No. 811,757. PATENTED FEB. 6, 1906.

V. G. APPLE.

GAS ENGINE.

APPLICATION FILED DEC. 5, 1904.

4 SHEETS—SHEET 1.

Fig. 1

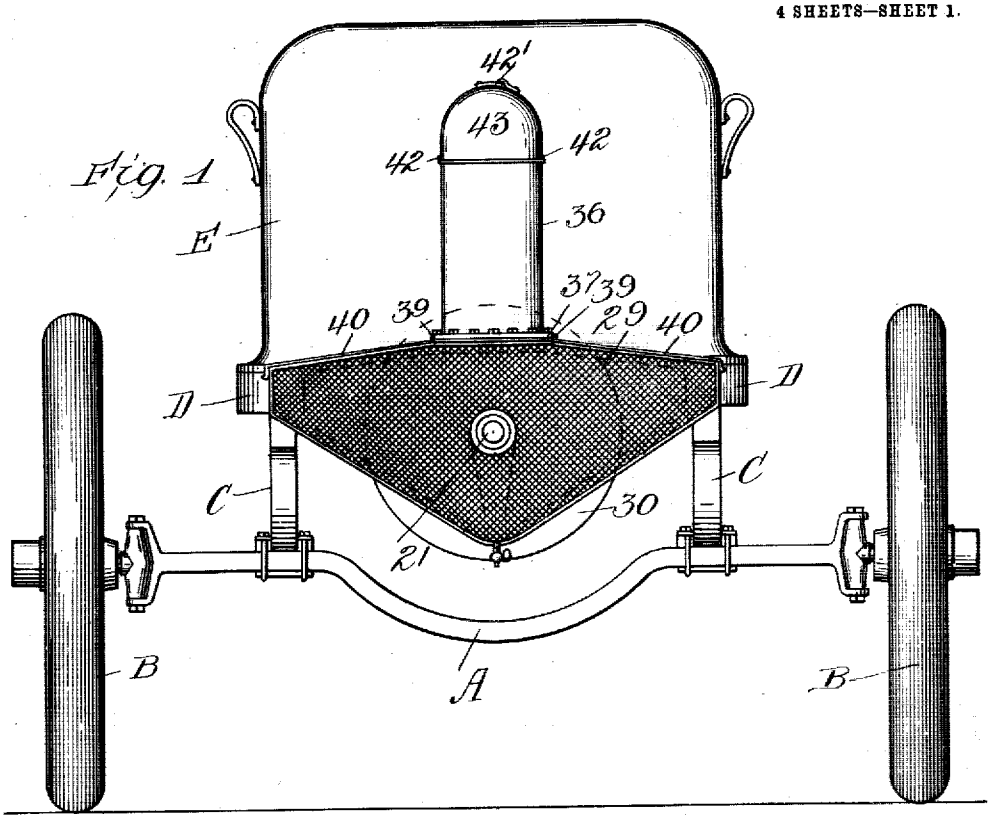
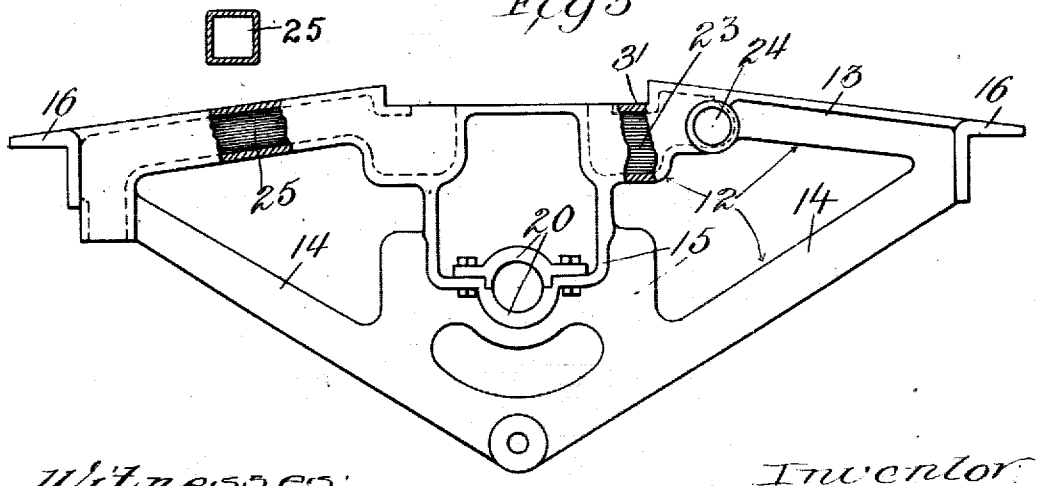


Fig 5



Witnesses:
Ray White.
Harry R. Lubke

Inventor
Vincent G. Apple.
By Jones Bain & Atty.

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4 SHEETS—SHEET 2.

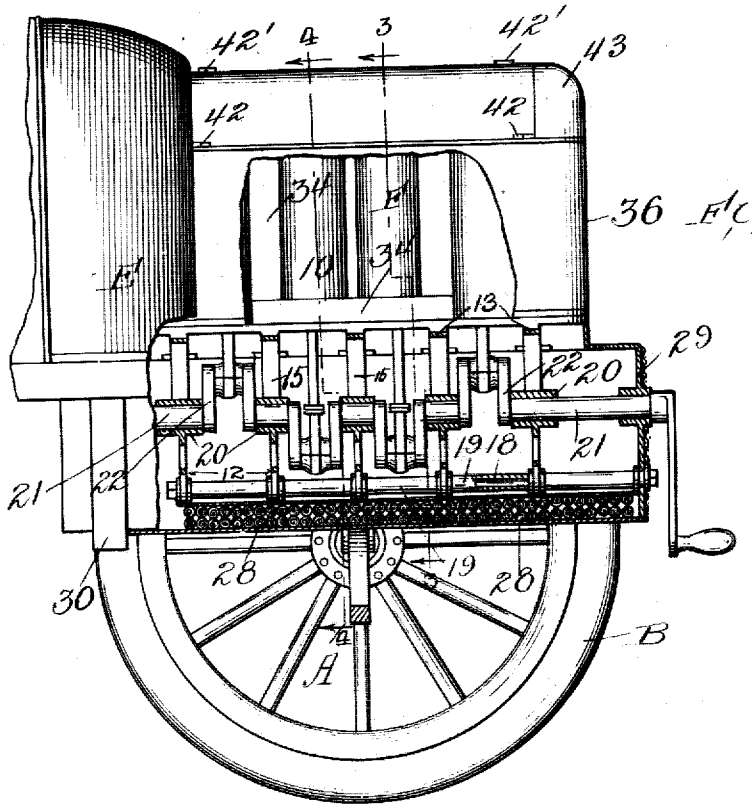
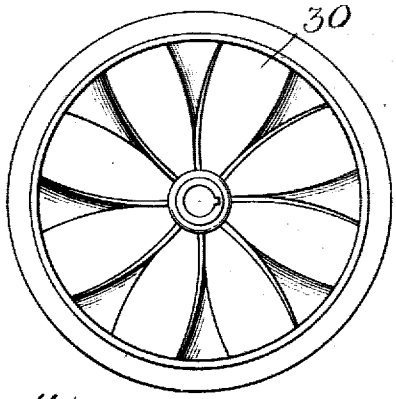


Fig. 2

Fig. 6.



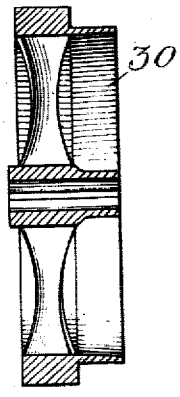


Fig. 7.

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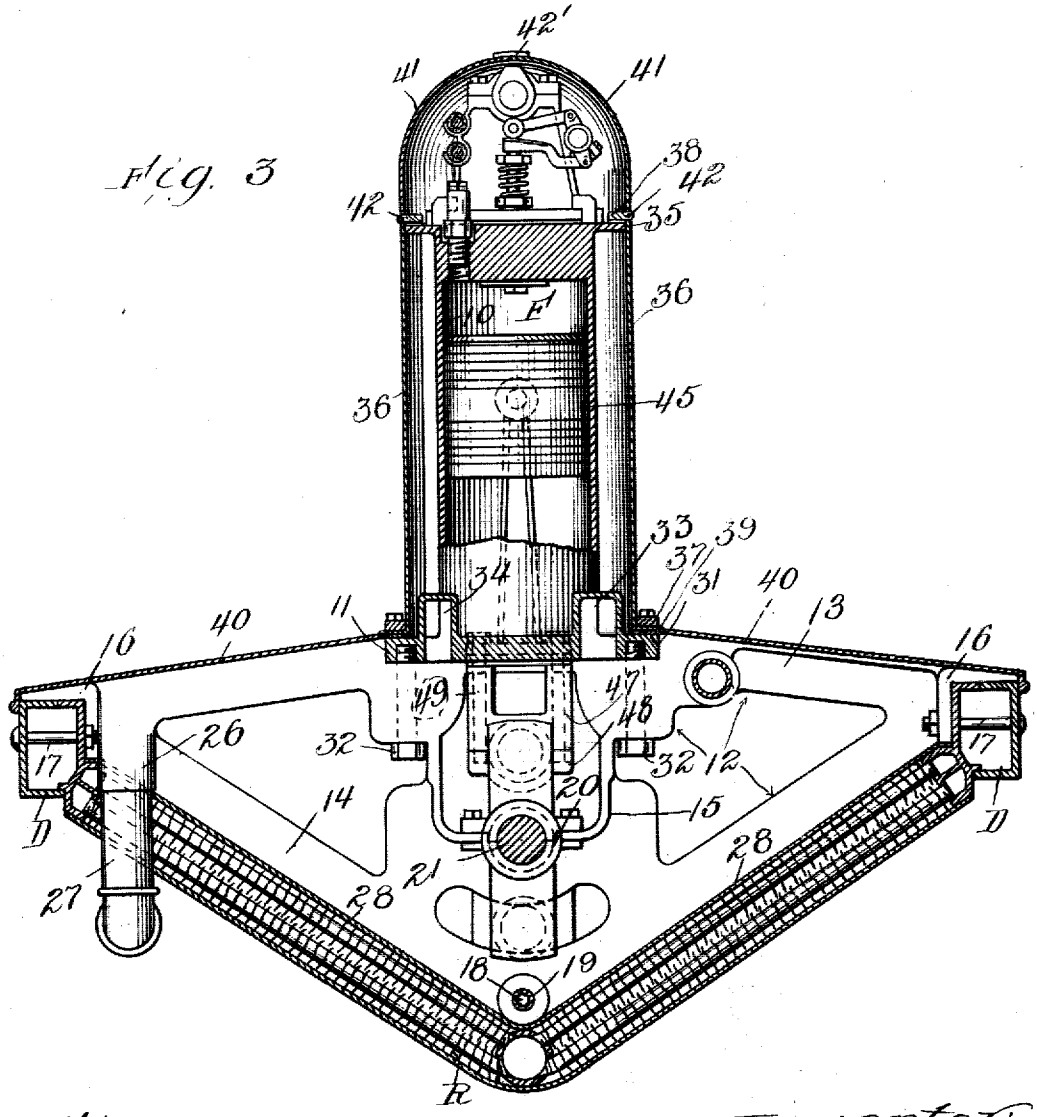
V. G. APPLE.

GAS ENGINE.

APPLICATION FILED DEC. 5, 1904.

4 SHEETS—SHEET 3.

Fig. 3



Witnesses:
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Harry R. Lubliner

Inventor:
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By Jones Bains Atty

No. 811,757. PATENTED FEB. 6, 1906.

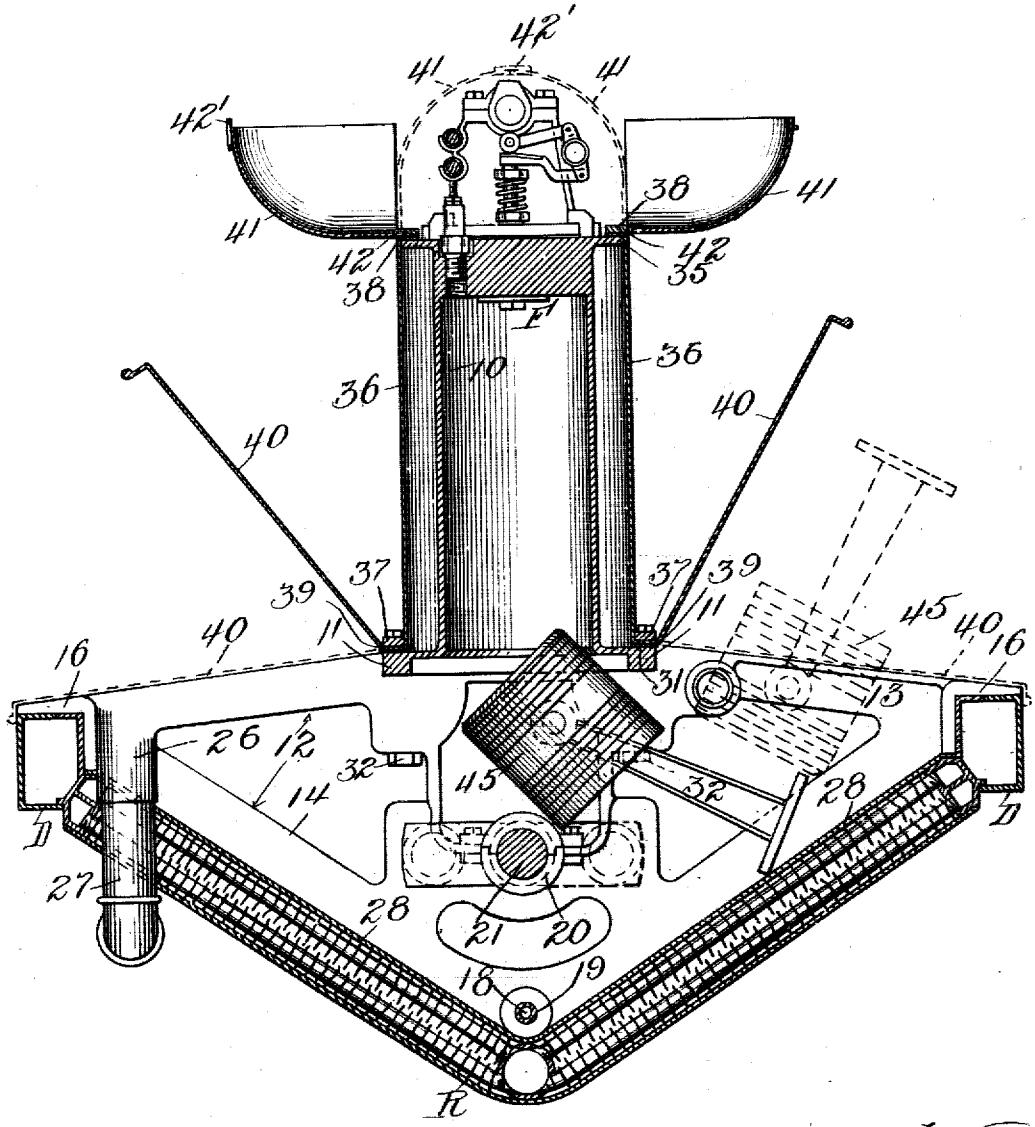
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GAS ENGINE.

APPLICATION FILED DEC. 5, 1904.

4 SHEETS—SHEET 4.

Fig. 4



Witnesses:
Ray White.
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UNITED STATES PATENT OFFICE.

VINCENT G. APPLE, OF DAYTON, OHIO.

GAS-ENGINE.

No. 811,757. Specification of Letters Patent. Patented Feb. 6, 1906.

Application filed December 5, 1904. Serial No. 235,583.

To all whom it may concern:

Be it known that I, VINCENT G. APPLE, of Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Gas-Engines; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to gas-engines, and more particularly to gas-engine construction adapted for motor conveyances, such as automobiles, motor-launches, and the like.

Heretofore it has been customary in the construction of automobiles to provide vertical multiple-cylinder gas-engines adapted to be placed upon the front of the vehicle; but these engines are usually unsightly and unattractive in appearance, and it is therefore customary to provide a hood or bonnet extending from side to side of the frame and from the front thereof to the dashboard to completely cover the engine.

One of the salient objects of my invention is to provide a bonnetless gas-engine construction, the engine and its appurtenances being constructed and arranged to present a pleasing appearance.

A further object is to provide an engine construction wherein all the working parts are normally concealed and protected from dust and dirt and yet to so dispose and collocate the parts of the engine that those elements thereof which are apt to require attention or inspection are readily accessible and are in position for easy manipulation in making repairs, &c.

Further, it is an object of my invention to provide a novel construction of gas-engine which in its association with the frame of an automobile or launch will materially strengthen the frame construction, will afford strong rigid bearings for the engine-shaft at such points as bearings are advantageous, and will otherwise be of advantage in the construction, as will hereinafter more fully appear.

Numerous other objects of this invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illustrative of the application of an engine employing my invention to an automobile.

In said drawings, Figure 1 is a front or end elevation of an automobile equipped with an engine embodying my invention. Fig. 2 is a side elevation with parts in section of the front end of the vehicle. Fig. 3 is a vertical section of the engine on line 3 3 of Fig. 2. Fig. 4 is a similar section on line 4 4 of Fig. 2. Fig. 5 is a detail showing the construction of one of the supporting-legs of the engine. Figs. 6 and 7 are respectively face and sectional views of the engine fly-wheel.

Throughout the drawings like characters of reference refer always to like parts.

In the drawings, A indicates the front axle of the vehicle; B B, its wheels; C C, its springs; D D, two side pieces of the framing, and E the dashboard.

The engine (generally indicated as F) is preferably a vertical multiple-cylinder engine, preferably having four cylinder-casings 10 10 arranged in longitudinal alinement and preferably made in a solid casting having a suitable base-flange 11. The engine F is supported upon truss members or supports 12 12, spanning the space between the side bars D D of the frame and supported on or secured to said side bars. The truss members 12 may be of any suitable contour to effect the results sought and are preferably more numerous than the cylinders of the engine, one of said trusses being arranged between each pair of adjoining cylinders and one at each end of the engine, so that for the four-cylinder engine at least five trusses are provided. I prefer that each of the trusses should consist of a bridge-piece 13, preferably arched or elevated somewhat at its center, a V-shaped truss member 14, coextensive with the bridge-piece 13, and a strut member 15, vertically connecting the elevated central portions of the bridge member and the depressed central portion of the truss member. Integral supporting and bracing flanges 16 16 of suitable shape to overlie and bear laterally against the inner side of the frame members D are provided at the extremities of the truss member, and bolts 17 17, passing through the frame members and said flanges, secure the truss members in position upon the frame. At their lower central portions the truss members 14 of the frame-pieces are provided with apertures through which takes a tie bolt and rod 18, bearing spacing-thimbles 19, arranged between the truss members and which serve to maintain the lower ends of the truss members in proper separated position. Each support or truss member 12 is constructed to provide a shaft-hanger bearing 20, and one of these supports being pro-

vided between each adjacent pair of engine-cylinders, and at each end of the engine the crank-shaft 21 of the engine receives bearing on each side of each of its cranked portions 22, so that the most efficient possible support is afforded said crank-shaft.

Preferably one of the legs or truss members 12 is provided, as shown in Fig. 5, with ducts leading therethrough to afford intake and exhaust passages, the intake-passage 23 preferably having its outer end 24 disposed in position to communicate with a carbureter to be arranged between two of the truss members and leading to a point of communication with the engine-frame, and the exhaust-passage 25 extending from a point of communication with the engine-frame down through the leg to an external portion 26, where it can make communication with the exhaust-pipe 27, leading to the exterior of the machine.

Preferably an imperforate shield 28 is secured below the truss-supports 12 12 to completely close the under side of the framework, said shield extending to and connecting with the imperforate face-plate 29, closing the front end of the machine. The rear end of the frame is preferably left open. Associated with the truss member below the plate 28 I have also shown a radiating-coil R, and I prefer that the radiator should be so situated; but such construction is not herein made a feature of claim, and for the purpose of this invention the radiator might be situated anywhere desired.

Mounted on the engine-shaft 20 directly in rear of the casing is the engine fly-wheel 30, preferably constructed, as shown in Figs. 6 and 7, to constitute a fan, which in its rotation draws air from the front portion of the machine, and thereby tends to withdraw air from the crank-space in front thereof.

The base 11 of the engine F is preferably mounted in suitable recesses 31, formed in the crest or elevated portion of the bridge-piece 13 of each truss-support, said base being held to each of the said supports 12, as by bolts 32.

The engine-casing 10 has preferably formed integrally therewith ducts or passages 33 and 34 for the carbureted and exhaust gases, so disposed that their lower ends communicate directly with the corresponding intake and outlet ducts 23 25; but the specific arrangement of the ducts 33 34 in their association with the cylinders is not a feature of the present case and is not here claimed.

At its upper end the cylinder-casing 10 is provided with a flange 35, between which and the said flange 11 extends a thin sheathing member 36, preferably of some metal susceptible of receiving an attractive finish and adapted to act as a water-jacket sheathing. The sheathing 36 is secured to the flange 11 at its lower end by a band 37, which holds it to the base flange 11, and at its upper end by a band 38, which holds it to the top flange 35, making water-tight connections, so that water may be circulated between said sheathing and the cylinder-casing. Preferably the portion of the sheathing secured by the band 37 is bent over to form a hinge member 39, or a hinge is otherwise provided at or adjacent said point by which is pivotally connected to the structure the hinged door or cover plate 40, one of which extends along each side of the engine, completely covering the space from the side of the casing to the edge of the frame and from the dashboard to the front of the machine. The hinged arrangement of these doors or cover-plates 40 enables them to be thrown back, so that access may be readily had to the crank-casing; but when they are in lowered or closed position they form practically continuations of the water-jacket sheathing and completely close the crank-casing so far as its top is concerned, said crank-casing being open only at its rear end when the machine is in normal condition. At or above the top of the sheathing 36 are also provided hinged doors or cover-plates 41, which form wholly or in part a canopy inclosing a valve-chamber, the two covers 41 being preferably pivoted at their lower edges, as at 42, and arranged when in raised or closed position to meet centrally of the machine at the top thereof at a suitable distance above the top of the engine-cylinders. Latches or fastenings 42′ are preferably provided for releasably securing the doors 41 41 in closed position; but when released they may swing upon their hinges 42 42 to the position shown in Fig. 4. In the space between the doors 41 and the top of the engine are arranged the valve mechanism, the wires for the spark-plugs, and such other appurtenances and parts of a gas-engine as require care and attention and may be conveniently placed at or near the head end of the engine. All other parts which require attention—such as the carbureters, the circulating-pump, and the like—are placed in the crank-casing in position to be conveniently reached when the doors 40 40 are open, the multiplicity of truss members affording convenient support for such devices. Preferably the doors 41 41 do not extend quite the full length of the machine, but end at a front casting 43, although such construction is not essential, the only requirement being that the doors 41 shall be of sufficient extent and number to permit easy access to be had to the part mounted above the engine-cylinder, and it will be apparent that said doors might be made in several parts or sections and each section made capable of opening independently or that parts of the canopy structure might be stationary.

In many of the vertical engines now employed it is difficult or impossible to remove the piston from the cylinders without practi-

cally disassembling the engine structure; but my invention provides a construction whereby the removal of the individual engine-pistons may be accomplished without the disturbance of any of the remaining parts of the engine.

Referring now particularly to Figs. 3 and 4, 45 indicates a piston, preferably of the trunk type, and 46 its piston-rod, which is preferably relatively shorter than the usual piston-rod section and is provided with a separate bearing-block section 47 and its associated strap 48, adapted for connection with the crank of the engine-shaft and arranged to be secured by bolts 49 to the piston-rod 46 to form the complete sectional piston-rod structure. The distance between the lower end of the cylinder and the engine-shaft 21 is such that when the bolts 49 are loosened and the parts 47 48 removed the piston and its rod may be drawn down to the position indicated in full lines in Fig. 4, after which they may be removed through the open doorway of the crank-casing, as indicated in dotted lines in said figure.

It will thus be apparent that by my invention I provide an engine wherein all of the valve parts, plug-wiring, and the like are disposed above the engine-cylinders in a chamber inclosed by a canopy comprising doors which may be readily opened to give access to the inclosed parts, wherein the remaining parts which are apt to require attention are inclosed in a crank-casing provided with cover-plates which may be readily opened to permit easy access to said casing, and wherein the canopy and crank-case doors are associated with a water-jacket in such a way as to afford an engine of pleasing external appearance, exhibiting no working parts and requiring no hood. Further, it will be apparent that by the same construction I provide an extremely rigid, strong, and convenient support for the engine which acts to give great strength to the vehicle-frame. Further, it will be seen that by the combination of the crank-casing open at its rear end, as before described, and substantially closed at other points throughout, in combination with the fan-like fly-wheel in rear thereof I provide a device which tends to exhaust the air from said casing and prevent the accumulation of dust and at the same time prevent the accumulation in the casing of dust otherwise apt to be there deposited by eddy-currents generated by the swift movement of the automobile.

While I have described in some detail an embodiment of my invention which I find to be highly advantageous and the specific features of which I claim to be new, I do not desire to be understood as limiting myself to the exact construction shown and described further than as specified in the claims, as it will be apparent that numerous changes and modifications of the construction might be made without departure from the spirit and scope of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In combination, vertical engine-cylinders, supports therefor laterally extended beyond the engine-cylinders, an engine-crank below the top of said supports, valve-gearing above the engine-cylinders, a sheathing for the cylinders, a canopy arranged when in normal position to constitute a continuation of the sheathing and movable to give access to the valve-gearing, and doors arranged when closed to constitute a continuation of the cylinder-sheathing disposed to overlie the laterally-extended portions of the supports.

2. In combination, vertical engine-cylinders, supports therefor, valve-gearing above the engine-cylinders, a water-jacket sheathing for the cylinders, and a movable canopy arranged when in normal position to constitute a continuation of the sheathing and movable to give access to the valve-gearing.

3. In combination, vertical engine-cylinders, separated supports therefor laterally extended beyond the cylinders, mechanism appurtenant to the engine disposed above the engine-cylinders, mechanism appurtenant to the engine disposed between the said supports, a sheathing for the cylinders, a canopy arranged when in normal position to constitute a continuation of the sheathing and movable to give access to the mechanism above the cylinders, and doors arranged when closed to overlie the engine-supports, said canopy-doors and sheathing constituting the exterior of the engine.

4. In combination, a frame, supports bridging the frame, a vertical engine-cylinder supported centrally on the frame, the engine-crank below the top of the frame, and doors arranged when closed to constitute covers for the supports between the engine-cylinders and the supporting-frame.

5. In combination, a frame, supports bridging said frame, a gas-engine cylinder supported centrally of said frame, the engine-crank below the top of the support, valve-gearing above the engine-cylinder, and an inclosure for the engine parts comprising an immovable central sheathing structure constituting part of the cylinder water-jacket, and movable doors arranged when closed to constitute continuations of the sheathing and when open to give access to the engine-crank and to the valve mechanism.

6. In combination, a vertical-cylinder engine, a frame and trusses for supporting said engine in the frame, one of said trusses comprising a bridge-piece extending from one side of the frame to the other, a truss member therebelow, and a strut member connecting said bridge and truss members.

7. In combination, the vertical cylinders of a gas-engine, the crank-shaft therefor, a frame and truss members for supporting the engine in said frame, each comprising a bridge member spanning the frame from side to side, a truss member therebeneath, a strut member connecting the bridge and truss members and affording support to the crank-shaft.

8. In combination, an engine-cylinder having a gas-duct therefor, of a supporting-frame for the cylinder comprising a member having integrally formed therein a passage arranged for communication with the gas-duct of the engine-cylinder to form a continuation therefor.

9. In combination, a gas-engine cylinder, gas inlet and outlet ducts associated with said cylinder, a frame, and means for supporting said cylinder in the frame, having formed integrally therein passages for communication with the inlet and outlet ducts of the engine-cylinder to constitute continuations thereof.

10. In combination, a vertical-cylinder engine, a supporting-frame therefor, a crank-casing in the frame open at its rear end only, a crank-shaft within the casing, and a fan flywheel arranged adjacent the open end of the casing and disposed to propel air away from the open end of said casing.

11. In combination, an engine comprising a cylinder, a crank and a removable piston, a casing for the crank comprising a door arranged and adapted to permit the removal of the piston.

12. In combination, an engine comprising a cylinder, a crank, a sectional piston-rod, the parts whereof are separately connected, the piston and its associated piston-rod part being fashioned to permit their removal from the cylinder without disturbing the crank, and a casing for the crank comprising a door arranged and adapted to permit the removal of the said piston.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

VINCENT G. APPLE.

In presence of—
WILBUR M. APPLE,
ROENE MCNARY.