

No. 831,822.

PATENTED SEPT. 25, 1906.

E. H. BOOCOCK.
STEAM ENGINE.

APPLICATION FILED JAN. 15, 1906.

2 SHEETS—SHEET 1.

FIG. 1

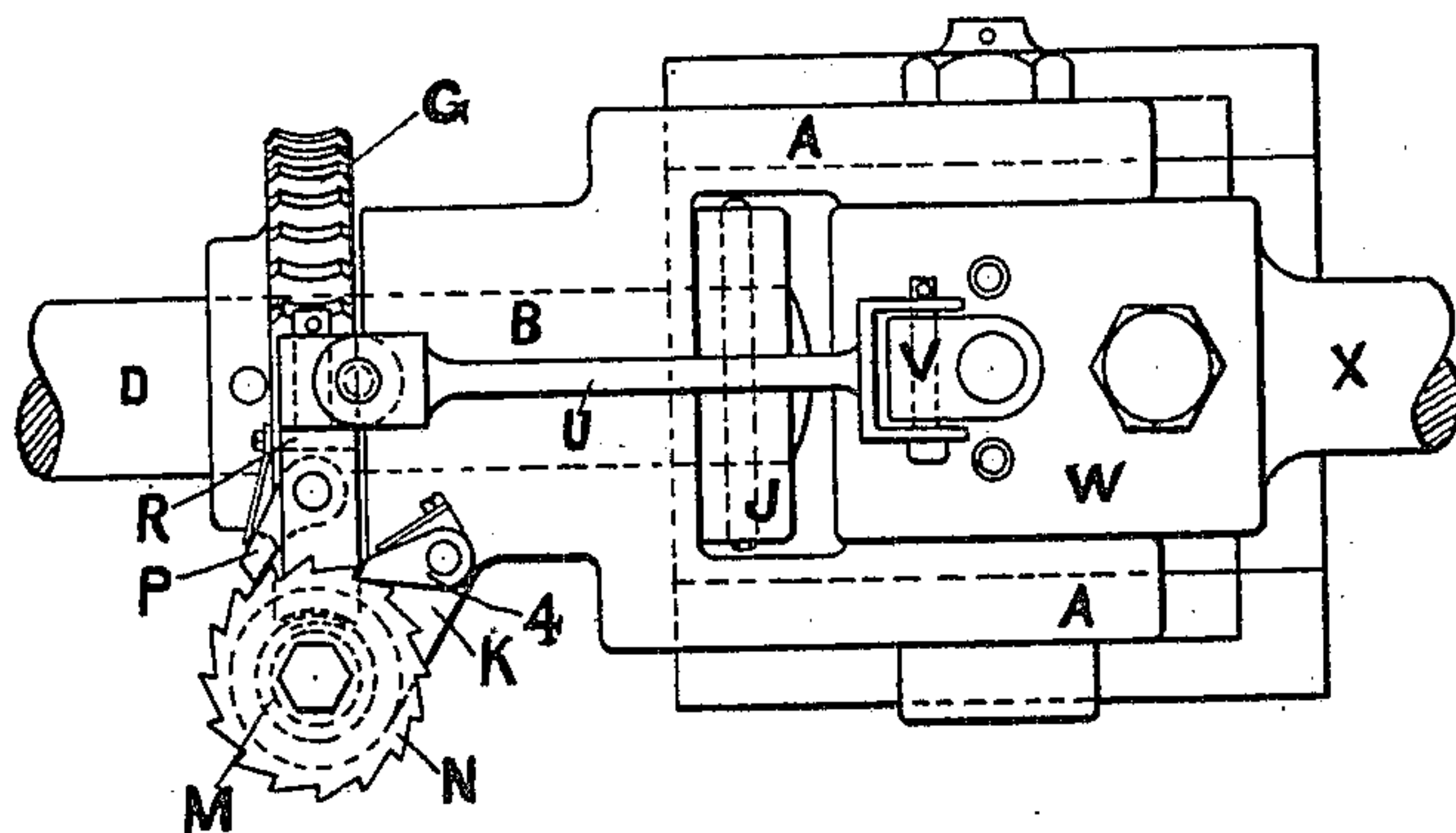
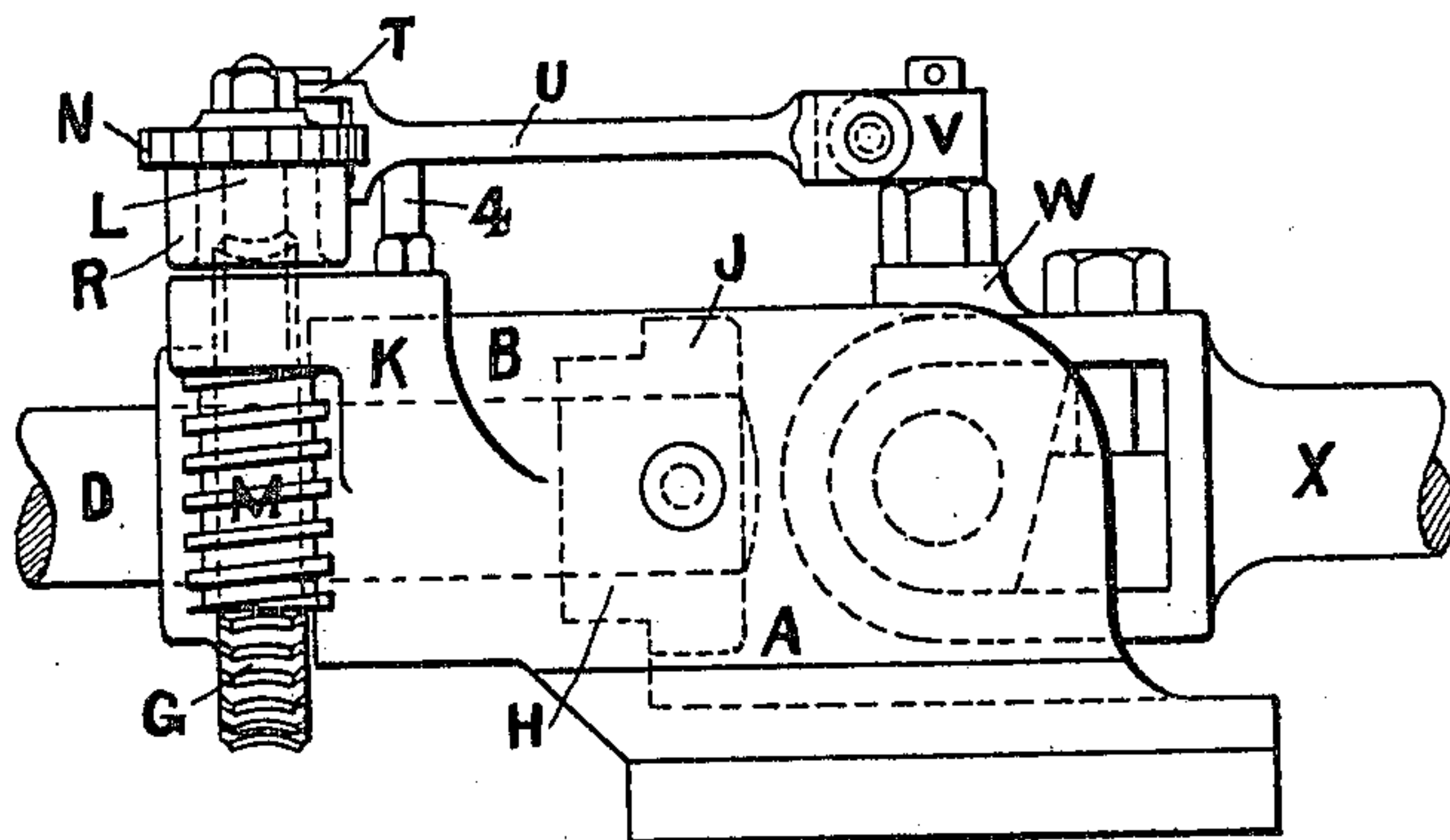


FIG. 2.



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 3.

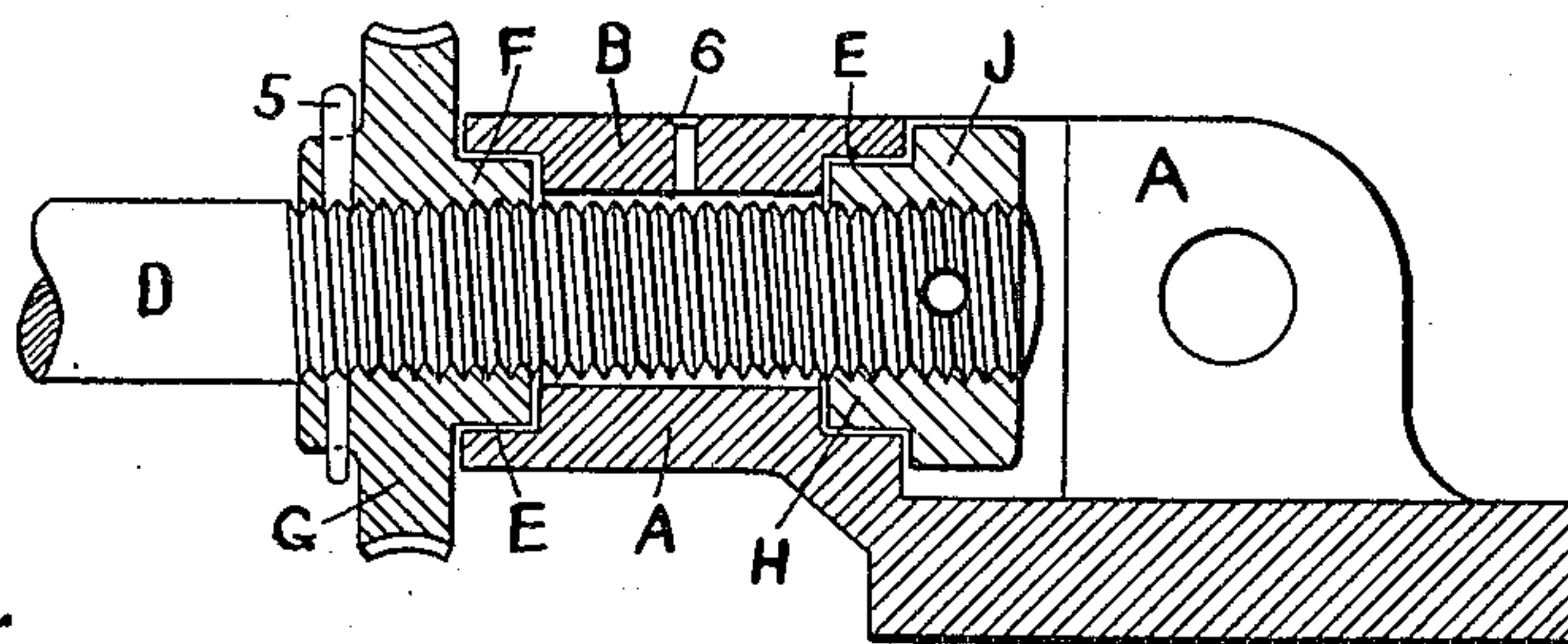


FIG. 5.

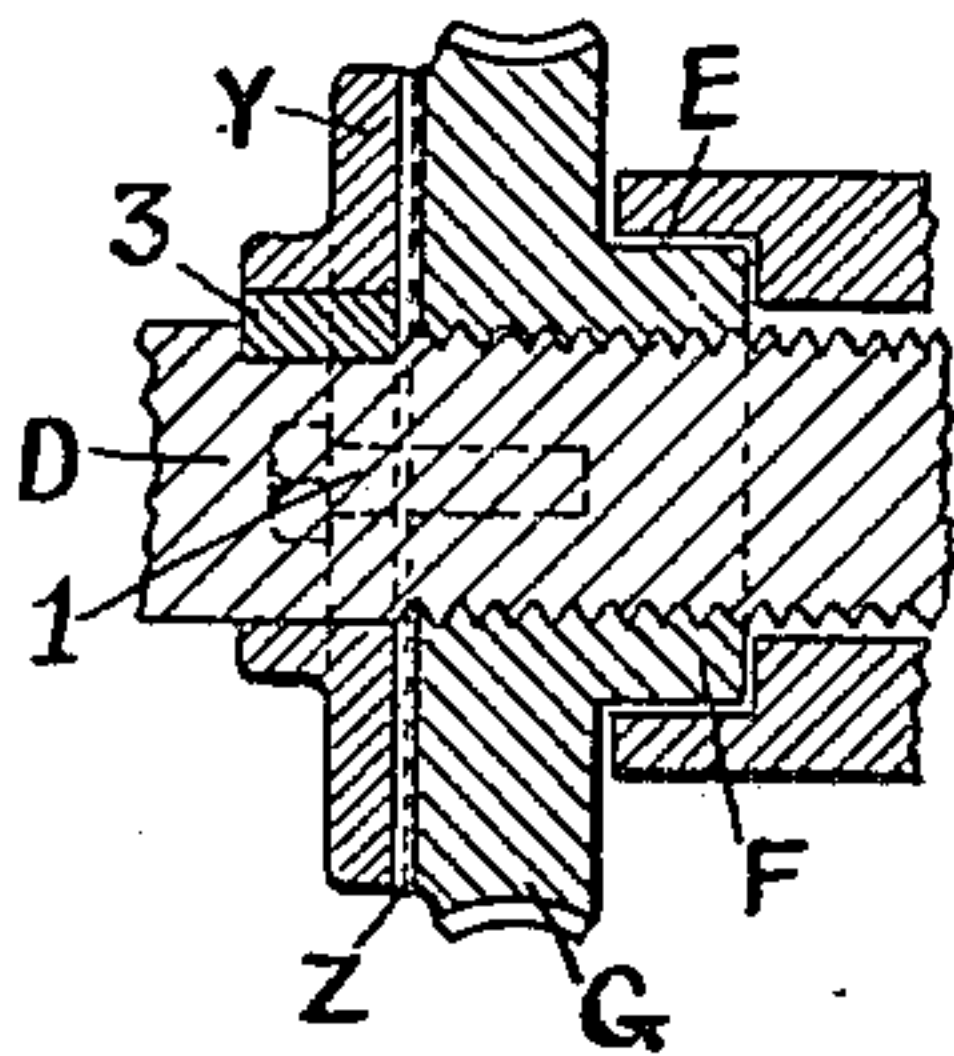


FIG. 6.

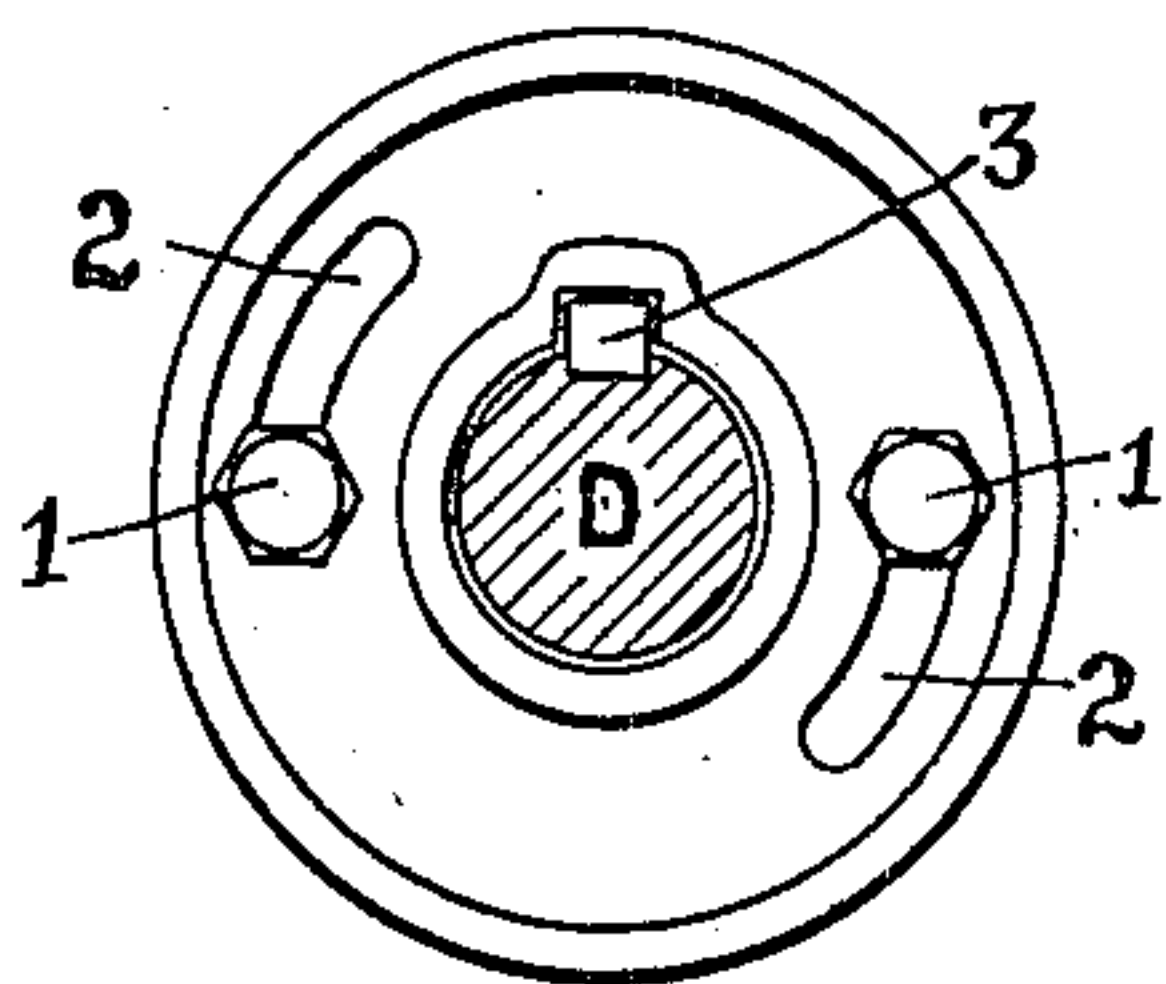
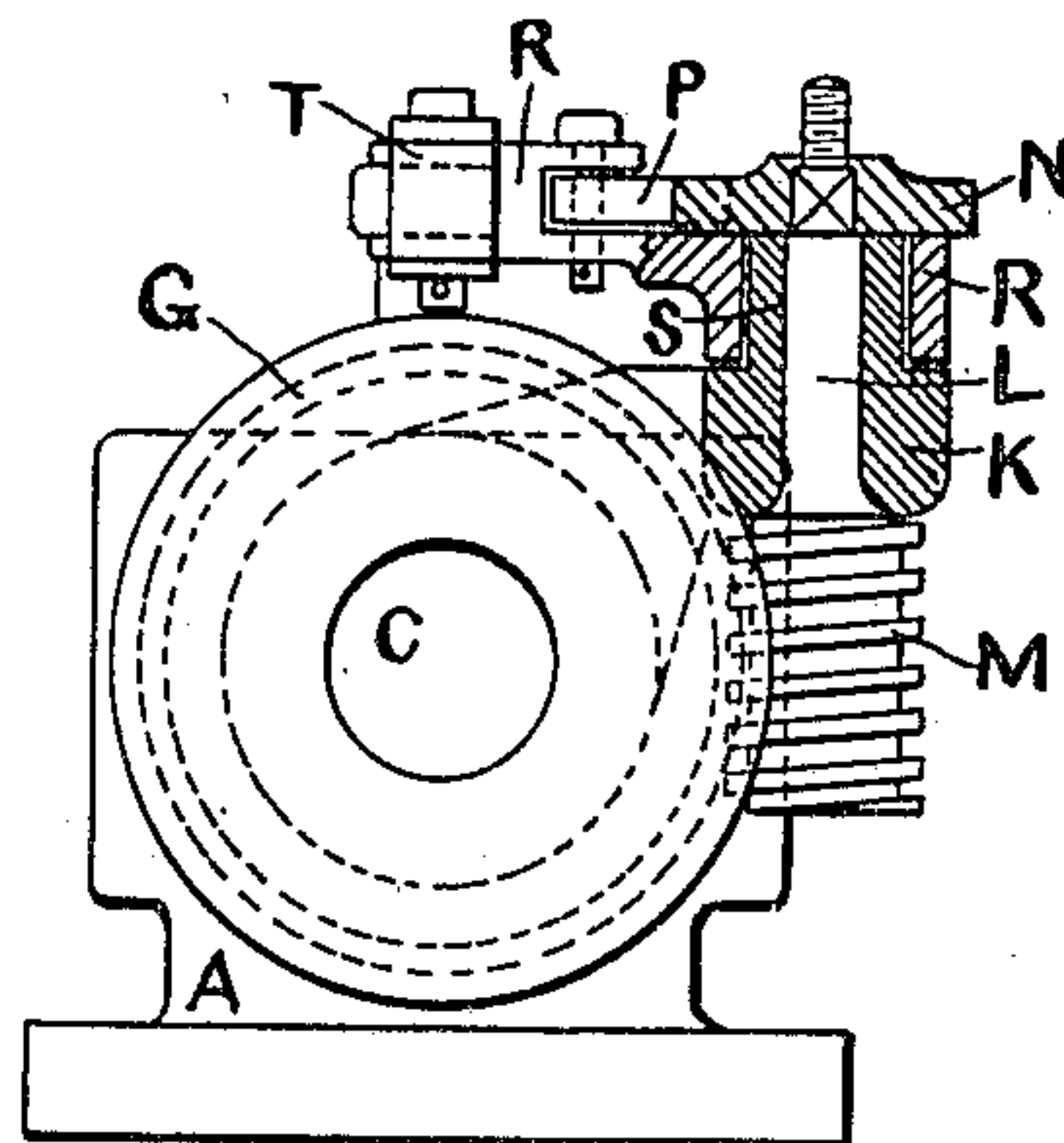


FIG. 4.



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UNITED STATES PATENT OFFICE.

EDWARD HANSON BOOCOCK, OF WEST VALE, ENGLAND.

STEAM-ENGINE.

No. 831,822.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed January 15, 1906. Serial No. 296,130.

To all whom it may concern:

Be it known that I, EDWARD HANSON BOOCOCK, a subject of the King of Great Britain, residing at West Vale, in the county of York, England, have invented certain new and useful Improvements in Steam and other Engines, Pumps, and the Like, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates particularly to pistons and piston-rods of reciprocating steam-engines, but may be applied to similar gas or oil engines or to pumps or any other appliance or mechanism in which a reciprocating piston and piston-rod or the like is employed; and the object of the invention is to simplify the mechanism for giving the piston and piston-rod a rotary movement in addition to the usual reciprocating movement, also to employ a more effective means for securing the piston to the cross-head and for securing and adjusting the worm-wheel to and upon the piston-rod; and with these and other objects in view the invention consists in the construction, combination, and arrangement of the parts hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of our improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a plan of cross-head, showing piston and connecting-rod connections with my improvements applied. Fig. 2 is a side elevation of Fig. 1. Fig. 3 is a sectional side elevation of cross-head with my improvements applied. Fig. 4 is an end elevation of cross-head with my improvements applied. Fig. 5 is a sectional elevation of part of my improvements, showing means for adjusting and fixing the position of the worm-wheel upon the piston-rod in case of wear. This method is especially suitable for powerful engines; and Fig. 6 is an end view of Fig. 5.

In order to accomplish the objects of this invention, I give a rotary motion to the piston and piston-rod in addition to and simultaneous with the ordinary reciprocating motion, the mechanism for which is actuated by the vertical oscillation of the connecting-rod of the engine.

In my invention I form the cross-head A with an arm B upon that side nearest the cylinder. This arm has a central hole C,

through which is passed the end of the piston-rod D, which is screwed or threaded at this part. Also, in addition to the hole aforesaid, there is provided an annular recess E upon each end of the said arm B. In one recess fits the boss F of a worm-wheel G, keyed or otherwise secured upon the piston-rod, and in the other fits the boss H of a nut J. This nut J, screwing onto the end of the piston-rod D, secures the same to the cross-head A. Both the wheel G and nut J revolve with the piston-rod, and the recesses aforesaid serve as bearing-surfaces for both. The aforesaid arm B has also a projecting wing or bearing K, supporting a vertical shaft or stud L, upon which is a worm M, gearing with the worm-wheel G aforesaid. At the other end of this stud L is secured a ratchet-wheel N, operated by a pawl P and lever R. This lever R pivots upon the boss S of the bearing K and is connected by means of a link U, having a yoke-shaped coupling T, with a similar coupling V, mounted upon the head W of the connecting-rod X, attached to the cross-head A.

The action is as follows: The vertical oscillation of the connecting-rod X of engine gives a backward and forward movement to the link U and couplings T V aforesaid, operating the lever R and pawl P, which moves the ratchet-wheel N one tooth at each backward stroke of the connecting-rod X. The operation of the ratchet-wheel N gives a corresponding movement to the worm M and worm-wheel G, and the latter being fast upon the piston-rod D rotates the same and piston accordingly, the piston and rod making, preferably, one complete revolution for every two hundred revolutions of the crank-shaft, or this may be varied, as desired.

For large and powerful engines where the bearing-surfaces of the worm-wheel and nut are liable to wear, and in order to compensate for such wear, I preferably secure the worm-wheel G upon the piston-rod D by means of a toothed or serrated disk or clutch Y, (see Figs. 5 and 6,) said teeth Z of clutch engaging with a corresponding surface formed upon the side of the worm-wheel G. This clutch is secured to the worm-wheel G by bolts or set-screws 1 within radial slots 2 and upon operation of the wheel G rotates the piston and piston-rod by means of key 3.

The adjustment in case of wear is effected by slackening the set-screws 1. The slots 2 enable the clutch to be turned, simultaneously moving the worm-wheel upon the thread of

the piston-rod until its boss is in contact with its bearing-surface within the recess aforesaid. The set-screws are then tightened, clamping the clutch and worm-wheel together and the adjustment completed.

6 is a hole for lubricating the bearings.

For light engines the worm-wheel may be secured by cotter-pin 5. (See Figs. 1, 2, and 3.)

10 The catch 4 is provided in order to prevent oscillation or backward movement of the ratchet-wheel and shaft.

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

15 1. In a steam-engine, a cross-head, a connecting-rod connected therewith, a piston-rod rotatably connected with the cross-head, a worm gear-wheel secured to the piston-rod, and devices operated by the cross-head and connecting-rod and operating in connection with said worm gear-wheel for rotating the piston-rod, substantially as shown and described.

25 2. In a steam-engine, a cross-head, a connecting-rod connected therewith, a piston-rod rotatably connected with the cross-head, a worm gear-wheel secured to the piston-rod, a worm supported adjacent to said gear-wheel and meshing therewith, a ratchet-wheel connected with said worm-gear, and devices operated by the cross-head and connecting-rod and operating in connection with said ratchet-wheel for turning said worm-gear and rotating the piston-rod.

35 3. In a steam-engine, a cross-head provided with an arm having a central longitudinal

bore, a piston-rod one end of which passes through said bore, said bore being provided at each end with an annular enlargement, a nut secured on the end of the piston-rod and provided with a boss which fits in one of said enlargements, a worm gear-wheel secured to the piston-rod and provided with a boss which fits in the other enlargement, and devices operated by the cross-head and connecting-rod and operating in connection with said worm gear-wheel for rotating the piston-rod.

4. In a steam-engine, a cross-head provided with an arm having a central bore provided at each end with an annular enlargement, a piston-rod which passes through said bore, a nut connected with one end of said rod and provided with a boss which fits in one of said annular enlargements, a worm gear-wheel secured to said rod and provided with a boss which fits in the other annular enlargement, a worm-gear supported adjacent to said worm gear-wheel and meshing therewith, a ratchet-wheel connected with said worm-gear, and devices operated by the cross-head and connecting-rod and operating in connection with said rod for turning said worm-gear and rotating said piston-rod.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 2d day of January, 1906.

EDWARD HANSON BOOCOCK.

Witnesses:

FRED HAMMOND,
W. H. KENNARD.