

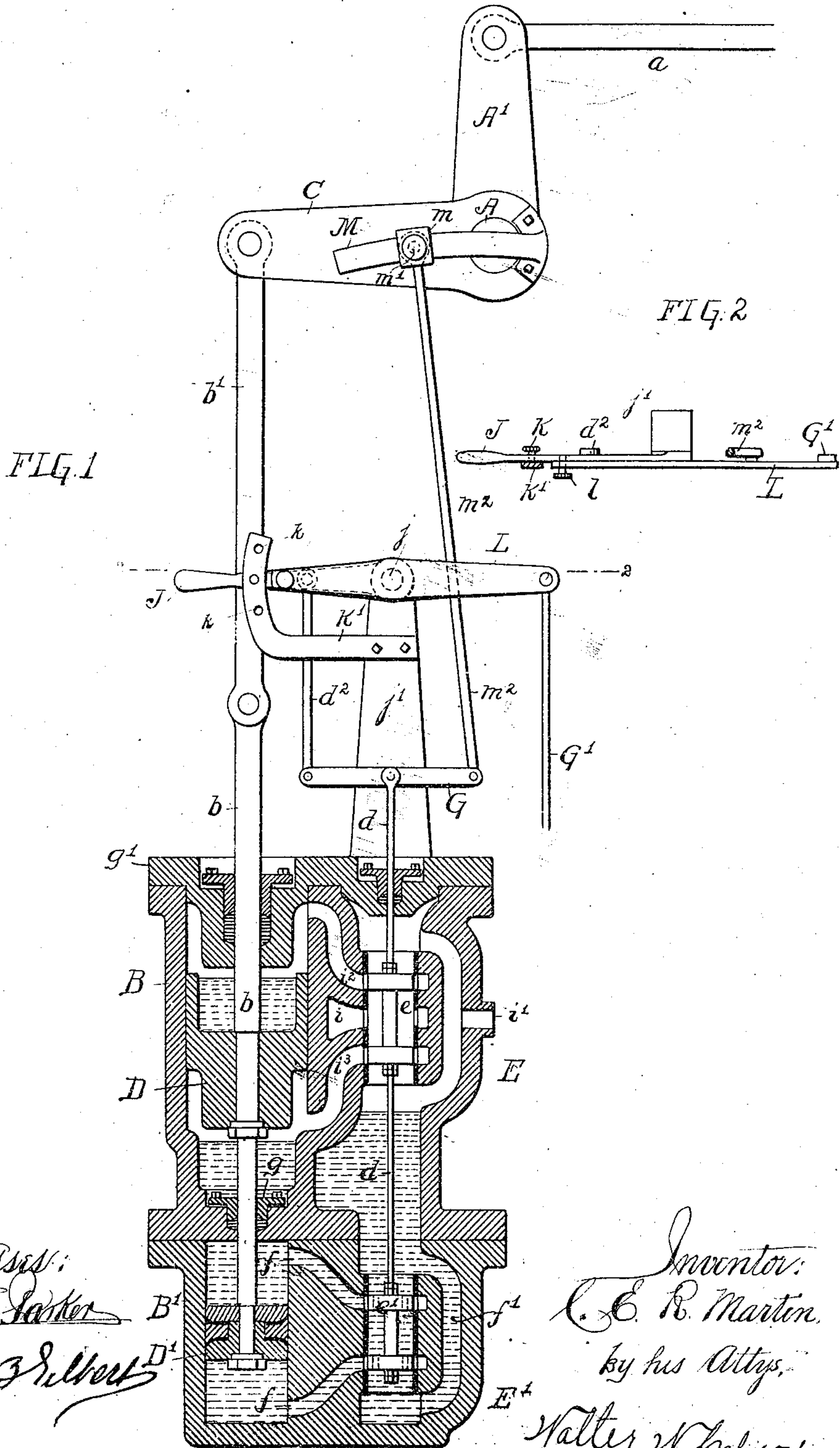
(No Model.)

3 Sheets—Sheet 1.

C. E. R. MARTIN.
ENGINE REVERSING GEAR.

No. 528,275.

Patented Oct. 30, 1894.



Witnesses:

John C. Parker

Wm. S. Gilbert

Inventor:
C. E. R. Martin

by his Attys.

Walter K. Calhoun

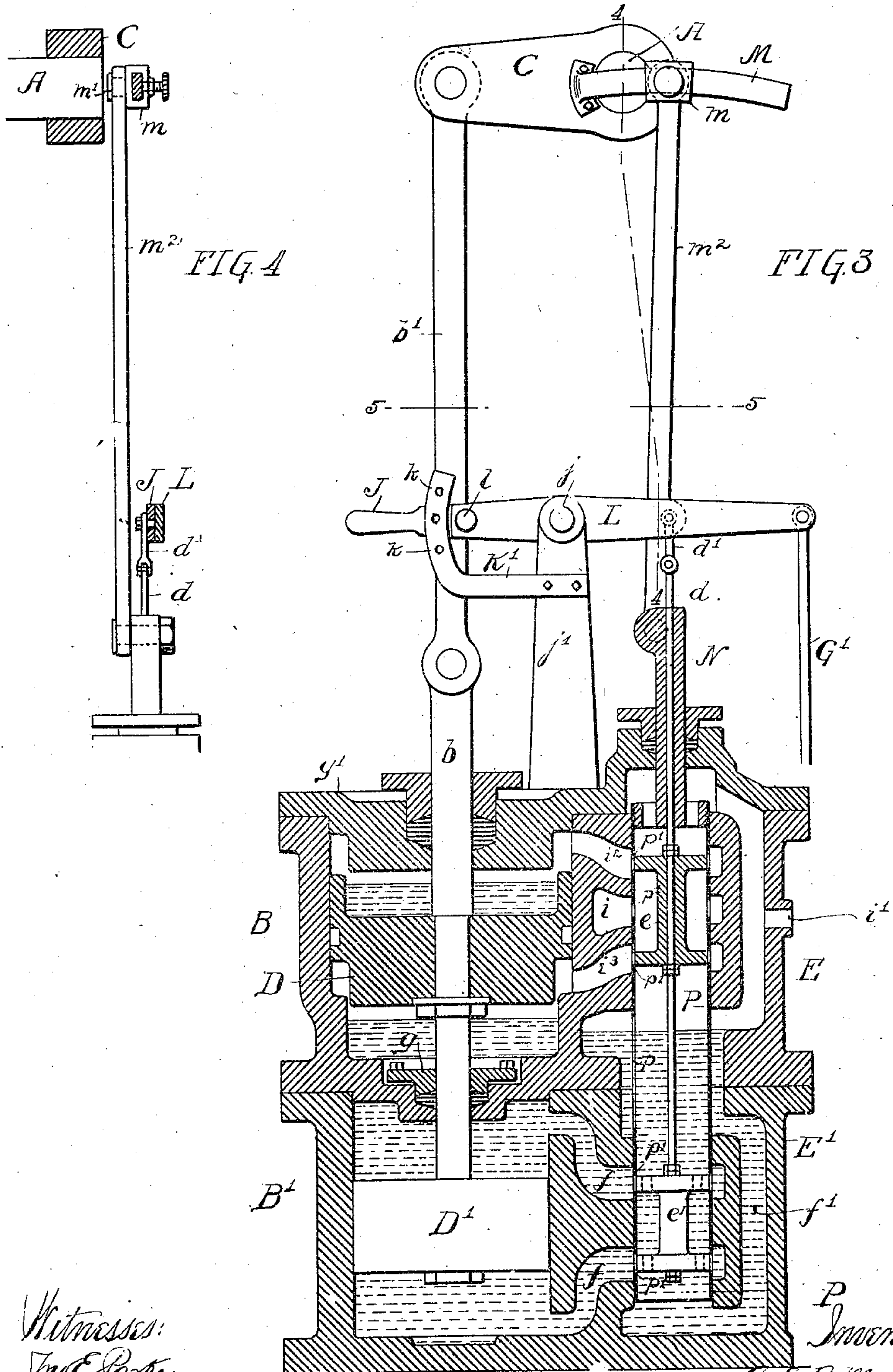
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Witnesses:
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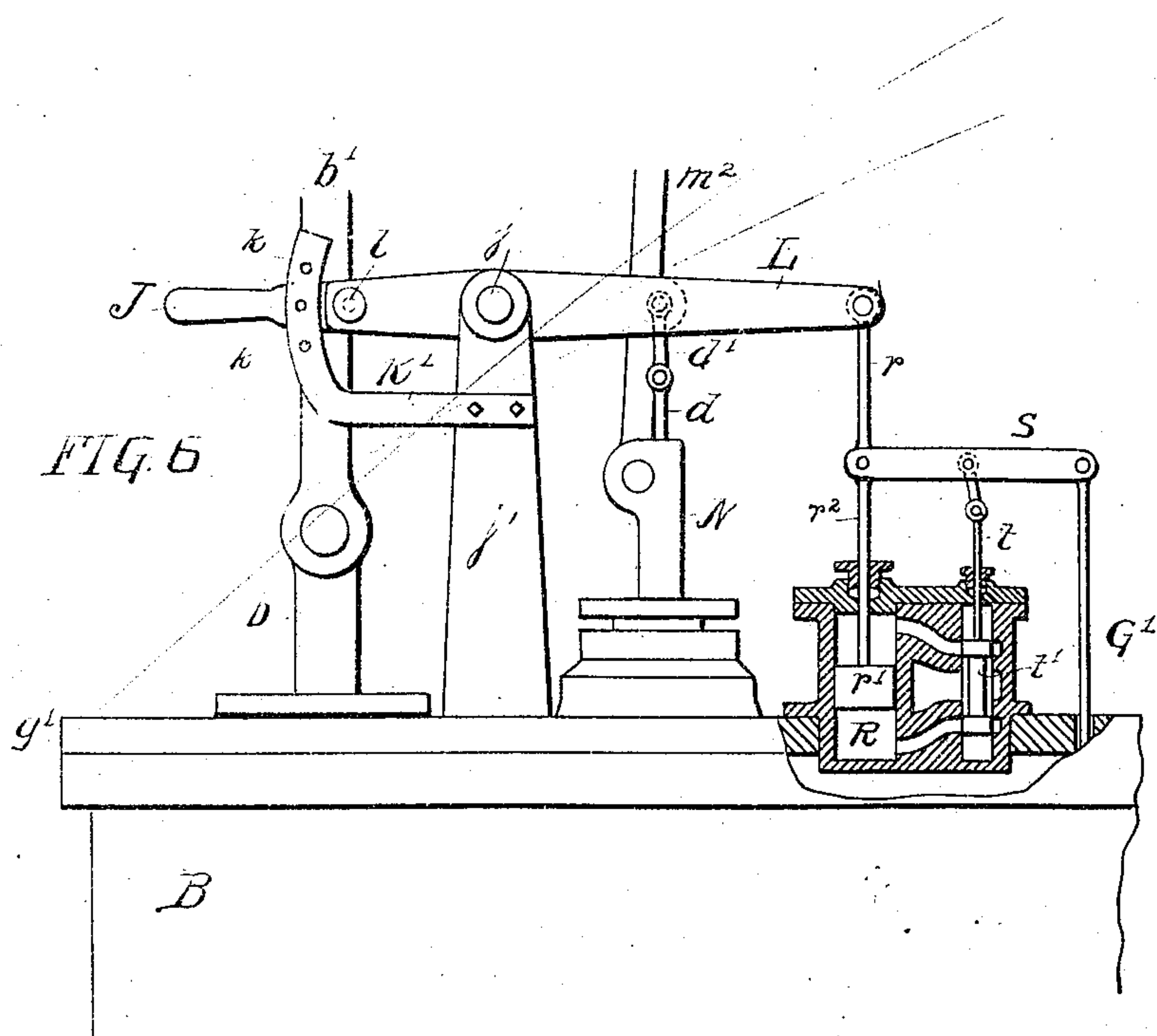
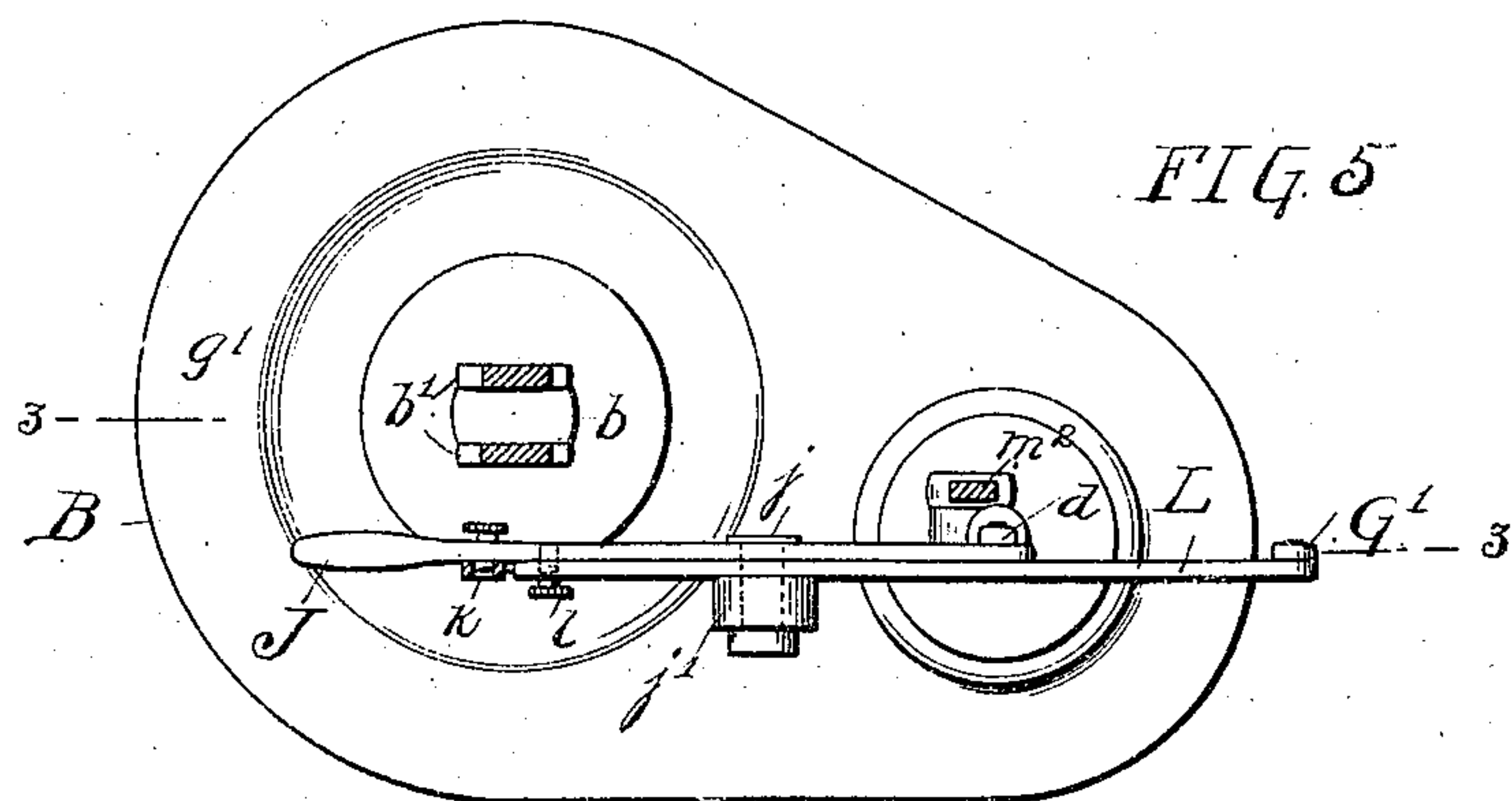
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Witnesses:
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UNITED STATES PATENT OFFICE.

CARL E. R. MARTIN, OF PHILADELPHIA, PENNSYLVANIA.

ENGINE-REVERSING GEAR.

SPECIFICATION forming part of Letters Patent No. 528,275, dated October 30, 1894.

Application filed March 29, 1894. Serial No. 505,546. (No model.)

To all whom it may concern:

Be it known that I, CARL E. R. MARTIN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Engine-Reversing Gear, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to certain improvements in governing devices of that class forming the subject of an application for Letters Patent filed by me on February 1, 1893, under Serial No. 460,516; and it consists more particularly in the construction and arrangement of the mechanism for reversing the engine.

The invention further consists in certain improvements in the construction of the governing mechanism, as more fully set forth hereinafter.

In the accompanying drawings:—Figure 1 is a sectional elevation of a governor and reversing mechanism constructed in accordance with my invention. Fig. 2 is a sectional plan view on the line 2—2 Fig. 1 of a portion of the same. Fig. 3 is a sectional elevation on the line 3—3 Fig. 5 illustrating a modification. Fig. 4 is a sectional elevation of a portion of the same, on the line 4—4 Fig. 3. Fig. 5 is a sectional plan view on the line 5—5 Fig. 3, and Fig. 6 is an elevation partly in section of a further modification of the invention.

The device as shown in the accompanying drawings, is intended more especially for use in connection with a marine engine, but it may be employed on a stationary engine, or other engine with but slight modification.

In suitable bearings in a stationary frame is a shaft A carrying an arm A' from which extends a rod *a* connected to the link or link block of the engine. On this shaft is also keyed a lever or arm C, the movement of which through the shaft A and arm A' governs the position of the link block, or of the link, and consequently alters the speed of the engine.

B, B' respectively are steam, or any kind of pressure, and water cylinders arranged in line and having pistons D, D' both secured to a common piston rod *b* which is connected by a rod *b'* to the arm C to transmit to the latter the movements of the pistons as they

are acted upon in reversing or in governing the speed of the engine.

E, E' are two valve chests arranged on the same line and having valves *e e'* of the piston type, both secured to a common valve rod *d*.

The lower cylinder B' and its valve chest E' are formed in a single casting and are filled with water at all times, the cylinder communicating with the valve chest through ports *f* and then being at one side of the valve chest, a by pass *f'* through which the water may flow freely to enter through both ports *f* into the cylinders when the valve is open. The upper or steam cylinder B and its valve chest E are also formed in a single casting and are secured directly upon the casting forming the lower cylinder and valve chest. In the lower portion of the cylinder B, is formed a stuffing box *g* through which the piston rod *b* passes to prevent any communication between the cylinders. This upper cylinder is so designed as to economize the amount of steam employed, and to that end its lower portion is of less diameter than that portion in which the piston slides, and the upper head *g'* of the cylinder is also formed of less diameter than the cylinder proper and projects partly within the same.

The steam piston D, has its upper surface recessed partly to accommodate the inwardly projecting head *g'* of the cylinder and it becomes partly filled with water of condensation so as to reduce the quantity of steam employed. The lower face of the piston is of smaller diameter than its main body and is adapted to enter the smaller portion of the cylinder, as shown. The lower portion of the cylinder also becomes partly filled with water of condensation so that the steam space below the piston is also materially reduced.

The valve chest E is provided with a steam inlet port *i* and outlet or exhaust port *i'* and upper and lower ports *i²* and *i³* respectively leading to the upper portion and lower portion of the cylinder B.

The valves *e, e'* are secured to the valve rod *d* which at its upper end is centrally connected to a floating lever G, one end of the latter being connected by a rod *d³* to a handled reversing lever J fulcrumed at *j* to a standard *j'* on the frame. This reversing lever J travels over a segment K' having open-

ings k into which may enter a locking screw K carried by the lever so that the latter may be locked, if desired, in position for either going ahead, stopping or reversing.

5 To the arm C is secured a segment M on which is provided an adjustable block m carrying a pivot pin m' , to which is secured one end of a rod m^2 the opposite end of which is connected to that end of the floating lever
10 G opposite the rod d^2 and forms a fulcrum point for such lever during its movement through the reversing lever J, to shift the position of the valves. To the standard j' is also pivoted a lever L one end of which, when
15 the engine is running forward is secured to the lever J by a set screw l which may be freely turned by hand to cause its disengagement from the lever J when it is desired to shift the position of the valves by hand and
20 adjust the position of the link block or link for starting or reversing. The opposite end of the lever is connected by a rod G' to a governing motor, such for instance, as that described in an application for Letters Patent
25 filed by me on the 20th day of February, 1894, under Serial No. 500,875, or any other suitable form of governor, and so arranged that any variation in the speed of the engine will immediately act upon the rod G' to either raise
30 or lower the same and cause the opening of the valves e e' and the consequent raising and lowering of the pistons and the shifting of the position of the link block, or link.

The operation of the mechanism, when the
35 ports are in the position shown in the drawings, with the screw K moved out of contact with the openings k and the two levers J and L connected by the screw K is as follows: Any variation in the speed of the engine will
40 cause, through the mechanism described in my above-mentioned application, or any other kind of governor that may be used, a corresponding vertical movement of the rod G' , and if the movement be in an upward direc-
45 tion, the valve rod d will be depressed through the levers L, J and G and both valves e and e' will be opened. The opening of the valve e permits steam to flow from the entrance port i through the port i^3 to the lower portion of
50 the cylinder B and opens communication between the upper portion of the cylinder and the exhaust. The steam then acts to raise the piston, and a corresponding upward movement is given to the lower piston D'. This
55 upward movement being transmitted to the arm C immediately causes a corresponding upward movement of the segment M and acts through the rod m' to raise the end of the lever G with the rod d^2 as a fulcrum, and brings
60 the disks of the valves e , e' directly opposite the ports into their initial position, shutting off both the steam and the water, and permitting no further movement of the pistons, until another variation in the speed causes
65 the valves to reopen. Movements of the rod G' in an opposite direction will cause the

same result and effect corresponding movements in opposite directions of the various parts.

The function of the lower or water cylinder 70 is merely to act as a check or hold on the piston D of the steam cylinder, as the effect of the steam pressure on the water is, when the lower valve is open, equal on both sides of the piston, but after being once moved and 75 the lower valve again closed by the movement of the segment M both ports of the water cylinder are closed and the piston is immovably held and locked until the valve again opens.

80 The movements of the lever J by hand are, of course, of the same character and when moved to the reversing position the screw k is turned to engage in the proper opening r of the segment K' and held so long as the 85 engine is running backward.

In the modified structure illustrated in Figs. 3, 4, and 5 the general arrangement of the levers is somewhat altered, the valve rod 90 d being connected directly to the reversing lever J by a link d' , at a point beyond its fulcrum, and the reversing lever thus acts more directly upon the valves. In this structure also, a sleeve P, open at p , to permit the free passage of the water and having ports 95 p' corresponding to the various ports of the upper and lower valve chests, is placed around the valves e , e' and is connected by a sleeve N directly to the rod m^2 . When this construction is in operation, the movement of 100 the lever L to raise the valve rod d will open communication between the upper portion of the cylinder B and the entrance port i and the pistons will be forced downward depressing the arm C and consequently raising the 105 segment M, which, in this instance, projects beyond the shaft A. This movement of the segment will raise the sleeve P until all its various ports p' are opposite the disks of the valves e and e' , and thus cut off all further 110 flow of either steam or water.

The motor mechanism described in my aforesaid application is of delicate character and as considerable power is required to 115 raise the two valves e and e' it is more desirable to effect the operation of the latter through an intermediate pressure cylinder R, the outer end of the lever L being in such case connected directly or indirectly to the 120 piston rod r^2 of the piston R' and the rod G' extending from the motor being connected to a vibratory cross head S to the center of which the valve rod t of the valve t' is connected, and the other end connected to the piston rod r^2 . In this manner the movements 125 of the rod G may be rendered more delicate and the accurate adjustment of the parts assured.

Whenever the reversing lever is used in the claims, it means the lever controlling the 130 link or the link block or any other mechanism of the engine for the purpose of chang-

ing the cut off of steam admitted to the cylinder of the engine, whether the engine can be made to reverse its motion or not.

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

1. The combination of the cylinders and pistons, of the link controlling lever connected to said pistons, valves for said cylinders, a valve stem, two pivoted levers, one connected to said valve stem, and the other to a speed governing mechanism, and means for locking said levers together, substantially as described.

2. The combination of the cylinders, pistons therein, a piston rod extending from said pistons and connected to the link controlling lever of the engine, the valves, a valve stem, a floating lever centrally connected to said valve stem, a reversing lever connected to one end of said floating lever, and the opposite end thereof being operatively connected to the link controlling lever, an automatic speed governing mechanism and a lever operatively connected thereto and adapted to be locked to the reversing lever, substantially as described.

3. The combination of the rock shaft, a lever secured thereto, the steam and water cylinders, pistons therein, a piston rod carrying both pistons and connected to said lever, the said steam and water valves, a reversing lever operatively connected thereto and a sliding valve sleeve surrounding said steam and water valves with means for operating the same, substantially as described.

4. The combination of a rock shaft, a lever secured thereto, a segment secured to said lever and projecting beyond the center of the shaft, steam and water cylinders, the pistons

therein, piston rod carrying both pistons and connected to said lever, the steam and water valves, a reversing lever operatively connected thereto, a sliding ported valve sleeve surrounding said valves, and a connecting rod extending from said valve sleeve to the segment, substantially as specified.

5. The combination of a rock shaft, a lever secured thereto, a segment secured to said lever and projecting beyond the center of the same, a pivot block adjustable on said segment, steam and water cylinders, pistons therein, a piston rod carrying both pistons and connected to said lever, steam and water valves, a single valve rod carrying the same, a reversing lever connected to said valve rod, a ported valve sleeve surrounding the valves, and a connecting rod extending from said valve sleeve to the said adjustable pivot block, substantially as described.

6. In a reversing and governing mechanism for engines, the combination of a steam cylinder and a water cylinder situated on the same vertical line, pistons therein, a piston rod connecting both pistons, governing valves for controlling the supply of steam and water to said cylinders, communicating valve chests in which said valves are contained, a ported valve sleeve surrounding said valves, and mechanism for automatically opening said valves and for effecting the movement of the valve sleeve to close the same, substantially as specified.

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

CARL E. R. MARTIN.

Witnesses:

WALTER W. CALMORE,
DANIEL HALLAM.