No. 830,099. PATENTED SEPT. 4, 1906.

J. W. PACKARD.

HYDROCARBON ENGINE FOR MOTOR VEHICLES.

APPLICATION FILED JUNE 29, 1903.

3 SHEETS—SHEET 1.

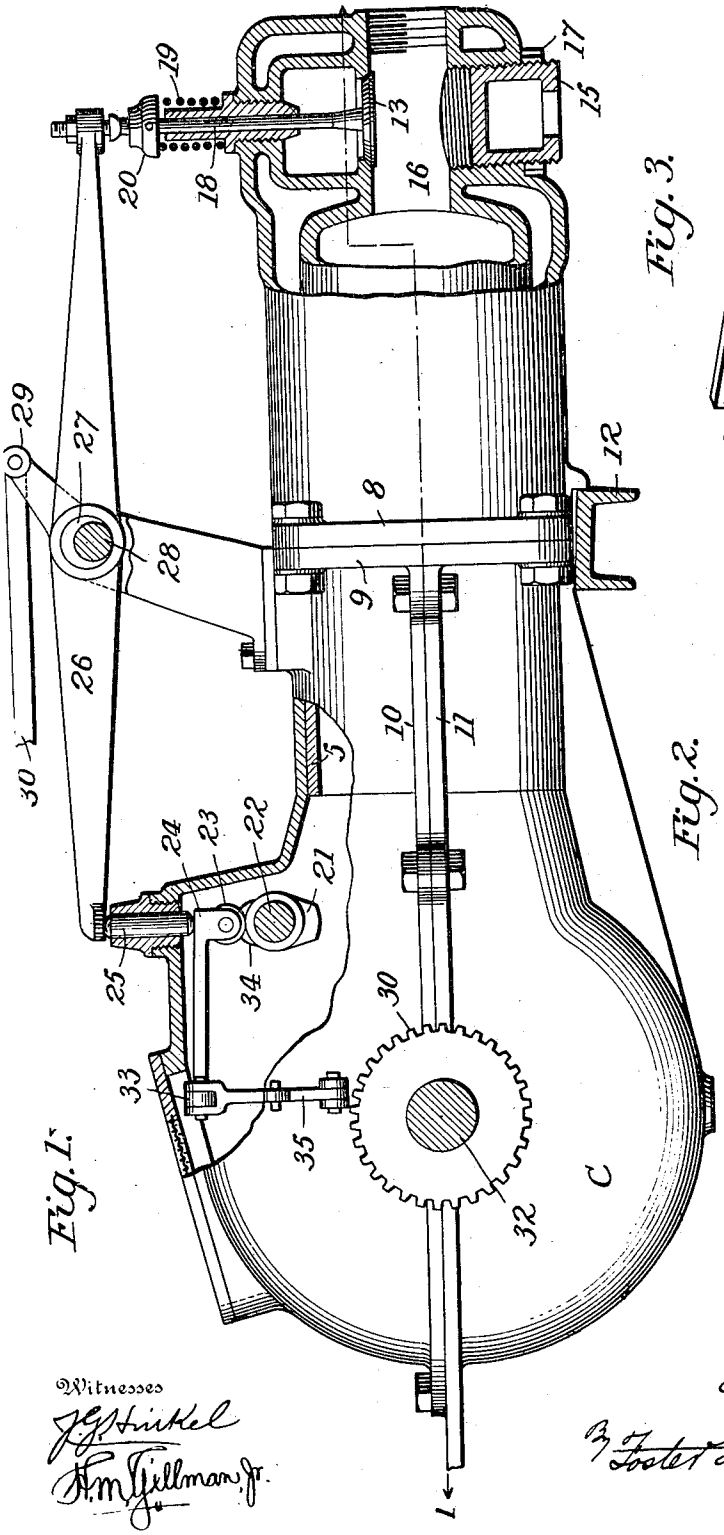


Fig. 1.

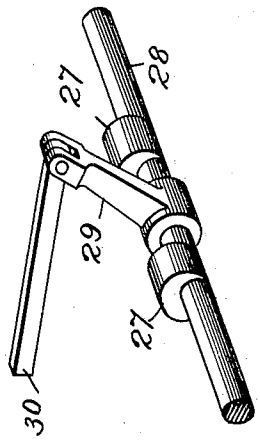


Fig. 3.

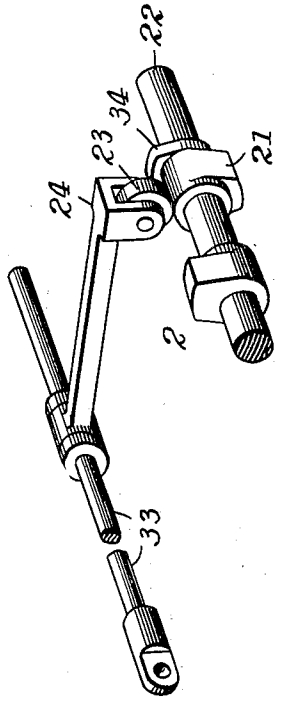


Fig. 2.

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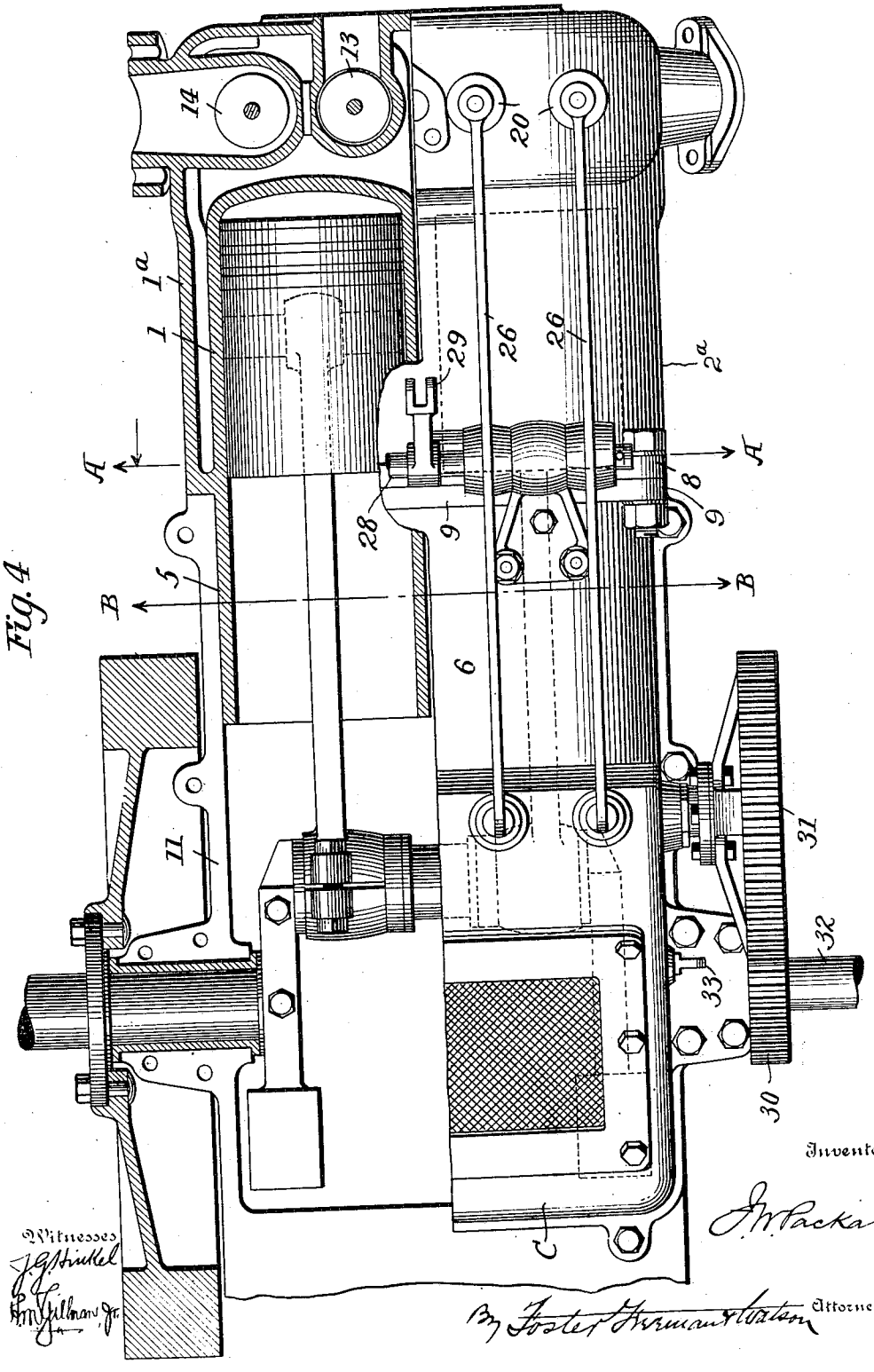
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3 SHEETS—SHEET 2.

Fig. 4



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3 SHEETS—SHEET 3.

Fig. 5.

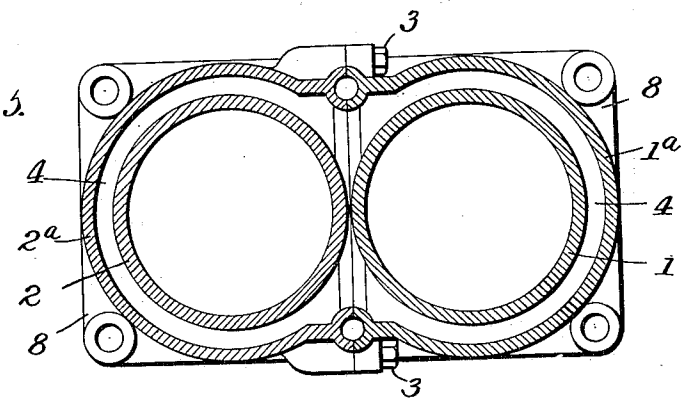
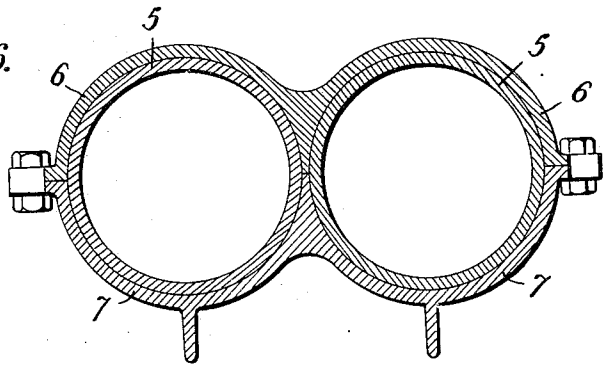


Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES W. PACKARD, OF WARREN, OHIO, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF WARREN, OHIO, A CORPORATION OF WEST VIRGINIA.

HYDROCARBON-ENGINE FOR MOTOR-VEHICLES.

No. 830,099. Specification of Letters Patent. Patented Sept. 4, 1906.

Application filed June 29, 1903. Serial No. 163,589.

To all whom it may concern:

Be it known that I, JAMES W. PACKARD, a citizen of the United States, residing at Warren, in the county of Trumbull and State of Ohio, have invented certain new and useful Improvements in Hydrocarbon-Engines for Motor-Vehicles, of which the following is a specification.

This invention comprises various improvements in hydrocarbon-engines which are especially intended to adapt this class of engines to motor-vehicles.

In the accompanying drawings, Figure 1 is a side view of a hydrocarbon-engine embodying this invention, parts being broken away. Figs. 2 and 3 are details. Fig. 4 is a plan view, partly in section. Fig. 5 is a view on the line A A of Fig. 4. Fig. 6 is a view on the line B B of Fig. 4.

The engine illustrated in the accompanying drawings is a double-cylinder engine having a single crank, to which both connecting-rods are jointed.

One feature of the invention relates to the manner of connecting the cylinders to form a single water-jacket. As illustrated, the right-hand cylinder 1 is surrounded by a section of water-jacket 1^a and the left-hand cylinder is surrounded by a similar section of water-jacket 2^a. In order to facilitate the water circulation and to set the cylinders close together, so that their connections to the crank may be close, the water-jackets 1^a 2^a are open at their inner sides and the inner edges abut and are fastened by bolts 3. This provides a continuous water-space 4 extending about both cylinders and having a sectional form similar to a figure **8**. It will be seen that this permits of the cylinders being placed close together without sacrificing any cooling-surface.

A second improvement consists in fitting or telescoping the cylinders into the crank-case in such a manner as to strengthen both and stiffen the connection between them. As shown, each of the cylinders has a cylindrical extension 5, Figs. 1, 4, and 6, which is clamped between the upper section 6 and the lower section 7 of the crank-case C. The crank-case is made in two parts divided along a substantially horizontal line passing through the crank-shaft, and each of these parts has two semicircular portions at its front end adapted to fit closely to the cylinder extensions 5. The cylinders are also cast with flanges 8, which fit corresponding flanges 9 on the front end of the crank-case.

It will be seen that when the flanges 8 and 9 are bolted together and the meeting flanges 10 11 of the crank-case are also bolted together the crank-case and cylinders become virtually a single piece. The engine is preferably supported from the motor-vehicle frame by a transverse bar 12, extending beneath the flanges 8 9.

Each cylinder is provided with an inlet-valve 13 and an exhaust-valve 14. Beneath each valve is a removable plug 15, closing an opening through which the valve may be removed. The inlet and exhaust valves 13 and 14 are located above the explosion-chamber 16, and the plugs 15 below said chamber are made adjustable and provided with check-nuts 17 for locking them in any desired position. The object in making the plugs adjustable is to permit of increasing or decreasing the size of the explosion-chamber, and thereby decreasing or increasing the intensity of the explosion.

The valves 13 and 14 are provided with stems 18, and they are normally closed by springs 19, abutting against heads 20 on said stems. The valves are positively opened by means of cams 21 on a cam-shaft 22, said cams operating through rollers 23, arms 24, pins 25, and levers 26, said levers bearing at one end upon the pins 25 and at the opposite end upon the valve-stems 18. In order to vary the degree of opening of the inlet-valves 13, the levers 26 which operate the inlet-valves are mounted on eccentrics 27, which are carried by a rock-shaft 28. The levers 26 which operate the exhaust-valves have bearings which are concentric with shaft 28. As shown in Figs. 1 and 3, the rock-shaft 28 is operated by an arm 29 and a link 30, connecting said arm to any suitable operating lever or governor. This device provides a very cheap and efficient means for regulating the power and speed of the engine. The cam-shaft 22 is driven by suitable gearing 30 31 from the crank-shaft 32. The arms 24 are loosely carried by a rod 33, which has a sliding movement. The sliding movement is intended to permit the cam-rolls 23, which operate the exhaust-valves, to ride upon the

cams 34, which are opposite in effect, or substantially so, to the cams 21. When it is desired to reduce the charge in the explosion-chamber, the rod 33 is moved over by a lever 35, so that the rollers travel on both cams 21 and 34. This causes the exhaust-valves 14 to open normally during the exhaust-stroke of the piston and then to open again during the compression-stroke sufficiently to let a portion of the charge escape through the exhaust-passages before ignition takes place. By this means the power and speed of the engine can be regulated either by hand or by governor.

The valve-operating mechanism herein described forms the subject-matter of a divisional application, Serial No. 282,646, filed October 13, 1905.

What I claim, and desire to secure by Letters Patent, is—

1. In a hydrocarbon-engine, the combination with two parallel cylinders formed separately, a casing for each cylinder partially surrounding the same, the two casings being joined to form a continuous water-jacket about the two cylinders, of a crank-case formed of two parts suitably connected together, the parts of the crank-case being joined on a plane passing through the axes of the two cylinders, and said cylinders and crank-case having telescoping portions.

2. In a hydrocarbon-engine, the combination with two parallel cylinders formed separately, each cylinder being partially surrounded with a casing at its rear end and having a telescoping portion at its forward end, and said casings being joined to form a continuous water-jacket about the rear ends of the cylinders, of a crank-case formed of two parts which are joined on a plane at right angles to the plane of joining of the said casings, the said crank-case being adapted to telescope with the said cylinders.

3. In a hydrocarbon-engine, the combination with two parallel cylinders formed separately and connected together, of a crank-case formed of two parts which are joined together on a plane at right angles to the plane of the joining of the cylinders, said cylinders and crank-case having telescoping portions, whereby their connection is strengthened.

4. In a hydrocarbon-engine, the combination of two parallel cylinders formed separately and connected on a vertical line with a crank-case formed of two parts connected on a horizontal line, and means for connecting said cylinders and crank-case, said cylinders and crank-case having telescoping portions, whereby their connection is strengthened.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES W. PACKARD.

Witnesses:
S. D. WALDON,
RUSSELL HUFF.