

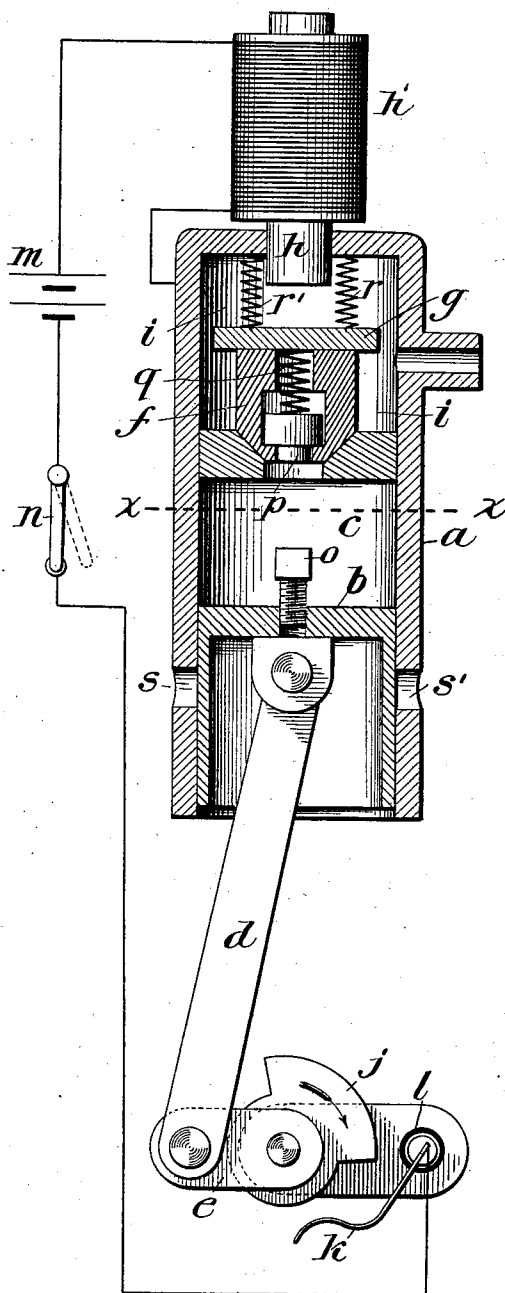
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Patented Mar. 4, 1902.

R. O. HOOD.
VALVE GEAR FOR ENGINES.

(Application filed Mar. 7, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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VALVE-GEAR FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 694,547, dated March 4, 1902.

Application filed March 7, 1900. Serial No. 7,696. (No model.)

To all whom it may concern:

Be it known that I, RALPH O. HOOD, a citizen of the United States, residing at Danvers, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Valve-Gear for Fluid-Pressure Engines, of which the following is a specification.

My invention relates to fluid-pressure engines in which it is necessary to control, by means of a valve, the flow of the fluid or gas under pressure into the expansive chamber, where work is done by the movement of a piston or abutment, and it relates more particularly to that class of engines in which puppet-valves are used, thereby doing away with the necessity of valve lubrication and permitting the use of the fluid or gas at a high temperature.

The object of my invention is to operate engine-valves without the existence of any external mechanical arrangement connecting through the walls of the engine to the valves and necessitating steam-packing and lubrication, and also my object is to operate them in such a manner that they may be closed at the will of the operator at any of the proper times during the cycle of the engine.

I attain the first part of my object in the apparatus illustrated in the accompanying drawing and described in the following specification by means of a valve device placed in the path of the piston or its projection and arranged so as to be opened by the motion of the piston itself, and the second part of my object I attain by means of an electromagnetic device adapted to act on said valve and retard its time of closing as much as may be desired at different times.

My invention may be embodied in many engines of different forms, and it is to be understood that I do not limit myself in any way to the exact construction of the engine described herein, as many and various changes may be made without departing from its spirit and scope.

Reference is to be had to the annexed drawing and to the letters thereon, forming a part of this specification.

The drawing shows diagrammatically the different parts that go to make up my invention and the electric connections used therein.

The cylinder of the engine is represented

by *a* and its piston by *b*, together forming the expansive-chamber *c*. The piston is connected by means of the usual connecting-rod *d* to the crank-shaft *e*.

f represents a valve for controlling the supply of steam to the cylinder.

g is an armature (which is attached to and called a part of the valve) to the electromagnet *h*. The steam-chamber is represented by *i*. On the crank-shaft is affixed the contact *j*, which comes in contact with the brush *k*, held by the rotatable brush-holder *l* during a part of each revolution. One end of the magnet-coil *h'* is connected to the brush *k* through the battery *m* and switch *n*. The other end of the magnet-coil is connected to the contact *j* by means of the metal of the engine.

In the head of the piston is affixed the adjustable screw *o*, and at the lower end of the valve the piece *p*, under the action of the spring *q*, for coming in contact with the screw *o* during part of the cycle of the engine.

r r' represent springs somewhat weaker than *q* for causing a quick closing of the valve at the proper time.

s s' are exhaust holes or ports, which are uncovered by the pistons during the proper part of the cycle.

The action of the apparatus is as follows: When the head of the piston has reached the position indicated by the dotted line *x x*, the valve has been lifted until the armature is in contact with the magnet. Just before reaching this position electric contact is made between the brush *k* and contact *j*. After this the valve is magnetically held open until the circuit is broken between the brush and the contact *j*. By moving around the brush-holder *l* in the direction the reverse of that shown by the arrow it is clear that the valve will remain open a shorter period of time. In fact, by moving it different amounts any cut off of steam desired may be easily obtained, as all the magnet has to do is to hold the armature in place after it has been opened by the movement of the piston. The amount of electricity required is very small. The magnet is not strong enough to open the valve of its own strength; but when the armature is brought up to the magnet a very small amount will hold it in place. Although the valve is

opened just before the completion of the instroke of the piston, yet the time is so small as compared with the time it is held open on the outstroke a decided forward tendency is produced, especially when three or four cylinders are used connected to the same crankshaft. In this case the engine does not have to be started by hand. In fact, this lead in the admission of steam is quite necessary when the engine is running fast.

The spring *q* and piece *p* are so arranged that the valve will not open against the steam-pressure until the piece *p* touches in its upward movement an inward-projecting shoulder of the hole in the valve in which the piece *p* slides. This can be adjusted to occur just before the completion of the instroke. After once opened in the least the action of the spring *q* will cause the valve to open to its fullest extent and come up against the magnet.

It will be seen in the mechanism herein described that when once started the engine will operate with minimum cut-off without any magnetic retarding effect on the valve, thereby permitting the opening or doing away with the electric circuit; but to increase the power of the engine when desired it is necessary to establish the magnetic retarding effect, thus giving the engine more steam each stroke.

This type of engine was designed more especially for use in motor-carriages, wherein it is necessary that such an engine would not require attention in lubrication and repacking and where superheated steam could be used with consequent low-water consumption.

Having thus explained the nature of my invention and having described a way of constructing the same, though without attempt to describe all the forms in which it may be made or all the modes of its use, it is declared that what is claimed is—

1. In a fluid-pressure engine, an expansion-chamber, a piston therein, mechanism for controlling the flow of fluid to said chamber, said mechanism including a valve, and operated by, said piston, a magnet controlling the closing of said valve and exhaust ports in the expansion-chamber uncovered by said piston when forced outward.

2. In a fluid-pressure engine, an expansion-chamber, a piston therein, mechanism for controlling the flow of fluid to said chamber, said mechanism including a valve, and a magnet regulating the movement of said valve, and exhaust-ports in the expansion-chamber uncovered by said piston when forced outward.

3. In a fluid-pressure engine, an expansion-chamber, a piston therein, and mechanism for controlling the flow of fluid to said chamber, said mechanism including a spring-tensioned valve opened by said piston and magnetic means for holding said valve open for a predetermined period of time.

4. In a fluid-pressure engine, an expansion-chamber, a piston therein, mechanism for controlling the flow of fluid to said chamber, said mechanism including a valve opened by said

piston, magnetic mechanism for retarding the closing movement of said valve, and exhaust-ports in the expansion-chamber uncovered by said piston when forced outward.

5. In a fluid-pressure engine, an expansion-chamber, a piston therein, and mechanism for controlling the flow of fluid to said chamber, said mechanism including a valve opened by said piston, and magnetic mechanism for retarding the closing movement of said valve.

6. In a fluid-pressure engine, an expansion-chamber, a piston therein, and mechanism for controlling the flow of fluid to said chamber, said mechanism including a spring-tensioned valve operated in one direction by the piston, an electromagnet for retarding the closing movement of the valve, an electric circuit including said electromagnet, and automatic circuit making and breaking devices.

7. In a fluid-pressure engine, the combination of an expansion-chamber in which work is done by the movement of the fluid or gas, a magnetic valve mechanism for controlling the flow of the fluid or gas into said chamber, said mechanism consisting in a valve opened by the movement of a piston which forms a part of said chamber and a magnet adapted to act through the walls of the engine upon an armature forming a part of said valve, and means for causing said magnet to act at each cycle of the engine to retard the closing movement of said valve.

8. In a fluid-pressure mechanism, a casing closed at one end, and a partition dividing said casing into two compartments, a steam-inlet leading into one compartment, a valve seated in said partition, a piston in the other compartment directly engaging and opening the valve at one end of its stroke, a steam-outlet formed by ports placed in said other compartment and uncovered by the piston at the other end of its stroke, and means located in the first-mentioned compartment for retarding the closing movement of the valve.

9. In a fluid-pressure mechanism, a casing closed at one end and a partition dividing said casing, into two compartments, a steam-inlet leading into one compartment, a valve seated in said partition, a piston in the other compartment directly engaging and opening the valve at one end of its stroke, and electromagnetic mechanism partially located in said first-mentioned compartment for retarding the closing movement of said valve.

10. In a fluid-pressure engine, an expansion-chamber, a piston movable therein, a valve for controlling the admission of fluid to said chamber, said valve having a yielding member, means for retarding the closing movement of said valve, and means carried by said piston for engaging the yielding member of said valve for opening the same.

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Witnesses:

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