

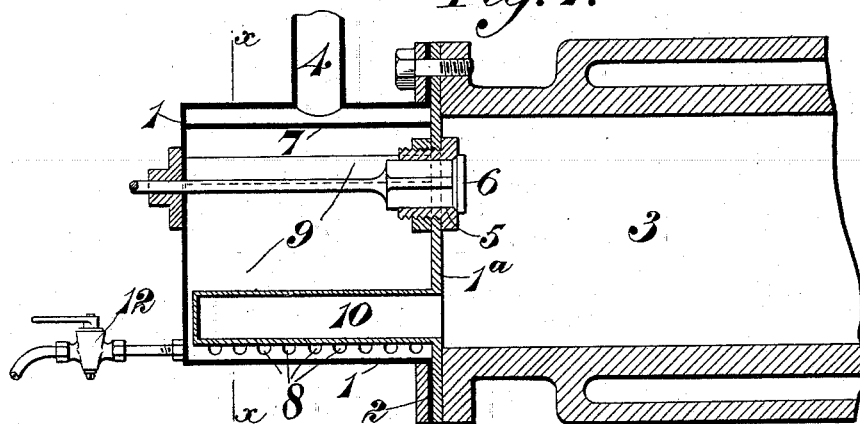
(No Model.)

J. H. KNIGHT.  
HYDROCARBON MOTOR.

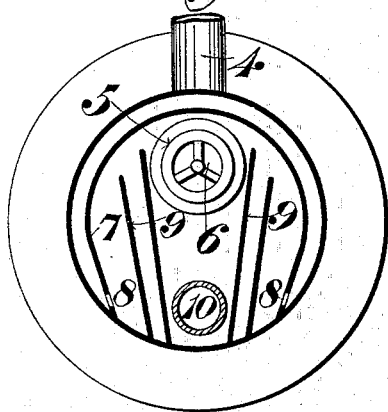
No. 524,945.

Patented Aug. 21, 1894.

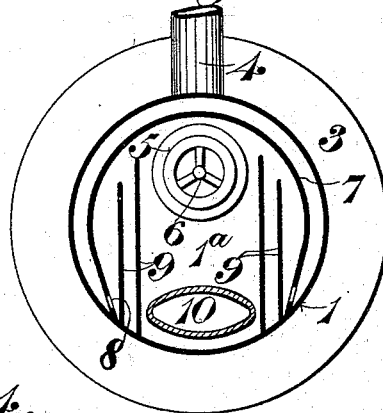
*Fig. 1.*



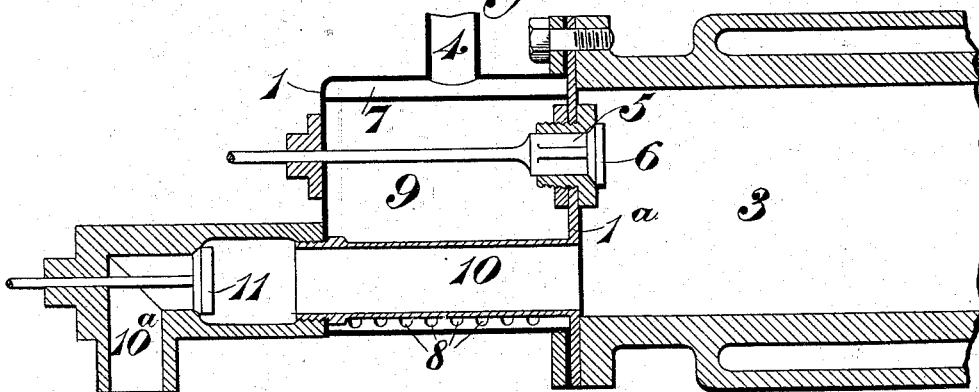
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



*Witnesses*  
*William Cross*  
*Charles E. Brougham.*

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*John Henry Knight*

# UNITED STATES PATENT OFFICE.

JOHN HENRY KNIGHT, OF FARNHAM, ENGLAND.

## HYDROCARBON-MOTOR.

SPECIFICATION forming part of Letters Patent No. 524,945, dated August 21, 1894.

Application filed November 16, 1893. Serial No. 491,139. (No model.) Patented in England April 24, 1889, No. 6,831.

### *To all whom it may concern:*

Be it known that I, JOHN HENRY KNIGHT, a subject of the Queen of Great Britain and Ireland, residing at Farnham, in the county of Surrey, England, have invented Improvements in Hydrocarbon-Motors, of which the following is a specification, and for which an English patent was granted April 24, 1889, No. 6,831.

10 This invention has reference to improvements in vaporizers for enabling hydrocarbon motors to be readily started and worked with heavy hydrocarbon such as kerosene or paraffin.

15 To enable the vaporizer to be effectually heated by the explosions of the combustible charges in the combustion chamber or motor cylinder, it is constructed according to this invention, with two or more internal chambers, one of which forms the vaporizing chamber, which is normally disconnected from the motor cylinder and is or may be provided with special heat conducting bodies, and the other or others of which constitute a heating 25 chamber or chambers that is or are in free communication with the combustion end of the motor cylinder. The heating chamber, or each such chamber if more than one be provided, may advantageously be in the form of a tube arranged to extend into the lower part of the vaporizing chamber and thereby obviate liability of this part of the vaporizer cooling down and ceasing to generate sufficient hydrocarbon vapor when the external 35 source of heat that is applied to the lower external side of the vaporizer at starting, is removed. The said heating chamber, or one of them when two or more are used, may be arranged to form part of the exhaust pipe or passage through which the hot waste gases escape from the motor cylinder.

40 In the accompanying drawings, Figure 1 is a central longitudinal section of a vaporizer constructed according to this invention, applied to the combustion end of the cylinder of a hydrocarbon motor. Fig. 2 is a cross section on the line *xx* (Fig. 1). Fig. 3 is a similar view to Fig. 2 illustrating a modification. Fig. 4 is a similar view to Fig. 1 illustrating a further modification.

50 Referring to Figs. 1 and 2; 1 is the vaporizer connected by its flange 2 to the combus-

tion end of the motor cylinder 3. This vaporizer, in the example shown, comprises a cylindrical casing provided at its upper part 55 with an inlet 4 for liquid hydrocarbon and air, and in its front wall 1<sup>a</sup> with an outlet 5 for conducting hydrocarbon vapor and air into the motor cylinder, this outlet being controlled by a suitably operated valve 6. Within the casing 1 is a curved metal plate or partition 7 over which the supply of liquid hydrocarbon and air flows and which divides the interior of the casing into two parts that communicate with each other through openings 8 in the lower part of the said plate.

9, 9 are heat conducting bodies in the form of thin metal plates that are in metallic connection with the lower portion of the vaporizer and with the front wall 1<sup>a</sup> thereof.

10 is a metallic tube closed at its outer end and in free communication at its inner end with the motor cylinder so as to form a heating chamber that will become heated to a high temperature by the explosions of the combustible charges within it and the motor cylinder. This tube affords a large additional heating surface, and is shown arranged in the lower part of the vaporizer for the purpose hereinbefore mentioned. It is shown in Figs. 80 1 and 2 as being of circular form in cross section, but obviously it may be of other form as for example of oval form as shown in Fig. 3, and it may be corrugated to increase its heating surface.

85 In Fig. 4 the heating tube 10 is arranged to form part of the exhaust pipe 10<sup>a</sup>, the exhaust valve 11 being at a point beyond the vaporizer so that the tube 10 is at all times in free communication with the motor cylinder.

With the construction of vaporizer described, when the heat of a lamp or stove is applied to the lower side of the said vaporizer at starting, heat will be conducted by the plates 7 and 9 from the lower portion of the vaporizer casing to the front wall 1<sup>a</sup> thereof so as to heat the vaporizing chamber and combustion end of the motor cylinder to the requisite temperature for starting. Liquid hydrocarbon and air are then admitted to the vaporizing chamber, wherein the former is vaporized and taken up by the latter and the mixture is admitted to the motor cylinder

wherein it is exploded so as to start the motor. When the motor is fairly at work, the said plates, in conjunction with the heating tube or tubes 10, will serve to transmit sufficient heat from the combustion end of the cylinder to the vaporizing chamber to heat the air and vaporize the hydrocarbon therein, and thus permit the external source of heat to be then dispensed with.

- 10 12 is a cock, or it may be a removable plug, by which any thick heavy oil that may be produced in the vaporizing chamber when using some kind of mineral oils and which is not capable of being easily vaporized, can be withdrawn from the said chamber and thus prevented from interfering with the efficiency of the vaporizer.

What I claim is—

- 20 1. In a hydrocarbon motor, a vaporizer having two chambers one of which constitutes a vaporizing chamber that is normally disconnected from but is adapted to be placed at intervals in communication with the combustion end of said cylinder, and the other of which is in free and constant communication with the combustion end of said cylinder substantially as herein described for the purpose specified.

2. In a hydrocarbon motor, a vaporizer secured to the combustion end of the motor cylinder and formed with a vaporizing chamber adapted to be placed at intervals in communication with said cylinder, a valve adapted to control said communication, heat conducting plates located within said vaporizing chamber, and one or more tubes extending

into said vaporizing chamber and in free communication with the combustion end of said cylinder substantially as herein described for the purpose specified.

3. In a hydrocarbon motor, the combination with the motor cylinder, of a vaporizer comprising a casing secured to the combustion end of said cylinder so as to form the end wall thereof, said vaporizer being provided internally with metallic ribs or plates in connection with its lower and front sides and an exhaust pipe or passage extending from the combustion end of said cylinder through the lower portion of said vaporizer substantially as herein described for the purpose specified.

4. In a hydrocarbon motor, the combination with the motor cylinder, of a vaporizer comprising the casing 1 provided with an inlet 4 and outlet 5 controlled by a valve 6, metal plates arranged within the vaporizing chamber between the lower and front sides of said casing and adapted to transmit heat from one to the other, and a metal tube or chamber 10 closed at its rear end and in open connection at its other end with the motor cylinder and extending into said vaporizing chamber substantially as herein described.

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

JOHN HENRY KNIGHT.

Witnesses:

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