No. 673,513. Patented May 7, 1901.

C. F. COWDREY.

SHUT-OFF MECHANISM FOR ENGINES.

(Application filed Jan. 15, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

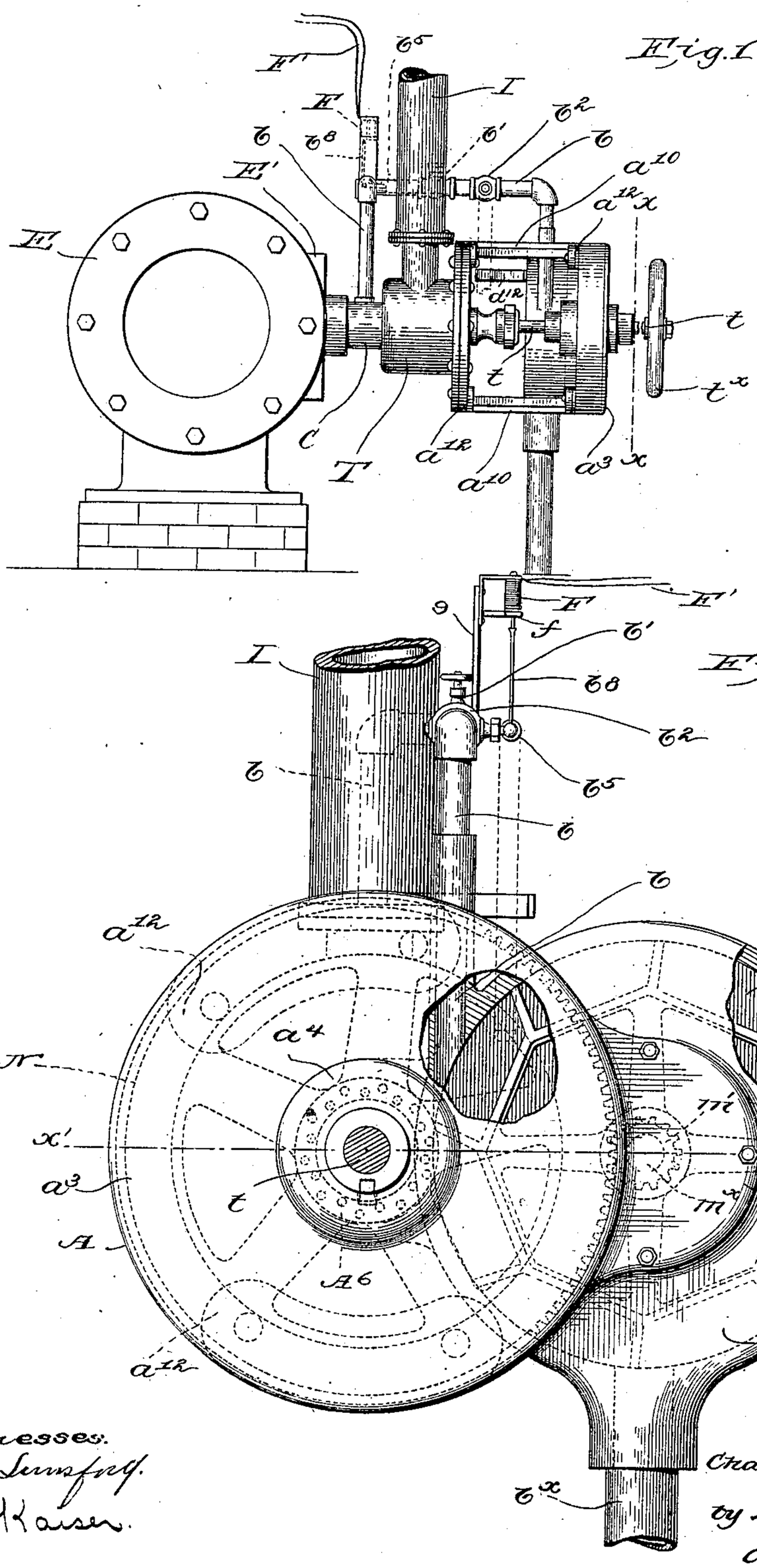

Fig. 2.

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Fig. 3.

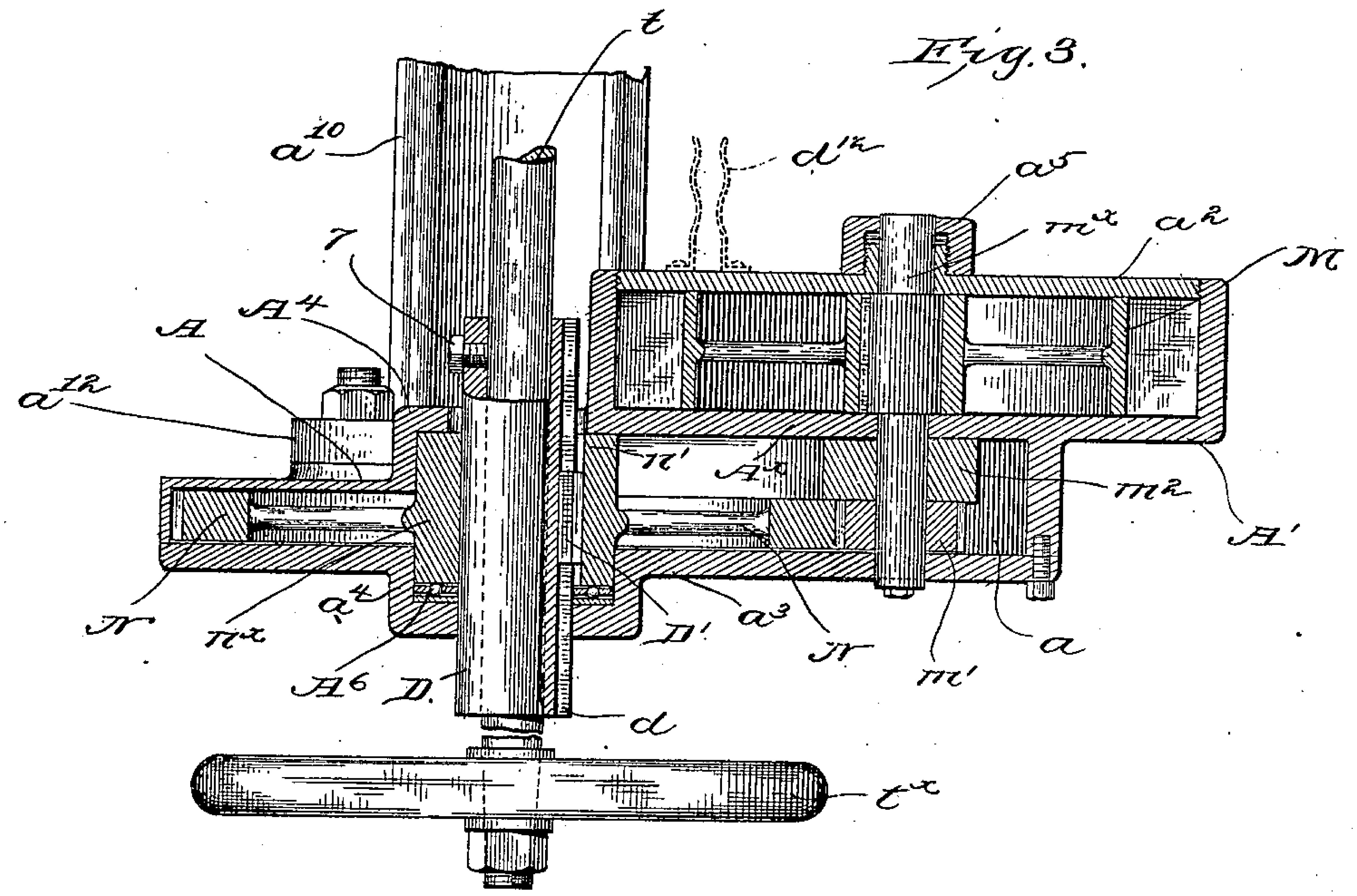


Fig. 5

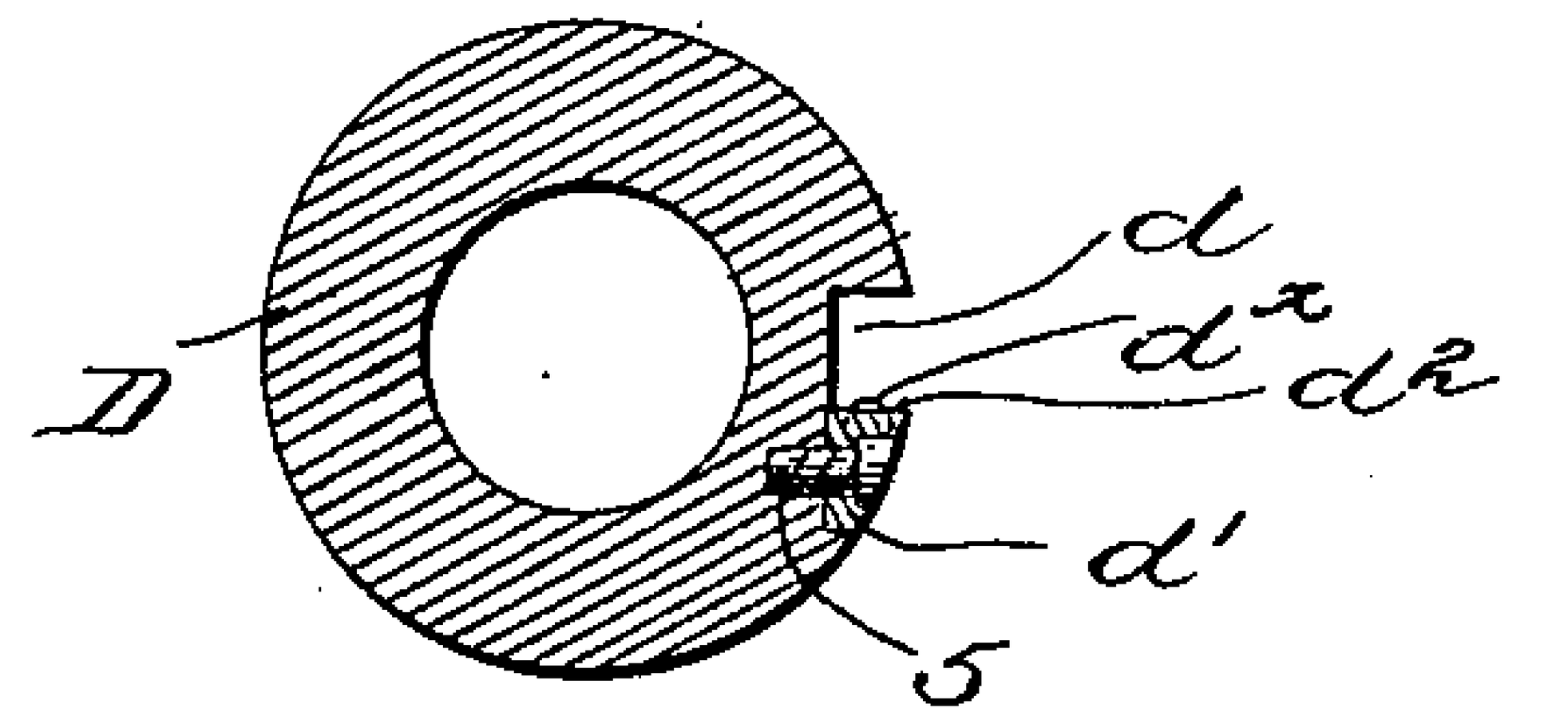
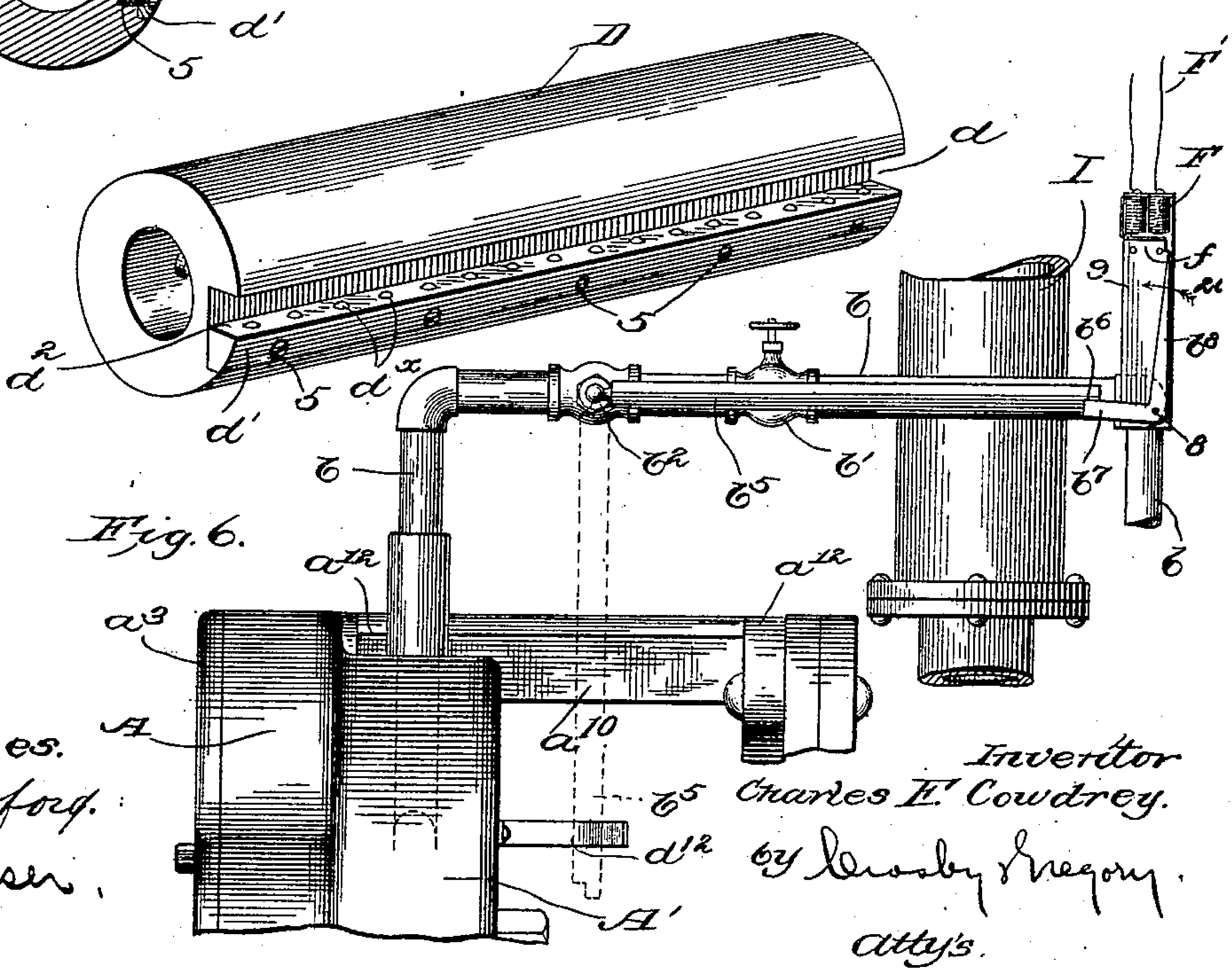


Fig. 4.

Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES F. COWDREY, OF FITCHBURG, MASSACHUSETTS.

SHUT-OFF MECHANISM FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 673,513, dated May 7, 1901.

Application filed January 15, 1901. Serial No. 43,322. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. COWDREY, a citizen of the United States, residing at Fitchburg, county of Worcester, State of Massachusetts, have invented an Improvement in Shut-Off Mechanism for Engines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention relates to mechanism applicable to fluid-pressure engines of various types, whereby the supply of motive fluid may be shut off and the engine stopped at once from any part of the building in which it is located, independent of the usual throttle-valve. Sometimes the throttle-valve is inaccessible owing to surrounding escaping steam when some adjacent part has been ruptured, and often it is highly desirable to quickly stop a steam or other fluid pressure engine in order to prevent an accident in a part of the building distant from the engine-room, there being no time to communicate with the engineer. Mechanism of this general character has heretofore been devised; but its use has been limited to engines of comparatively low horse-power; and it is the object of my present invention to provide novel and positive-acting shut-off mechanism which can be successfully used with large engines of very high power, as well as with those of low power.

Figure 1 is a side elevation of shut-off mechanism embodying one form of my invention, illustrated in operative connection with the usual shut-off or throttle valve of a steam-engine. Fig. 2 is a sectional view thereof, on a greatly-enlarged scale, on the line $x\ x$, Fig. 1, looking toward the left, the casing being partly broken out. Fig. 3 is a horizontal section on the line $x'\ x'$, Fig. 2. Fig. 4 is a perspective view of the sleeve forming a part of the shut-off mechanism. Fig. 5 is an end view thereof; and Fig. 6 is an enlarged view, in side elevation, of the connecting-pipe between the engine and shut-off mechanism, showing more clearly the means for operating the valve in such connection.

In Fig. 1 the throttle-valve T, of usual construction, is located between the steam-inlet pipe 1 from the boiler and the connection C with the steam-chest E′ of the engine-cylinder E, all of well-known or usual construction, the rotatable and longitudinally-movable valve-stem t being provided with a suitable hand-wheel $t^{\times}$ to operate the throttle-valve by hand in usual manner.

A casing A A′, preferably made as a casting presenting two partly superposed and offset portions, has a partition-wall $A^{\times}$, which divides the casing into two chambers $a\ a'$, the former being tightly closed by a cover-plate a^2, Fig. 3, and the latter by a cover-plate a^3. An inlet-pipe b is tapped into the engine-inlet C and communicates with the chamber a', said pipe b having preferably two valves therein, as $b'\ b^2$, and leading into the chamber a' tangentially, (see Fig. 2,) an exhaust $b^{\times}$ leading from the lower portion of said chamber.

Within the chamber a' I have mounted a rotary motor M, its shaft $m^{\times}$ being supported in the partition $A^{\times}$ and by the cover-plates $a^2\ a^3$, a stuffing-box a^5, surrounding the end of the shaft, projecting beyond the plate a^2, and between the partition and the plate a^3 a pinion m' is secured to the shaft within the chamber a, a collar m^2, fast on the shaft, positioning the pinion.

The part A of the casing has a barrel-like portion A^4, which serves as a bearing for the hub $n^{\times}$ of a large gear N, which is wholly within the chamber a and in mesh with the pinion m', a boss a^4 on the cover-plate a^3 completing the bearing for the gear-hub, and preferably I interpose an end-thrust ball-bearing A^6 between the boss and the adjacent end of the hub.

I have herein shown the casing A A′ as supported by and rigidly secured to the throttle-valve case by means of rigid bracket-arms a^{10}, having segmental ends a^{12}, which are bolted to the back of the part A of the casing and to the flange t^2 of the throttle-valve case, the casing being so located that the gear N is coaxial with the valve-stem t, the latter being extended through the hub $n^{\times}$ and connected to it to rotate therewith, as will be described. A long sleeve D, extended completely through the gear-hub and the casing part A, is provided with a longitudinal groove or keyway d, which is made wide enough to receive a ball-carrier, shown as a metal bar d', having ball-seats made in its face d^2 to

receive a series of antifriction-balls $d^{\times}$, the carrier being secured in the keyway by suitable screws 5. The keyway has thus one of its longitudinal sides provided with a ball-bearing on the side which takes the thrust of the key D′, which is driven firmly into a groove n' in the gear-hub $n^{\times}$, Fig. 3, the key having an easy fit in the keyway d of the sleeve D. The latter is rigidly secured to the valve-stem t in suitable manner, as by a set-screw 7, to move therewith, and it will be manifest that rotation of the sleeve by rotation of the gear N will also rotate the valve-stem, and the longitudinal movement of the latter as the throttle-valve is seated will be permitted by the key and keyway connection described.

Referring now to Fig. 6, the valve b^2 has an external swinging arm b^5 secured to it, notched at its free end at b^6 to receive the short arm b^7 of a locking-lever fulcrumed at 8 on a stand 9, the upturned long arm b^8 of said lever normally resting against the armature f of an electromagnet F, included in an electric circuit F′, which leads to any desired part of the building or to different rooms thereof. By closing the circuit in usual manner the armature f is retracted, releasing the lever b^7 b^8, which swings in the direction of arrow 20, Fig. 6, and the valve-arm b^5 is permitted to drop into dotted-line position, opening the valve at b^2 and establishing communication between the steam-supply of the engine and the motor-casing, entering the chamber a' as a jet and striking the blades of the motor M, rotating the latter at high speed. By the pinion m' and gear N this speed is greatly reduced, with a corresponding gain in power, and the valve-stem t is rotated with great power and longitudinally moved to close the main or throttle valve, shutting off the steam from the engine, as will be readily understood. The usual hand operation of the throttle-valve is in no way interfered with, and by the power-multiplying means interposed between the motor and the valve-stem the main valve is actuated with sufficient power to rapidly and easily close it, no matter what the horse-power of the engine. As the steam for the motor is taken from the engine side of the throttle, the full pressure thereof is initially available and the motor is instantly speeded up, the momentum of the latter sufficing to complete the closing of the throttle-valve as the pressure diminishes in the motor-casing due to such closure of the main valve.

In order to prevent any vibration of the valve-arm b^5 after it has assumed its dotted-line position, Fig. 6, I provide a detent d^{12}, which may be two spring arms or jaws, between which the free end of the arm b^5 enters and is held stationary.

The hand-operated valve b' in the connecting-pipe b can be used when it is desired to completely cut off communication between the shut-off mechanism and the engine supply of steam.

I have shown my invention in connection with a steam-engine as one practical embodiment thereof; but it will be manifest that it is equally applicable to any form of fluid-pressure engine, whether the motive power be steam, air, &c.

Having described the invention, what I claim, and desire to secure by Letters Patent, is—

1. A fluid-pressure engine, and a valve to control the passage thereto of fluid under pressure, combined with a motor, a connection between said motor and the engine-supply, a valve in said connection, means to operate it, and positively-acting power-multiplying mechanism intermediate and connecting the motor and the controlling-valve of the engine, whereby operation of the motor will effect the closure of said valve.

2. A fluid-pressure engine, a valve to control the passage thereto of fluid under pressure, and a longitudinally and rotatably movable stem for said valve, combined with a rotary motor connected with the engine-supply and having an attached pinion, a large gear in mesh with the pinion, and connected with the valve-stem to rotate the same and permit longitudinal movement thereof, a valve between the engine and motor, and means to operate it, rotation of the motor when said valve is opened operating through the gearing to effect closure of the controlling-valve and consequent stoppage of the engine.

3. A fluid-pressure engine, a valve to control the passage thereto of fluid under pressure, and a longitudinally and rotatably movable stem for said valve, combined with a rotary motor connected with the engine-supply and having an attached pinion, a large gear in mesh with the pinion mounted on the valve-stem and connected therewith by a key, to permit longitudinal movement of the stem relatively to the gear, a valve between the engine and motor, and means to operate it, opening of the said valve establishing communication between the engine-supply and the motor to effect the operation of the latter.

4. In a steam-engine, the throttle-valve having a stem, a large gear mounted on said stem to rotate therewith and permit longitudinal movement of the stem relatively thereto, a rotary motor having an attached pinion in mesh with the gear, a casing for said motor, provided with an exhaust, a pipe tapping the connection between the engine and its throttle-valve, and opening into the casing, a valve in the pipe, and means to operate the valve.

5. The combination with a steam-supply for an engine, and the throttle-valve, of a steam-motor, positively-acting power-multiplying connections between it and the valve, a steam-inlet pipe for the motor, tapping the connection between the engine and the throttle-valve, a controlling-valve for said inlet-pipe,

and means to operate said valve, whereby steam from the engine-supply may be delivered to and to operate the motor, to thereby effect the closing of the throttle-valve.

6. In apparatus of the class described, a rotary motor having an attached pinion, a casing for the motor, having an exhaust and adapted to be connected with the steam-supply pipe of an engine between the latter and the throttle-valve, a valve to govern the entrance of steam to the casing, a gear in mesh with the pinion and having its hub provided with a key, a sleeve loosely extended through the hub and provided with a keyway to be entered by the key, whereby rotation of the gear will rotate the sleeve while permitting longitudinal movement thereof, and antifriction bearing-balls mounted in the thrust-receiving side of the keyway, the sleeve being adapted to be secured to the stem of the throttle-valve.

7. In apparatus of the class described, a casing having a partition to present two chambers, a rotary motor mounted in one chamber and having its shaft extended through the partition into the other chamber, a pinion in the latter fast on the shaft, and a large gear in mesh with the pinion, bearings in the latter chamber for the hub of the gear, a sleeve loosely extended through the hub and rotatable therewith but longitudinally movable in said hub, the sleeve being adapted to the stem of a throttle-valve, inlet and exhaust ports for the motor-chamber, the former being connected with the steam-supply of an engine, and a valve to control entrance of steam to the motor-chamber.

8. The combination, with the stem of a throttle-valve having a longitudinally-grooved sleeve fast thereon, of a gear through the hub of which the sleeve is loosely extended, a key in the hub to enter the groove in the sleeve, a rotary motor having an attached pinion in mesh with said gear, a pipe to supply the motor with fluid under pressure, a valve in said pipe, means to operate it, and a device to prevent accidental closure of the valve when open.

9. The combination with the stem of a throttle-valve, of a gear rotatable therewith and through the hub of which said stem is longitudinally movable, a rotary motor having an attached pinion in mesh with the gear, a casing for the motor, having an exhaust and provided with a pipe to supply the motor with fluid under pressure, a valve in said pipe, having an actuating-arm, means to release the arm to open the valve, and a detent to automatically engage and hold the arm when the valve is opened.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES F. COWDREY.

Witnesses:
GEORGE E. CLIFFORD,
HERBERT G. MORSE.