W. V. D. KELLEY.

ENGINE OR MOTOR.

APPLICATION FILED AUG. 17, 1912.

1,108,182.

Patented Aug. 25, 1914.

Fig. 1

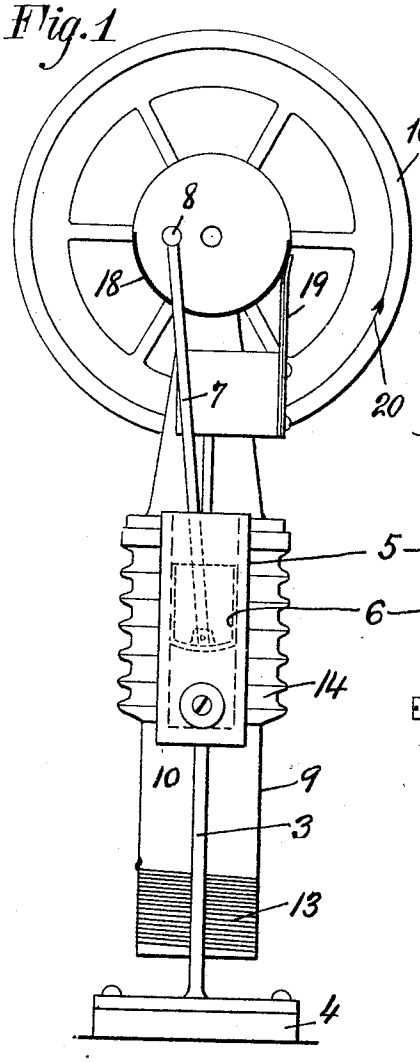


Fig. 2

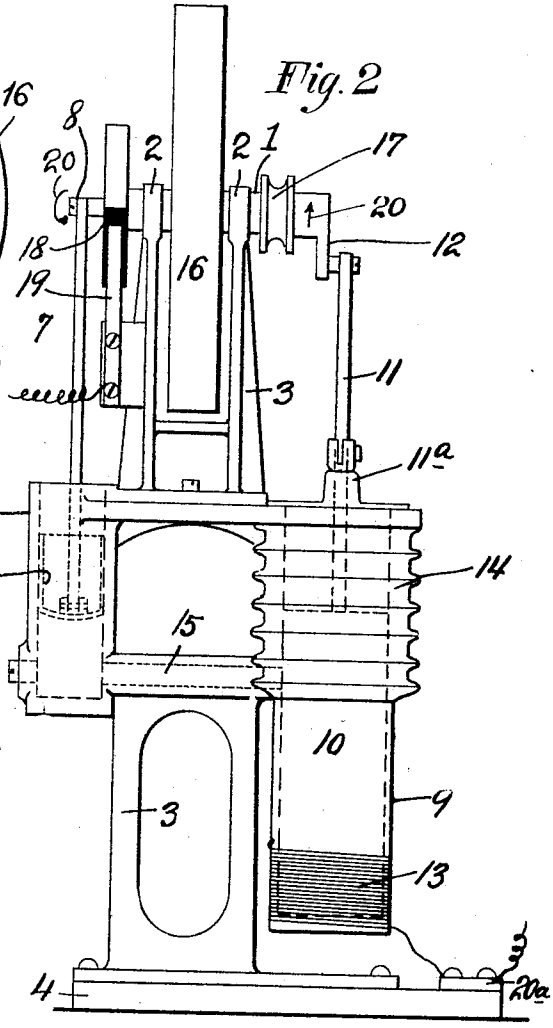


Fig. 3

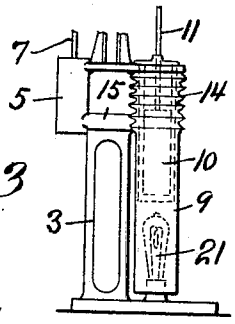
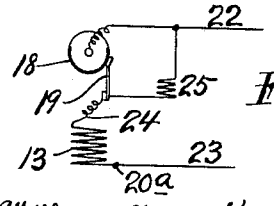


Fig. 4



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

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ENGINE OR MOTOR.

1,108,182. Specification of Letters Patent. Patented Aug. 25, 1914.

Application filed August 17, 1912. Serial No. 715,530.

To all whom it may concern:

Be it known that I, WILLIAM V. D. KELLEY, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Engines or Motors, of which the following is a full, clear, and exact specification.

This invention relates to engines or motors driven by an expansible medium.

More particularly, this invention relates to engines actuated by an expansible medium of a certain quantity which is not changed during the operation of the engine, which medium is caused to flow through a system of inter-connected cylinders, one cylinder of which incloses a power piston for driving the engine shaft, and another cylinder of which contains a displacing element for controlling the flow of the medium, the medium being subjected to alternate expansion and contraction. The expansion of the medium is effected, in accordance with my invention, by means of an electrically controlled heating element, and the contraction of the medium is secured by radiation into the atmosphere, the heating element being deënergized during the period of cooling. Preferably, air is employed as the expansible medium, but other suitable gases may also be used.

One feature of my invention is the employment of an electrically controlled heating element, such as a heat coil, incandescent lamp, etc., the energization and deënergization of which is controlled by a commutating device.

My invention is applicable for power purposes under commercial conditions for relatively light work, where low expense of installation and fair efficiency are prime factors; my invention is also valuable as a toy.

Other features of this invention will be more fully understood from the following description and the accompanying drawings, in which—

Figure 1 is a side elevation of an engine embodying my invention; Fig. 2 a front elevation of the same; Fig. 3 a detail showing a modification; and Fig. 4 a diagram illustrating the electric circuit connections.

Referring to Figs. 1 and 2, the engine shaft 1 is mounted in bearings 2, 2 carried by the standard 3 mounted on base 4. On one side of the standard 3 is shown the power cylinder 5 containing the relatively short, tightly fitting piston 6 connected by the rod 7 to the eccentric 8 mounted on the shaft 1. On the opposite side of the standard 3 is disposed the expansion cylinder 9 containing the relatively long, loosely fitting displacing element 10 connected by the crank rod 11 to the crank 12; the crank rod 11 passes through the packing 11^a. The crank 12 is displaced ninety degrees relative to the eccentric pin 8. At or near the bottom of the expansion cylinder 9 is the heating element, shown in Figs. 1 and 2 as an electrical heat coil 13, the connections of which will be described hereinafter. The upper portion of the expansion cylinder 9 serves to cool the air or other actuating medium, and for this purpose it is preferable to promote the cooling by means of cooling ribs 14, or cooling jacket. The passage 15 connects the lower portion of the power cylinder 5 with the expansion cylinder 9 at a point intermediate the effective heating portion and the effective cooling portion of the expansion cylinder 9. The engine is provided with a fly wheel 16 and a pulley 17. The commutating device is illustrated in the form of a circular metallic disk, one portion, approximately one-half of the circumference of said disk being covered with insulation 18. In the engine illustrated, the commutating device for simplicity sake is combined with the eccentric 8. The brush 19 of the commutating device is connected to one terminal or side of the electric circuit, and one end of the heat coil 13 is connected to the contact 20^a and thereby to the other terminal or side of the electric circuit, the remaining connections being effected by connecting the remaining end of the heat coil 13 to the metal expansion cylinder 9. It will thus be seen that when the brush 19 engages the non-insulated portion of the circumference of the disk 8, the electric circuit will be completed through the shaft 1, bearings 2, standard 3, and the expansion cylinder 9.

By referring to Fig. 1, it will be noted that the brush 19 strikes the insulation 18 when the power piston 6 is descending, and this condition exists until the eccentric 8 has turned approximately a half revolution. The circuit will be closed by the brush 19 when the power piston 6 is moving, or is about to move, upwardly. Assuming the engine to be running in the direction of the arrows 20, the heat coil 13 will be energized, that is the brush 19 will come in con-

tact with the non-insulated portion of the commutating device, when the expansion cylinder 10 has left its lowest position and is moving upwardly, whereby the heated air will expand, and rise upwardly, this movement being assisted by the upward movement of the displacing element 10. The heated gas will flow through the passage 15 into the power cylinder 5, and exert an upward driving force on the work piston 6 until the same has reached its highest position. At this time, the displacing element 10 is descending and exerts a "suction" on the air in the work cylinder 5, causing the air to return through the passage 15 and flow into the upper portion of the expansion cylinder 9, where it is cooled by radiation into the atmosphere.

The position of the parts shown in Fig. 2 takes place during the cooling period of the air, and, as stated above, the coil 13 is de-energized while the actuating medium is being cooled. A few turns of the fly wheel 16 by hand is sufficient to start the engine, whereupon the device will operate continuously at a fair efficiency. It is preferable to make all joints between the cylinders and the inter-connecting passage 15 as air-tight as possible; also between the piston 6 and cylinder 5, and the crank rod 11 and packing 11^a.

Fig. 3 shows a modification, wherein an incandescent lamp 21 serves as the heating element, the terminals of the incandescent lamp being connected similar to the connections of the heat coil 13 described above.

Fig. 4 indicates the circuit connections of the arrangement shown in Figs. 1 and 2. The conductor 22 running to the commutating device is connected to one side of the line of the power circuit, or one terminal of a battery, or other source. The conductor 23 connected to one end of the heat coil 13 at the contact 20^a, is connected to the other side of the power circuit, or other terminal of the battery, or other source. The connection 24 represents a conductor connected to the remaining end of the heat coil 13 and to the brush 19, or may indicate the electrical connection between said remaining end of the heat coil 13 and the brush 19 effected by the expansion cylinder 9, standard 3, bearing 2 and shaft 1. A high resistance 25, connected in shunt between the brush 19 and the rotating element of the commutating device, serves to minimize arcing or sparking.

It will thus be seen that my engine or motor may be operated by means of a primary battery, a storage battery, or any direct current lighting system, or alternating current lighting system, or on any other source of electric energy.

My invention possesses advantages when embodied as a toy motor, since practically all danger due to electrical shocks is eliminated, and is inexpensive and capable of withstanding rough usage, at the same time giving satisfactory service. However, my invention is also applicable for doing light work as a commercial motor, such as for operating switches for electric lighting signs, and similar use.

It will be understood that many changes and modifications may be made in the specific forms illustrated and described without departing from my invention.

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

1. In a device of the character described, a shaft, a power cylinder, a piston tightly fitted in said cylinder and connected to said shaft, an expansion cylinder, a displacing piston element loosely movable in said expansion cylinder and connected to said shaft, means for effecting communication of the actuating medium between said power cylinder and said expansion cylinder, and for cooling the actuating medium in the upper portion of said expansion cylinder, an electric heating coil carried by the lower end of said expansion cylinder for heating the actuating medium contained therein, and a switch mechanism driven by the shaft for cutting said heating coil into and out of circuit at predetermined times in each revolution and for a predetermined part of each revolution.

2. In a device of the character described, a shaft, a power cylinder, a piston tightly fitted in said cylinder and connected to said shaft, an expansion cylinder, a displacing piston element loosely movable in said expansion cylinder and connected to said shaft, means for effecting communication of the actuating medium between said power cylinder and said expansion cylinder, and for cooling the actuating medium in the upper portion of said expansion cylinder, an electric heating coil carried by the lower end of said expansion cylinder for heating the actuating medium contained therein, a switch mechanism driven by the shaft for cutting said heating coil into and out of circuit at predetermined times in each revolution and for a predetermined part of each revolution, and means in conjunction with said switch for preventing complete opening of the circuit and arcing at the switch.

3. In a device of the character described, a shaft, a power cylinder, a piston tightly fitted in said cylinder and connected to said shaft, an expansion cylinder, a displacing piston element loosely movable in said expansion cylinder and connected to said shaft, means for effecting communication of the actuating medium between said power cylinder and said expansion cylinder, and for cooling the actuating medium in the upper portion of said expansion cylinder,

an electric heating coil carried by the lower end of said expansion cylinder for heating the actuating medium contained therein, and a switch mechanism driven by the shaft for cutting said heating coil into and out of circuit at predetermined times in each revolution and for a predetermined part of each revolution, said heating coil being at the lower end of the heating chamber and in close contact therewith.

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

WILLIAM V. D. KELLEY.

Witnesses:
H. C. EGAN,
G. N. KERR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."