

H. W. BOLENS.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED MAY 12, 1911.

1,044,481.

Patented Nov. 19, 1912.

Fig. 1.

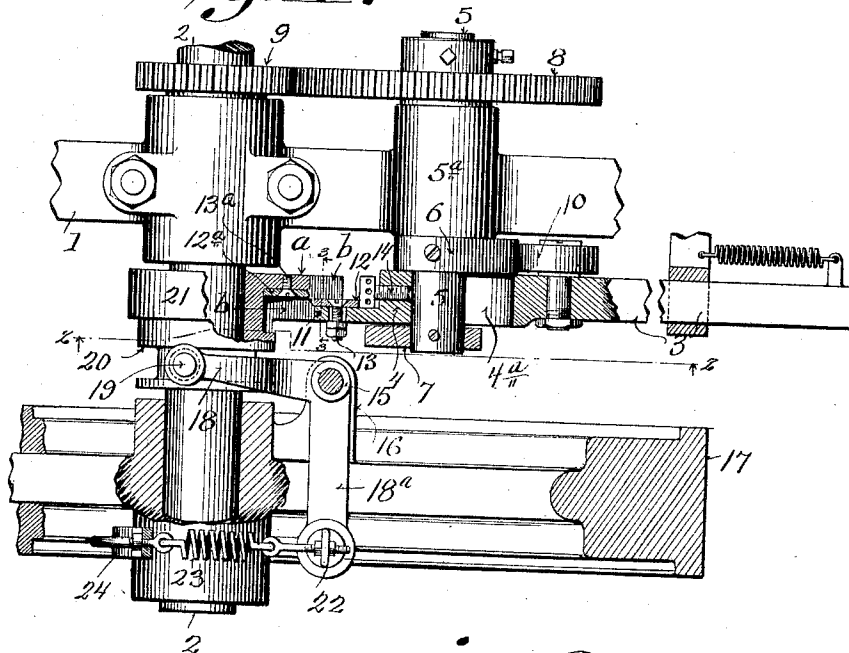


Fig. 3.

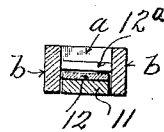
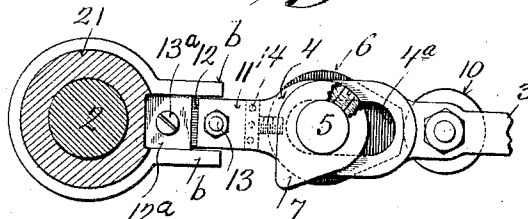


Fig. 2.



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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

1,044,481.

Specification of Letters Patent.

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Application filed May 12, 1911. Serial No. 626,653.

To all whom it may concern:

Be it known that I, HARRY W. BOLENS, a citizen of the United States, and resident of Port Washington, in the county of Ozaukee and State of Wisconsin, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention refers to governor-controlled mechanism of the hit and miss type for internal combustion engines, the general object of the invention being to provide simple, effective, durable and positive means for automatic control of the admission and exhaust ports of the engine cylinder.

Specific objects of my invention are to provide a governor-controlled sleeve that is loosely mounted upon the engine crank-shaft and adapted to be brought into the path of travel of a spring-controlled reciprocative valve-rod; to provide a durable interchangeable hit and miss tappet plate for the valve-rod and sleeve, and to provide means whereby the sleeve tappet is held against rotation about said crank-shaft.

With the above objects in view the invention consists in what is herein described with reference to the accompanying drawings and subsequently claimed.

In the drawings Figure 1 represents a plan view partly in horizontal section of a fragment of an internal combustion engine embodying the features of my invention; Fig. 2, a detailed section of the same as indicated by line 2—2 of Fig. 1, and Fig. 3, a detail cross-section of a hit and miss tappet mechanism, the section being indicated by line 3—3 of Fig. 1.

Referring by characters to the drawings 1 represents a fragment of an engine bed provided with a bearing for the engine crank-shaft 2.

3 indicates a spring-controlled valve-rod, the rear end of which is arranged to engage and actuate the valves (not shown) in any suitable manner. The forward end of the valve-rod 3 is provided with a head 4 having an elongated slot 4^a through which slot one end of an arbor 5 projects, the same being journaled in a bearing 5^a that extends from the engine bed, the outer end of the arbor serving as a support and guide for said valve-rod. The valve-rod head 4 is held against lateral play upon the arbor end, between a valve-cam 6 and an ignition timing

cam 7, both of which cams are secured to the arbor and arranged to abut the side faces of said valve-rod head. The valve-cam 6 also serves as a thrust-collar in opposition to end play of the arbor in one direction with relation to its bearing, end play in the reverse direction being limited by the hub of a gear-wheel 8 that is fast upon said arbor at its inner end. The gear-wheel 8 meshes with a pinion 9 that is secured to the engine crank-shaft 2 and constitutes the usual drive mechanism for the spark-timing and valve cams that are rotatable with the arbor. The valve-rod head also carries an anti-friction roller 10 that is arranged to engage the valve-cam 6 whereby positive thrust of said valve-rod in opposition to its spring-control is had incidental to a valve movement. The head 4 of the valve-rod terminates with an apertured ear 11 to which is fitted a hardened metal tappet-plate 12, the same being adjustably secured thereto by a retaining bolt 13 that passes through the ear aperture and a corresponding aperture in said tappet-plate.

One edge of the tappet-plate 12 is provided with a beveled engaging face and its opposite end is arranged to abut the head of an adjusting screw 14 which screw is in threaded engagement with the adjacent end face of the valve-rod head. This construction permits the tappet-plate 12 to be finely adjusted in or out upon the ear and after such adjustment the retaining bolt 13 is tightened to firmly clamp the tappet and ear together, said retaining bolt being secured by suitable lock nuts.

The governor comprises a bell-crank lever having a hub 15 which is fulcrumed between ears 16 that extend from the hub and spokes of a fly-wheel 17, the same being fast upon the crank-shaft. One arm 18 of the bell-crank extends inwardly to the crank-shaft and is provided with a pin 19 that carries an anti-friction roller which engages an annular groove 20 of a sleeve 21, the latter being loosely mounted upon the crank-shaft. The opposite arm 18^a of the bell-crank projects outwardly between the spokes of the fly-wheel and approximately parallel with its axis, the said arm terminating with a weight 22 to which is secured the ends of a pair of coiled springs 23, only one of the same being shown. The opposite ends of these springs are connected by a stirrup 24 that is fitted about the fly-wheel hub whereby said springs

serve to resist centrifugal movement of the weighted bell-crank. The sleeve 21 is provided with a projecting web *a* having parallel terminal flanges *b* that extend slightly beyond said web, the same constituting fork members that straddle the ear 11 of the valve-rod head as shown. Seated upon the face of the web is a tappet-plate 12^a which tappet-plate is a duplicate of the tappet-plate 12 carried by the valve-rod head and is arranged to have hit and miss engagement with the latter, the said tappet-plate being rectangular in form and is held to the web by a retaining screw 13^a and owing to the two sides of the tappet-plate being engaged by the web-flanges *b*, the sleeve is prevented from twisting.

From the foregoing description it is apparent that when a predetermined speed is attained by the engine crank-shaft centrifugal movement of the governor will cause the sleeve tappet-plate 12^a, to be drawn into the path of travel of the head tappet-plate 12, and when the valve-cam recedes from its engagement with the valve-rod roller 10, said valve-rod will be locked against the spring-control movement due to the engagement with the oppositely disposed tappet-plates and thus the exhaust-valve (not shown) will be held open whereby one or more free revolutions of the engine crank is permitted.

Particular attention is called to the fact that the sleeve is held against rotation with the crank-shaft, while at the same time it is free to reciprocate back and forth due to its web being in spanner engagement with the valve-rod head, the width of the web flanges being sufficient to permit all the transverse play required without disengagement of the members and should the engaging faces of the tappet-plates become worn they may be reversed or turned, whereby new faces will be presented.

It is also apparent that when the tappet members are in the position shown in Fig. 1, their engaging faces are slightly out of alinement and when the valve-timing cam 6 completes approximately a quarter of a turn, the spring which controls the valve-rod will cause the same to travel forward, there being clearance between the sleeve proper at the base of the web to permit said movement.

I claim:

1. In an internal combustion engine having a crank-shaft and a valve-rod provided with a head end in juxtaposition to the crank-shaft, an ear extending from the head end of the valve-rod, a tappet-plate secured to the ear, a governor-controlled sleeve loosely mounted upon the engine-shaft, a web extending from the sleeve, means carried by the web having interlocking engagement with the valve-rod ear whereby

said sleeve is held against rotation, and a tappet-plate secured to the web adapted to have hit and miss engagement with the valve-rod tappet-plate.

2. In an internal combustion engine having a crank-shaft and a spring-controlled reciprocative valve-rod, the valve-rod being provided with a head in juxtaposition to the crank-shaft, an ear extending from the head, a tappet-plate secured to the ear, a governor-controlled reciprocative sleeve loosely mounted upon the engine shaft, a web extending from the sleeve, a tappet-plate secured to the web arranged to have hit and miss engagement with the valve-rod tappet, and flanges extending from the web overlapping the valve-rod head whereby rotation of the sleeve about the engine crank-shaft is checked.

3. In an internal combustion engine having a crank-shaft and a spring-controlled valve-rod, the valve-rod being provided with a head in juxtaposition to the crank-shaft, an ear extending from the head, a rectangular tappet-plate adjustably secured to the ear, a governor-controlled reciprocative sleeve loosely mounted upon the crank-shaft, a flanged web extending from the sleeve, the flanges being arranged to have spanner engagement with the ear of the valve-rod head, and a rectangular tappet-plate detachably secured to the web for hit and miss engagement with the valve-rod tappet-plate.

4. In an internal combustion engine having a crank-shaft and a spring-controlled reciprocative valve-rod provided with a head end in juxtaposition to the crank-shaft, an ear extending from the head end of the valve-rod, a tappet-plate adjustably secured to the ear, a governor-controlled sleeve loosely mounted upon the engine-shaft, a web extending from the sleeve, means carried by the web having interlocking engagement with the valve-rod ear whereby said sleeve is held against rotation, and an interchangeable tappet-plate secured to the web adapted to have hit and miss engagement with the valve-rod tappet-plate.

5. An internal combustion engine having a crank-shaft and a reciprocative valve-rod provided with a head in juxtaposition to the crank-shaft, a tappet-plate extending from the head end of the valve-rod, a governor-controlled sleeve loosely mounted about the engine shaft, a web extending from the sleeve, and means carried by the web for interlocking engagement with the valve-rod tappet-plate.

6. In an internal combustion engine having a crank-shaft and a reciprocative valve-rod provided with a head end in juxtaposition to the crank-shaft, a tappet-plate extending from the head, a governor-con-

trolled sleeve loosely mounted about the engine shaft, a tappet-plate carried by the sleeve for hit and miss engagement with the valve-rod tappet-plate, and engaging means in connection with the sleeve and valve-rod head for effecting an interlocking connection between said sleeve and valve-rod whereby the sleeve is held against rotation.

- 10 7. In an internal combustion engine having a crank-shaft and a valve-rod provided with a head end in juxtaposition to the crank-shaft, a tappet-plate extending from the valve-rod head, a governor-controlled
15 sleeve loosely mounted about the engine

shaft, a tappet-plate carried thereby for hit and miss engagement with the valve-rod tappet-plate, and means for effecting interlocked engagement between the sleeve and valve-rod head, said means permitting lateral movement of the sleeve relative to a reciprocative movement of the valve-rod.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee in the county of Milwaukee and State of Wisconsin in the presence of two witnesses.

HARRY W. BOLENS.

Witnesses:

GEO. W. YOUNG,

MAY DOWNEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."