owing to its engagement by the chain 33 trained about the sprocket 34 fast upon the shaft 24. It is likewise true that the gear 36 is constantly rotating. However, when the gear 37 is in the position shown in Figure 4, that is to say in mesh with the gear 36, the shaft 31 will be rotated in a direction opposite the direction of rotation of the shaft 24 and the fan 48 will be driven in such a direction that the air will be forced out through the radiator or away from the motor. When the operator manipulates the rod 43 to cause the forked lever 40 to move the gear 37 out of mesh with the gear 36, the fan will remain stationary as may be advisable under some circumstances. Clearly, when it is desired to warm up the motor as for instance when starting in cold weather, or at any other time if such is found advisable, the intention is that the gear 37 be in mesh with the gear 36 so that the fan will drive the warm air from about the motor through the radiator, or else that the fan be permitted to remain stationary. After the water in the circulating sys-

tem has been warmed up to a sufficient extent, or in other words when the motor itself has become sufficiently warmed to insure proper operation, the operator may manipulate the rod 43 to shift the fork 40 and move the gear 37 to such position that the clutch face 38 thereon will come into engagement with the clutch face 35. When this is done, the sprocket 32 is locked for rotation with the shaft 31 whereupon the shaft 31 will be driven in the same direction as the shaft 24. The result of this is that the fan 48 will act to draw cold air through the radiator and onto the motor, as is the usual or customary practice and is highly desirable after the motor has become sufficiently warmed up and the circulating system needs to be kept cool. In the first form of the invention it is of course true that the gears may be placed in neutral position so that the fan may be kept stationary whenever such is desired in exactly the same manner as in the second mentioned form.

From the foregoing description and a study of the drawings, it will be apparent that I have thus provided a very simply constructed and easily installed and controlled mechanism by means of which the fan of a motor may be selectively rotated in either direction or permitted to remain stationary, depending upon circumstances. The mechanism is under instant control of the operator so that the shift from one direction of rotation to the other or from rotary movement of the fan to a neutral or idle position thereof, or vice versa, may be readily effected at an instant notice. It is really believed that the construction, operation and advantages will be readily apparent from the foregoing description without further explanation, especially to one skilled in the art.

While I have shown and described the preferred embodiment of the invention, it should of course be understood that I reserve the right to make such changes in the form, construction and arrangement of parts as will not depart from the spirit of the invention or the scope of the subjoined claim.

Having thus described the invention, I claim:

In a cooling system for an internal combustion engine, a drive shaft, a fan shaft, a fan fast upon the fan shaft, means controlled by the operation of the engine to operate the drive shaft, means freely mounted upon the drive shaft and operatively connected with the fan shaft, a gear fast upon the drive shaft, a gear slidable upon the drive shaft, means carried by the drive shaft gear for engagement with means carried by the freely mounted drive shaft means to lock the latter to said drive shaft, and means to selectively position the slidable gear to engage either the freely mounted means referred to and operate the fan in one direction, the fan shaft gear to operate the fan in an opposite direction, or to move the slidable gear to an inactive position and stop the operation of the fan.

In testimony whereof I affix my signature.

ALBERT S. LA FOLLETTE.