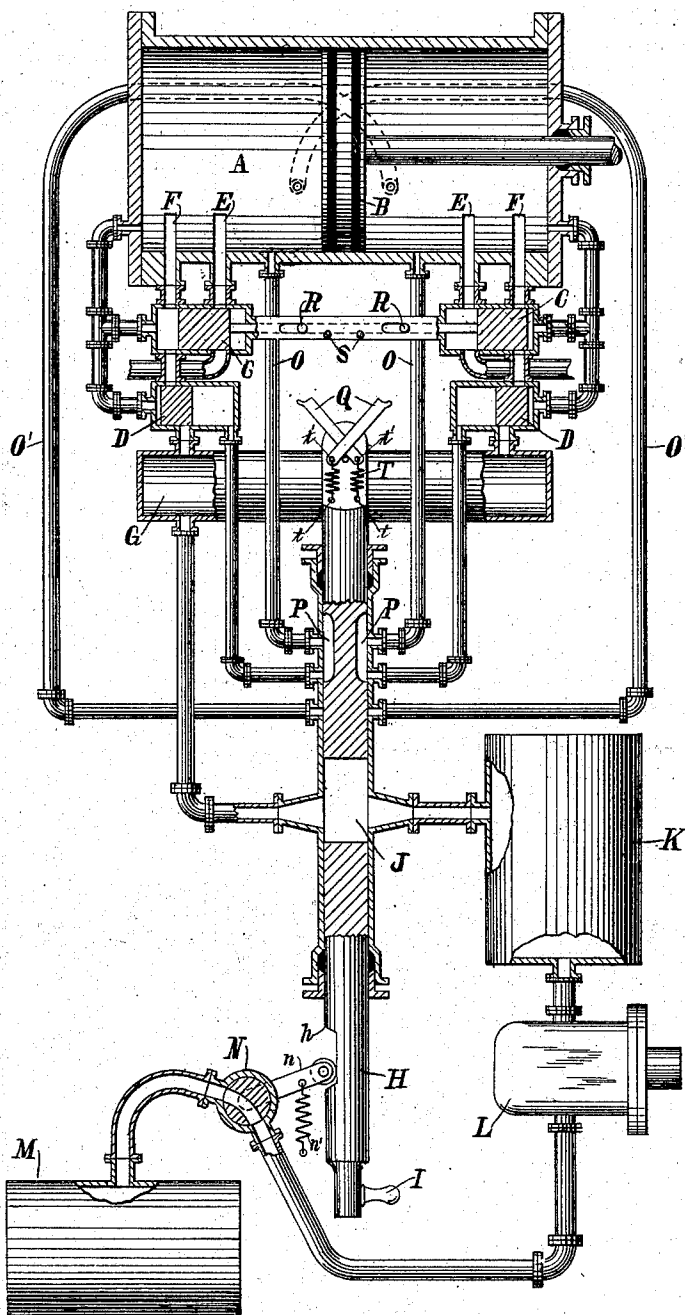


(No Model.)

W. H. KNIGHT.
CONTROLLING MECHANISM FOR ENGINES.

No. 562,305.

Patented June 16, 1896.



WITNESSES:

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CONTROLLING MECHANISM FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 562,305, dated June 16, 1896.

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To all whom it may concern:

Be it known that I, WALTER H. KNIGHT, a citizen of the United States, residing at New Brighton, county of Richmond, State of New York, have invented a new and useful Improvement in Controlling Mechanism for Fluid-Pressure Engines, of which the following is a specification.

The object of my invention is to provide a controlling-valve and mechanism for a fluid-pressure engine in which the valves are operated by the fluid-pressure; and it consists of a main controlling-valve operated by proper levers, the said valves performing following functions, or any two or more of them: first, to open throttle of engine; second, to open stop-valve between high-pressure reservoir and reducing-valve; third, to set cut-off for minimum work; fourth, to set cut-off for maximum work; fifth, to reverse the engine.

It is intended that the operation of the valve when moving in one direction shall perform the first four steps given above, so that the operating-lever will be moved from the stopping position to its furthestmost position to start the engine, thus giving fluid-pressure to full stroke, or almost full stroke, and with the throttle wide open, and then as the engine begins to attain speed, a reverse motion of the lever will gradually close the throttle, at the same time changing the cut-off from maximum to the minimum, and finally wire-drawing the fluid to the desired amount, until the throttle is completely closed. Continuing the reverse movement of the lever after the throttle is closed, a valve will be brought into action that will cause the reversal of the engine, so that upon again moving forward the lever to open the throttle, the engine will run, or tend to run, in the opposite direction. The various positions of the lever will therefore call for any one of the five conditions already specified. The first two conditions, or functions, may be brought about simultaneously, but these together with the other three should be represented by four distinctly different positions of the operating-handle. The dial over which the handle sweeps should, therefore, be marked with the following symbols: "Reverse," "Open," "Minimum cut-off," "Maximum cut-off."

It will be understood that unless the lever is brought back to the reversing position, the engine will not reverse, but will simply have its power cut off.

To reverse a fluid-pressure engine where the valves are operated by the fluid-pressure, simply requires that the valves shall be thrown to a position the reverse of that at which they are standing. To do this, requires a selective device, and I have shown a mechanical device for accomplishing this purpose, which when operated on by the most rearward movement of the controlling lever or mechanism so acts as to throw the valve or valves into a position the reverse of that at which they are standing, and to then so leave things that the valve can go on with its regular movements without being interfered with until the operator again moves forward his handle and brings it back to "Reverse."

The accompanying drawing represents diagrammatically an apparatus embodying my invention.

A is the cylinder of the fluid-pressure engine, and B is the piston.

C is the main valve; D, cut-off valves.

E are exhaust-ports from the cylinder.

F are supply-ports from which the fluid-pressure is admitted from fluid-pressure chest G.

H is the controlling-valve, operated by handle I.

J is the throttle-valve part of the controlling-valve, whereby fluid-pressure is admitted from low-pressure reservoir K to the pressure-chest G.

L is the reducing-valve, whereby pressure is reduced in passing from high-pressure reservoir M to low-pressure reservoir K.

N is a stop-valve for shutting off passage from the high-pressure reservoir to the reducing-valve, when the throttle-valve is closed for the purpose of preventing any leak that may occur from imperfect closing of the reducing-valve. A projection *n* on the stop-valve, engaging the projection *h* on the controlling-valve, enables the controlling-valve to open the stop-valve simultaneously with the opening of the throttle-valve J. A spring *n'* serves to return the stop-valve to its closed position simultaneously with the closing of

the throttle-valve, or the stop-valve could be closed by another projection on the controlling-valve.

O O' are cut-off ports entering the cylinder
 5 A at positions of minimum and maximum cut-offs, which, when the piston passes over them, serve to allow the fluid-pressure behind the piston to flow by way of the controlling-valve to the cut-off valve D. Ports P in the
 10 controlling-valve when in one position of the controlling-valve (viz: that shown in the drawing immediately after the opening of the throttle-valve) connect the minimum cut-off passages O with the cut-off valves D; and
 15 when in another position (viz: that corresponding to the fully-open position of the throttle-valve) connect the maximum cut-off passages O' with the cut-off valves D, and is so proportioned that either one or the other of
 20 the cut-off passages O O' is always in communication with the valve D, but never both of them at once.

On the end of the controlling-valve H are two triggers Q, which will, upon a continued
 25 backward movement of the said valve after the closing of the throttle by the controlling-valve, engage with one or the other of pins or projections R on the main valve C. The particular pin that the triggers will engage with
 30 will be the one nearest the center, so that a still further backward movement of the controlling-valve or lever will throw the main valve, by means of the toggle action of the engaging trigger, in a direction the reverse
 35 from that in which it was previously moved. When the controlling-valve or lever has been thrown back as far as possible, the main valve will have been completely reversed, and the engaging trigger disengaged from the pin R
 40 by means of the disengaging-pins S.

It will be noticed that during this engagement of one trigger, the other trigger cannot engage with its corresponding pin R, but will pass by it, and can only be made to engage
 45 with it by another forward and backward movement of the controlling-valve or lever. To permit the triggers Q to perform their proper motion and yet bring them back when disengaged to their proper normal position,
 50 springs T, pivoted at *t* to the controlling-valve and attached to the triggers at *t'*, are employed.

Having thus described my invention, the following is what I claim as new therein and
 55 desire to secure by Letters Patent:

1. A controller for fluid-pressure engines operated from a low-pressure reservoir supplied from a reservoir of high pressure, combining a throttle-valve for admitting pressure

to the engine from the low-pressure reservoir, 60 and a stop-valve for opening the passage from the high-pressure to the low-pressure reservoir, both operated by the same handle.

2. A controller for fluid-pressure engines, combining a throttle-valve for admitting pressure to the engine from the low-pressure reservoir, and a valve for controlling the cut-offs, both operated by the same handle. 65

3. A controller for fluid-pressure engines, combining a throttle-valve for the engine, and cut-off valves, minimum cut-off being put in operation with the first opening of the throttle, and the maximum cut-off when the throttle is fully opened. 70

4. A fluid-pressure engine combined with a high-pressure reservoir, a low-pressure reservoir, a reducing-valve for regulating the supply from the high pressure to the low pressure, a stop-valve for shutting off the high pressure, and a controlling mechanism for operating the throttle-valve of the engine and the high-pressure stop-valve simultaneously. 75

5. A fluid-pressure engine combined with a high-pressure reservoir, a low-pressure reservoir, a reducing-valve for regulating the supply from the high pressure to the low pressure, a stop-valve for shutting off the high pressure, suitable reversing mechanism, and a controlling mechanism adapted to simultaneously operate the throttle-valve, the high-pressure stop-valve and the reversing mechanism. 80

6. A controller for fluid-pressure engines, combining a throttle-valve, a main valve and separate cut-off valves, means for controlling the cut-off valves, and means for reversing the engine, all operated by one handle. 85

7. A controller for fluid-pressure engines, in which the valves are operated by fluid-pressure, the combination of a throttle-valve, cut-off controlling-valve, and reversing mechanism for throwing the main valve in position to reverse the engine, all controlled by one handle. 90

8. A controller for fluid-pressure engines, combining a stop-valve for shutting off passage between high-pressure and low-pressure reservoir, a throttle-valve, a cut-off controlling-valve, and a main-valve-reversing mechanism. 95

9. The combination of the handle I, controlling-valve H, comprising throttle-valve J, cut-off controlling-valve P a valve-reversing mechanism and stop-valve N. 100

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Witnesses:

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