

No. 677,855.

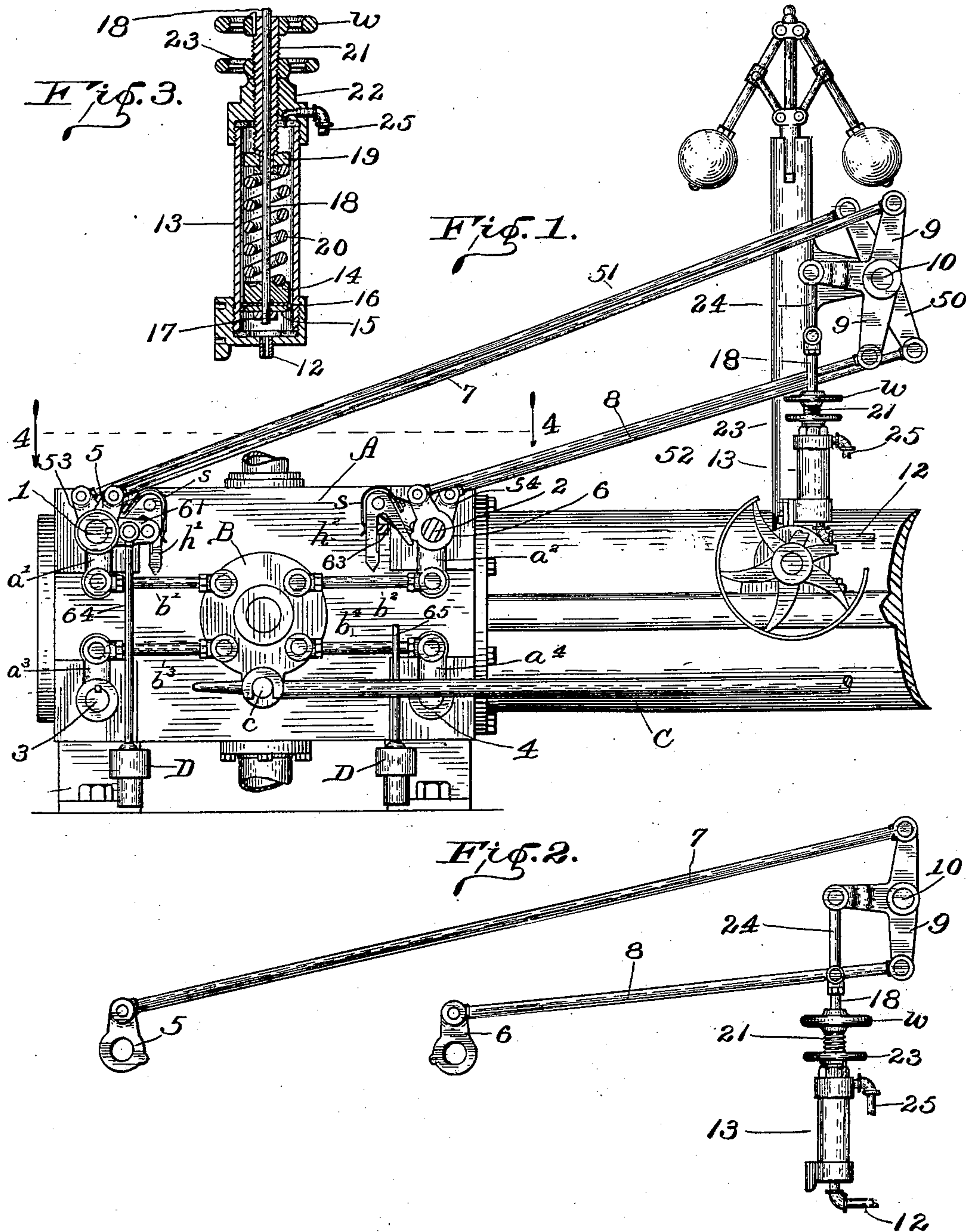
Patented July 9, 1901.

E. M. CARR.
ENGINE GOVERNOR.

(Application filed Nov. 23, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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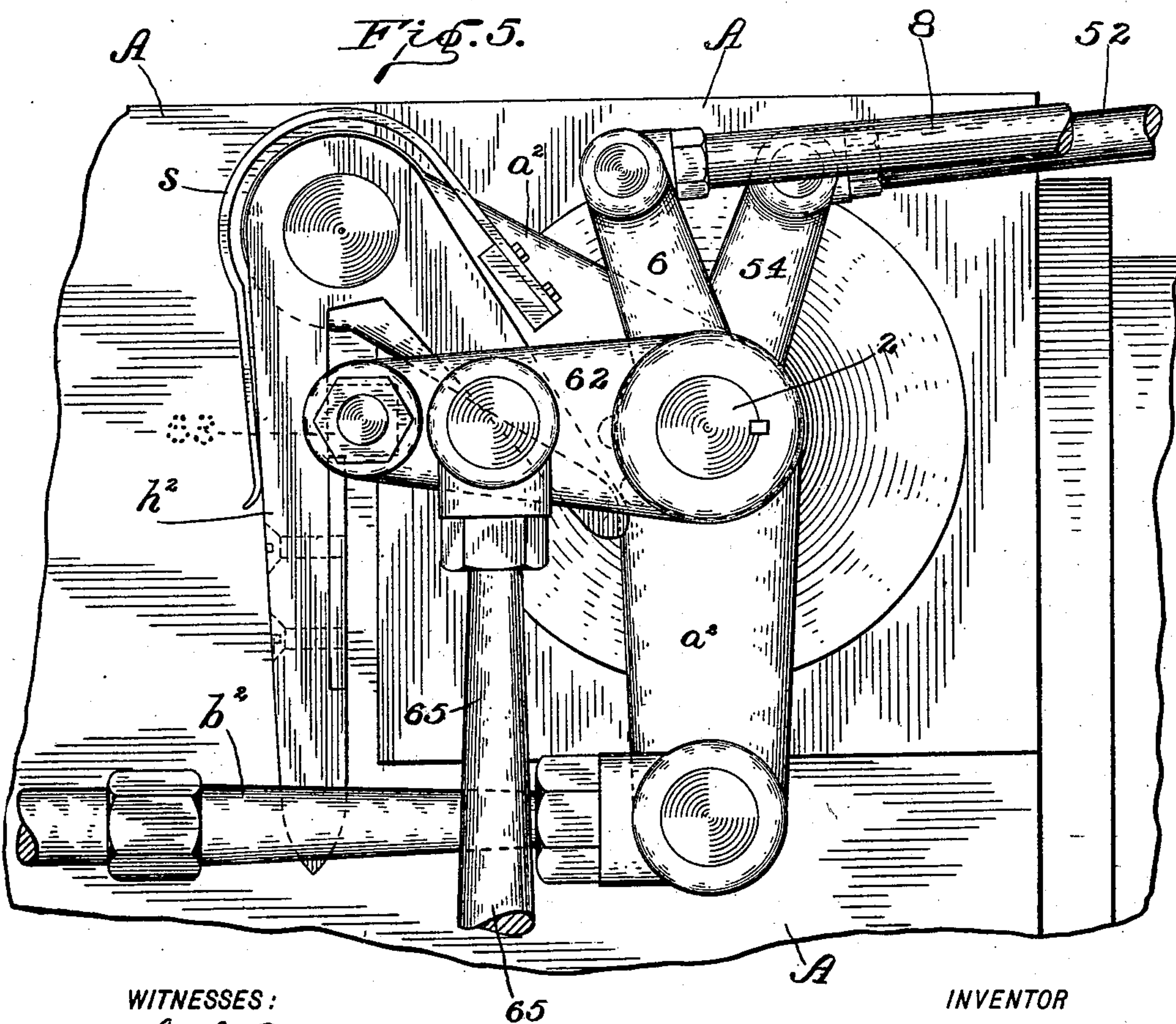
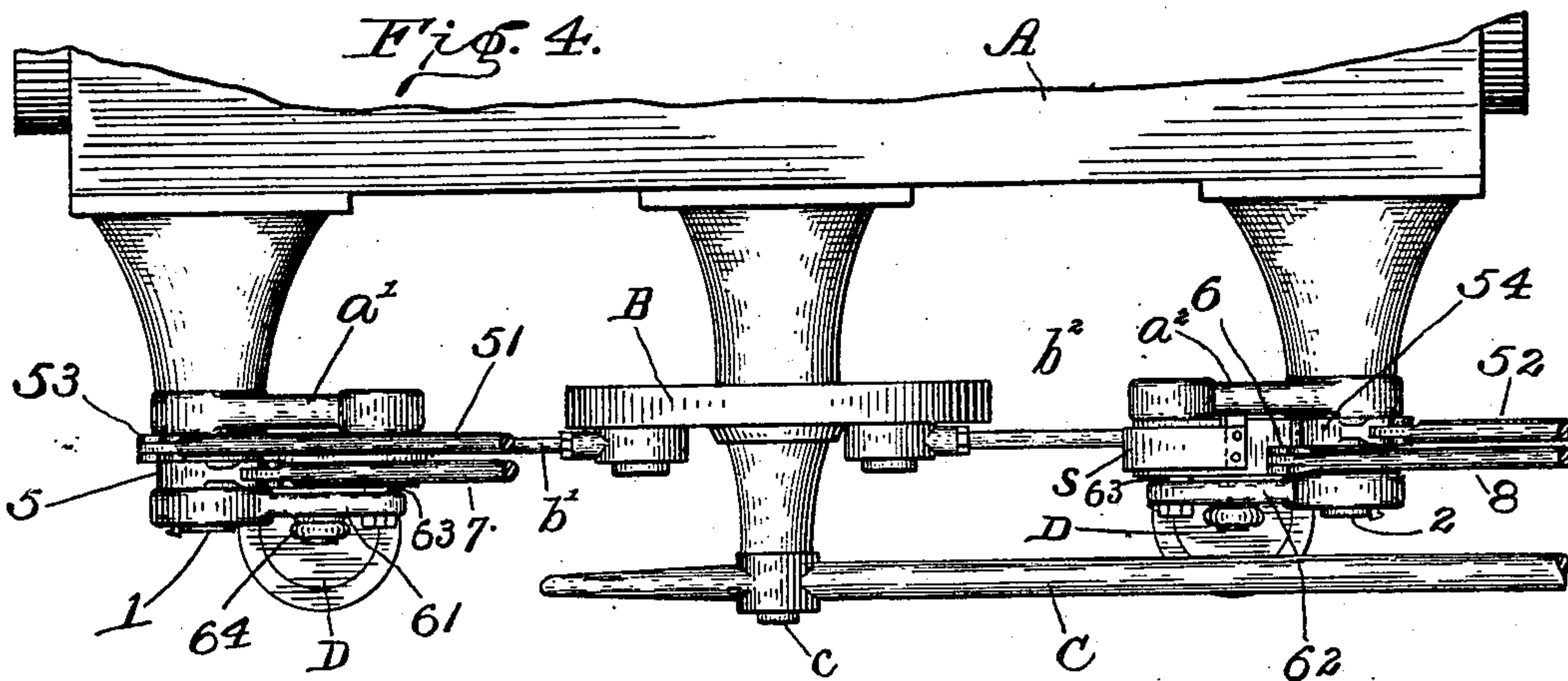
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UNITED STATES PATENT OFFICE.

EMORY M. CARR, OF NEWCASTLE, INDIANA.

ENGINE-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 677,855, dated July 9, 1901.

Application filed November 23, 1900. Serial No. 37,465. (No model.)

To all whom it may concern:

Be it known that I, EMORY M. CARR, a citizen of the United States, residing at Newcastle, in the county of Henry and State of Indiana, have invented certain new and useful Improvements in Pumping-Engine Governors, of which the following is a specification.

The object of my said invention is to provide an apparatus by means of which a pumping-engine can be automatically controlled from the pressure in the discharge-pipes of the system, so that a constant water-pressure in the discharge-pipes or mains can be maintained, and this is accomplished by varying the point of cut-off in the steam-cylinder, thus varying the speed of the engine according to the amount of water consumed by means of my valve mechanism, which includes means whereby it is automatically controlled by the water-pressure in the discharge-pipes or mains, as will be hereinafter more particularly described and claimed.

Referring to the accompanying drawings, which are made a part hereof, and on which similar reference characters indicate similar parts, Figure 1 is a side elevation of a portion of a pumping-engine at the steam end provided with governor apparatus embodying my said invention; Fig. 2, a similar view of a portion of the governor apparatus separately; Fig. 3, a detail central sectional view of that portion of said apparatus which is immediately acted upon by the pressure in the pipes of the system; Fig. 4, a detail top or plan view, on an enlarged scale, of the valve mechanism as seen when looking downwardly from the dotted line 4 4 in Fig. 1; and Fig. 5, a detail elevation, on a still further enlarged scale, of one set of the valve-gear.

The engine A is or may be of an ordinary form. That illustrated is of the Corliss type, which is provided with four semi-rotary valves, which are mounted on the valve-stems 1, 2, 3, and 4. Of these those mounted on the stems 1 and 2 are for the admission of live steam, and those mounted on the stems 3 and 4 control the exhaust-steam. All are operated primarily from a central wrist-plate B through suitable rods b^1 , b^2 , b^3 , and b^4 , running to suitable arms a^1 , a^2 , a^3 , and a^4 on said valve-stems, the plate itself being operated, as will be readily understood, by a rod C,

running to an eccentric on the engine-shaft and detachably engaged with a wrist c, provided therefor at one side of said plate. 55

The position of those valves which are mounted on the valve-stems 1 and 2 is adapted to be controlled and the points of cut-off in the steam-cylinders varied through a system of levers, cams, hooks, and dash-pots, as will be hereinafter described, and the time at which these shall operate is determined by the apparatus which I have combined therewith, which includes the cams 5 and 6, mounted on the valve-stems 1 and 2, connecting-rods 7 and 8 leading from the arms of said cams to the opposite ends of two of the arms of a three-armed or T-shaped lever 9, mounted on a pivot-shaft 10, and which is actuated by the pressure in the discharge-pipes of the pumping system, as will be presently described. 60 65 70

The pipe 12 leads from the discharge-pipe of the pumping system to the bottom of a cylinder 13, which is secured to the frame of the engine, as shown. Within this cylinder is a piston composed, in the construction shown, of a head 14, a plate 15, and a cup-leather 16, said plate and said cup-leather being held in place by a nut 17. Surrounding the piston-rod 18, near the upper end of the cylinder, is an annular ring 19, and interposed between said ring and the head 14 is a spring 20. The piston-rod 18 passes out through a tubular adjusting-screw 21, which in turn passes down through a screw-threaded perforation in the head 22 of the cylinder 13 and is adapted to be held in adjusted position therein by a lock-nut 23. Said piston-rod 18, at a point above the cylinder, is connected to the intermediate arms of the lever 9 by a link 24, and thus through the connecting-rods 7 and 8 operates upon the valve mechanism of the engine. 75 80 85

A drip-pipe 25 communicates with the interior of the upper end of the cylinder 13, as best shown in Fig. 3. 90 95

In operation the pressure on the piston 14 is regulated as desired by adjusting the tubular screw 21, by means of which the spring 20 can be adjusted to resist any predetermined pressure. When the pump is in operation, the fluid is forced into the pipes of the system, whence it is withdrawn for use. As the capacity of the pump is usually in excess of the 100

requirements for consumption, in the absence of some regulating device the pressure in the pipes would become excessive. With my apparatus whenever there is an excess of pressure in the pipes it acts upon the piston 14 in the cylinder 13, and thence, through the piston-rod 21 and links, levers, and connecting-rods connected therewith, upon the valves of the pumping-engine, shifting the point of cut-off of such valves, and thus reducing the capacity of the engine. As the pressure in the pipes becomes reduced, the spring 20 acting against said pressure will force the piston-rod down, shifting the valves, through said connections, in the other direction and increasing the capacity of the engine correspondingly.

By means of my apparatus I secure the following results: The water-pressure is maintained equally at all times, as the speed of the engine is controlled by the pressure in the discharge-pipe. The steam may be admitted to the steam-cylinder at full boiler-pressure, as the cut-off is controlled by the water-pressure in the discharge-pipe, and after the cut-off takes place the steam expands the remainder of the stroke, thus securing a saving in consumption of steam. By its use the speed of the engine is controlled by the amount of water consumed and renders the Corliss pumping-engine as suitable for pumping water direct into mains as it is in the reservoir or stand-pipe system. This apparatus is positive in its action, is simple, requires little or no attention, and involves no danger in case of the water being shut off suddenly. As the pressure is governed automatically, there can be no excess of pressure, and consequently no undue strain on the pump or on the mains. This pressure-governor may be operated in the same machine and in connection with a speed-governor, although entirely independent in its operation.

In Fig. 1 there is illustrated, in addition to the apparatus by means of which the engine is controlled from the pressure in the mains or discharge-pipes, an ordinary speed-governor, which through a lever 50 on the shaft 10, connecting-rods 51 and 52, and cams 53 and 54, the remainder of the apparatus being the same, the speed of the engine may be controlled. If both the speed-governor and the pressure-governor are used on the same engine, the speed-governor will commonly be so adjusted as not to be operative except when the engine reaches a speed beyond that which it is expected will be required to maintain the proper pressure. The cams 53 and 54 are counterparts of each other, and the cams 5 and 54 are likewise counterparts, and these cams operate in the same way upon the hooks when conditions under which they operate are reached.

In order that the operation of my invention may be fully understood, I will now proceed to describe the valve-gear in connection therewith.

As above stated, all the valves receive their motion from the wrist-plate. The exhaust-valves always travel the same and also the bell-crank levers a' and a^2 and the hooks h' and h^2 , which are mounted thereon. Rigidly connected to the valve-stems 1 and 2 are the valve-operating levers 61 and 62. These levers at the extreme outer ends bear blocks 63, which engage with the hooks. From said levers connecting-rods 64 and 65 extend down to dash-pots D. Springs s , rigidly secured to the bell-crank levers a' and a^2 , operate to force the hooks into engagement with the block 63 on the valve-operating levers 61 and 62. The lever 62 and the upper portion of the rod 65 are broken away and omitted in Fig. 1 for purposes of clearness of illustration, so as to better show the relation of the cam 6 to the hook a^2 . Said lever and rod are, however, shown in Figs. 4 and 5, and the position of the cam-point on the cam 6 is shown in Fig. 5 by means of dotted lines, also the position of the cam-point on the cam 54.

The operation of the two valves is similar, and for convenience I will describe only that illustrated in Fig. 5, which is drawn on a larger scale and where, therefore, the illustration is plainer.

As above stated, the movement of the hook h^2 is always the same, it being driven from the wrist-plate B. The point at which the steam shall be cut off, therefore, depends upon the point where this hook disengages with the block 63 on the arm 62, and this is controlled by the position of the cam-point on the cam-lever 6. This, as will be understood from the foregoing description, is controlled through the connecting-rod 8 and lever 9 from the cylinder 13. As the pressure increases in the discharge-pipes of the pumping system the piston in the cylinder 14 will be forced upwardly, compressing the spring 20 and through the rod 18 rocking the T-shaped lever 9, which through the rods 7 and 8 moves the cams 5 and 6 to such position that the hooks h' and h^2 will strike them more quickly, thus disengaging said hooks from the blocks 63 on the levers 61 and 62 and permitting the dash-pots D to operate to shut the valves and cut off the steam. As the pressure in the discharge-pipes of the pumping system decreases the reverse operation takes place, and steam is consequently admitted to the cylinders for a longer period with a proportionate increase of pumping power. The pressure is thus governed with great sensitiveness, and changes in the cut-off of the steam whenever the pressure varies are made with the utmost promptness.

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

1. The combination, in a pumping system, of a pumping-engine provided with a hook mechanism for controlling the valves whereby a variable cut-off is produced, a cylinder communicating with the discharge-pipes of the

pumping system, a piston therein adapted to be operated in one direction by said pressure, a spring adapted to operate said piston in the other direction against the pressure, a T-shaped rocking lever with one arm of which said piston is connected, rods running from the other arms of said lever to cams by which the hooks of the cut-off mechanism are controlled, and said hooks, said several parts being arranged and operating substantially as set forth.

2. The combination, in a pumping system, of an engine provided with hook mechanism for controlling the cut-off, an ordinary speed-governor for actuating said hooks, and a pressure-governor operated from the pressure in the discharge-pipes of the pumping system for also operating said hooks; said pressure-governor embodying a cylinder connected to

the discharge-pipes of the system, a piston therein adapted to be operated in one direction by the pressure, a spring adapted to operate said piston in the opposite direction against the pressure, a T-shaped lever mounted to rock on a shaft, one arm whereof is connected to the piston-rod of said cylinder, and rods connected to the other arms of said lever and to the cams for operating the hooks of the cut-off mechanism of the engines, all substantially as shown and described.

In witness whereof I have hereunto set my hand and seal at Newcastle, Indiana, this 17th day of November, A. D. 1900.

EMORY M. CARR. [L. S.]

Witnesses:

PERRY FRAIZER,
E. A. NATION.