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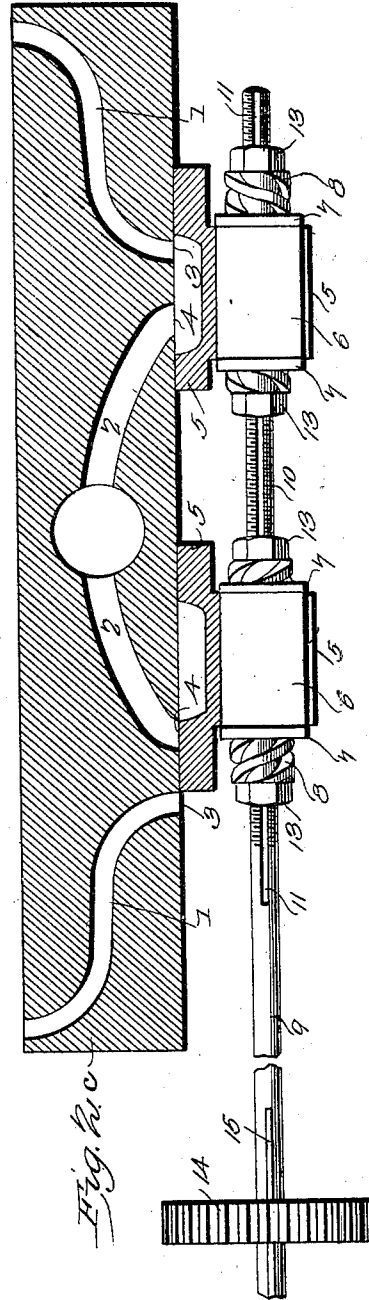
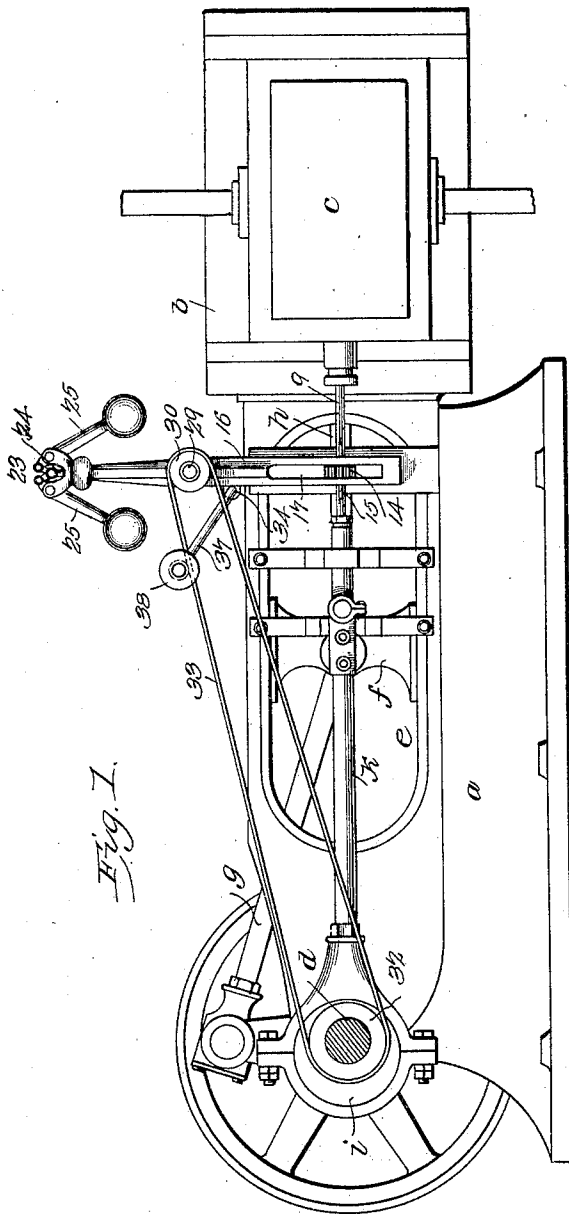
Patented June 3, 1902.

F. T. SHOEMAKER.
CUT-OFF VALVE MECHANISM.

(Application filed July 16, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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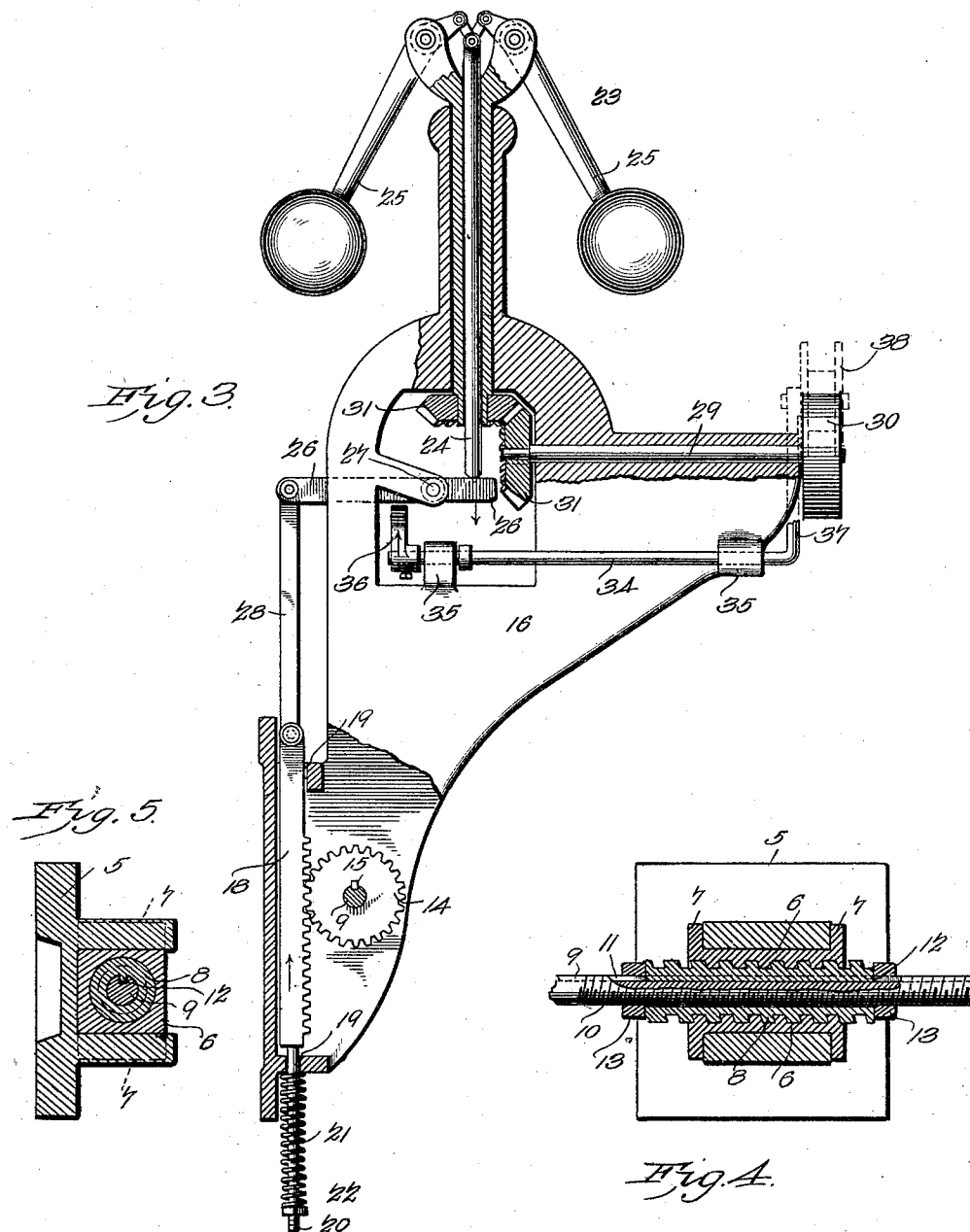
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UNITED STATES PATENT OFFICE.

FRANKLIN T. SHOEMAKER, OF CORINTH, MISSISSIPPI, ASSIGNOR OF ONE-HALF TO THOMAS K. JONES, OF CORINTH, MISSISSIPPI.

CUT-OFF-VALVE MECHANISM.

SPECIFICATION forming part of Letters Patent No. 701,406, dated June 3, 1902.

Application filed July 16, 1901. Serial No. 68,531. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN T. SHOEMAKER, a citizen of the United States, residing at Corinth, in the county of Alcorn and State of Mississippi, have invented a new and useful Cut-Off-Valve Mechanism for Steam-Engines, of which the following is a specification.

My invention is an improved cut-off-valve mechanism for steam-engines; and it consists in the peculiar construction and combination of devices hereinafter fully set forth and claimed.

One object of my invention is to combine with the cut-off valve of a steam-engine a centrifugal governor adapted to adjust the said cut-off valve in such manner as to increase or decrease the supply of steam to the cylinder of the engine accordingly as the speed of the engine varies to regulate the speed thereof.

A further object of my invention is to effect improvements in the means for adjusting the cut-off valves.

A further object of my invention is to provide means for automatically causing the cut-off valves to cut off the supply of steam to the cylinder in the event that the belt which drives the governor mechanism should break or slip from one of its pulleys, and hence cause the engine to stop.

In the accompanying drawings, Figure 1 is a side elevation of an engine provided with my improved speed-governor and valve-gear. Fig. 2 is a detail longitudinal section, on a larger scale, taken through the cut-off valves and showing the steam and exhaust channels. Fig. 3 is a detail transverse vertical sectional view showing the connections between the screw-threaded cut-off-valve stem and the centrifugal mechanism. Fig. 4 is a longitudinal section through the tubular nut and screw of the valve, and Fig. 5 is a transverse section of the same.

For the purposes of this specification I show my invention as used on a horizontal engine; but it will be understood that the same may be employed in connection with a steam-engine of any type.

The bed of the engine is represented at *a*, the cylinder at *b*, the steam-chest at *c* on one side of the cylinder, the crank-shaft at *d*, the

guideways at *e*, the cross-head at *f*, the pitman at *g*, the piston-rod at *h*, the eccentric at *i*, and the pitman attached to the eccentric and which operates the cut-off valves at *k*. 55

In Fig. 2 of the drawings the steam-channels which lead from the steam-chest to the ends of the cylinder are indicated at 1 and the exhaust-channels at 2, 3 being the steam-ports and 4 the exhaust-ports. In connection with the steam and exhaust ports I employ a pair of cut-off valves 5, which may be either of the form here shown or of any other suitable form. Each of the cut-off valves is secured on a sleeve 6, which is provided on its ends with flanges 7, which bear against the ends of the cut-off valves. The said sleeves 6 are interiorly threaded and are disposed on and engaged by screw-sleeves 8, the respective screw-threads of which are reversely disposed, as shown in Fig. 2. The sleeves 6 form tubular nuts which are engaged by and are adapted to travel longitudinally on screw-sleeves 8. The latter are provided with plane longitudinal bores through which extends the valve-stem or rod 9. The same is screw-threaded throughout a portion of its length, as at 10, said threaded portion of the said valve-stem passing through but not engaging the screw-sleeves 8. Said threaded portion of the valve-stem is provided on one side with a longitudinal groove 11, and the same is engaged by feathers 12, with which the screw-sleeves are provided, whereby the latter are splined on the valve-stem, are adapted to move longitudinally thereon, and caused to rotate therewith. Each of the screw-sleeves 8 is adjustable longitudinally on the threaded portion of the valve-stem by adjusting-nuts 13, which bear against the ends of the screw-sleeves, as shown in Fig. 3, and by means of which the sleeves may be adjusted longitudinally on the valve-stem toward and from each other, as will be understood. It will be further understood that by turning the valve-stem the screw-sleeves 8, which are respectively right and left hand screws, will cause the cut-off valves to move toward or from each other and vary the extent to which they open the steam-ports 3 at each stroke. Hence by appropriately turning the valve-stem the quantity of steam admitted to the cylinder at each stroke 100

of the piston may be regulated at will. I will now describe means whereby the valve-stem may be thus operated by a centrifugal-governor mechanism to regulate the speed of the engine.

The valve-stem 9 is connected to and operated by the pitman *k*, which is actuated by the eccentric *i* and imparts reciprocating motion to the cut-off valves when the engine is in operation. A pinion 14 is splined on the valve-stem 9, as at 15, so that the valve-stem may reciprocate in the pinion without moving the latter in a lateral direction. On one side of the guideways *e* is a bracket 16, which has a vertical slot 17, in which the pinion 14 is disposed, the sides of the said slot forming stops which prevent lateral movement of the pinion. The latter is engaged by a vertically-movable rack-bar 18, which operates in guideways 19, with which the bracket 16 is provided. From the lower end of the said vertically-movable rack-bar projects a depending stem 20. A spring, which is here shown as a coiled extensile spring 21, is on the said stem and bears against the lower side of bracket 16 and an adjusting-nut 22, which is screwed on the stem 20 and by means of which the tension of the said spring may be varied at will. It will be understood that the spring normally moves the rack-bar downwardly, and since the latter is in engagement with the pinion 14 normally prevents the valve-stem 9 from turning. The centrifugal governor mechanism 23 may be either of the construction here shown or of any other suitable construction. The movable element 24 thereof, which is here shown as a rod vertically movable by the centrifugally-actuated weighted arms 25, bears against the inner portion of a lever 26 on the upper side thereof. The said lever is fulcrumed as at 27 and is connected to the rack-bar 18 by a link 28. A shaft 29, which has its bearings in the bracket 16, is provided at its outer end with a pulley 30, and its inner end is geared to the centrifugal governor mechanism by miter-gears 31. A pulley 32, which is on the crank-shaft *d*, is connected to the pulley 30 by an endless belt 33, as shown in Fig. 1, and hence the centrifugal governor mechanism is rotated when the engine is in operation.

The engine is initially adjusted with reference to the desired rate of speed and the load by appropriately turning the adjusting-nuts 13 and by adjusting the tension of the spring 21. At the desired rate of speed the lever 26 is balanced between the spring 21 and the vertically-movable element 24 of the centrifugal mechanism. On an increase of the speed of the engine above the predetermined rate the weighted centrifugal arms 25 depress the rod 24 and cause the lever 26 and link 28 to move the rack-bar 18 upwardly, thereby turning the valve-stem 9 in the direction indicated by the arrow in Fig. 3, the right and left hand screw-sleeves on the valve-stem causing the cut-off valves to be moved from

each other in opposite directions, so that they will partly overlap the steam-ports 3 at the ends of their strokes, and hence decrease the quantity of steam supplied to the cylinder. On a decrease of the speed of the engine below the desired rate the valve-stem 9 will be partly turned in the reverse direction, as will be understood, to move the cut-off valves toward each other, so that they will open the steam-ports 3 to a greater extent.

I will now describe means whereby in the event that the belt 33 should break or slip from one of the pulleys the valve-stem 9 will be turned to such an extent as to cause the cut-off valves to entirely cut off the admission of steam to the ends of the cylinder, and thereby stop the engine. The rock-shaft 34 is journaled in bearings 35, with which in the embodiment of my invention here shown the bracket 16 is provided. The said rock-shaft has a cam 36, which engages or is adapted to engage the lever 26, and is further provided with a rock-arm 37, the latter carrying an idle-pulley 38, which bears on the belt 33, as shown in Fig. 1. Normally the rock-shaft 34 is inoperative; but in the event that the belt 33 breaks or slips from one of its pulleys the pulley 38 will descend, owing to its weight, cause the arm 37 to turn the rock-shaft 34, and the cam 36, which turns with the said rock-shaft, will engage with the lever 26 and operate the latter in such manner as to cause the rack and pinion to turn the valve-stem 9 to such an extent that the cut-off valves will entirely cut off access of steam to the cylinder through the steam-ports 3.

I do not desire to limit myself to the precise construction and combination of devices herein shown and described, as it is evident that modifications may be made therein without departing from the spirit of my invention.

Having thus described my invention, I claim—

1. The combination of a reciprocating valve-stem, right and left hand screw-sleeves splined thereon, means to adjust said screw-sleeves on said valve-stem, means to turn the latter, and cut-off valves engaged and operated by said screw-sleeves, whereby said cut-off valves may be moved longitudinally in opposite directions by turning said valve-stem, for the purpose set forth, substantially as described.

2. The combination of a reciprocating valve-stem, right and left hand screw-sleeves splined thereon, means to adjust said screw-sleeves on said valve-stem, means to turn the latter, cut-off valves engaged and operated by said screw-sleeves, whereby said cut-off valves may be moved longitudinally in opposite directions by turning said valve-stem, and a centrifugal mechanism and connections between the same and said valve-stem, to automatically turn the latter, substantially as described.

3. The combination of a reciprocating screw-threaded valve-stem, right and left

hand screw-sleeves splined thereon, but not engaged by the screw-thread thereof, adjusting-nuts on said threaded valve-stem to adjust said screw-sleeves, and cut-off valves engaged by said right and left hand screw-sleeves, for the purpose set forth, substantially as described.

4. In an engine, the combination of cut-off valves, a reciprocating revoluble valve-stem, to move said valves reversely, for the purpose set forth, a spring to turn said valve-stem in one direction, and a centrifugal mechanism to turn said stem in the reverse direction, substantially as described.

5. In an engine, the combination of cut-off valves, a reciprocating revoluble valve-stem, to move said valves reversely, for the purpose set forth, a spring to turn said valve-stem in one direction, a centrifugal mechanism to turn said stem in the reverse direction, and means to vary the power of said spring, substantially as described.

6. In an engine, the combination of cut-off valves, a reciprocating revoluble valve-stem,

to move said valves reversely, for the purpose set forth, and means, automatically operated, on an abnormal increase of speed of the engine, to turn said stem and cause said valves to cut off the supply of steam to the cylinder, substantially as described.

7. In an engine, the combination of cut-off valves, operative on the steam and exhaust ports of the cylinder, a speed mechanism to adjust said valves automatically, a belt to drive said speed mechanism, a normally idle element supported by said belt, and connections between said normally idle element and said valves, to operate the latter when said normally idle element is released by said belt, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

FRANKLIN T. SHOEMAKER.

Witnesses:

W. F. WALLACE,
W. B. WILSON.