

No. 630,738.

Patented Aug. 8, 1899.

H. J. PERKINS.
GAS OR VAPOR ENGINE.

(Application filed Jan. 12, 1899.)

(No Model.)

3 Sheets—Sheet 1.

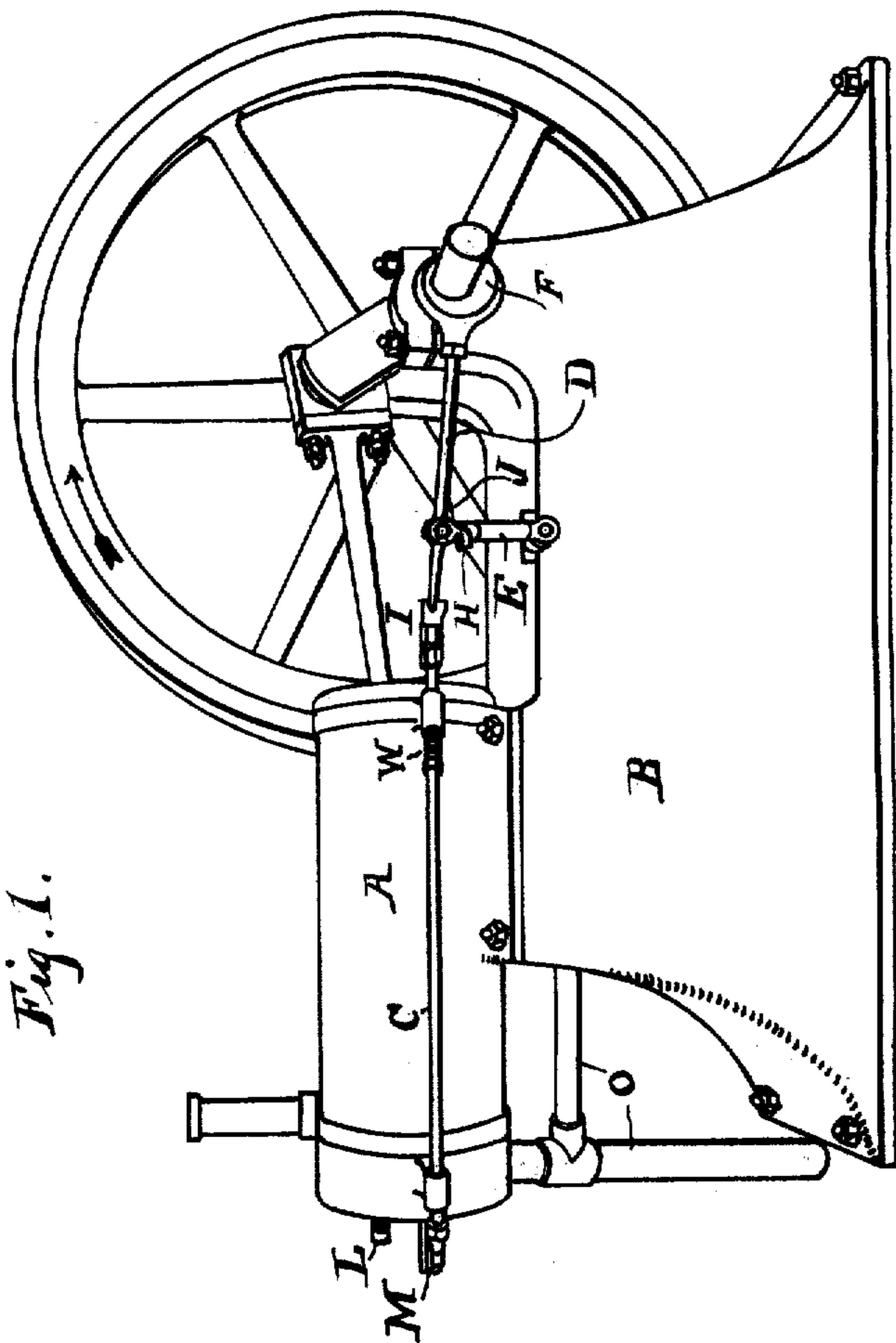


Fig. 1.

WITNESSES.

Ernest C. Hindman
Christopher Hondelink

INVENTOR.

Harry J. Perkins

BY his ATTORNEY.

Edward Tappan

No. 630,738.

Patented Aug. 8, 1899.

H. J. PERKINS.
GAS OR VAPOR ENGINE.

(Application filed Jan. 12, 1899.)

(No Model.)

3 Sheets—Sheet 3.

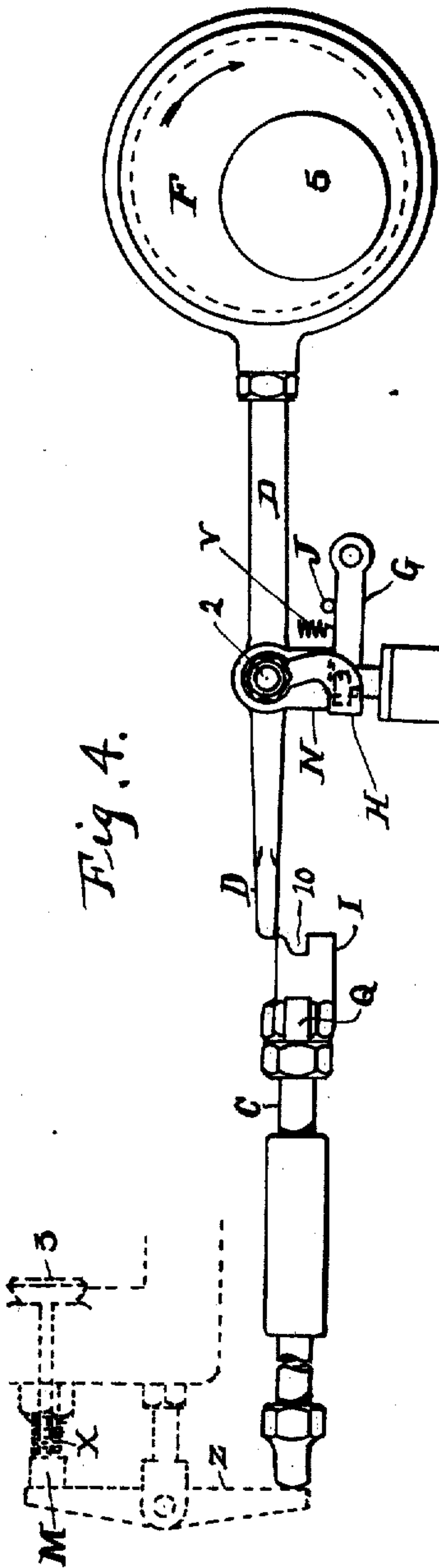


Fig. 4.

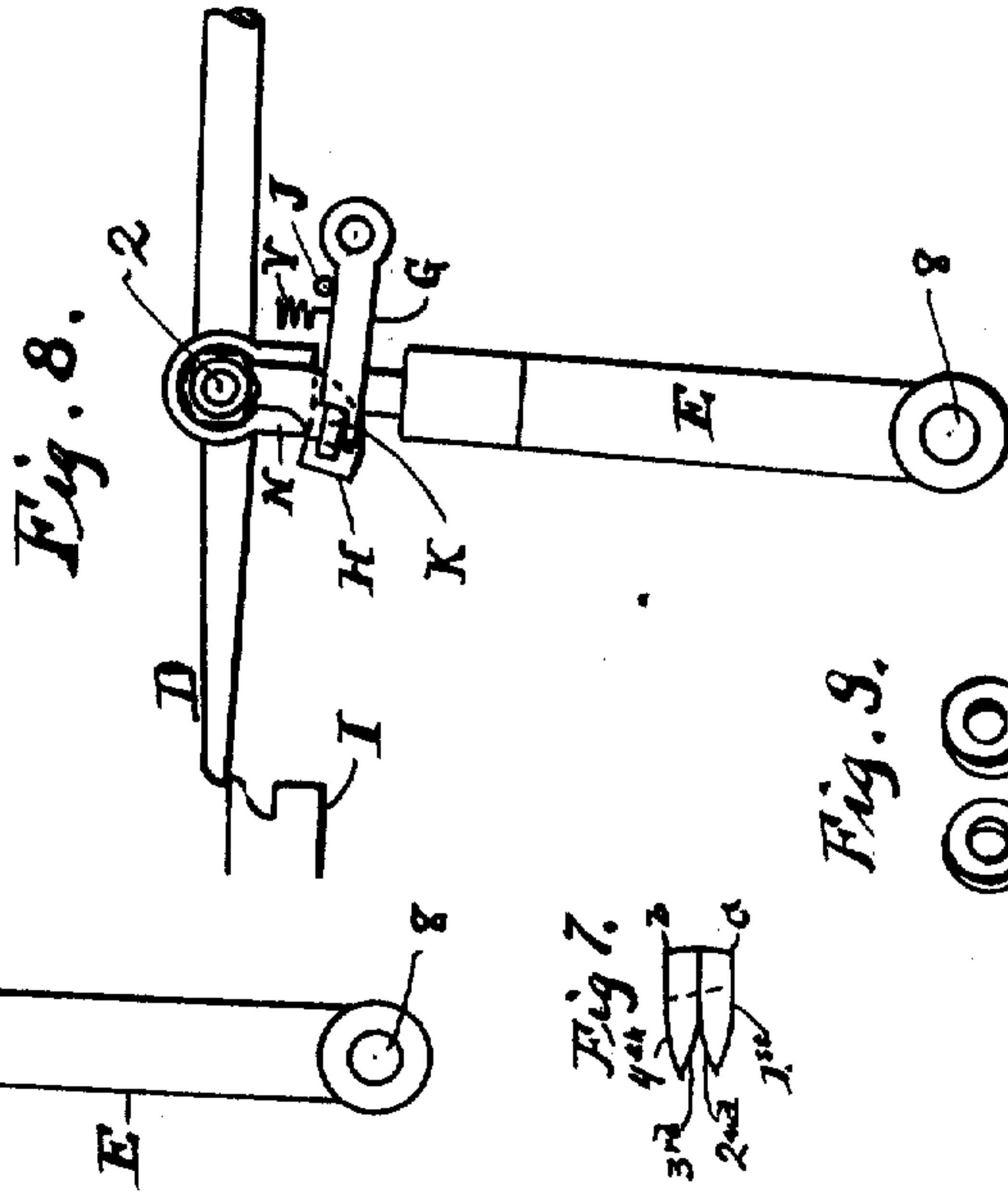


Fig. 8.

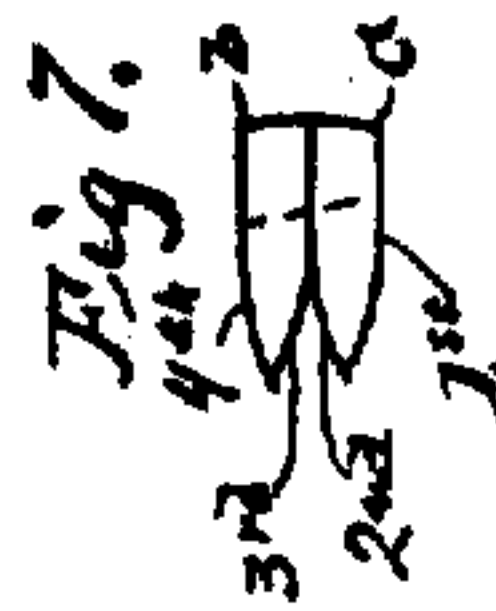


Fig. 7.

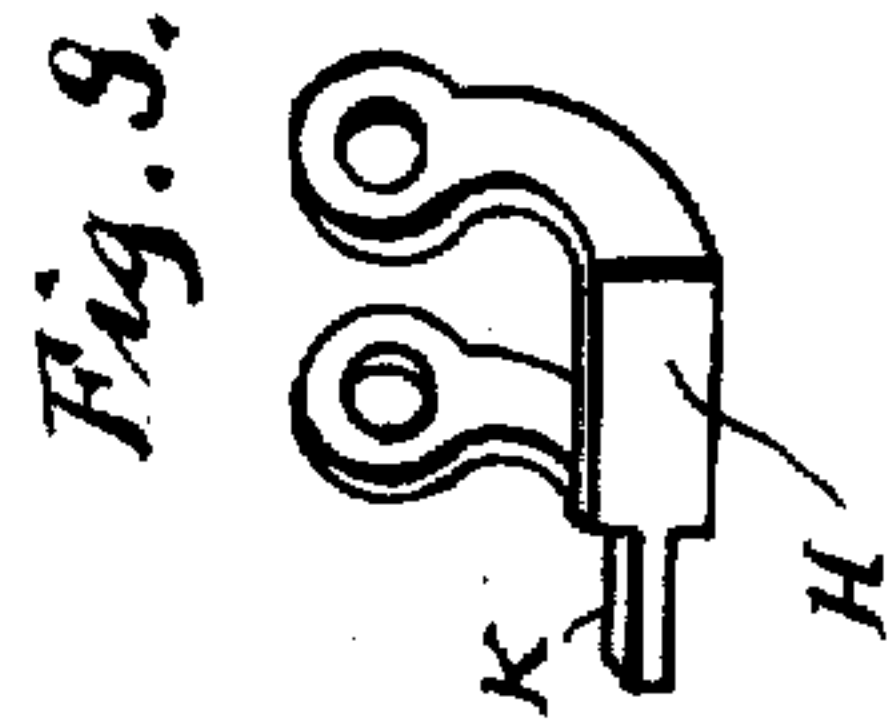


Fig. 9.

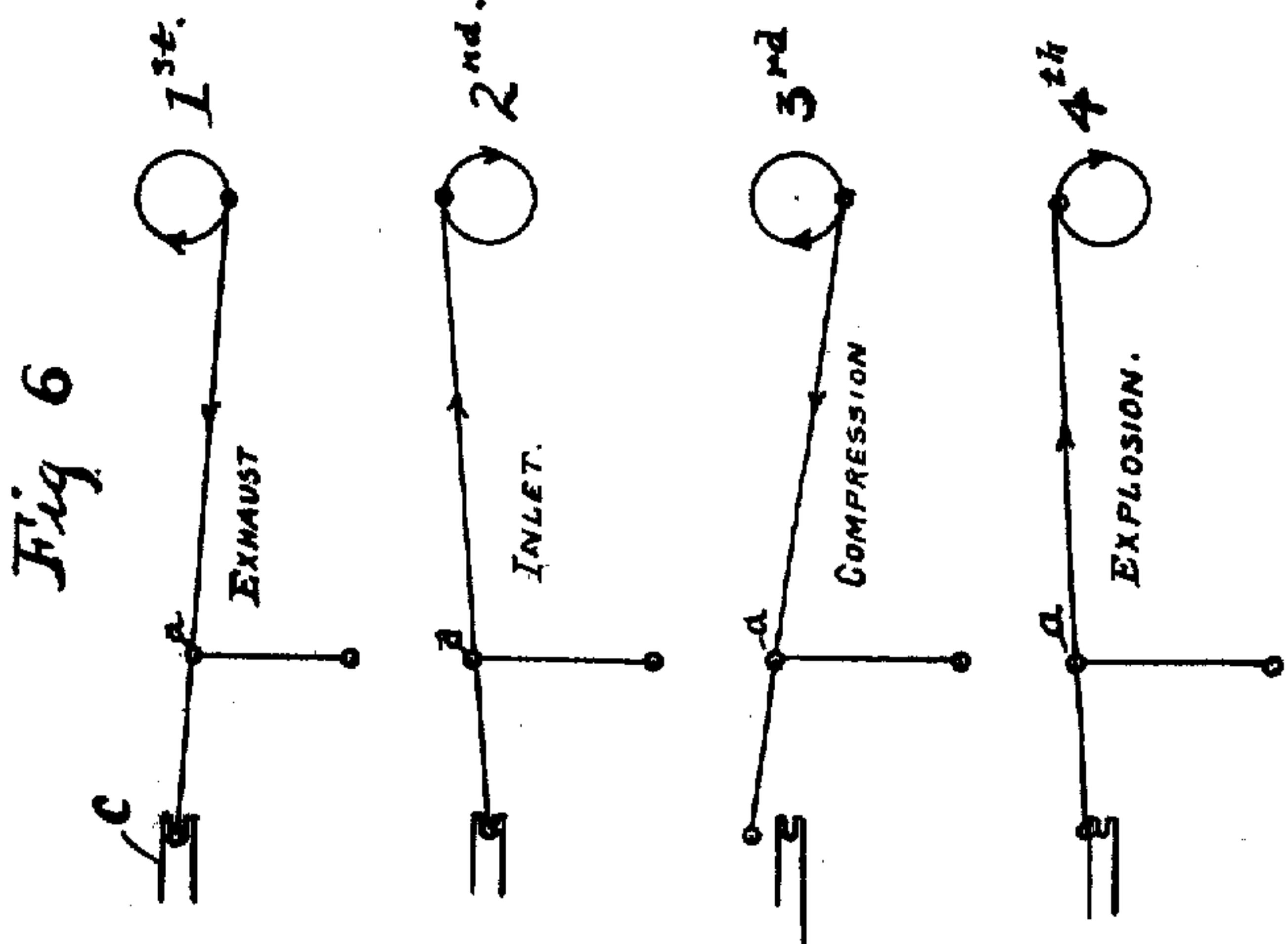


Fig. 6.

WITNESSES.

Ernest E. Hindman
Christopher Hondelink

INVENTOR.

Harry J. Perkins

BY *his* ATTORNEY.

Edward Tappan

UNITED STATES PATENT OFFICE.

HARRY J. PERKINS, OF GRAND RAPIDS, MICHIGAN.

GAS OR VAPOR ENGINE.

SPECIFICATION forming part of Letters Patent No. 630,738, dated August 8, 1899.

Application filed January 12, 1899. Serial No. 701,973. (No model.)

To all whom it may concern:

Be it known that I, HARRY J. PERKINS, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented new and useful Improvements in Gas or Vapor Engines, of which the following is a specification.

This invention relates to certain new and useful improvements in gas and vapor engines; and the invention consists in the method of operating the exhaust-valve at every other revolution of the main shaft of the engine; and the objects of the invention are, first, to dispense with gears and complicated mechanism for operating the exhaust-valve of a four-cycle engine; second, to operate the exhaust-valve of a four-cycle engine directly from an eccentric, with suitable mechanism for conveying direct action to the exhaust-valve at every other revolution of the eccentric; third, other objects particularly described and pointed out in the specification and claims. These objects I accomplish by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side perspective view of a gas or vapor engine to which my improvements are attached, with one of the fly-wheels and governor removed for the purpose of showing the method of attaching my device to the engine. Fig. 2 is a plan view of an engine provided with my improvements, a portion of the fly-wheel being shown in section and with the governor applied. Fig. 3 is a side elevation of the eccentric, the eccentric-rod, and the sliding rod, which operates through suitable mechanism the exhaust-valve, the eccentric-rod being mounted on a rocker-arm, the rocker-arm being shown partially in section. Fig. 4 is also a side elevation of the eccentric, the rocker-arm supporting the eccentric-rod, eccentric-rod, and sliding rod, the dotted lines showing the connection between the sliding rod and the exhaust-valve. Fig. 5 is a front elevation of the rocker-arm, showing an end view of the eccentric-rod and also showing the pawl which is adapted to hold the cap on the piston, which fits into the rocker-arm in its extended position, and also shows the lug on the pawl II, hereinafter described. Fig. 6 is a diagram showing the position of the eccentric-rod and the engagement-point in the slid-

ing rod or shaft C at the point in each cycle as numbered 1, 2, 3, and 4, the first showing the position of the exhaust, the second the position of the parts at the suction or inlet stroke, the third at the point of compression, and the fourth at the point of explosion. Fig. 7 is a diagram showing the travel which the point *a*, Fig. 6, passes through in two revolutions of the eccentric. Fig. 8 shows a side elevation of the rocker-arm with a portion of the eccentric-rod and the sliding rod at a point just before the end of the eccentric-rod drops or passes from the cap I on the sliding rod C. Fig. 9 is a detached perspective view of the pawl II.

Similar letters and figures refer to similar parts throughout the several views.

A represents the cylinder of the engine, constructed in any suitable form.

B represents the bed of the engine, which supports the cylinder and working parts of the engine.

C is what I term the "sliding rod," which is adapted through suitable mechanism to operate the exhaust-valve 3.

D is the eccentric-rod, which eccentric-rod is supported upon a rocking arm E, said rocking arm E turning upon the pivotal bolt 8, and in the example of my invention shown in the drawings the body of the rocking arm E is a cylinder provided with a piston fitting therein, which piston is shown by N, and has a cap and a pivotal pin 2, which passes through the cap and attaches the eccentric-rod thereto. The piston N is provided with a spring 7, secured within the cylinder portion E, the lower portion of the spring bearing against a block Y and the upper end of the spring bearing against shoulders 9, said spring having the function of returning the piston N to its normal position after the same has been released by the pawl hereinafter described.

F is the eccentric, constructed in any suitable manner and connected to the eccentric-rod D.

G is a pawl or stop, which in the fourth cycle, as illustrated in the diagram, releases the pawl II and allows the spring 7 to return the piston to normal position after the same has been lifted from normal position, as hereinafter described. The pawl II is preferably supported by the pivot 2 and is adapted to

swing into position, so as to lock or retain the piston in its extended position when the same has been lifted out until said pawl has been removed by contact with the stop or
5 pawl G.

I is a cap forming a contact-point on the sliding rod C. This cap is preferably provided with a notch 10, with which the end of the eccentric-rod D engages at every other
10 revolution of the eccentric. The pawl G is pivoted to a bracket or to any other suitable support on the engine. Its upward movement is limited by the stop J, as shown in Fig. 4.

15 K is a lug or extension on the pawl H, which comes in contact with the pawl G and removes the same from its locking position, thereby releasing the piston and allowing the same to be drawn to normal position by the spring 7.

20 L is an inlet-valve for the gas and air, constructed in any suitable form or shape, and M is the valve-stem for the exhaust-valve 3.

Z is a pivoted lever, one end of which is adapted to bear upon the valve-stem M and
25 the other adapted to be operated by the movement of the sliding rod C. This is illustrated more fully in Fig. 4.

O are the exhaust-pipes.

P is a spring-actuated pin which is adapted to engage with the projection Q on the sliding rod C and to hold the exhaust-valve open when the governor-balls are spread by the increased speed of the engine.

35 Q is a projection of any suitable form adapted to engage with the pin P. The pin P preferably slides in a cylinder 4 on the end of the lever R, the lever R turning upon the pivot or fulcrum S and being provided with a pin which engages with the movable slide operated by the governor-balls.

40 T is a movable slide with which the arms of the governor-balls engage.

U are the governor-balls.

45 The governor and the connections of the governor to the engine are not a part of my invention, and any form of governor may be used. I have introduced into the drawings the governor and its connections merely to show the operation of my improvements.

50 V is a spring connected to the pawl G, adapted to raise the same to normal position in order to retain the pawl G in contact with the stop J, which is its normal position.

55 X is a heavy spring used for retaining the exhaust-valve closed and to allow the exhaust-valve to be opened by the operation of the eccentric, the eccentric-rod, and mechanism connected therewith.

5 is the main shaft of the engine.

60 The operation of my invention is as follows: The revolution of the eccentric carries the free end of the eccentric-rod forward until the same engages with the notch 10 in the cap I of the sliding rod C, as shown in the first figure of Diagram 6. By revolving the eccentric one-half a revolution the rod C has been
65 pushed forward, opening the exhaust, and

when drawn backward closing the exhaust, and at the same time the rod has lifted the piston and allowed the pawl H to drop into
70 position to retain the piston raised. Now by giving the eccentric another half-revolution we have reached the third cycle, as shown in the third figure of Diagram 6. The free end of the eccentric-rod is then raised, as shown
75 in said diagram—that is, the piston in the rocking arm E is extended—and by giving the eccentric another half-turn the front end of the eccentric-rod rests upon the upper surface of the cap I, and the piston N is now extended to its fullest extent. The lug on the
80 pawl H passes above the projection of the pawl G and is removed from the shoulder or upper part of the cylinder E, so that it is no longer in position to hold the piston extended. The
85 further movement of the cylinder in the same direction allows the free end of the eccentric-rod to escape from the cap I, whereupon the spring 7 returns the piston to normal position in readiness for the next revolution of the eccentric. Thus the eccentric-rod D engages
90 with the cap I of the sliding rod C at one revolution and moves the same, and at the next revolution the free end of the eccentric-rod is carried above the point I, so that the sliding rod C and the mechanism connected thereto which operates the exhaust-valve is only moved to open the valve at every other revolution of the eccentric.

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

1. In combination with a gas or vapor engine, an eccentric, an eccentric-rod, an extensible rocking arm to which the said eccentric-rod is pivoted, a sliding rod or shaft adapted to operate the exhaust-valve by every alternate revolution of said eccentric.

2. The combination of an eccentric and eccentric-rod, said eccentric-rod pivotally connected to an extensible rocking arm and adapted to come in contact with and operate a sliding rod at one revolution, suitable mechanism for retaining the rocking arm extended at every other revolution of the eccentric.

3. The combination of an eccentric, an eccentric-rod pivotally connected to an extensible rocking arm, a sliding arm with suitable connecting mechanism for operating the exhaust-valve of the engine, a pawl adapted to retain the rocking arm extended at one revolution, and a stop adapted to remove said pawl from its locking position, substantially as described.

4. The combination of an eccentric, an eccentric-rod, a rocking arm, a piston moving in said rocking arm and pivoted to the said eccentric-rod, a spring adapted to return the piston to its normal position, a swinging pawl carried by said piston, a sliding shaft having suitable connections with the exhaust-valve, a stop-pawl adapted to remove from locking position the pawl carried by the piston, and suitable means for returning both pawls to

normal position after the stop-pawl has removed the locking-pawl carried by the piston, substantially as described.

5 The combination of an eccentric, an eccentric-rod, a suitable rocking arm to which said eccentric-rod is pivoted, a sliding rod with which the free end of the eccentric-rod engages and moves at one revolution of the eccentric, a pawl adapted to drop into position to lock the piston in the rocking arm extended at the end of the first revolution, and a stop-pawl adapted to remove from locking position said pawl first mentioned at the end of the second revolution, substantially as described.

6 The combination of an eccentric, an eccentric-rod having a free end, a suitable extensible rocking arm to which the said eccentric-rod is pivoted, a sliding shaft adapted to engage with the free end of the eccentric-rod, forming a temporary fulcrum by means of which the further revolution of the eccentric extends the rocking arm, substantially as described.

7 The combination of an eccentric, an eccentric-rod having a free end, a suitable automatically-extensible rocking arm to which the eccentric-rod is pivoted, a sliding shaft operated by the eccentric-rod adapted to form a fulcrum whereby the rocking arm is partially extended by one revolution of the eccentric-shaft, and by the second contact, during the next revolution, is extended fully, substantially as described.

8 The combination with the eccentric, an eccentric-rod pivoted to a suitable rocking arm, a sliding shaft moved by contact with the eccentric-rod and forming a fulcrum for extending the extensible rocking arm, a pawl adapted to fall into locking position and retain said rocking arm extended, and a pawl acting as a stop adapted to remove said locking-pawl from its locking position and to allow the swinging arm to return to normal position, substantially as described.

9 The combination of an eccentric and an eccentric-rod, a rocking arm, a piston in said rocking arm pivotally connected to the eccentric-rod, a sliding shaft adapted to engage with the free end of the eccentric-rod at one

revolution and partially extend the said piston at one revolution, and to engage with the free end of the said eccentric-rod and complete its extension by the second revolution, substantially as described.

10 The combination of an eccentric, an eccentric-rod, an extensible rocking arm, a sliding rod operated by contact with the free end of the eccentric and serving as a fulcrum at one revolution of the eccentric, a pawl adapted to lock the arm in its partially-extended position, the second contact between the free end of the eccentric-rod and the sliding shaft also adapted to further extend the rocking arm, and a stop-pawl adapted at every alternate revolution of the eccentric to release the locking-pawl from position and to allow the piston in the extensible arm to return to normal position, substantially as described.

11 In combination with a gas or vapor engine, the combination of an eccentric, an eccentric-rod, an extensible arm to which said eccentric-rod is pivoted, a sliding shaft adapted to engage with the free end of the eccentric-rod, and suitable mechanism for extending the rocking arm at every other revolution of the eccentric, substantially as described.

12 The combination of an eccentric and eccentric-rod, an automatically-extensible rocking arm pivoted thereto, and suitable means for presenting the free end of the eccentric-rod in different positions at every other revolution of the eccentric, substantially as described.

13 In combination with an eccentric and eccentric-rod, said eccentric-rod having a free end, an automatically-extensible rocking arm to which said eccentric-rod is pivoted, a sliding shaft adapted to contact with the free end of the eccentric at one point during one revolution and at a different point at the next revolution.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HARRY J. PERKINS.

Witnesses:

EDWARD TAGGART,
CHRISTOPHER HONDELINK.