D'ORSAY McC. WHITE.

HYDROCARBON MOTOR.

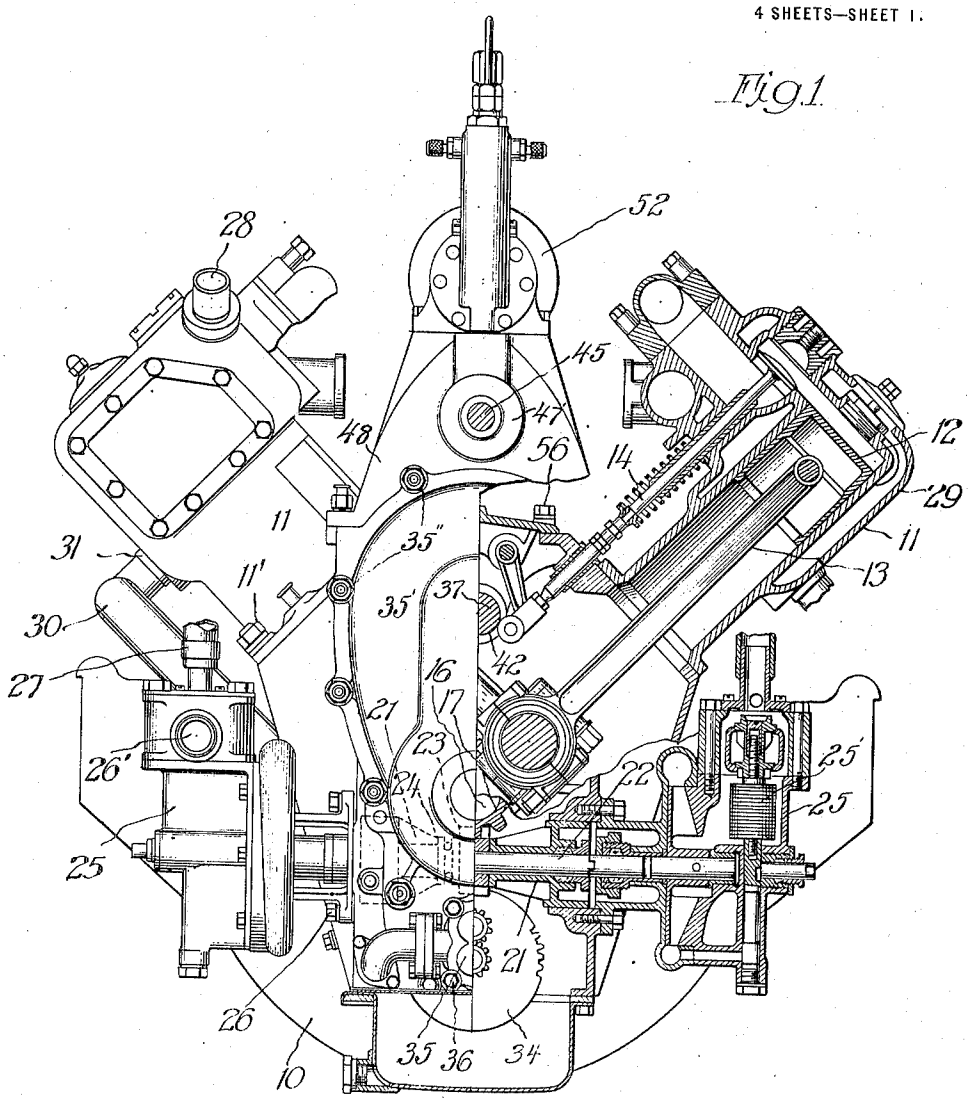
APPLICATION FILED NOV. 11, 1915.

1,308,465.

Patented July 1, 1919.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

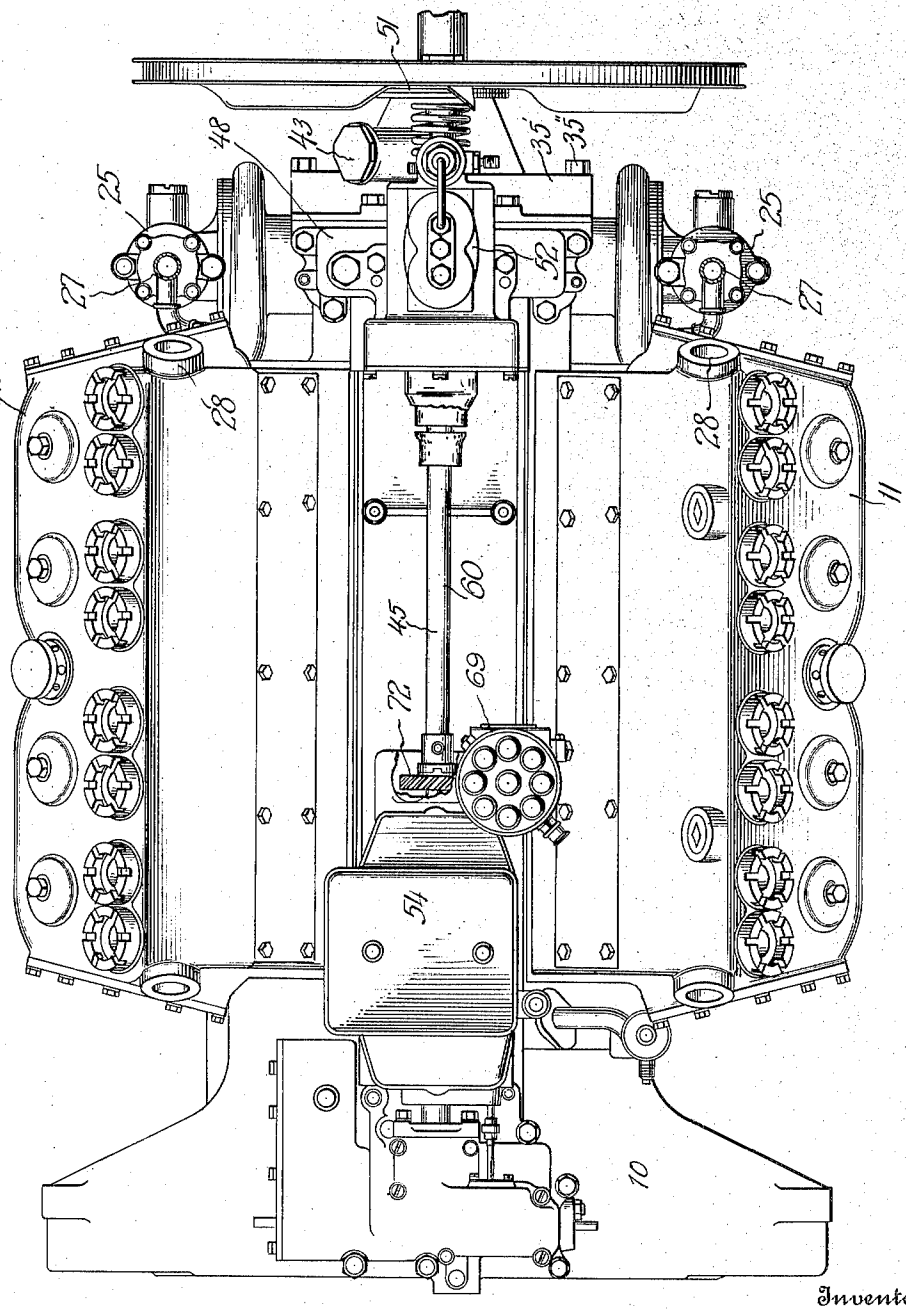


Fig. 2.

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4 SHEETS—SHEET 3.

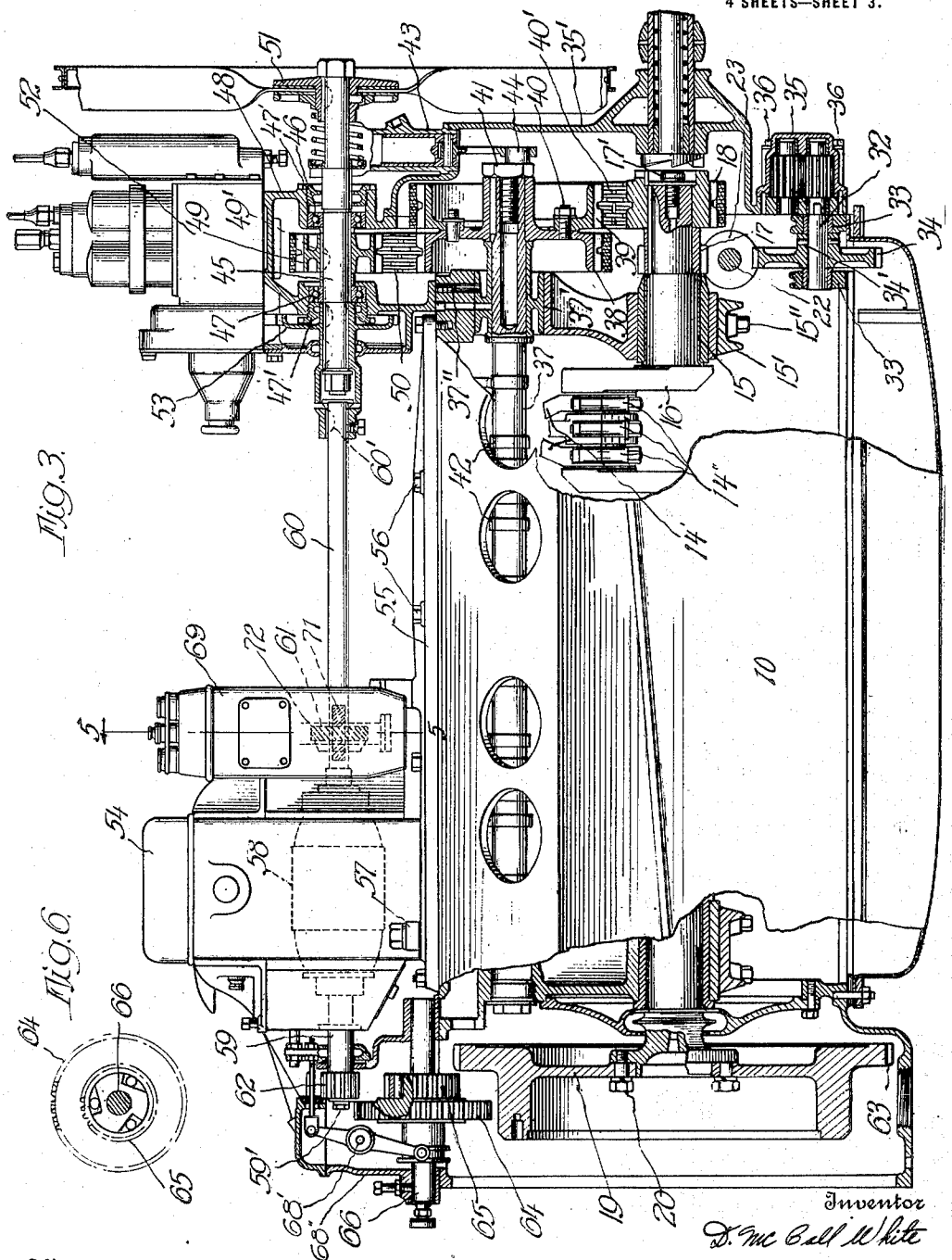


Fig. 3.

Fig. 6.

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4 SHEETS—SHEET 4.

Fig. 4.

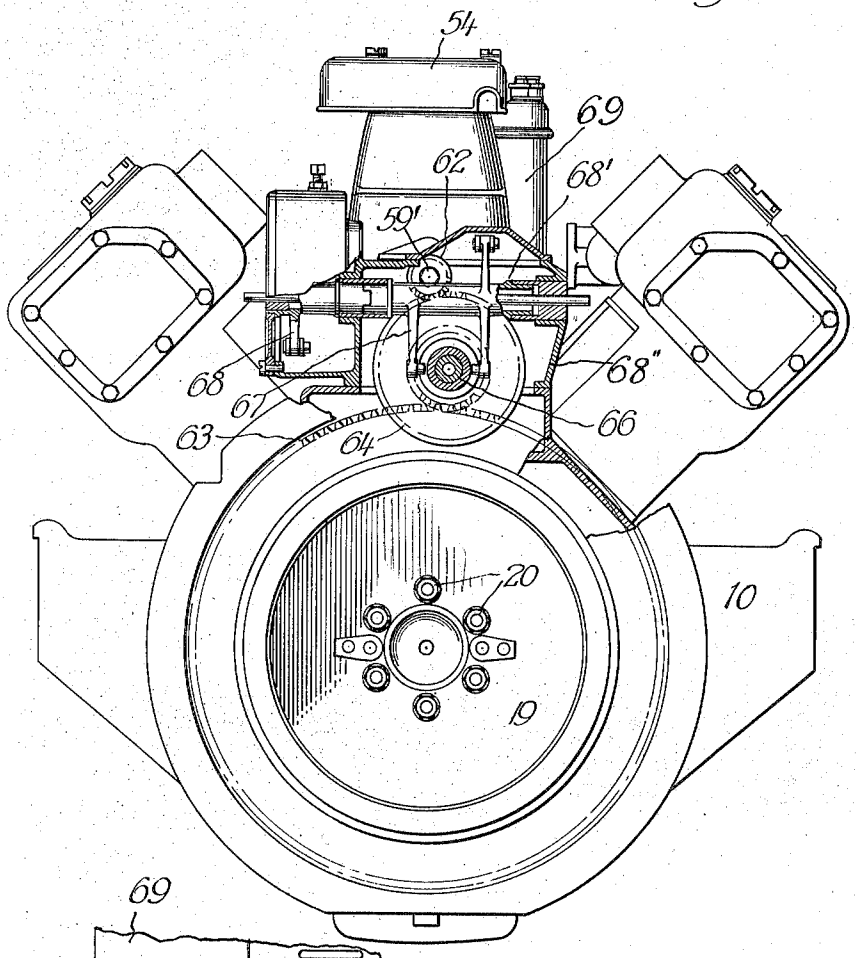
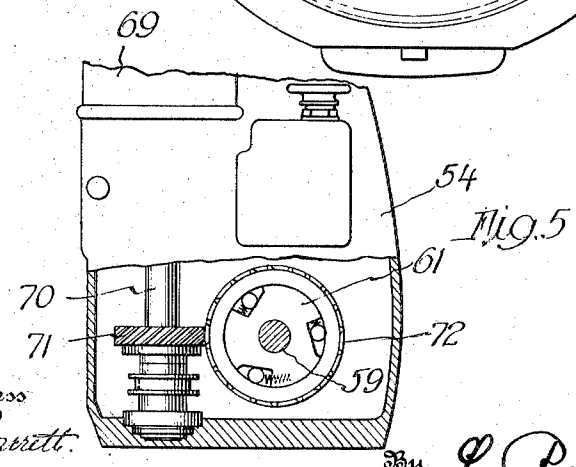


Fig. 5.



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UNITED STATES PATENT OFFICE.

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HYDROCARBON-MOTOR.

1,308,465. Specification of Letters Patent. Patented July 1, 1919.

Application filed November 11, 1915. Serial No. 60,812.

To all whom it may concern:

Be it known that I, D'ORSAY McCALL WHITE, a loyal subject of the King of England, and resident of Detroit, Wayne county, State of Michigan, have invented certain new and useful Improvements in Hydrocarbon-Motors, of which the following is a specification.

This invention relates to hydrocarbon motors, and particularly to motors of the so-called V type.

One of the objects of this invention is an improved arrangement and disposition of the various elements and shafts of the motor, and the devices or accessories usually a part of the motor and driven thereby.

Another object of this invention is an improved location of the various accessories of the motor.

Another object is to provide an arrangement of the accessory drive mechanisms which may be easily assembled and dis-assembled, and is comparatively inexpensive to manufacture.

Other objects will appear from the following description, taken in connection with the accompanying drawings, which form a part of this specification, and in which:

Figure 1 is a front elevation of a power plant of a V type motor, embodying this invention, showing parts broken away for clearness;

Fig. 2 is a plan view of a similar motor showing parts broken away;

Fig. 3 is a side elevation, with parts broken away, of the motor, shown in Figs. 1 and 2, with the cylinders removed;

Fig. 4 is a rear elevation, showing parts broken away;

Fig. 5 is a transverse sectional view substantially on the line 5—5 of Fig. 3, showing the driving mechanism for the electrical devices; and

Fig. 6 is a section through the over running clutch, adapted to connect the electrical starting motor shaft with the fly wheel.

Referring to the drawings, 10 represents the crank case or motor base, on which are suitably mounted in V relation, as by bolts 11′, a pluralitv of cylinder blocks 11. The usual pistons 12, connecting rods 13 and valve mechanisms 14 are also provided. It will be understood that the connecting rods 13 of opposite cylinders, are connected at their respective lower ends to a single crank, one of the rods having a forked portion, as shown at 14′ and the other rod having the usual straight end. These connecting rods may be secured to a crank shaft through the well known detachable caps and bolts, illustrated at 14″.

Arranged in bearings 15, as by detachable caps 15′ and bolts 15″, in the crank case 10 is a crank shaft 16, which is provided with a plurality of gears 17 and 18 suitably secured adjacent the front end thereof, as by bolt 17′, and a fly wheel 19 may be secured to the rear end thereof, as by bolts 20.

Mounted in bearings 21 in the crank case 10, and arranged transversely to the crank shaft 16 is a shaft 22, provided with a gear 23 secured thereto intermediate its ends and adapted to be driven from the crank shaft by means of the spiral gear 17 arranged thereon. A bearing 24 may be provided between the inner face of one of the bearings 21 and the gear 23 to take the lateral driving thrust of the transversely arranged shaft 22.

A plurality of devices in the form of pump mechanisms 25, of the centrifugal type, provided with thermostatically operated valve controlling elements 25′, mounted therein, may be secured to opposite sides of the crank case 10, as by bolts 26. Each of these pumps is adapted to be driven, as shown, from the opposite ends of the shaft 22.

It will be understood that each of the pumps is adapted to draw its respective supply either from a port 26′, which may be connected with the lower portion of a radiator, not shown, or from a bypass 27, adapted to be connected to a conduit, not shown, leading from the outlet 28 from the water jacket 29 of one of the cylinder blocks 11. The water may be discharged from the pumps into the conduits 30 and then to the intakes 31 of the respective jackets 29.

A third shaft 32 is arranged parallel to the crank shaft 10, and below it. This shaft is mounted in suitable bearings 33, as shown, in the crank case and is provided with a gear 34, suitably secured thereto, as by a pin 34′, and adapted to be driven from the crank shaft 16 through the gear 23 on the transversely arranged shaft 22.

A device, in the form of an oil pump 35,

of the well known gear type, may be mounted on the cover plate 35′, as by bolts 36, and may have a direct connection for driving it from the shaft 32, as illustrated. It will be understood that the plate 35′ is adapted to cover the various driving mechanisms arranged adjacent the front end of the motor, and may be secured in position, as by the bolts 35″.

Another, or fourth shaft 37 is arranged above the crank shaft 16 and parallel therewith, in suitable bearings 37′, mounted in the crank case 10. The shaft 37 and its bearings 37′ may be secured in position by means of a pin 37″. It is also provided intermediate its ends with a plurality of gears 38 and 39 secured thereto, as by bolts 40 and 41, the gear 39 having a 2 to 1 ratio driving connection, as by chain 40′, with the gear 18 on the crank shaft. Devices, in the form of valve operating cams 42 for driving the valve mechanisms 14 are arranged on one side of the gears 38 and 39, and a device, in the form of a pump 43, of the reciprocating type, may have a direct driving connection with the shaft 37, as by the pin 44, formed on the bolt 41. The pump 43, it will be seen, is suitably mounted in the cover plate 35′ and may supply air pressure to various parts of the motor, where needed, as to the fuel tank, not shown.

A fifth two-part shaft 45, which is parallel with the cam shaft 37, is arranged above the crank shaft 16, between the cylinder blocks 11. This shaft is mounted in bearings 46 and 47 of the anti-friction type, which may be secured in position, as by the caps 47′, arranged in the upper part of a detachable portion 48 of the crank case.

The shaft 45 is provided with a gear 49, secured intermediate its ends, as by a key 49′, and may be driven as by chain 50, from the shaft 37. It will thus be seen that four parallel shafts are provided, which are connected together and arranged in the same vertical plane; of course it will be understood that they are not necessarily so arranged.

A device, such as a fan 51, may be connected in any well known manner to said shaft 45 at one side of the gear connection 49, and another device, in the form of a tire pump 52 may be driven from shaft 45 by means of a gear connection 53, arranged on the opposite side of the gear 49.

An electrical device, such as a motor generator 54, may be mounted on the cover plate 55, which is secured to the crank case, as by bolts 56, and secured to the plate as by bolts 57. This electrical device is provided with an armature 58, arranged on the part 59 of the shaft 45 and adapted to be driven from the crank shaft 16 through either of two sets of gear connections, each having different ratios and arranged at opposite ends of the motor, as will now be more clearly described.

The part 60 of the shaft 45, it will be noted, is constantly connected as by the key 60′, with the front end of the crank shaft through the gears 18, 39, 38 and 49, and the part 60 is also adapted to be intermittently connected with the part 59 by means of an automatic over-running ball or roller clutch 61 of any well known form. Secured on one end of the part 59, as by bolt 59′, is a gear 62, which is adapted to drive the gear 63 formed on the fly wheel 19, by means of the gears 64 and 65, which may be connected together, as desired, through an automatic over-running clutch 65′, such as of the well known ball or roller type. These gears 64 and 65 are slidingly mounted on the shaft 66 and adapted to be brought into driving connection with the gears 62 and 63, such as by the shifter fork 67 and crank 68, which are arranged on the shaft 68′, which is mounted in the cover 68″, arranged on the crank case 10.

It will be understood that when the electrical motor 54 is in operation and is connected through the gears 64 and 65 with the gear 63 on the fly wheel 19, it is adapted to turn over the motor for starting purposes. Under such conditions, as the result of the lower gear connection between the part 59 and the rear end of the crank shaft, than between the part 60 and the front end of the crank shaft, the part 59 overruns the part 60 of the shaft 45 and is disconnected therefrom by means of the automatic overrunning clutch 61. When the motor is running under its own power and the current is cut off from the electrical starting motor 54, if the gears 64 and 65 are slid out of mesh with the gears 62 and 63, the part 59 of shaft 45, of course slows down relatively to the part 60 of this shaft, and the armature 58 is then driven by the part 60 of this shaft, through the clutch 61. The over-running clutch 65′ is provided so that when the electrical machine 54 slows down relative to the fly wheel 19, while the gears 64 and 65 are in mesh with the gears 62 and 63, it permits an automatic disengagement of the connection between the two gears 64 and 65. Thus it will be seen an automatic clutch connection is provided between the drive from either end of the crank shaft 16 and the shaft 45.

A timer 69 is suitably mounted on the motor generator 54. It is provided with a shaft 70, arranged transversely to the cam shaft 37, and adapted to be driven therefrom, by means such as a spiral gear 71, arranged on said transversely arranged shaft 70. through the gear 72, on the part 60 of the shaft 45, which as is well understood, is connected to the cam shaft 37 by means of the gear 38, chain 50 and the gear 49.

While I have described a preferred form of my invention which will be specifically claimed, it is understood that various modifications will occur, to one skilled in the art, without departing from the spirit and scope of my invention, as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. In a hydrocarbon motor, the combination with a crank shaft, a cam shaft driven thereby, and another shaft parallel with said cam shaft, of means intermediate the ends of said latter shaft for driving the same from said cam shaft, a pump driven from one end of said parallel shaft and a fan driven from the other end of said parallel shaft.

2. In a hydrocarbon motor, the combination with a crank shaft, and a cam shaft driven thereby, of another shaft parallel to said cam shaft having means intermediate its ends for driving it from said cam shaft, said parallel shaft having a geared connection between one of its ends and a device to be driven and also provided with a direct connection between the other of its ends and another device to be driven.

3. In a hydrocarbon motor, the combination with a crank shaft, of a second shaft arranged transversely thereto, a driving connection arranged intermediate the ends of said second shaft whereby it may be driven by said crank shaft, a device directly connected to each end of said second shaft, a third shaft parallel to said first shaft and having a geared connection with said second shaft, a device having a direct connection with said third shaft and adapted to be driven thereby, another shaft parallel to said crank shaft and having a geared connection intermediate its ends whereby it is driven from said crank shaft, devices arranged on either side of said geared connection on said other parallel shaft and adapted to be driven thereby.

4. In a hydrocarbon motor, the combination with a crank shaft, of a second shaft arranged transversely thereto, a driving connection arranged intermediate the ends of said second shaft whereby it is driven by said crank shaft, a device directly connected to each end of said second shaft, a third shaft parallel to said first shaft and having a geared connection with said second shaft, a device having a direct connection with said third shaft and adapted to be driven thereby, another shaft parallel to said crank shaft and having a geared connection intermediate its ends whereby it is driven from said crank shaft, devices arranged on either side of said gear connection on said other parallel shaft and adapted to be driven thereby, and another shaft parallel to said crank shaft and having a geared connection intermediate its ends with said other parallel shaft and devices arranged on either side of said latter gear connection, adapted to be driven thereby.

5. In a hydrocarbon motor, the combination with a crank shaft, of a cam shaft arranged parallel thereto and having a gear connection arranged intermediate its ends for driving the same from said crank shaft, and devices arranged on either side of said gear connection provided with direct driving connections with said cam shaft.

6. In a hydrocarbon motor, the combination with a crank shaft having a gear arranged thereon, a second shaft arranged below said crank shaft and transversely thereto, and a gear on said second shaft meshing with said first gear, of a third shaft parallel to said first shaft having a gear arranged thereon meshing with the gear on said second shaft, another gear on said crank shaft, a fourth shaft parallel to said crank shaft and having a pair of gears arranged thereon, one of said gears having a chain connection with the other gear on said crank shaft, a fifth shaft parallel with said crank shaft, having a gear arranged thereon, and a chain connection between said gear on said fifth shaft and said other gear on said fourth shaft.

7. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, cylinder blocks mounted on said crank case in V relation, and a shaft arranged above said crank shaft and between said cylinders, of means arranged intermediate the ends of said second shaft for driving it from said crank shaft, and a plurality of devices arranged on one side and cams arranged on the other side of said driving means adapted to be driven by said second shaft.

8. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, cylinder blocks mounted on said crank case in V relation, of a shaft parallel to said crank shaft arranged between said cylinders, said shaft having means arranged intermediate its ends for driving the same from said crank shaft, an electrical machine directly connected with one end of said shaft, and a fan driven by the other end of said shaft.

9. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of an electrical machine arranged between said cylinders, and a shaft arranged between said cylinders and mounted on said crank case, said shaft being driven by said crank shaft and driving said electrical machine.

10. In a hydrocarbon motor, the combination with a crank case, a crank shaft

mounted therein, and cylinder blocks mounted on said crank case in V relation, of a shaft arranged between said cylinders and mounted on said crank case, said shaft being adapted to be driven from either end of said crank shaft.

11. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of a shaft arranged between said cylinders and adapted to be constantly driven from one end of the crank shaft and intermittently driven from the other end of said crank shaft.

12. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of a two part shaft, one end of which is adapted to be constantly driven from said crank shaft, and the other of which is adapted to be intermittently driven from the other end of said crank shaft.

13. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of a two part shaft arranged between said cylinders, and adapted to be driven from said crank shaft by either of two sets of gearing having different ratios.

14. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of a two part shaft arranged between said cylinders, one end of said shaft being adapted to be constantly driven from said crank shaft, the other end being adapted to be driven from the other end of said crank shaft, and a clutch connection between the two parts of said shaft.

15. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of a shaft arranged between said cylinders adapted to be driven at one of its ends from said crank shaft and adapted to be driven from the crank shaft at the other of its ends by a sliding gear connection.

16. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of a shaft arranged between said cylinders adapted to be driven at one of its ends from said crank shaft and adapted to be driven from the crank shaft at the other of its ends by a sliding gear connection, and an automatic clutch between the two ends of said shaft.

17. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of a shaft arranged between said cylinders adapted to be driven at one of its ends from said crank shaft and adapted to be driven from the crank shaft at the other of its ends by a sliding gear connection, and an electrical machine between the ends of said shaft.

18. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of a shaft arranged between said cylinders, adapted to be driven at one of its ends from said crank shaft and adapted to be driven from the crank shaft at the other of its ends by a sliding gear connection, and an automatic clutch and an electrical machine between the ends of said shaft.

19. In a hydrocarbon motor, the combination with a crank case, and a crank shaft mounted therein, of a second shaft mounted in said crank case transversely to said crank shaft, means arranged adjacent the middle of said transversely arranged shaft for driving it from said crank shaft, and devices connected to each end of said transversely arranged shaft and adapted to be driven thereby.

20. In a hydrocarbon motor, the combination with a crank shaft, of a second shaft arranged transversely thereto and driven thereby, and a third shaft arranged parallel to said first shaft and driven from said second shaft.

21. In a hydrocarbon motor, the combination with a crank shaft, of a second shaft arranged transversely thereto, means adjacent the middle of said transversely arranged shaft for driving the same from said crank shaft, devices arranged adjacent the ends of said second shaft and driven thereby, and a third shaft arranged parallel to said first shaft and adapted to be driven by said second shaft.

22. In a hydrocarbon motor, the combination with a crank shaft, of a second shaft arranged transversely thereto, a gear connection between the middle of said second shaft and said crank shaft, a pump connected with each end of said second shaft, a third shaft arranged parallel to said first shaft, adapted to be driven by said second shaft, and a pump driven by said third shaft.

23. In a hydrocarbon motor, the combination with a crank shaft, and a second shaft arranged transversely thereto and driven thereby, of a plurality of pumps each adapted to be driven by one end of said second shaft by means of a detachable connection, a third shaft arranged parallel to said first shaft and driven thereby, and a pump having a detachable driving connection with said third shaft.

24. In a hydrocarbon motor, the combination with a crank case, and a crank shaft mounted in bearings therein, of a shaft ar-

ranged transversely thereto, a geared connection between said shafts, bearings for said second shaft arranged on either side of said gear connection, said bearings being mounted in said crank case and adapted to take both radial and thrust loads, and a plurality of pumps detachably secured to said crank case, each having a driving connection with an end of said second shaft.

25. In a hydrocarbon motor, the combination with a crank shaft, of a second shaft arranged transversely thereto and driven thereby, a plurality of pumps driven by said second shaft, a third shaft parallel to said first shaft and driven thereby, a pump driven by said third shaft, another shaft parallel to said crank shaft and driven thereby, and a pump driven by said latter shaft.

26. In a hydrocarbon motor, the combination with a crank shaft, a cam shaft arranged in the same vertical plane with said crank shaft, and a timer, of gear connections between said cam shaft and said crank shaft, and another gear connection between said cam shaft and said timer.

27. In a hydrocarbon motor, the combination with a crank shaft, a cam shaft and devices comprising a pump and timer adapted to be driven from said cam shaft, and means for driving said cam shaft from said crank shaft, of independent means for driving said pump and said timer from said cam shaft, one of said devices being indirectly connected to said cam shaft.

28. In a hydrocarbon motor, the combination with a crank shaft, a cam shaft arranged in the same vertical plane with said crank shaft, and driven thereby, and a timer, of a shaft for driving said timer arranged transversely to said cam shaft and a gear connection between said transversely arranged shaft and said cam shaft.

29. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, cylinders arranged in V relation mounted on said crank case, and a cam shaft mounted in said crank case between said cylinders, said cam shaft being driven from said crank shaft, a timer provided with a shaft arranged transversely to said cam shaft and a geared connection between said timer and said cam shaft.

30. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, cylinder blocks mounted on said crank case in V relation, and a cam shaft mounted in said crank case and adapted to be driven from said crank shaft, of a timer having a shaft arranged transversely to said cam shaft, a geared connection between said cam shaft and said transversely arranged shaft, a pump and means for driving said pump from said cam shaft.

31. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, cylinders arranged in V relation on said crank case, and a cam shaft mounted in said crank case, of gears arranged adjacent the front ends of said crank shaft and said sam shaft respectively, for connecting the same, a detachable housing arranged on said crank case above said gears, and a fan shaft mounted in said detachable housing.

32. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, cylinders arranged in V relation on said crank case, and a cam shaft mounted in said crank case, of gears arranged adjacent the front ends of said crank shaft and said cam shaft respectively, for connecting the same, a detachable housing arranged on said crank case above said gears, a device mounted on said detachable housing, and a shaft arranged therein adapted to have a driving connection with said cam shaft and to drive said device.

33. In a hydrocarbon motor, the combination with a crank case, a cam shaft mounted therein, and cylinder blocks mounted on said crank case in V relation, of a detachable housing arranged between said cylinder blocks and mounted on said crank case, a shaft mounted in said housing adapted to drive device from either of its ends, and gear connections between said latter shaft and said cam shaft.

34. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, a gear arranged on said crank shaft outside said crank case, a cam shaft mounted in said crank case, a gear arranged thereon outside of said crank case, and a driving connection between said shafts, of a cover plate for said gearing, a fan shaft and a device to be driven arranged in said cover plate and having driving connection with said gearing.

35. In a hydrocarbon motor, the combination with a crank case, a crank shaft mounted therein, a gear arranged on said crank shaft outside said crank case, a cam shaft mounted in said crank case, a gear arranged thereon outside of said crank case, and a driving connection between said shafts, of a housing for said gearing, said housing having an opening therein, a detachable housing secured to said first housing, a fan shaft mounted in said detachable housing and a device to be driven, and a gear connection in said detachable housing between said cam shaft gearing and said device to be driven.

36. In a hydrocarbon motor, the combination with a crank case, a cam shaft and crank shaft mounted therein, gearing mounted on said shafts outside of said crank case and adapted to connect the same, and a cover for housing said gearing, of a device to be driven detachably arranged on

said housing and adapted to be driven from within said housing.

37. In a hydrocarbon motor, the combination with a crank case, a cam shaft and crank shaft mounted therein, gearing mounted on said shafts outside of said crank case, and adapted to connect the same, and a cover for housing said gearing, of a gear driving device detachably mounted on said housing and adapted to be driven by one of said shafts.

In testimony whereof I affix my signature in the presence of two witnesses.

D. McCALL WHITE.

Witnesses:
LE ROI J. WILLIAMS,
F. L. DAVIS.