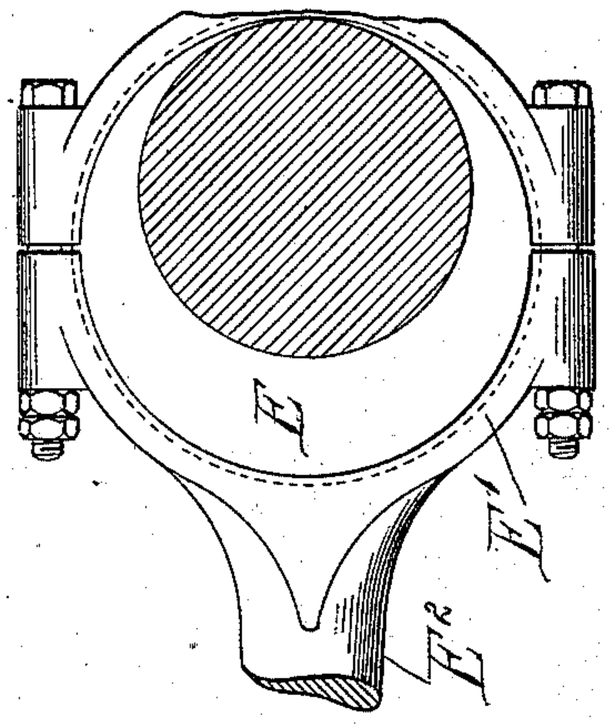
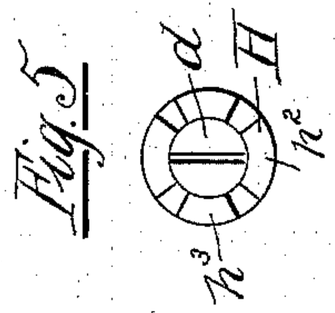
(No Model.)

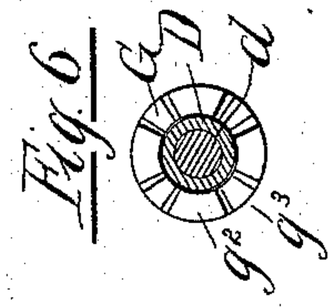
G. ALDERSON.

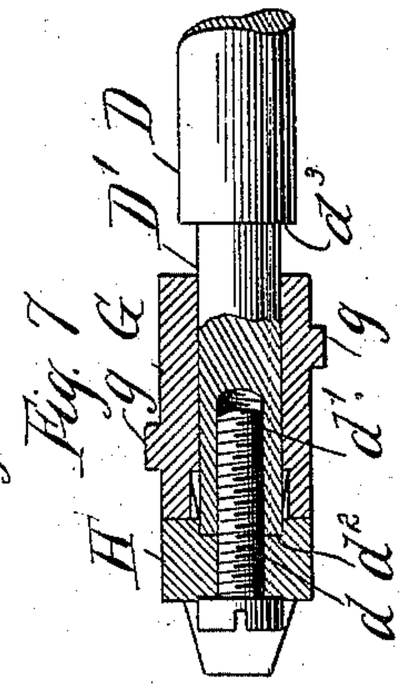
VALVE ACTUATING MECHANISM.

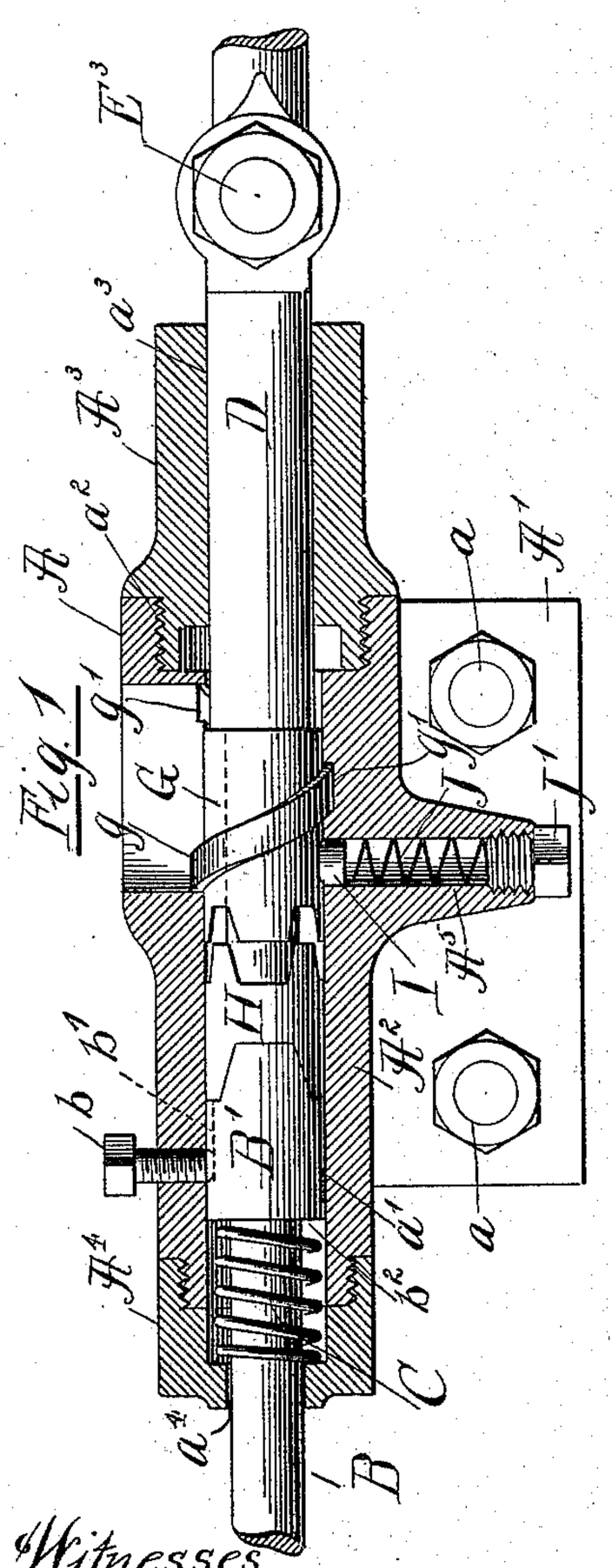
No. 573,194. Patented Dec. 15, 1896.

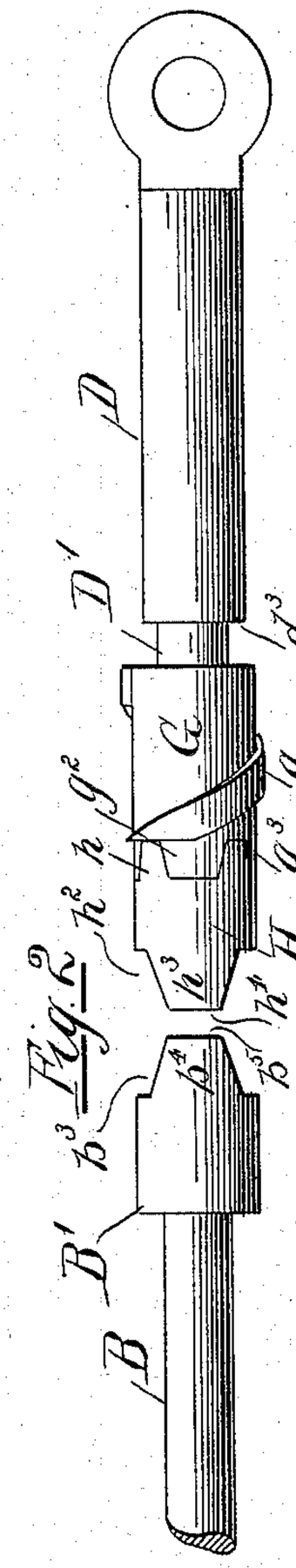


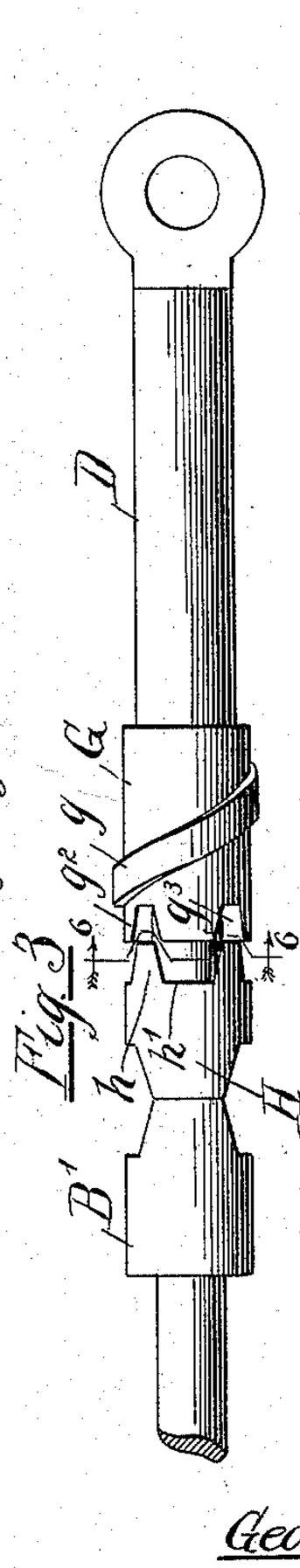


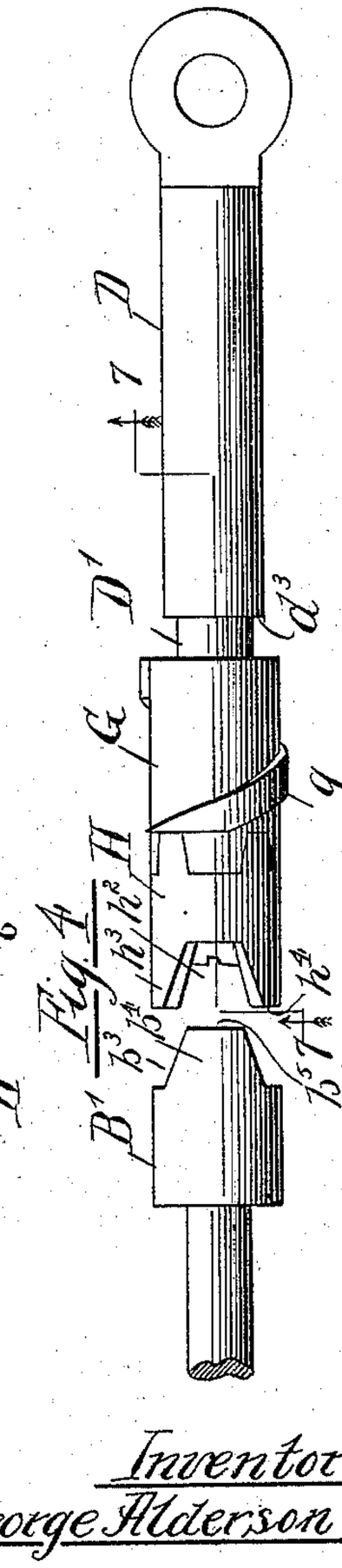












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UNITED STATES PATENT OFFICE.

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VALVE-ACTUATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 573,194, dated December 15, 1896.

Application filed May 4, 1896. Serial No. 590,124. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ALDERSON, of La Salle, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Valve-Actuating Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in valve-actuating mechanism for gas, steam, or other engines, and refers more specifically to a valve-actuating mechanism having an alternating movement or which actuates the valve only upon certain strokes of the piston.

The object of the invention is to provide a simple, compact, and extremely reliable and durable mechanism; and the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims.

The invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a view in side elevation of my improved valve-actuating mechanism, the journal-box within which the mechanism is mounted being shown in axial section and the actuating-rod and parts carried thereby being shown at the limit of their forward throw, the parts being in this position at the end of the idle or non-actuating stroke. Fig. 2 is a similar view of the valve-actuating mechanism, the bearing-box being omitted, the actuating mechanism being shown at the opposite or rearward limit of its throw and in the position assumed in the next movement succeeding its non-actuating forward throw. Fig. 3 is a similar view showing the actuating-rod and parts carried thereby again at the limit of the forward throw and the parts in the position assumed when the valve is actuated. Fig. 4 is a view similar to that of Fig. 2, but with the parts in the changed position assumed at the end of the throw succeeding the actuating forward throw. Fig. 5 is a front end elevation of the thrust-head. Fig. 6 is a transverse sectional view taken on line 6 6 of Fig. 3. Fig. 7 is an axial section of the thrust-head and actuating-sleeve and the forward end of the connecting-rod upon which said parts are mounted.

The invention is herein shown as embodied in a construction especially adapted for actuating the exhaust-valve of a gas or vapor engine of that type wherein the said valve is held closed during every other or alternate outstroke of the piston; that is to say, the exhaust-valve is held open during the back stroke of the piston next succeeding its outward power-stroke under the impulse of an explosion, and is held closed during the next outward and inward strokes of the piston while a new charge of vapor is being drawn into the cylinder and compressed therein, respectively, and also, of course, during the outward power-stroke following the explosion of the charge, so that the valve remains closed at least during three-fourths of the time.

Referring to the drawings, A designates as a whole a tubular journal-box which is suitably secured in proper position upon the engine-frame so as to stand with the axis of its tubular bore parallel with the line of movement of the exhaust-valve of the engine. Conveniently, and as herein shown, said journal-box is secured in position by means of bolts $a\ a$, inserted through a depending integral web A′ and into a suitable part of the engine-frame. The housing A comprises a central main portion A^2, provided with a cylindrical bore a', extending therethrough, an end section A^3, united with the central main section A^2 by means of a screw-threaded joint a^2, and also provided with a cylindrical bore a^3, arranged in axial alinement with the bore of the part A^2, and an end-closing cap A^4, threaded upon the opposite end of the part A^2, said cap having a central end aperture a^4, through which enters the valve-rod B.

B′ designates a cylindric tappet-head rigidly mounted upon the inner end of the valve-rod B and adapted to reciprocate within the tubular journal-box, but which is held from rotary movement by means of a set-screw b, inserted radially through the journal-box and engaging at its inner end with a keyway b', formed in said tappet-head B′.

The valve-rod B is of somewhat less diameter than the interior diameter of the jour-

nal-box, so that a shoulder b^2 is provided at the junction of said rod with the tappet-head, and between this shoulder b^2 and the inner end surface of the end-closing cap A^4 and surrounding the valve-rod B is a coil-spring C, which serves to hold the valve-rod normally at the inward limit of its throw, or in that position in which the exhaust-valve is held closed. The limit of movement of the valve-rod B, under the action of the spring C, may be determined by the contact of the end of the keyway b' with the set-screw b, as herein shown, or the valve itself may be provided with any suitable stop, as preferred.

D designates as a whole an actuating or thrust rod mounted to reciprocate endwise within the tubular bore A, said rod being shown in this instance as actuated from an eccentric E, mounted upon the main counter-shaft of the engine and from which reciprocatory movement is transmitted to the rod D through the medium of the usual eccentric-strap E′ and eccentric-rod E^2, which latter is pivotally connected at its end with the end of said rod B by means of a pivot-bolt E^3.

The inner end of the actuating-rod D is provided with a reduced portion D′, of suitable length, upon which is mounted to slide loosely a cylindric sleeve G. The sleeve G has spiral screw-threaded engagement with the interior of the journal-box, in the present instance by means of a thread g, formed upon the exterior of the collar which engages a corresponding thread g', formed in the interior of the cylindric part of the journal. The pitch upon which this thread g is formed is such with relation to the length of the throw which is imparted to the collar G by the movement of the actuating-rod D as to rotate said collar G exactly one-fourth of a revolution upon each reciprocation of said part. H designates a second tappet or thrust head mounted upon the inner end of the rod D by means of a screw-bolt d, which is inserted axially through said tappet-head H, closely in contact with the end d^2 of the actuating-rod D, so as to prevent endwise movement of said tappet-head with relation to the actuating-rod, but to permit it to rotate freely upon the screw-bolt.

The proximate ends of the tappet-head H and the collar G are provided with alternate teeth and notches $h\,h'$ and $g^2\,g^3$, respectively, which are adapted to intermesh and lock said parts from rotation with relation to each other when they are brought together. The length of the reduced portion d' is somewhat greater than the length of the sleeve G, so that the latter may move into and out of mesh with the tappet-head H during the reciprocatory movement of the actuating-rod, the reduced portion terminating in a shoulder d^3 at the junction of the latter with the main part of the rod, which determines the amount of lost motion or sliding movement of the sleeve G upon said reduced part d'. The forward end of the tappet-head H and the proximate end of the tappet-head B′ are also provided with alternate recesses and notches $h^2\,h^3$ and $b^3\,b^4$, respectively, which are adapted to intermesh when the parts are brought into certain relation with each other. Each tappet-head is provided with but two projections or teeth, located in diametrically opposite relation to each other, as $b^4\ b^4$ and $h^3\ h^3$, respectively, and, consequently, with two diametrically opposite intervening notches, the notches of each tappet-head being of such width and conformation as to exactly accommodate the teeth of the opposite tappet-head when the latter is turned in position to register therewith. Preferably, and in the present construction, the teeth will be made tapering and of truncated conical form, as shown, and the depth of the recesses or the length of the teeth will be equal to the full throw of the valve-rod. The end faces b^5 and h^4 of the tappet-heads B′ and H, respectively, will be made of considerable width circumferentially, so that when the tappet-head H is turned a quarter-turn in either direction from the position in which the teeth and notches register with each other the end faces of said teeth will abut squarely against each other.

The operation of the device as thus constructed is as follows: Assuming the parts to be in the position as shown in Fig. 1, in which the interfitting parts of the tappet-heads B′ and H are in mesh with each other and the valve is closed, upon the first retractive movement of the actuating-rod B the teeth h of the tappet-head H will be carried into mesh with the notches g^3 of the collar G. As soon as the part H is carried fully into contact with the collar G the latter will be carried backward, along with the actuating-rod, and, by reason of its spiral screw-threaded engagement with the interior of the journal-box, will be caused to rotate, thereby rotating the tappet-head H, the latter having in the meantime been retracted sufficiently to permit it to turn without interference with the teeth of the tappet-head B′. As hereinbefore stated, the length of the throw of the actuating-rod D is such as to rotate the collar G exactly a one-quarter turn during its entire stroke, thus carrying the parts into the position shown in Fig. 2. Upon the next return or forward movement of the actuating-rod the frictional engagement of the screw-threads of the collar G with the bearing-box will prevent it from moving forward until the actuating-rod has carried the teeth of the tappet-head H out of mesh with those of the collar, this movement being obviously permitted by the lost motion provided between the end of the collar G and the annular shoulder d^3. The tappet-head H will therefore be carried forward in exactly the position in which it was left at the end of the previous back stroke, and its teeth or projections h^3 will therefore be in position to contact with the teeth b^4 of the tappet-head B′. The length of the throw of the actuating-rod D

being in this instance the same as before, the valve-rod B will obviously be carried back the full length of its throw, corresponding in the present instance to the length of the teeth b^4. Upon the next backward movement the tappet-head H will be again carried into mesh with the collar G, and thereby again rotated a second quarter-turn, thus bringing the parts into the position shown in Fig. 4, and at the end of the next forward movement the parts will again be in the position in which they started, or that shown in Fig. 1.

In order that the collar G may remain accurately in the position in which it is left by the throw of the rod D in either direction and to prevent its movement by momentum after the rod has ceased to move, I preferably provide a friction device consisting in this instance of a small bearing-plug I, arranged within a chamber A^5, extending axially through one side of the bearing, and which plug is held in engagement at its inner end with the cylindric collar G by means of a spiral coil-spring J interposed between the end of the plug and a screw-plug J′, which serves to close the end of the chamber A^5.

While I have herein described a preferred embodiment of my invention, yet it will be obvious that the details thereof may be varied to a considerable extent without departure from the invention and without involving more than ordinary mechanical skill. For instance, the length of the throw of the actuating-rod or the pitch of the thread of the collar may be varied and the meeting parts of the several tappet members changed so that a different part of a revolution is performed upon each stroke, or so that the actuating-rod may make a plurality of idle strokes between each actuating stroke.

Various other modifications will readily occur to those skilled in the art. Such modifications I claim as within the scope of my invention, and I do not therefore wish to be limited to the precise details shown herein, except as made the subject of specific claims.

I claim as my invention—

1. A valve-actuating mechanism comprising a reciprocatory actuating member, a tappet member rotatively mounted and reciprocating with said actuating member, an engaging part upon said tappet member adapted to be brought into and out of register with a corresponding part connected with the valve by rotation of the tappet member, and means operated by the movement of the actuating member for rotating said tappet member during the throw of the actuating member, consisting of a collar rotatively mounted on said actuating member and adapted to engage the tappet member.

2. A valve-actuating mechanism, comprising a reciprocatory actuating member, a tappet-head rotatively mounted upon said actuating member, an engaging part upon said tappet-head adapted to be brought into and out of register with a corresponding part connected with the valve, and means for rotating said tappet-head during the throw of the actuating member, comprising spiral screw-threaded connections between a rotative part reciprocating with the actuating member and a fixed part of the bearing.

3. A valve-actuating mechanism, comprising a bearing, a reciprocatory actuating member mounted therein, a tappet-head rotatively mounted on said actuating member, an engaging part on said tappet-head adapted to be brought into and out of register with a corresponding part connected with the valve, and means for rotating said tappet-head during the throw of the actuating member, comprising a sleeve-section loosely mounted upon the actuating member and having screw-threaded engagement with a fixed part of the bearing, and means for intermittently locking said tappet-head and the sleeve-section so as to rotate together.

4. A valve-actuating mechanism, comprising a bearing, a reciprocatory actuating member mounted therein, a tappet-head rotatively mounted upon said actuating member, an engaging part upon said tappet-head adapted to be brought into and out of register with a corresponding part connected with the valve-actuating mechanism, and means for rotating said tappet-head during the throw of the actuating member, comprising a sleeve-section loosely mounted upon the actuating member and having screw-threaded engagement with the bearing, said collar-section being movably mounted upon the reciprocatory actuating member so as to have a limited endwise movement thereon, and the proximate ends of the collar and tappet-head being provided with interlocking parts, whereby the tappet will be rotated only during the retractive movement of the actuating member.

5. A valve-actuating mechanism, comprising a bearing, a reciprocatory actuating member mounted therein, a tappet-head rotatively mounted upon said actuating member, an engaging part upon said tappet-head adapted to be brought into and out of register with a corresponding part connected with the valve-actuating mechanism, and means for rotating said tappet-head during the throw of the actuating member, comprising a sleeve-section loosely mounted upon the actuating member and having screw-threaded engagement with the bearing, said collar-section being movably mounted upon the reciprocatory actuating member so as to have a limited endwise movement thereon, and the proximate ends of the collar and tappet-head being provided with interlocking parts, whereby the tappet will be rotated only during the retractive movement of the actuating member, and the pitch of the screw-thread on the collar being such, with relation to the throw of the actuating member that the collar will be rotated a fractional part of a revolution upon each reciprocation.

6. A valve-actuating mechanism, compris-

ing a bearing, a reciprocatory actuating member mounted therein, a tappet-head rotatively mounted on said actuating member, an engaging part on said tappet-head adapted to be brought into and out of register with a corresponding part connected with the valve, and means for rotating said tappet-head during the throw of the actuating member, comprising a sleeve-section loosely mounted upon the actuating member and having screw-threaded engagement with a fixed part of the bearing, a friction device arranged to act upon said collar and prevent it from movement under the influence of momentum or jar of the machine, and means for intermittently locking said tappet-head and the sleeve-section so as to rotate together.

7. A valve-actuating mechanism, comprising a tubular bearing, a reciprocatory actuating-rod mounted therein, a tappet-head rotatively mounted upon the end of said actuating-rod and provided at its forward end with alternate teeth and intervening recesses, a valve-rod arranged to extend within the opposite end of the tubular bearing and provided at its end with a non-rotative tappet-head, provided with corresponding teeth and intervening spaces adapted to intermesh with those of the tappet-head upon the actuating-rod, and means for rotating the tappet-head carried by the actuating-rod so as to bring it alternately into and out of position to register with the tappet-head of the valve-rod, comprising a sleeve-section loosely mounted upon the actuating-rod and having screw-threaded engagement with a part of the bearing, said collar being movably mounted upon the actuating-rod so as to have a limited endwise movement thereon, and the proximate ends of the collar and tappet-head being provided with interlocking parts, whereby the tappet-head will be rotated only during the retractive movement of the actuating-rod, a spring acting on the valve-rod so as to hold it normally projected toward the actuating-rod, and operative connections between the actuating-rod and the crank-shaft of the engine, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of witnesses, this 28th day of April, A. D. 1896.

GEORGE ALDERSON.

Witnesses:
F. E. HOBERG,
HENRY A. ZUBROD,
H. J. VOOSEN.