N. T. HARRINGTON.

VALVE GEAR AND GOVERNING MECHANISM FOR EXPLOSION ENGINES.

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917,941. Patented Apr. 13, 1909.

Fig 1.

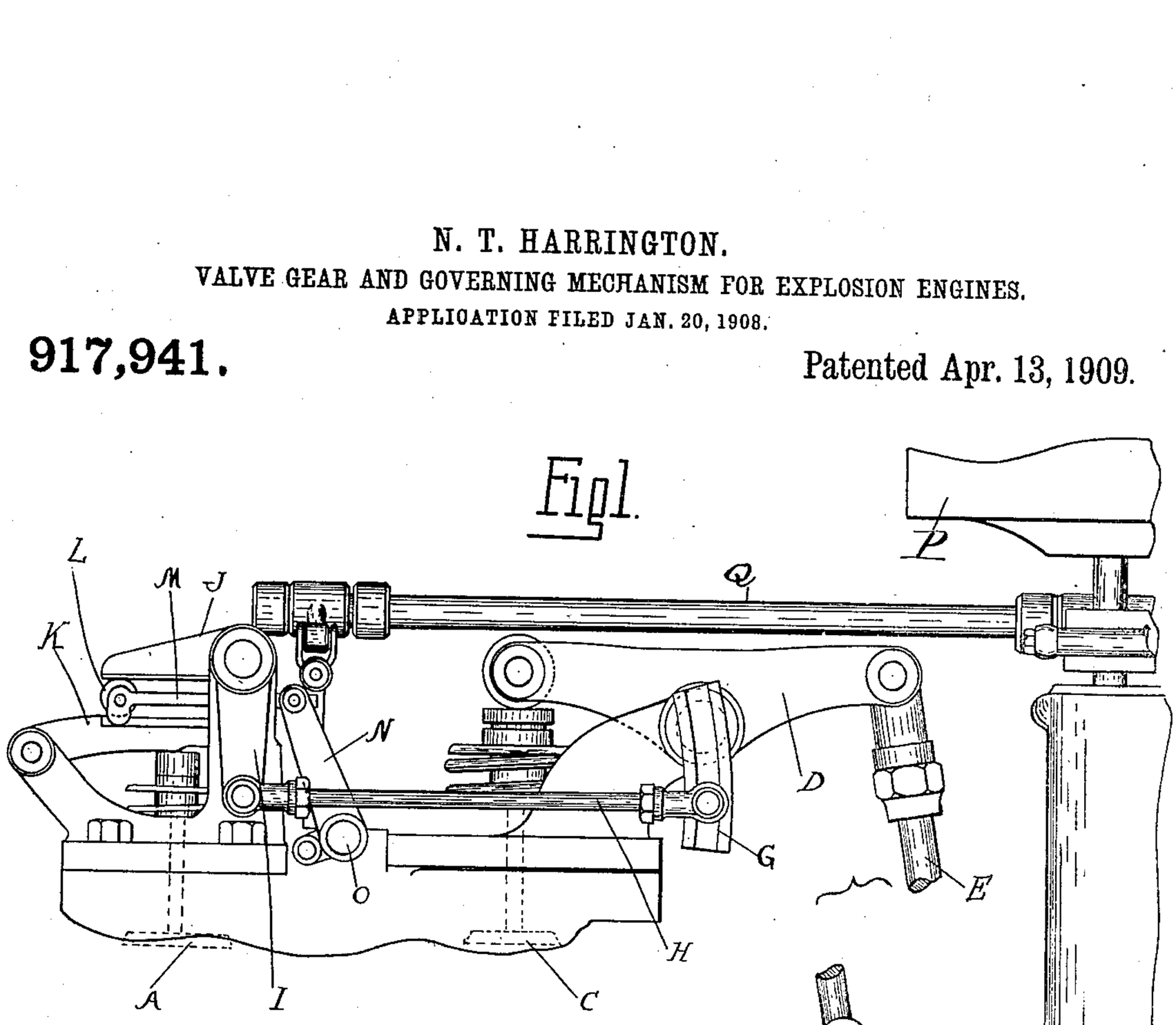
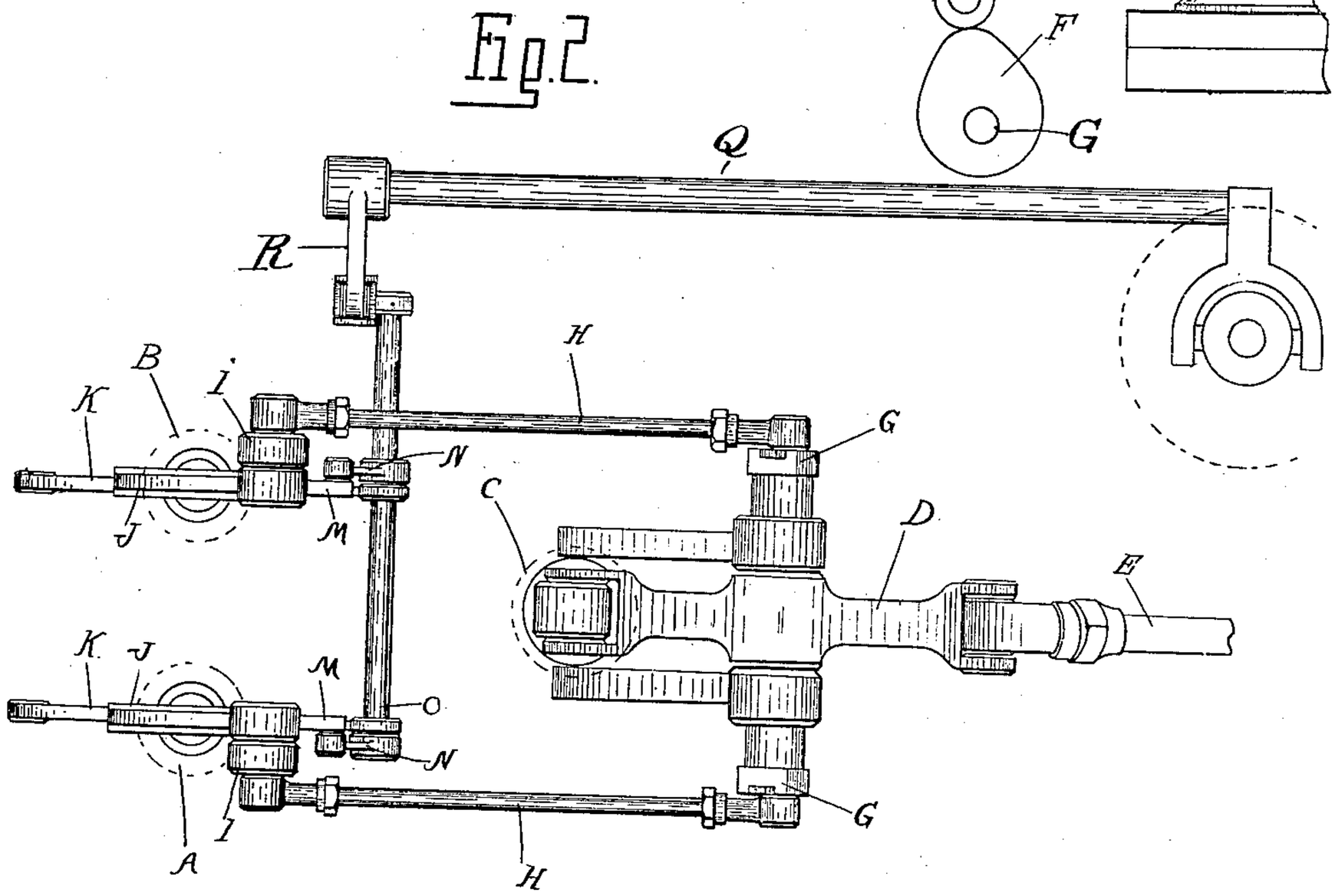


Fig. 2.



Witnesses

W. B. Ford

Harry N. Galvin

Inventor

Norman. T. Harrington

By Whittemore Hulbert & Whittemore

Attys.

UNITED STATES PATENT OFFICE.

NORMAN T. HARRINGTON, OF LANSING, MICHIGAN.

VALVE-GEAR AND GOVERNING MECHANISM FOR EXPLOSION-ENGINES.

No. 917,941. Specification of Letters Patent. Patented April 13, 1909.

Application filed January 20, 1908. Serial No. 411,738.

To all whom it may concern:

Be it known that I, NORMAN T. HARRINGTON, a citizen of the United States of America, residing at Lansing, in the county of Ingham and State of Michigan, have invented certain new and useful Improvements in Valve-Gear and Governing Mechanism for Explosion-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

It is the object of the invention to obtain a construction of valve gear for explosion engines which is adapted to control both the quantity and the quality of the explosive mixture, and which may be automatically governed by any suitable construction of centrifugal governor coöperating therewith.

To this end the invention consists in the construction of mechanism for simultaneously operating separate air and gas admission valves; further in the means by which the relative movement of said valves may be adjusted to vary the ratio of air to gas, and further in the means whereby the amplitude of movement of both valves may be correspondingly varied by an automatic governor, all as hereinafter set forth.

In the drawings—Figure 1 is a side elevation. Fig. 2 is a top plan view.

A and B are valves for respectively controlling the admission of air and gas to the mixing chamber of an explosion engine.

C is the exhaust valve, and D a lever for operating said exhaust valve through the medium of any suitable mechanism, such as the rod E and cam F upon the constantly driven shaft G′.

In the operation of explosion engines the amount of air that is mixed with a given volume of gas to produce the proper explosive mixture depends upon the quality or richness of the gas, while the power depends upon the quantity of any given explosive mixture which is admitted and compressed in the explosion chamber. One of the features of my invention is the construction by which adjustment for either quality (that is, the proportion of air to gas) or quantity may be readily effected independently of and without interfering with each other. For this purpose, the air and gas admission valves A and B are operated through a duplex mechanism, preferably directly from the lever D which operates the exhaust valve and which, as shown, is of the following construction:

G is a segmental arm or arms projecting laterally from the lever, and H are radius rods adjustably connected to said segments at one end, and at their opposite ends connected to levers I at a point concentric with the segments in the neutral position of the lever D. Each of the levers I is connected to the rock arms J which are arranged parallel to a rock arm K extending oppositely from its fulcrum. The rock arms K are arranged to engage with the stems of the valves A and B respectively.

L is a bearing intermediate the rock arms J and K through which the movement of the former is transmitted to the latter. This bearing, which is preferably in the form of a roll, is longitudinally adjustable in relation to the rock arms, and the leverage exerted by the one arm upon the other depends upon the position of this bearing L. The bearings L are adjusted by links M attached to rock arms N on a rock shaft O, the latter being preferably controlled by a centrifugal governor P connected to the rock shaft O through the medium of the rock shaft Q and lever R.

In operation the cam F will impart a rocking movement to the lever D, which will operate the exhaust valve C, and through the medium of segments G, radius rods H, and rock arms I will impart a rocking movement to the arms J, and these, through the medium of rolls L, will rock the arms K, operating the stems of the valves A and B. As the radius rods H in the normal position of the parts are concentric with the segments G and adjustable thereon, they may be set in any position from a point in line with the fulcrum with the lever D, and where no movement will be imparted to the rod to a point at the extreme end of the radius arm G. Each of the rods H may be adjusted upon its segment independently of the other, and thus the amplitude of movement of each of the rock arms J may be adjusted independently of the other, and to be in any desired ratio thereto. The amplitude of movement of the valves A and B is, however, dependent not only upon the adjustment of the radius rods H, but also upon the adjustment of the bearings L. These bearings may be adjusted into any po-

sition within fixed limits, but as they are simultaneously operated from a common rock shaft O the ratio of movement of the valves will be the same as that of the rock arms J. Thus the operation of the governor which controls the rock shaft O will merely vary the quantity of the explosive mixture admitted by the valves into the engine, but will not change its proportions. On the other hand, an adjustment of the radius rods H will change the relative proportion of air and gas so as to adapt the engine for operation with any gas which may be available.

What I claim as my invention is:

1. In an explosion engine, the combination of separate air and gas admission valves, a common actuating mechanism for simultaneously seating and unseating said valves, means intermediate said actuating mechanism and said valves for automatically and correspondingly varying the amplitude of movement of said valves and independent means for adjusting the relative degree of movement thereof.

2. In an explosion engine, the combination with separate air and gas admission valves, of a valve operating mechanism for simultaneously seating and unseating said valves, a governor controlling said valve operating mechanism for correspondingly varying the amplitude of movement of said valves, and independent means of adjustment for varying the relative amplitudes of movement of said valves.

3. In an explosion engine, the combination with separate air and gas admission valves, of a valve gear for simultaneously seating and unseating said valves, a governor automatically controlling said gear to correspondingly vary the amplitude of movement of said valves, and manually operable means for adjusting said gear to vary the relative amplitudes of movement of said valves.

4. In an explosion engine, the combination with separate air and gas admission valves, of a common actuating member therefor, and independently adjustable connections between said actuating member and said valves, each comprising a radius rod and a coöperating segment.

5. In an explosion engine, the combination with separate air and gas admission valves, of a common actuating member therefor, and means for adjusting the relative movement imparted by said member to said valves by a radius rod, and a coöperating segment to which said rod is adjustably secured.

6. In an explosion engine, the combination with separate air and gas valves, of a common actuating member for said valves, and connections between said common actuating member and both of said valves each comprising a rock arm, a radius rod pivotally attached thereto, and a segmental rock arm to which the opposite end of said rod is adjustably secured.

7. In an explosion engine, the combination with a plurality of valves for separately controlling the gaseous ingredients of the explosive mixture, of means for simultaneously seating and unseating said valves, and mechanism intermediate said means and each of said valves, including a segmental rock arm, a radius rod actuated thereby and adjustably secured to said segment, a rock arm actuated by said radius rod and oppositely parallel extending rock arms, and a shiftable bearing intermediate said rock arms.

8. In an explosion engine, the combination with a plurality of valves for separately controlling the gaseous ingredients of the explosive mixture, of means for simultaneously seating and unseating said valves, and mechanism intermediate said means and said valves comprising a segmental rock arm, a radius rod actuated by said rock arm, a rock arm actuated by said radius rod, a parallel and oppositely extending rock arm, a shiftable bearing intermediate said parallel rock arms; automatic governing means and manually operable means the one controlling the shifting of said bearing intermediate said rock arms and the other for adjusting said radius rod upon said segmental rock arm.

9. In an explosion engine, the combination with separate air and gas admission valves and an exhaust valve, of a valve gear comprising a member for actuating said exhaust valve and two independent connections between said member and the air and gas admission valves respectively, each comprising a radius rod and coöperating segments, a pair of oppositely extending rock arms and an intermediate shiftable bearing between said rock arms, and a common means for shifting the intermediate bearing of each of said intermediate connections simultaneously, for the purpose described.

10. In an explosion engine, the combination with separate air and gas valves, of a valve gear for simultaneously seating and unseating said valves, a governor automatically controlling said gear to correspondingly vary the amplitude of movement of said valves, positive connections between said governor and gear, and manually operable means for adjusting said gear to vary the relative amplitudes of movement of said valves.

11. In an explosion engine, the combination with separate air and gas valves, of a common actuating member therefor and independently adjustable connections between said actuating member and said valves, each comprising a radius rod and a coöperating segment and positive connections therebetween.

12. In an explosion engine, the combina-

tion of separate air and gas admission valves, a common actuating mechanism therefor, means intermediate said actuating mechanism and said valves for automatically and correspondingly varying the amplitude of movement of said valves, and independent means for adjusting the relative degree of movement of one of said valves in relation to the other, said means comprising a radius rod and segment.

In testimony whereof I affix my signature in presence of two witnesses.

NORMAN T. HARRINGTON.

Witnesses:

NELLIE KINSELLA,

JAMES P. BARRY.