

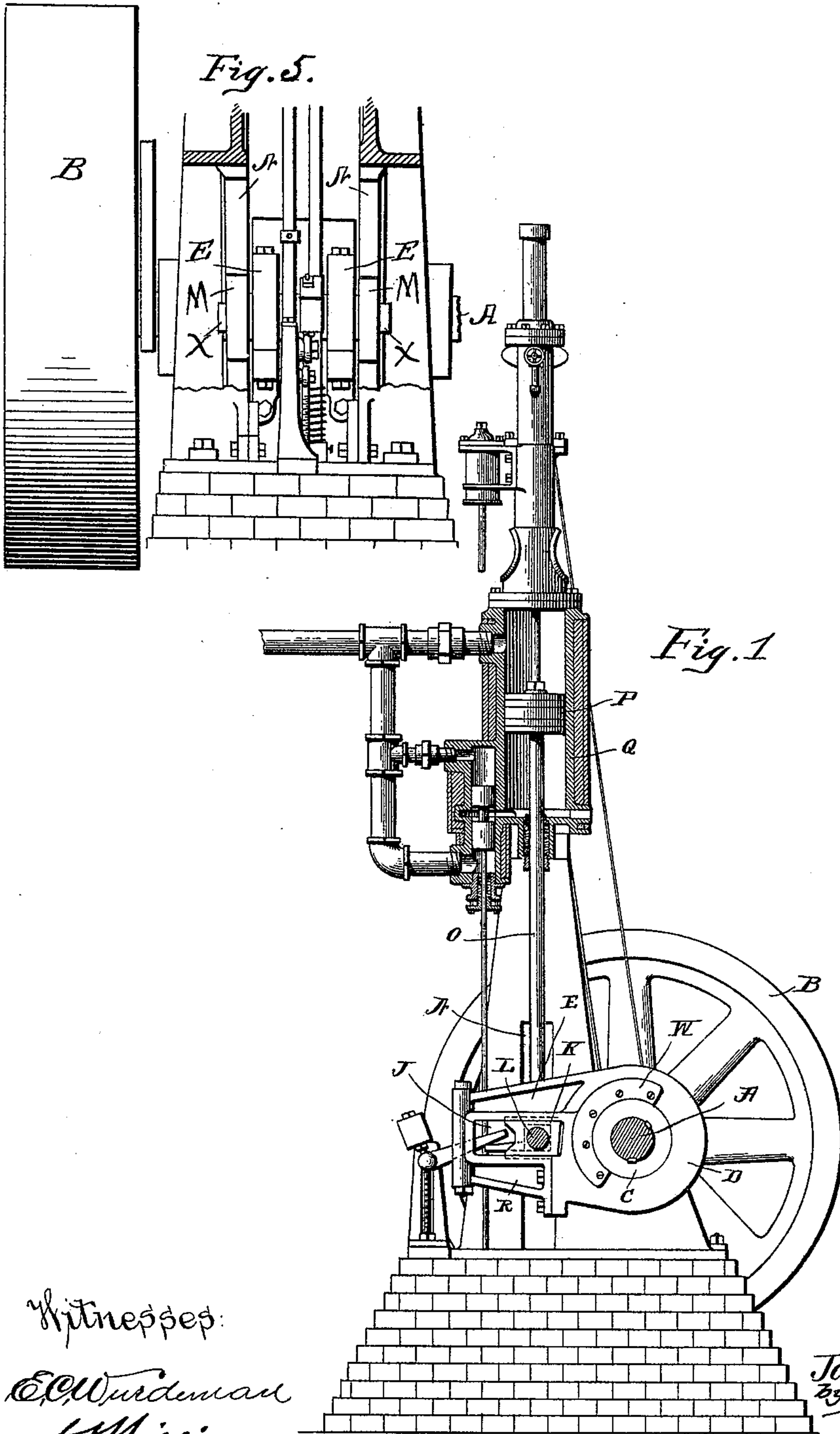
(No Model.)

2 Sheets—Sheet 1.

J. D. GRAY.  
CLUTCH FOR DIRECT ACTING ENGINES.

No. 582,819.

Patented May 18, 1897.



Witnesses:  
E. W. Wurdeman  
S. J. Williamson

Inventor  
James D. Gray  
by Geo. H. Holgate  
Attorney

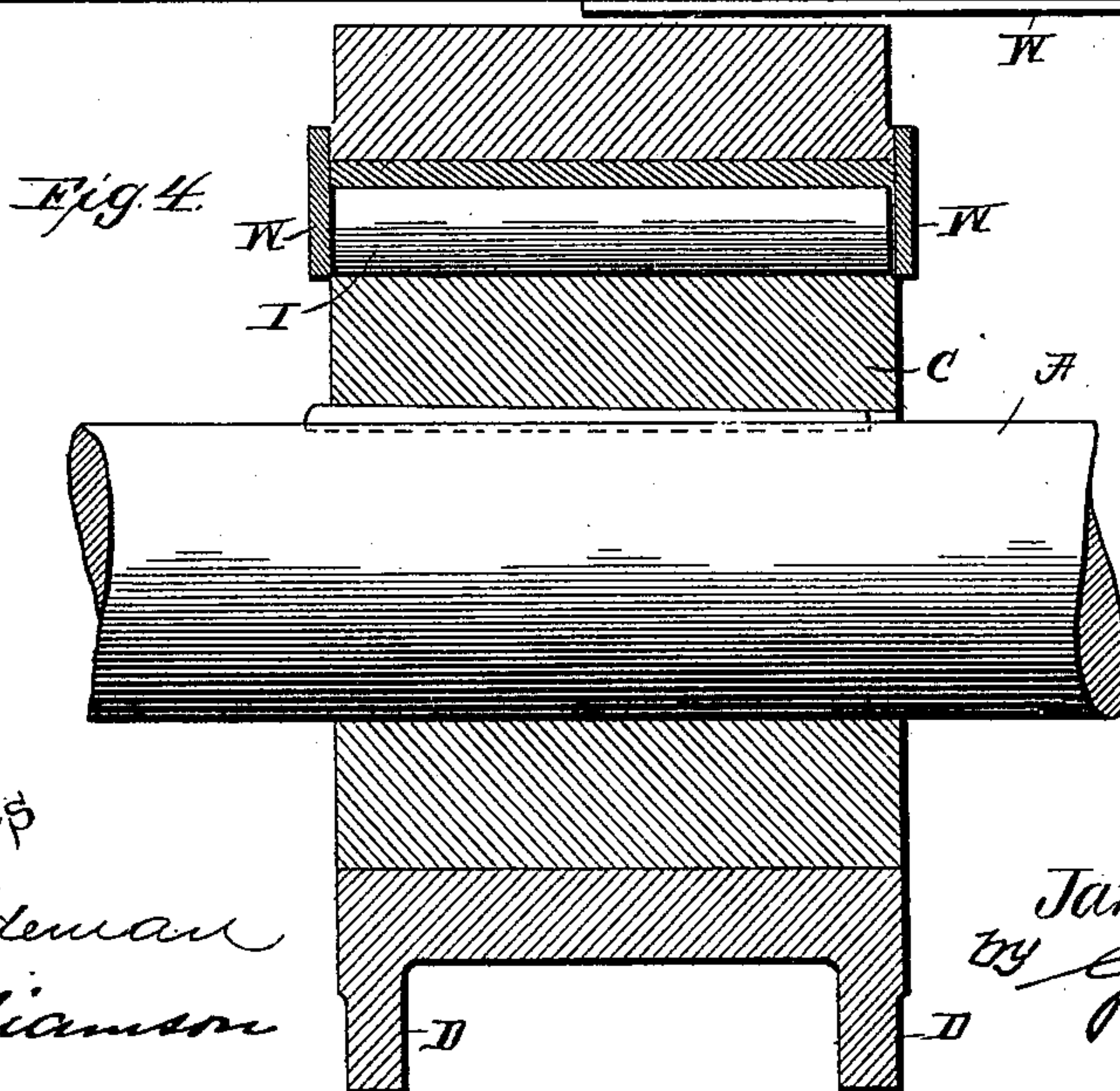
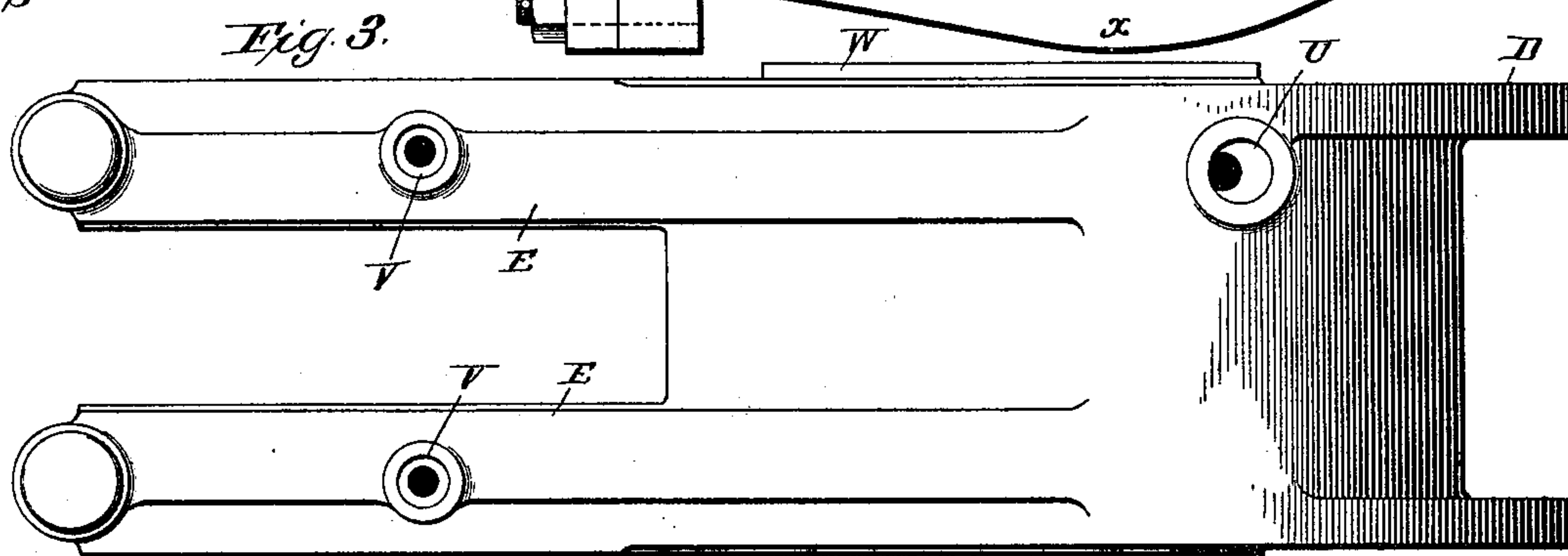
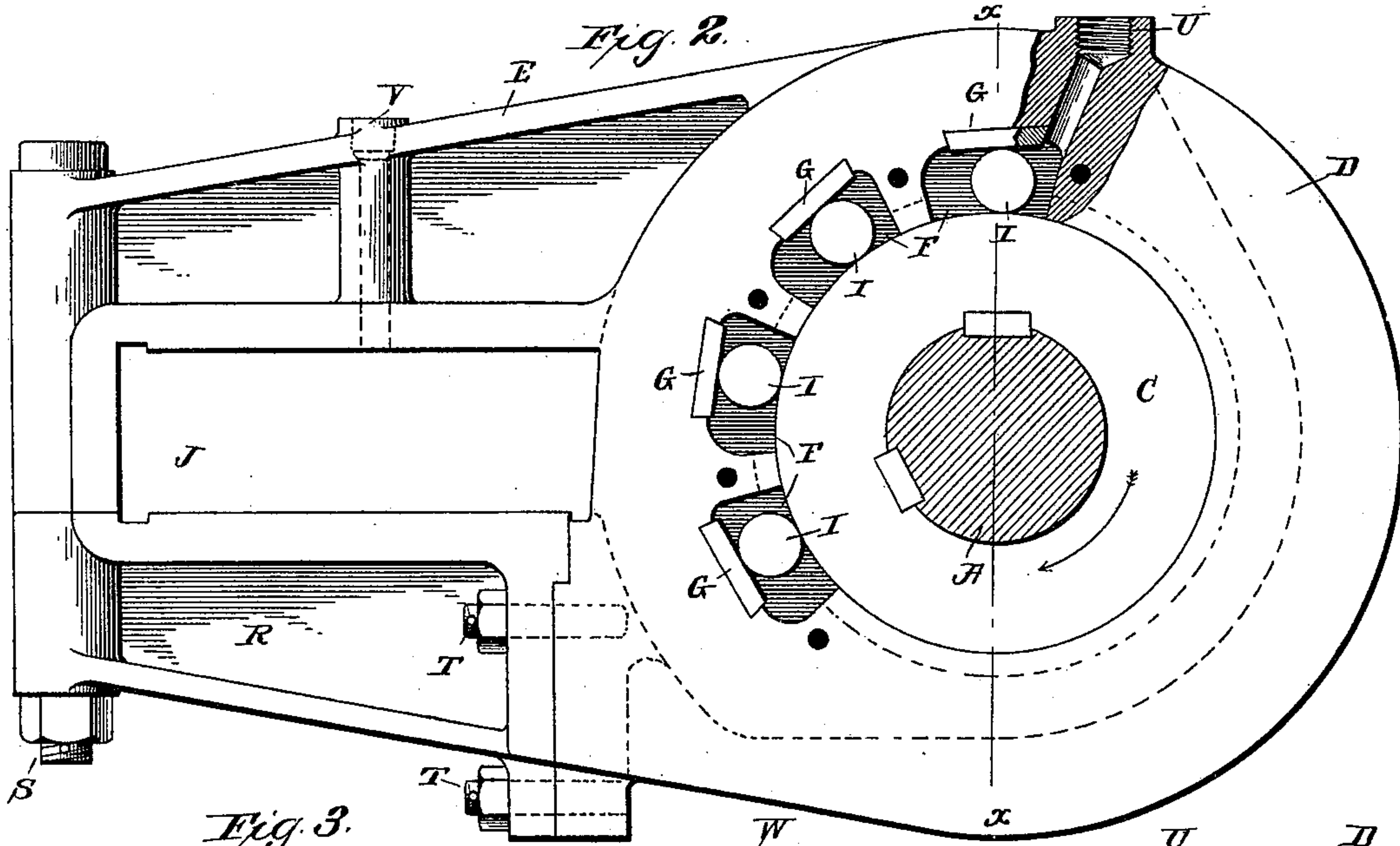
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# UNITED STATES PATENT OFFICE.

JAMES D. GRAY, OF BALTIMORE, MARYLAND, ASSIGNOR OF TWO-THIRDS  
TO WILLIAM B. PRICE AND ABRAHAM SHARP, OF SAME PLACE.

## CLUTCH FOR DIRECT-ACTING ENGINES.

SPECIFICATION forming part of Letters Patent No. 582,819, dated May 18, 1897.

Application filed June 30, 1896. Serial No. 597,521. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES D. GRAY, a citizen of the United States, residing in the city of Baltimore and State of Maryland, have invented certain new and useful Improvements in Clutches for Direct-Acting Engines, of which the following is a specification.

My invention relates to a new and useful improvement in direct-acting engines designed to utilize fluid under pressure for the development of mechanical power, and has for its object to provide a clutch mechanism for such an engine, and especially to improve upon the construction of clutch mechanism shown and described in Letters Patent No. 533,290, granted to me upon the 29th day of January, 1895; and with these ends in view my invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction and operation in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a central vertical section of an engine of the character above described, illustrating in elevation the arrangement of my improved clutch mechanism; Fig. 2, an enlarged elevation of the clutch mechanism, one of the caps being removed to clearly show the construction of the clutch; Fig. 3, a plan view of the clutch-arm, and Fig. 4 a section at the line *xx* of Fig. 2. Fig. 5 is a side view of the lower part of the engine with a portion of the frame broken away, showing the vertical guideway with its slippers in position.

In the drawings, A represents the main shaft, which is mounted in suitable bearings forming a part of the framework of the engine, and for ordinary uses this shaft has mounted thereon a fly-wheel B for perpetuating the momentum imparted thereto by the operations of the engine, thereby permitting the piston to dwell as long as this wheel continues to revolve at the predetermined rate of speed. Also secured upon this shaft by means of keys or otherwise is a clutch-block C, which is cylindrical in shape and of suffi-

cient length to provide the proper amount of surface for the gripping-rolls of the clutch.

The hub D of the clutch-arm E is fitted upon this block so as to revolve thereon or to permit said block to revolve therein, as the case may be, and within this hub are formed recesses F, which may be of any desired number. (Here shown as four.) The outer walls of the recesses are dovetailed and have fitted therein the hardened blocks G, which are set at a slight angle to the tangential line at right angles to the radius passing through the approximate center of each of the recesses, by which arrangement these recesses are given a slight tapering in the opposite direction from which the shaft is to be revolved.

A series of hardened rolls I are located within the recesses, and their diameters are somewhat less than the space intervening between the perimeter of the clutch-block and the flared ends of the blocks G, but greater than the distance between said clutch-blocks and the inner ends of the blocks G, the result being that when the clutch-hub is moved in the direction of the arrow thereon the roll will be bound tightly against the clutch-block by the cam action of the incline-blocks G, but when the clutch-hub is moved in the opposite direction the rolls will be freed from binding contact with the clutch-block, thereby permitting this reverse movement of the clutch-hub without affecting the shaft upon which the clutch-block is secured; but when the shaft is in motion and the clutch-hub at rest said hub will not be affected by this rotation, since the rolls will have a tendency to move toward the flared ends of the recesses, as will be readily understood. The clutch-arm is bifurcated, each member of which is slotted, as indicated at J, and within these slots are fitted to slide the slippers K, in which latter is journaled the cross-head L, said head being provided with the extensions X, upon which are fitted the slippers M. The slippers M in turn are fitted to slide within the guideways N, formed in the uprights of the engine-frame, so that when the piston-rod O, which carries the cross-head, is reciprocated the cross-head will be caused to move in a vertical line while imparting an oscillatory movement to the clutch-arm. From this it will be seen that



when the piston-rod is moved upward by the action of the compressed fluid against the piston P within the cylinder Q the main shaft will be caused to revolve in the direction of the arrow, and when the piston reaches the limit of its upward movement it may there dwell while the shaft continues to revolve by the momentum previously imparted to the fly-wheel, and when the revolutions of said fly-wheel have decreased below the predetermined rate the downward movement of the piston may be brought about by suitable mechanism, (not here shown or described,) and this downward movement will be permitted by the slipping of the clutch upon the clutch-block; but when said piston again starts upward the clutch will again take hold of the clutch-block and impart additional energy to the fly-wheel.

In order that the slippers K may be inserted within their respective slots J, a portion R of each of the bifurcated members of the clutch-arm is made separate from said member and secured in place by the bolts S and T. The clutch-block and rolls may be lubricated through a suitable gland U, and also the slippers K may be lubricated through glands V. When this form of clutch is used in conjunction with the class of engine described in the aforesaid patent, the kinetic force imparted to the piston will be transmitted directly to the main shaft without loss by decrease of leverage incident to the turning of the clutch-arm about the axis of said shaft, in that the cross-head is caused to move in a vertical line, and therefore increases its leverage upon the shaft in direct proportion to the angles assumed by the clutch-arm in passing through the several sines of the arc through which the arm oscillates. The rolls are prevented from being displaced sidewise by suitable caps W, secured to the faces of the hubs D, and this arrangement also prevents dust or other foreign matter from gaining access to the recesses in which the rolls are located.

I will not here enter into any detailed description of the cylinder and valve mechanism, governor, and cut-off for bringing about the proper movements of the piston, as they form no part of this invention and are described and claimed in the other applications filed by me.

Having thus fully described my invention, what I claim as new and useful is—

1. In combination with an engine of the

character described, a main shaft suitably mounted within the framework, a clutch-arm arranged to oscillate about the axis of said shaft, rolls located within the hub of said arm and adapted to revolve the shaft when moved in one direction, but to slip thereon when moved in the opposite direction, a cross-head carried by the piston-rod, slippers journaled upon said head and adapted to slide within suitable slots formed in the clutch-arm, and slippers also carried by the cross-head adapted to slide within suitable guideways formed in the frame of the engine, parallel with the movement of the piston-rod, substantially as and for the purpose set forth.

2. In combination with the main shaft of an engine of the character described, a cylindrical block secured upon said shaft, a clutch-arm fitted to turn upon said block or to permit said block to turn therein, said arm having tapering recesses formed therein, rolls fitted within said recesses and adapted to grip the cylindrical block when the arm is moved in one direction, but release their hold thereon when the arm is moved in the opposite direction, a cross-head carried by the piston-rod, two slippers K, adapted to slide within suitable slots formed in the clutch-arm and slippers M, also carried by the cross-head and adapted to slide within the guideways N, formed in the frame of the engine, substantially as and for the purpose set forth.

3. The herein-described combination of the main shaft A, the clutch-block secured thereon, the hub D, fitted to revolve upon said block or permit the block to revolve therein said hub having recesses formed therein, hardened blocks G, set within said recesses at an incline, rolls located within said recesses, a bifurcated arm formed with the hub, detachable portions R, secured to said arm, a cross-head carried by the piston-rod of the engine, slippers K, journaled upon said head and adapted to slide within suitable slots formed within the arm and slippers M, also carried by the cross-head and adapted to slide within the guideways N, substantially as and for the purpose set forth.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

JAMES D. GRAY.

Witnesses:

S. S. WILLIAMSON,  
R. BRENT WALLING.

