

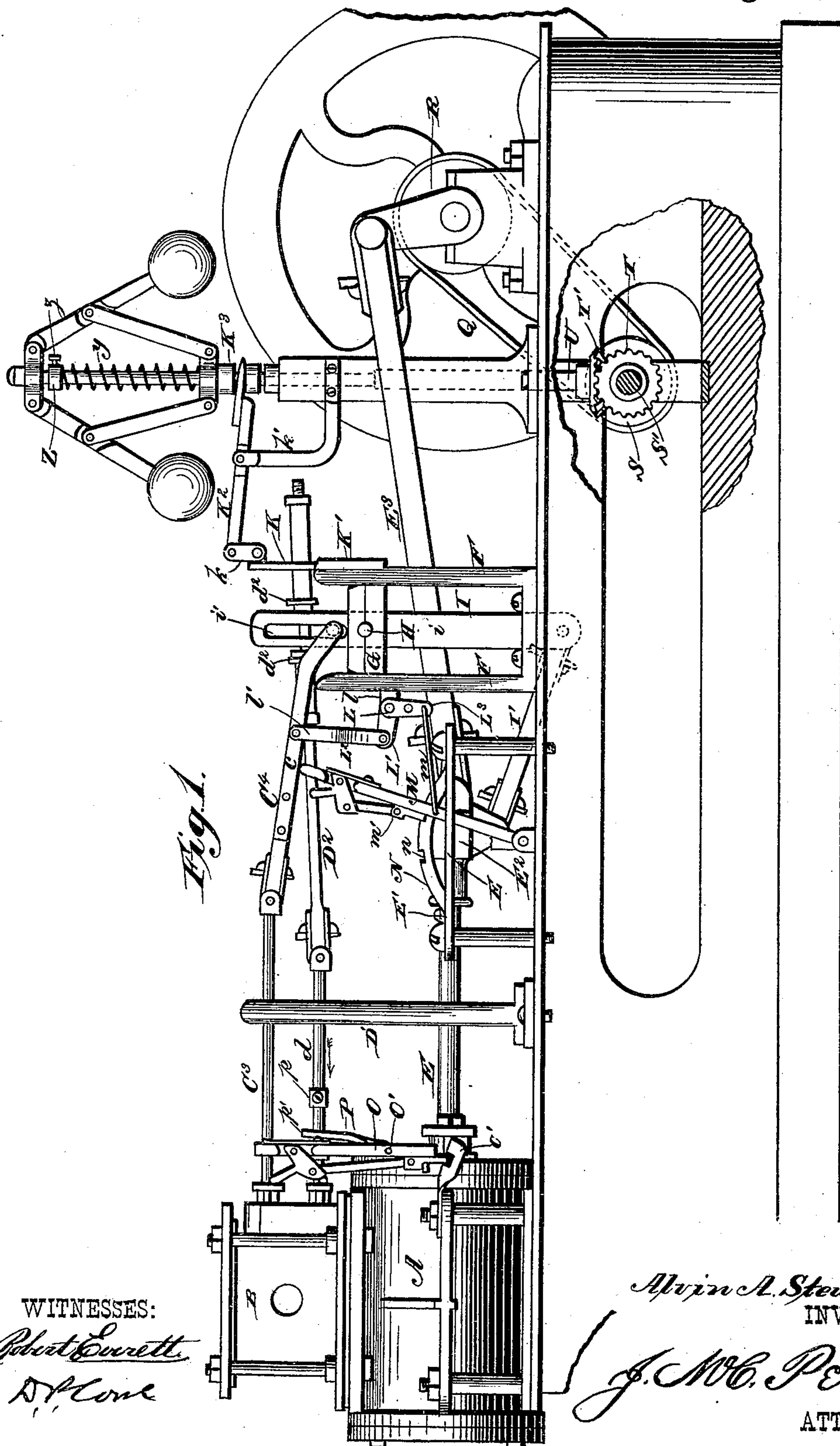
(No Model.)

2 Sheets—Sheet 1.

A. A. STEWART.
CUT-OFF VALVE GEAR.

No. 246,429.

Patented Aug. 30, 1881.



WITNESSES:

Robert Currett.
D. Home

Alvin A. Stewart.
INVENTOR.

J. W. C. Perkins
ATTORNEY.

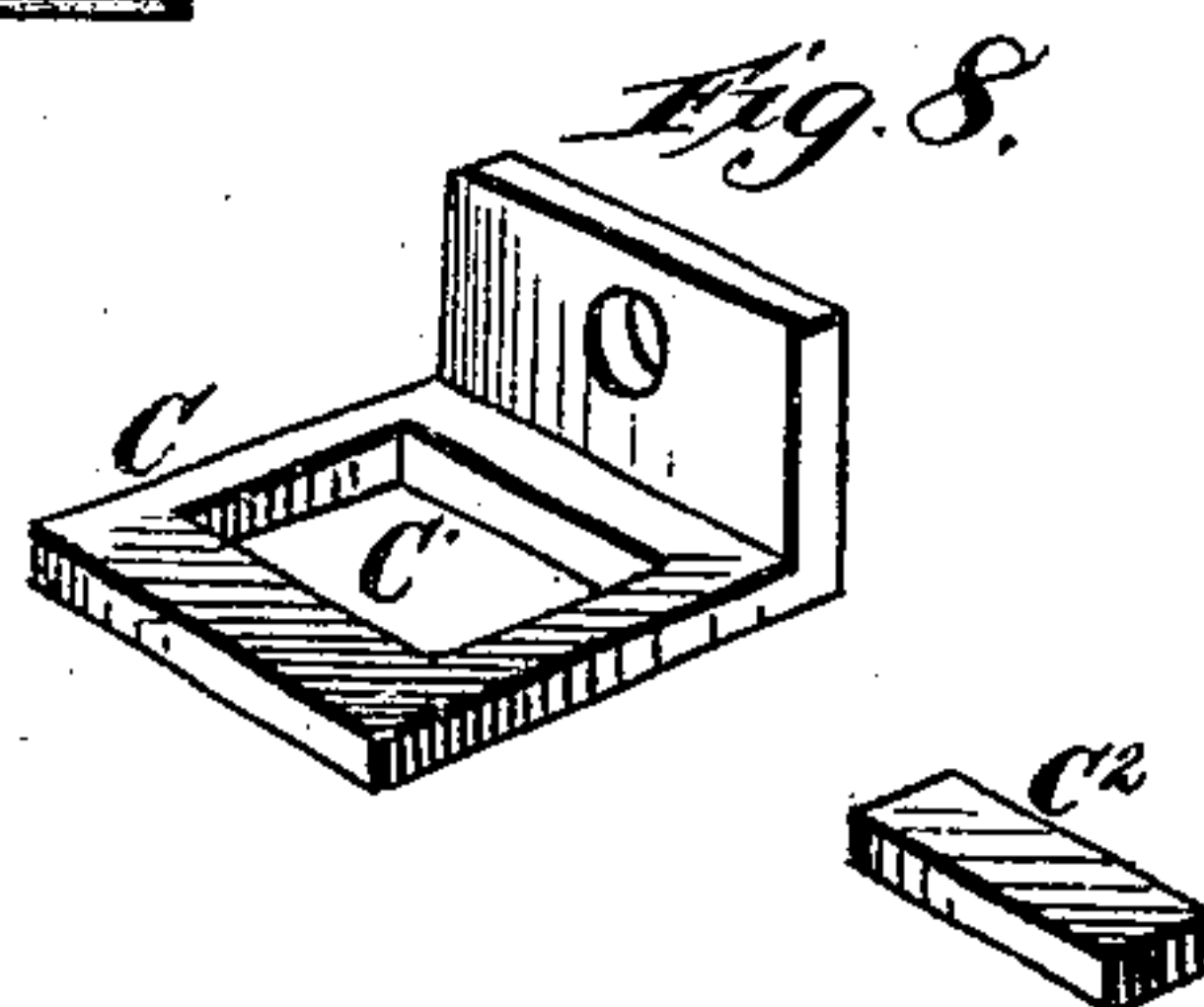
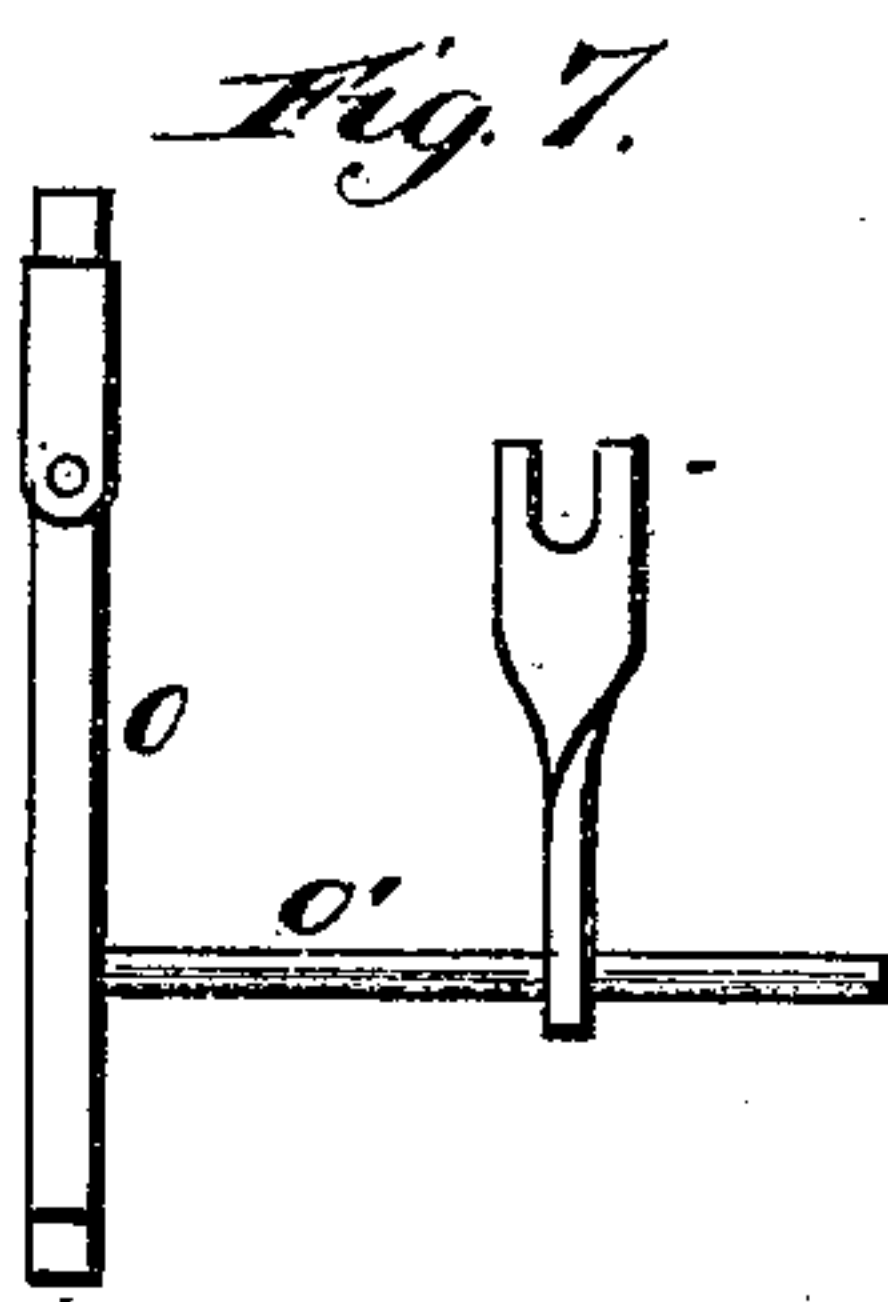
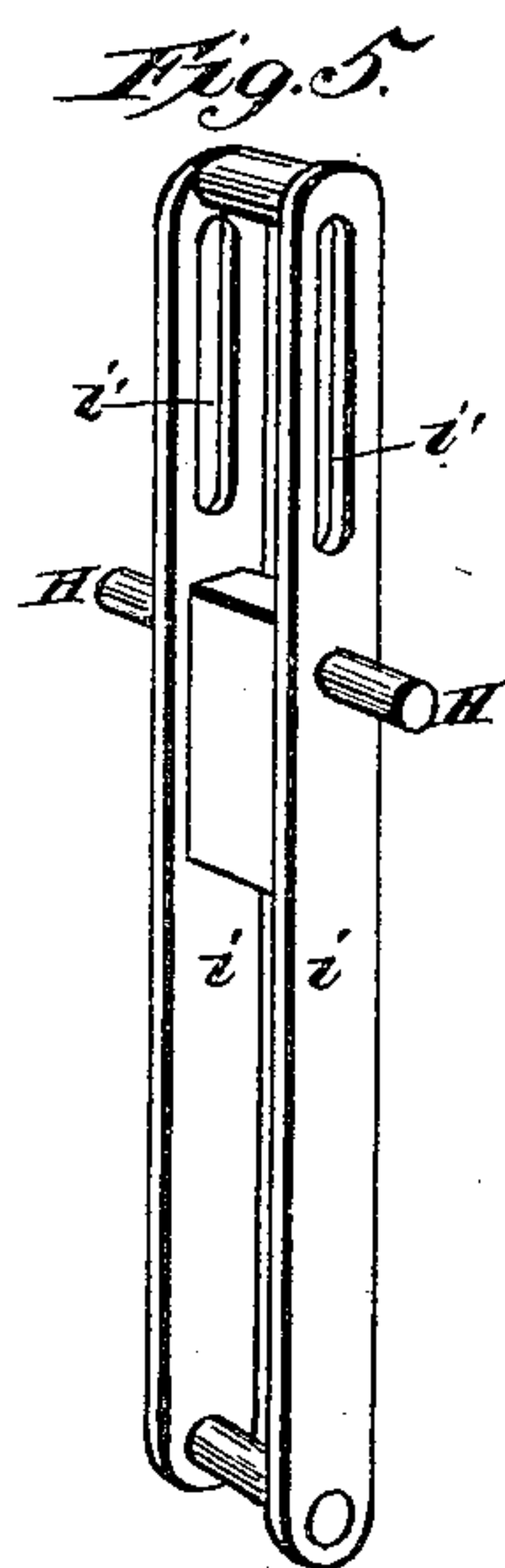
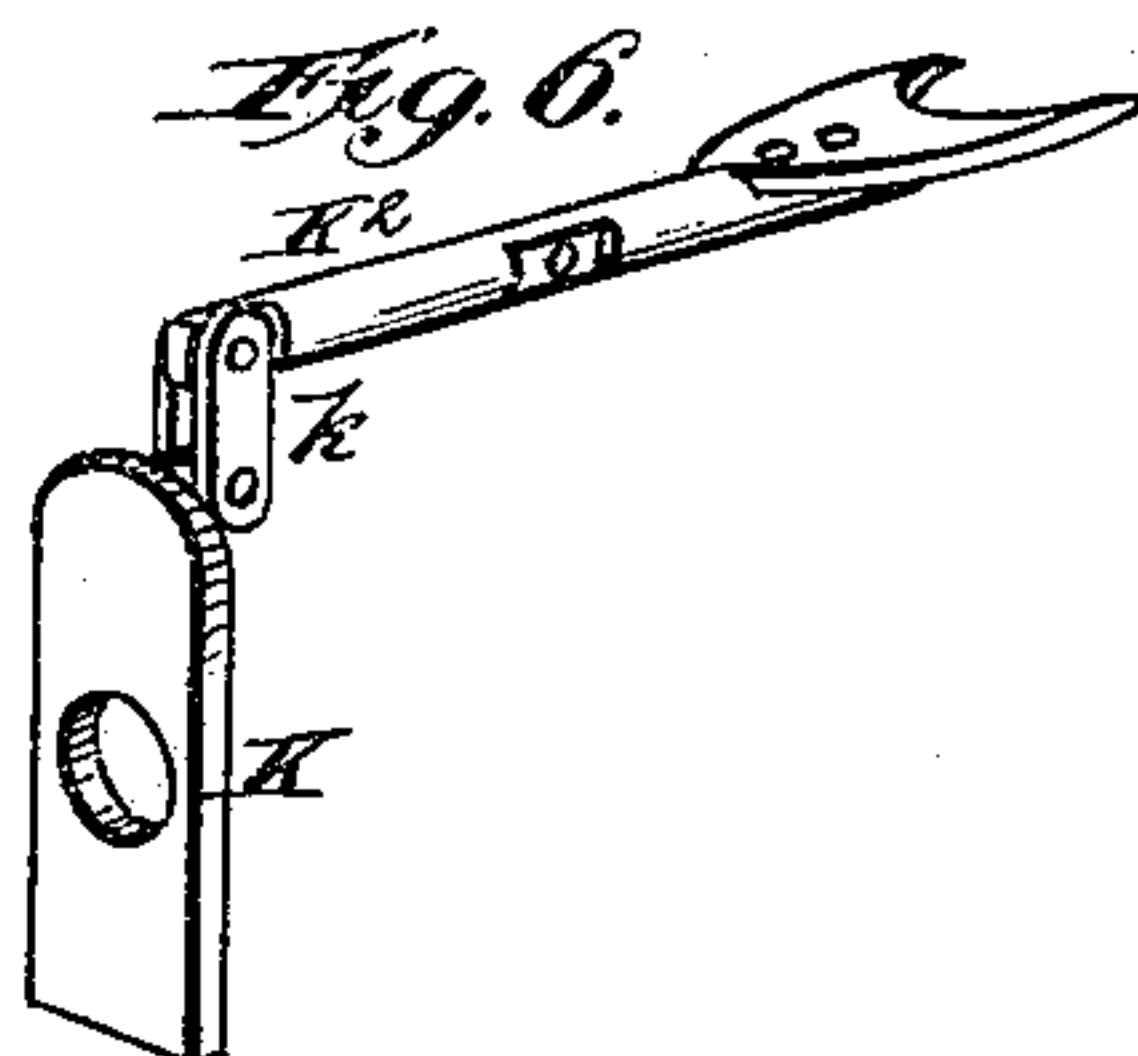
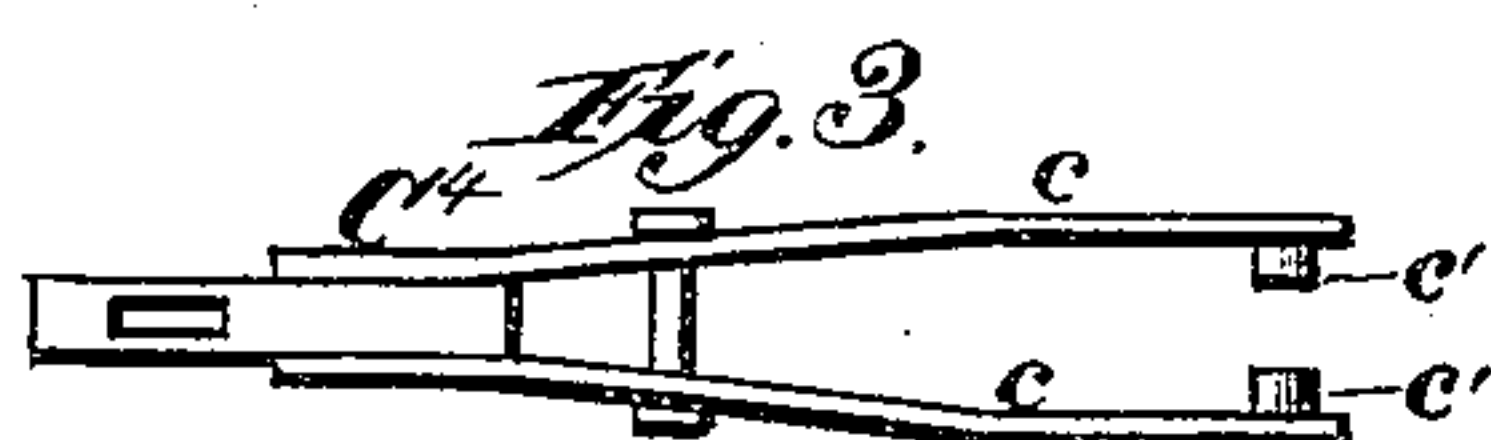
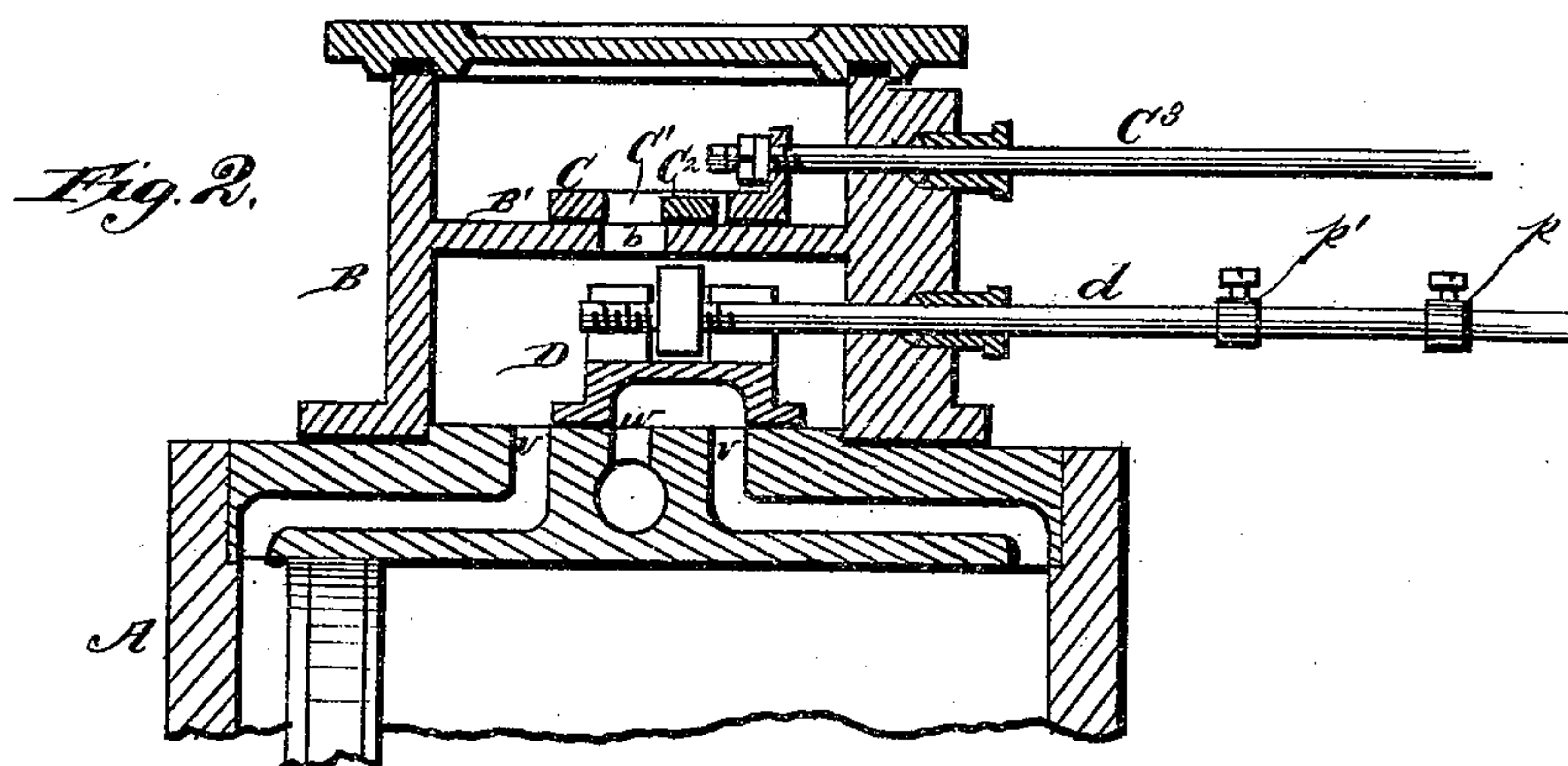
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2 Sheets—Sheet 2.

A. A. STEWART.
CUT-OFF VALVE GEAR.

No. 246,429.

Patented Aug. 30, 1881.



WITNESSES:

WITNESSES:
Chas. Hoyerberger
Robert Connett,

Alvin A Stewart.
INVENTOR.

J. W. Perkins
ATTORNEY.

UNITED STATES PATENT OFFICE.

ALVIN A. STEWART, OF PLEASANT PLAIN, OHIO.

CUT-OFF-VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 246,429, dated August 30, 1881.

Application filed May 25, 1881. (No model.)

To all whom it may concern :

Be it known that I, ALVIN A. STEWART, of Pleasant Plain, in the county of Warren and State of Ohio, have invented certain new and
5 useful Improvements in Cut-Off-Valve Gear for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, that will enable
10 others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

The same letters and figures of reference are
15 used to indicate the corresponding parts.

After describing the invention, its nature and extent will be shown in the claims.

My invention relates to a variable cut-off and governor connections for steam-engines, its
20 object being to simplify the means of regulating the cut-off and to connect the governor directly with the slide-valve, thereby causing the engine to respond more promptly to its movements than heretofore.

25 The invention consists in a novel construction and combination of parts, which will be hereinafter particularly described, and pointed out in the appended claims.

In the accompanying drawings, Figure 1 is
30 a side elevation of a steam-engine having my improvements applied thereto. Fig. 2 is a vertical central section of the steam-chest and the upper portion of the cylinder. Fig. 3 is a top view of the bifurcated pitman connected with
35 the cut-off rod. Fig. 4 is a similar view of the pitman connected with the valve-rod. Fig. 5 is a perspective view of the double lever connected with the piston-rod for effecting the movement of the slide-valve and cut-off. Fig.
40 6 is a detail view of the devices for connecting the governor to the valve. Fig. 7 is a view of the reversing-lever and the devices by which it shifts the valve-rod and valve to change the direction of the engine's movement. Fig. 8 is
45 a detached perspective view of the cut-off valve and its loose block.

In the annexed drawings, the letter A denotes the cylinder, upon which is mounted the steam-chest B, which, as will be seen in the
50 sectional view, Fig. 2, has a horizontal partition, B', which is provided with a central steam-

port, b. Upon this partition slides the cut-off valve C, having a central opening, C', in which is arranged loosely a block, C², which rests
upon the partition B', its superficial area being 55 such that it will close the steam-port b' when moved over it. The front part of the cut-off valve is connected to a rod, C³, which extends forward through a stuffing-box in the front wall of the steam-chest. 60

The steam-cylinder is provided with the ordinary steam-ports and supply-passages leading to opposite sides of the piston from the steam-chest, and also with the usual exhaust-port located between the supply-ports, where they 65 open into the steam-chest.

The slide-valve D is of the ordinary description for operating with ports so arranged, and is connected to a valve-rod, d, passing through a stuffing-box in the front wall of the steam- 70 chest, directly under that through which passes the rod of the cut-off valve. The rods C³ and d both play through guide-bearings in a standard, D', arranged in front of the steam-cylinder, and supported by the usual base upon 75 which the cylinder is mounted.

E designates the piston-rod, and E' the slide upon which its cross-head E² plays, this cross-head being connected by a pitman, E³, with the crank of the fly-wheel shaft, in the usual 80 manner. Between the fly-wheel shaft and the cross-head is arranged a double standard, F, which straddles the pitman E³, and has its upper portions connected by pillow-blocks G, in which are formed the bearings of a short trans- 85 verse shaft, H, upon which is fixed as a fulcrum a vertical lever, I, the lower end of which is connected to the cross-head of the piston-rod by a short pitman, I'. This lever I is formed of two parallel bars, i i, which have 90 elongated slots i' i' formed in their upper ends.

To the rear end of the rod C³ of the cut-off valve is connected a bifurcated pitman. The arms c c are provided with pins c' c', projecting inwardly into the elongated slots of the bars 95 i i, respectively.

To the rear end of the valve-rod d is connected a pitman, D², which passes rearwardly between the upper portions of the bars i i of the lever I, and also through an aperture in a 100 plate, K, which slides vertically in guides K', arranged upon the upper surface of the double

standard F, this plate being connected by a link, k , with a horizontal lever, K^2 , pivoted to an arm, k' , and having a bifurcated rear end, which embraces the sliding collar K^3 , arranged upon the governor-shaft, and connected with the ball-arms in the usual manner.

Upon the pitman D^2 are secured knocking-plates d^2 on opposite sides of the double lever I, each projecting laterally in both directions to such an extent that they will not pass between the bars composing said lever, but will be struck by the same when the lever vibrates, the pitman thereby being forced either forward or rearward, as the case may be, to move the valve-rod and shift the valve D.

From the front surface of the double standard F project lugs l , in which are journaled a transverse shaft, L, from the middle of which a short arm, L' , projects, and to the latter is pivoted a bifurcated link, extending upwardly, and having its arms l' connected at their tops to the arms c' , respectively, of the bifurcated pitman C^4 .

From the laterally-projecting end of the shaft L there projects downward an arm, L^3 , the lower end of which is connected by a link, m , with a hand-lever, M, pivoted to the base at its lower end, and provided with a sliding latch, m' , arranged to engage in notches n n , formed in an arc-shaped plate, N, rising from one of the plates forming the slide of the cross-head of the piston-rod.

The letter O denotes the reversing-lever fixed upon a short shaft, O' , journaled in lugs projecting from the front cylinder-head. The lever O is provided with a sliding latch, o , operated in the usual manner by a link and hand-lever, and arranged to take into a notch in the plate o' , arranged at one side of the cylinder, for holding the reversing-lever in a true vertical position.

From the middle of the shaft O' rises an arm, P, the forked upper end of which embraces the valve-rod d between two collars, p' p , secured to said rod at a suitable distance apart, for the purpose presently to be explained. The collar p' is hidden in Fig. 1 by the parts in front of it, but is shown clearly in Fig. 2.

Motion is transmitted to the governor-shaft by a belt, Q, passing over a belt-wheel, R, on the fly-wheel shaft, and a pulley, S, on a shaft, S' , upon which is mounted a bevel-gear, T, meshing with another bevel-gear, T' , on the governor-shaft U.

The operation of the engine is now described as follows: The reciprocation of the piston-rod E communicates through the short pitman I' a vibratory motion to the lever I. The outward movement of the piston-rod throws the upper end of the lever I toward the valve-chest, so that its arms i i strike the knocking-plate d^2 , throwing the pitman D^2 and the valve-rod d in the direction of the arrow, sliding the valve D to connect the rear port, v , of the cylinder with the exhaust-port w , and open the front port, v' , so that steam will pass from the steam-chest to the front of the piston-head.

The distance between the knocking-plates d^2 is such that they will be alternately struck by the lever I at the proper time to shift the valve D. The vibration of the lever I also works the pitman C^4 and rods C^3 to shift the cut-off valve. The rod C^3 has its greatest stroke and the cut-off valve its greatest throw when the pins c' are in the upper portion of the slots i' of the bars i , and when the pitman C^4 is in such position that the said pins are in said upper portions of the slots the valve C will have its longest and most rapid stroke, and moves its loose block to shut the steam off from passing through port b soonest after the piston begins its stroke; but when the pins c' of the arms of the bifurcated pitman are in the lower portion of the slots i' the cut-off valve will have a slower motion, and permits steam to flow through the port b and to the cylinder during the entire stroke of the piston.

In order to regulate the position of the pitman C^4 the lever M is moved as required. When it is moved to such position that the sliding latch m' engages with the notch n in arc N, the pitman C^4 will be thrown upward by the operation of the link m , arm L^3 , shaft L, arm L' , and bifurcated link L^2 .

Notches may be arranged in the arc N in such position as to hold the lever M at any desired point, so that the pitman C^4 may be adjusted to cause the cut-off valve to cut the steam off at any desired part of the stroke of this piston.

The knocking-plates d^2 are so arranged that when the pitman D^2 works in a true horizontal position, or in line with the valve-rod, the valve D will not fully open the ports v v' ; but if the governor-balls begin to fall the end of the lever K^2 which engages with the collar K^3 is depressed, throwing its other end upward, raising the plate K, which lifts the pitman D^2 , so that the knocking-plates d^2 come in contact sooner with the lever I, and the pitman is carried farther by said lever, thus giving the valve-rod d and the valve D a longer stroke, so that the valve will open the ports v v' more fully. If the engine commences to run too fast, the opposite effect, of course, will be produced, and less steam allowed to flow to the cylinder.

When the engine is running the reversing-lever O is normally held in a true vertical position, and there locked by means of the sliding latch o and the notched plate o' ; but when it is desired to reverse the engine the reversing-lever may be unlocked and moved in either direction at the proper time, so that the arm P will strike either of the collars p' , moving the valve-rod d and shifting the valve D to open either of the ports v or v' , as desired.

In order to regulate the operation of the governor, a spiral spring, y , is placed around its shaft, between the collar K^3 and an adjustable collar, Z, which is secured to the governor-shaft by means of a set-screw, z . If this collar Z is moved downward and secured, the spiral spring will be placed under greater ten-

sion, and more force will be required to lift the collar K³, and vice versa.

Having now fully explained my invention and described the operation thereof, I claim—

5 1. The cut-off valve C, having the opening C', in which is arranged a loose block, C², substantially as specified.

2. The combination, with the slide-valve and its rod *d*, of the pitman D², provided with the 10 knocking-plates *d*², the sliding plate K, having the aperture through which said pitman passes, the lever K², connected with said plate and the collar of the governor, and the vibratory lever I, receiving motion from the piston- 15 rod, as described.

3. The combination, with the valve D and rod *d*, provided with collars *p p'*, of the re-

versing-lever mounted on the shaft *o'*, having an arm, P, arranged to strike said collars, substantially as described. 20

4. The combination, with the pitman C⁴, having an arm, *c*, provided with the pins *c'*, and the slotted vibratory lever I, having its lower end connected with the piston-rod, of the lever M, connected with said pitman C⁴ by interme- 25 diated devices for raising and lowering the same, substantially as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 23d day of April, 1881.

ALVIN A. STEWART.

Witnesses:

THORNTON THOMPSON,
WM. B. STEWART.