(No Model.)

J. W. HARTLEY & J. KERR.

GOVERNING GEAR FOR GAS ENGINES.

No. 539,478. Patented May 21, 1895.

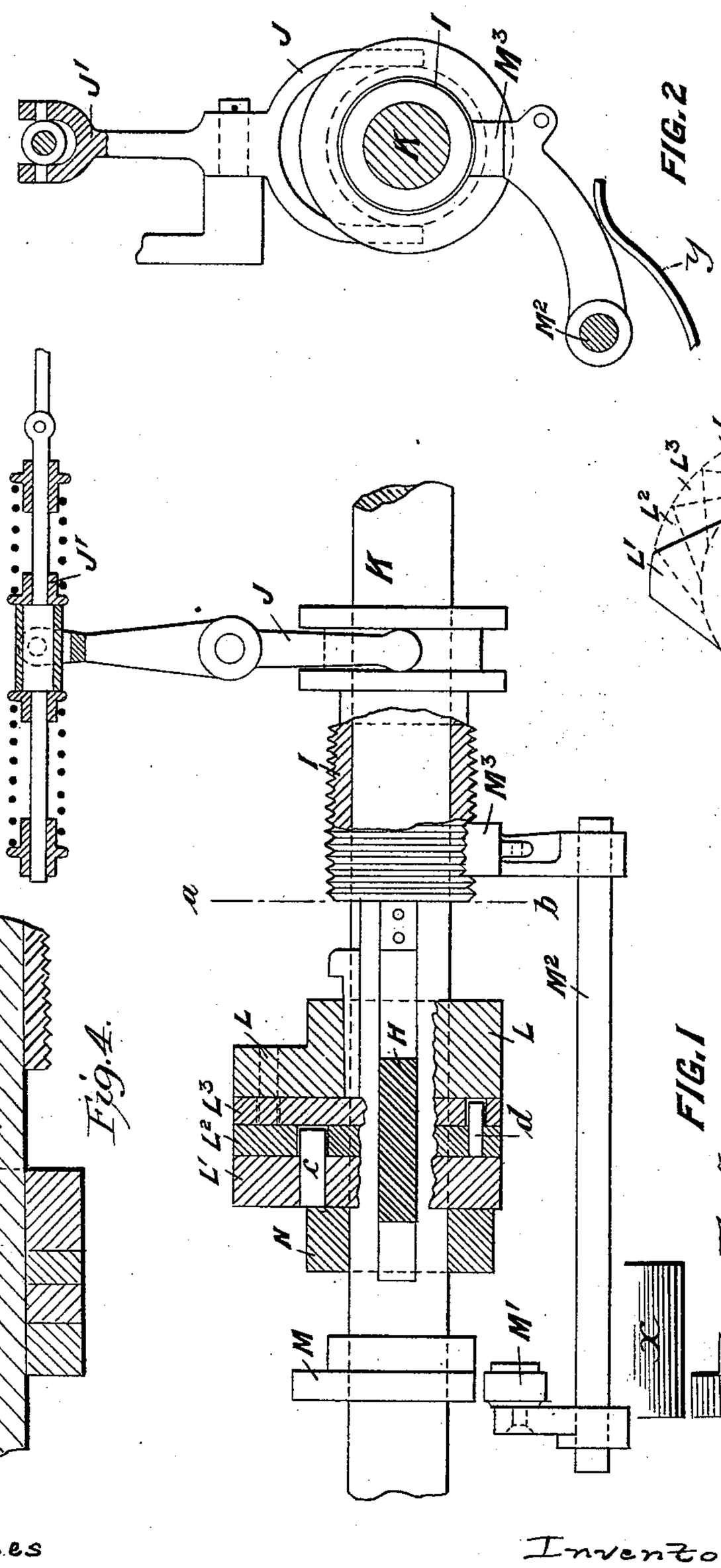

FIG. 2

FIG. 3

FIG. 4.

FIG. 1

FIG. 5.

Witnesses
E. K. Sturtevant.
A. D. Bruning

Inventors
John William Hartley
John Kerr
by Richards & R
Attys

UNITED STATES PATENT OFFICE.

JOHN WILLIAM HARTLEY AND JOHN KERR, OF KILMARNOCK, SCOTLAND.

GOVERNING-GEAR FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 539,478, dated May 21, 1895.

Application filed May 8, 1894. Serial No. 510,494. (No model.)

To all whom it may concern:

Be it known that we, JOHN WILLIAM HARTLEY and JOHN KERR, subjects of the Queen of England, and residents of Kilmarnock, in in the county of Ayr, Scotland, have invented certain new and useful Improvements in Governing-Gear for Gas-Engines, of which the following is a specification.

Our invention relates to the gas controlling cams for gas engines, and our object is to vary the amount of gas admitted to a gas engine cylinder by varying the point of beginning the admission of gas, while preserving a constant point of cut off. In cams hitherto constructed for this purpose, steps have been cut of different configurations, and a roller on the gas lever has been moved over the steps so as to fall into different steps as the speed changes.

Our invention is intended to vary the point of beginning the admission in a more certain and positive manner without causing the gas valve roller and its operating cam to travel along relative to each other.

Our invention is illustrated at Figures 1, 2, and 3 of the accompanying sheet of drawings. Fig. 1 is an elevation, partly in section, showing our new cam-governing gear. Fig. 2 is a transverse section on the line *a b*, Fig. 1. Fig. 3 is an end elevation showing the action of the separate parts of the cam. Fig. 4 is a sectional view along the shaft, showing the cam-sections also in section. Fig. 5 is a plan view of the cam-sections, showing at *x* the cam-roller of sufficient width to contact with the several sections.

In accordance with our invention for regulating the speed of gas and like engines, we use a helix or screw thread which we slide along the cam shaft. The said helix or screw thread is formed upon a sliding piece which piece is fitted into a slot in the gas cam, and causes a section or sections of the gas cam to revolve upon the shaft, when the helix is being moved to and fro axially along the said shaft by the governor. The grooved sleeve I is connected to the sliding piece H, having a helical thread or threads cut on it, and the said sleeve and helix are moved along the shaft K by the governor through the lever J and spring connection J'. The cam is built up of four pieces one piece L keyed to the shaft K and three pieces L' L^2 L^3 loose upon the shaft but held in place by the fixed washer N. By this device the leading edge of the gas cam is made to advance or retire, and to admit gas earlier or later.

We divide the gas cam as described in two or more sections, one portion L being keyed to the shaft so that the gas cam is always closed at the proper time, and the other section or sections are revolved by the helix and follow each other around the shaft and so form a continuous dam, the cam roller operating the gas valve lever being broad enough to cover in width the whole of the sections L, L', L^2 and L^3, as shown in Fig. 5. The leading section L' of the compound gas cam is cut to fit the helical thread on H, and slots are cut in the parts L^2, L^3 and L to clear the said helix. The section L' has a pin *c* operating in a slot in L^2 to move it at the proper time, and L^2 has a pin *d* operating in the same way in a slot in the piece L^3. When the sleeve I is moved in one direction the cam sections L', L^2 L^3 expand to produce the outline shown at Fig. 3. The leading cam section moving in the direction indicated by the arrow in Fig. 3 carries L^2 and L^3 successively with it. In that position gas is fully admitted. When the governor moves the sleeve I to reduce the gas supply the section L' is moved back by the helix until it covers L^2. Then the part L^2 moves back with it till both cover L^3. Then L^3 moves back if the gas is still further to be reduced till L' L^3 L^3 cover the part L. At that point the gas supply has been reduced to its minimum.

To prevent the influence of the cam being felt by the governor, when the cam engages with the gas lever roller, we lock the helix H on the shaft K by a multiple grooved collar I, in which a detent M^3 engages. This detent is operated by a separate cam M and lever and way shaft M', M^2 and is pressed home by springs such for instance as at *y*, Fig. 2, just before the compound cam L L' L^2 L^3 engages. The detent lever M^3 may be relieved against the spring pressure by the positive action of the cam M about the period when the gas cam closes the valve, being no longer needed.

Having now particularly described and as-

certained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

A gas engine governing gear comprising the valve shaft and governor, the sliding collar operated from the governor, the key bar H connected with the collar and seated in a groove in the shaft and having a threaded edge, the compound cam having loose portions engaged by said threaded edge, in combination with a detent for holding said sliding collar while the compound cam is operating the gas valve to remove the strain of keeping the cam in position, and means for operating said detent, substantially as described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

JOHN WILLIAM HARTLEY.
JOHN KERR.

Witnesses:
JAMES J. INGLIS,
FREDERIC W. BAKER.