J. W. B. LADD AND R. E. RICH.

COMBINED WATER AND AIR PUMP FOR AUTOMOBILES.

APPLICATION FILED JUNE 27, 1919.

1,341,915. **Patented June 1, 1920.**

2 SHEETS—SHEET 1.

Fig. 1

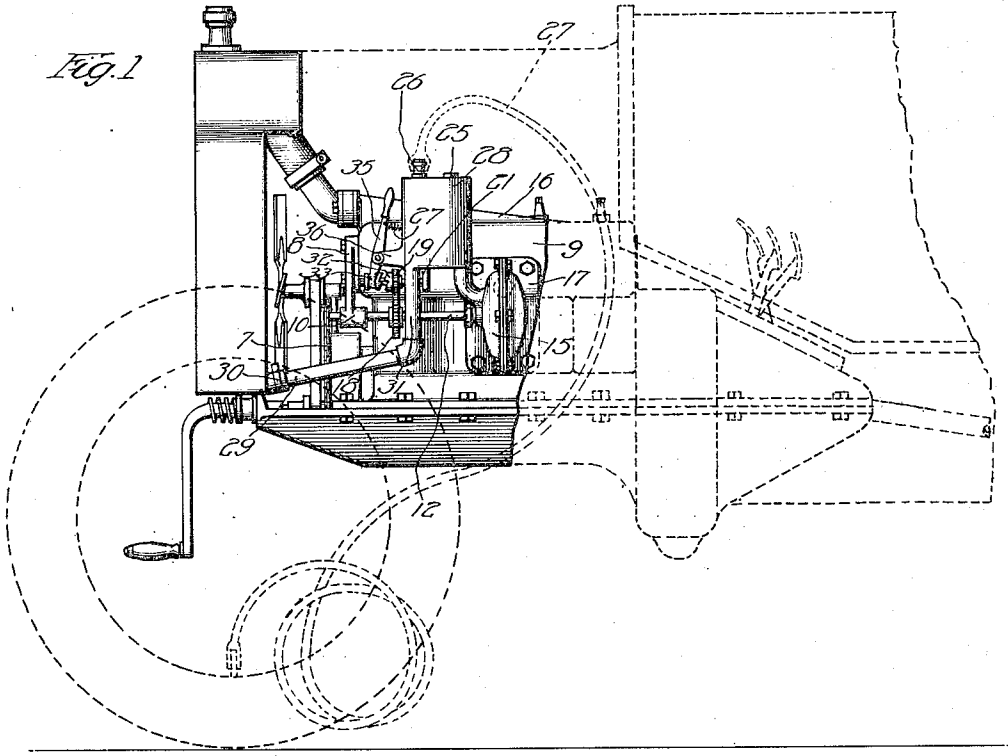
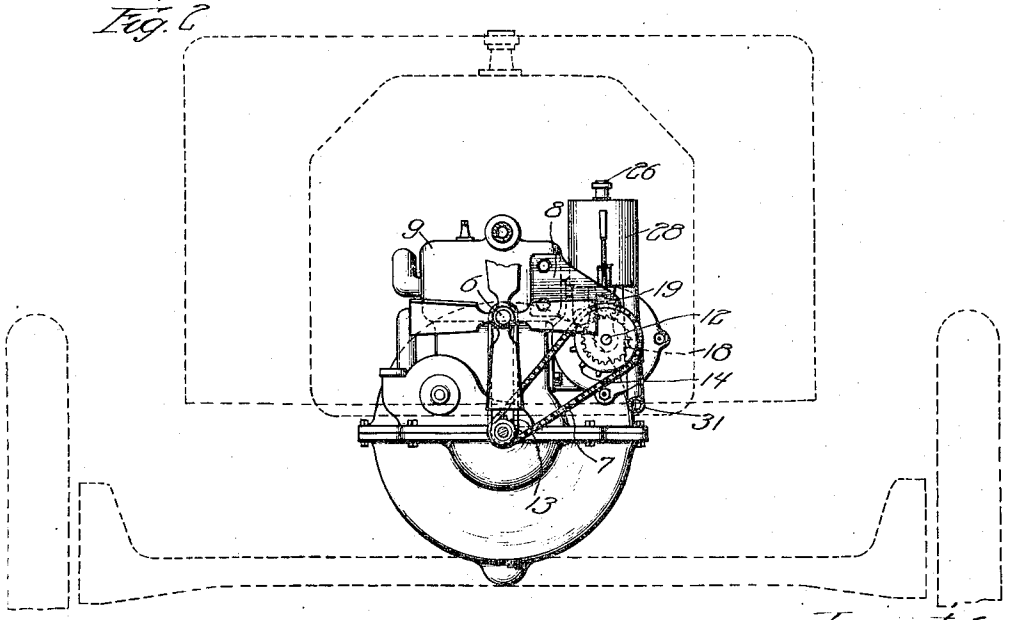


Fig. 2



Inventor

John W. B. Ladd

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By Frank D. Thomas Atty.

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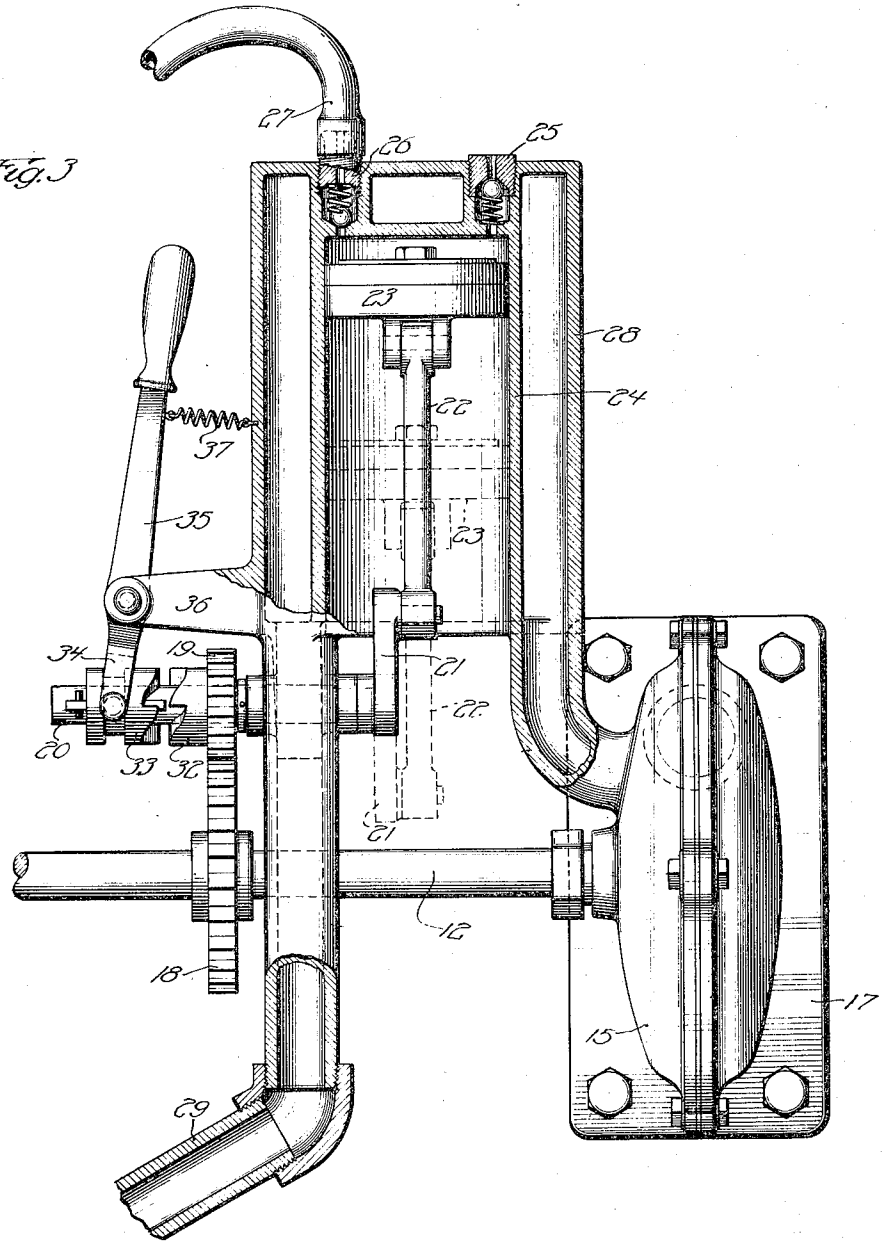
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2 SHEETS—SHEET 2.

Fig. 3



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UNITED STATES PATENT OFFICE.

JOHN W. B. LADD AND RALPH E. RICH, OF CHICAGO, ILLINOIS.

COMBINED WATER AND AIR PUMP FOR AUTOMOBILES.

1,341,915. Specification of Letters Patent. Patented June 1, 1920.

Application filed June 27, 1919. Serial No. 307,186.

To all whom it may concern:

Be it known that we, JOHN W. B. LADD and RALPH E. RICH, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Combined Water and Air Pumps for Automobiles, of which the following is a full, clear, and exact description.

Our invention relates to improvements in automobiles, and particularly to the means for operating pumps for circulating the water in the radiator and for pumping air into the tires of the same.

The principal object of our invention is to circulate by means of a water pump the water used for cooling the engine of an automobile not only through the engine but also through the water jacket of an air pump, thereby keeping the air pump cool when it is in operation. Another object of our invention is to utilize the same power that is now used to drive the car to actuate both the pump for circulating the water through the radiator and the pump for pumping air into the tires. Yet another object is to operate both of these pumps by one shaft that derives its motion from the engine. Yet another object is to provide a very economical construction for this purpose, the cost of manufacture of which is, comparatively speaking, very small, and which can be installed easily and quickly in a position within convenient reach, at a minimum expenditure for labor. These and other objects we accomplish, substantially as hereinafter fully described, and as illustrated in the drawings, in which—

Figure 1 is a side view of an engine showing our improvements applied thereto.

Fig. 2 is a front end view thereof.

Fig. 3 is an enlarged side view of the pump mechanism segregated from the driving mechanism.

Referring to the drawings, A represents the gas engine and 6 is the fan-shaft which is driven through the medium of a belt by the crank-shaft. A laterally disposed triangular shaped bracket 8 is secured by means of bolts to the front of the engine casing 9, and projects laterally beyond the right hand side thereof, and has a bearing 10 in its outer end for a longitudinal shaft 12 (hereinafter referred to as the "pump-shaft"). The crank-shaft has a sprocket-wheel 13, mounted thereon that is engaged by a chain 7, and this chain extends to and engages a sprocket-wheel 14 on the front end of a longitudinal pump-shaft 12 extending through bearing 10. The rear end of shaft 12 is journaled in the sides of the shell or casing 15 of a rotary pump, which latter is provided with an integral supporting plate 17 that is bolted or otherwise secured over the intake opening in the side of a water chamber 16 inclosing the tops of the cylinders.

A short distance in front of the rotary pump casing 15, shaft 12 has a suitable gear 18 securely mounted thereon, and this gear 18 is adapted to engage a pinion 19, which latter is splined to a horizontal crank-shaft 20 so as to revolve therewith and be capable of reciprocable motion thereon.

The end of shaft 20 opposite that on which pinion 19 is mounted is provided with a crank 21, and a pitman 22 is pivotally secured to the wrist-pin of this crank, substantially as shown. The opposite end of pitman 22 is pivoted in any suitable manner to a piston-head 23, which engages the cylinder 24 of an air-pump, and the head of this cylinder, opposite the open end thereof through which the pitman moves, has a valve-controlled intake stub 25 and a valve-controlled outlet stub 26. A suitable flexible tube 27 is attached to and leads from outlet stub 26, and has a valve-controlled nozzle (not shown) of the usual construction at its opposite end that is adapted to engage the inlet valve of an inflatable tire.

Cylinder 24 is surrounded by a water jacket 28, which may be cast in one piece with said cylinder, or cast separately and afterward suitably assembled and made integral therewith. This water-jacket 28 is closed at its lower end and has an inlet pipe 28^a extending downwardly therefrom to a point adjacent to the inclined pipe 29 leading upward from the lower chamber of the radiator 60 of the engine, to which it is connected by a suitable coupling 30. An outlet pipe 31 leads from this water-jacket, preferably, at a point diametrically opposite pipe 29, and this outlet-pipe 31 extends to and discharges into the center of casing 15 of the rotary pump.

We prefer to cast pipe 31 in one piece with pump-casing 15 and water-jacket 28 of the air-pump, and also to cast the water-jacket and cylinder in one piece therewith in order to support the whole structure of the air-pump and rotary pump from the

supporting-plate that secures the pump-casing to the side of chamber 16. We do not, however, desire to be confined to this construction, as it might, under certain circumstances, be advisable to make the pump and its several parts separately, and to connect the same together in accordance with well known mechanical methods. Intake-pipe 28ª of the water-jacket could also be cast in one piece with the water-jacket, and at a suitable point below the lower end of the cylinder it could be provided with bearings for shaft 20, substantially as shown.

Pinion 19 is loose on shaft 20, and on the side opposite the bearings of said shaft, it has a boss, the end edges of which are serrated to form a counterpart 32 of a longitudinally reciprocable clutch 33, whose opposing end is correspondingly serrated. This clutch is provided with a circumferential groove which is engaged by the inturned ends of the bifurcations 34 of the lower branch of a vertically disposed lever 35. This lever is fulcrumed at a suitable point between its ends to a lug 36 projecting laterally from the lower portion of the water-jacket and a coil contraction spring 37 connects its upper branch to the adjacent side of the water-jacket.

It will be apparent that the principal feature of our invention is the utilization of shaft 12 to actuate the air-pump as well as the rotary water pump, and also to cool the air pump, which heats very rapidly, by means of the water circulated through the radiator and water chamber of the engine. In the accomplishment of these objects, we do not wish to be confined to the exact mechanical construction, as hereinbefore described, and as illustrated in the drawings, as it is obvious modifications of the parts of our invention and changes of location of the same could be adopted without departing from the spirit of our invention.

What we claim as new is:

1. The combination with an internal combustion engine having a water cooling chamber, of a water pump that forces the water through said chamber, an air pump, and common means actuated by said engine for operating said water pump and air pump.

2. The combination with an internal combustion engine having a water cooling chamber, of a rotary pump that forces water through said chamber, a reciprocable air pump, and common means actuated by said engine for operating said water pump and air pump.

3. The combination with an internal combustion engine having a water cooling chamber, of a rotary pump that forces the water through said chamber, a shaft therefor, means actuated by said engine for revolving said shaft, and an air pump deriving motion from said shaft.

4. The combination with an internal combustion engine having a water cooling chamber, of a rotary pump that forces the water through said chamber, a shaft therefor, means actuated by said engine for revolving said shaft, and a reciprocable air pump deriving motion from said shaft.

5. The combination with an internal combustion engine having a water cooling chamber and an external intake, of a rotary pump that circulates water through said chamber, a longitudinal shaft on which said pump is mounted, a pitman, means for operatively connecting said pitman to said shaft, a piston reciprocated by said pitman, and the cylinder of an air pump engaged thereby.

6. The combination with an internal combustion engine having a water cooling chamber and an external intake therefor, and a fan-shaft, of a longitudinal shaft alongside of said engine, a rotary-pump mounted on said shaft that circulates water through said chamber, a casing therefor in which said longitudinal shaft has bearings and which discharges into said intake, a pitman, means for operatively connecting said pitman to said shaft, an air pump, a piston-head in said air-pump reciprocated by said pitman, and a flexible pipe leading from said air-pump.

7. The combination with an internal combustion engine having a water cooling chamber and an external intake therefor, and a fan-shaft, of a longitudinal shaft alongside of said engine deriving motion from said fan-shaft, a rotary pump mounted on said longitudinal shaft, a casing therefor in which said longitudinal shaft has bearings and which discharges into said intake, a crank-shaft, a pitman operated by the same, an air-pump, a piston-head reciprocated by said pitman, and a flexible pipe leading from said air-pump.

8. The combination with an internal combustion engine having a water cooling chamber, of an air-pump surrounded by a water jacket, a water pump that circulates water through said chamber and said jacket, and common means actuated by said engine for operating both said water pump and air-pump.

9. The combination with an internal combustion engine having a water cooling chamber, of a reciprocable air-pump surrounded by a water-jacket, a rotary pump that circulates water through said chamber and said jacket, and common means actuated by said engine for operating both said rotary pump and air-pump.

10. The combination with an internal combustion engine having a water cooling chamber, of an air-pump having a water jacket, a rotary pump that circulates water through said jacket and said chamber, a

shaft alongside said engine through the medium of which said air-pump and rotary pump are actuated, and means actuated by said engine for revolving said shaft.

11. The combination with an internal combustion engine having a water cooling chamber, of an air-pump having a water jacket, a rotary pump that circulates water through said jacket and said chamber, a shaft alongside of said engine through the medium of which said air-pump and rotary pump are actuated, a longitudinal shaft alongside of said engine, a crank-shaft for said engine, a fan-shaft therefor, and common means for transmitting the motion of said crank-shaft to said fan-shaft and pump-shaft.

12. The combination with an internal combustion engine having a water cooling chamber, of a reciprocable air-pump having a water-jacket, a rotary pump that circulates water through said jacket and said chamber, a shaft alongside said engine through the medium of which said air-pump and rotary pump are actuated, and means actuated by said engine for revolving said shaft.

13. The combination with an internal combustion engine having a water cooling chamber and an external intake, of a rotary pump, a longitudinal shaft alongside said engine on which said pump is mounted, an air-pump having a water-jacket through which and said cooling chamber said rotary-pump circulates water, a pitman, means for operatively connecting said pitman to said shaft, a piston-head in said air-pump that is reciprocated by said pitman, and a flexible pipe leading from said air-pump.

14. The combination with an internal combustion engine having a water cooling chamber and an external intake therefor, a fan-shaft, of a longitudinal shaft alongside said engine, a rotary pump mounted on said shaft that circulates water through said chamber, a casing therefor in which said longitudinal shaft has bearings and which discharges into said intake, a pitman, means for operatively connecting said pitman to said longitudinal shaft, a reciprocable air-pump having a water jacket through which the water circulated by the rotary pump passes, a piston-head in said air-pump reciprocated by said pitman, and a flexible pipe leading from said air-pump.

15. The combination with an internal combustion engine having a water cooling chamber and an external intake therefor, and a fan-shaft, of a rotary pump that circulates water through said chamber, a longitudinal shaft alongside of said engine on which said rotary pump is mounted, a casing for said rotary pump in which said longitudinal shaft has bearings and which communicates with said intake, a pitman, a crank-shaft actuating said pitman, and gearing connecting said crank-shaft to said longitudinal shaft, an air-pump having a water jacket through which the water circulated by the rotary pump passes, a piston-head in said air-pump reciprocated by said pitman, and a flexible pipe leading from said air-pump.

16. The combination with an internal combustion engine having a water cooling chamber, of a water pump that forces the water through said chamber, an air-pump, and common means actuated by said engine for operating said water pump and air-pump, said pumps and means being removable from the engine as a unit.

17. The combination with an internal combustion engine having a water cooling chamber, of a rotary pump that forces water through said chamber, a reciprocable air-pump, and common means actuated by said engine for operating said rotary pump and air-pump, said pumps and means being removable from the engine as a unit.

18. The combination with an internal combustion engine having a water cooling chamber, of a rotary pump that forces the water through said chamber, a shaft therefor, means actuated by said engine for revolving said shaft, and an air pump deriving motion from said shaft, said shaft and pumps being removable from operative position as a unit.

19. The combination with an internal combustion engine having a water cooling chamber, of a rotary pump that forces the water through said chamber, a shaft therefor, means actuated by said engine for revolving said shaft, and a reciprocable air-pump deriving motion from said shaft, said shaft and pumps being removable as a unit from the engine.

In witness whereof, we have hereunto set our hands this 14th day of May, 1919.

JOHN W. B. LADD.
RALPH E. RICH.

Witnesses:
MARION BOLTE,
J. B. PARRON.