

(No Model.)

D. A. FRAZER.

STEAM ENGINE.

No. 395,822.

Patented Jan. 8, 1889.

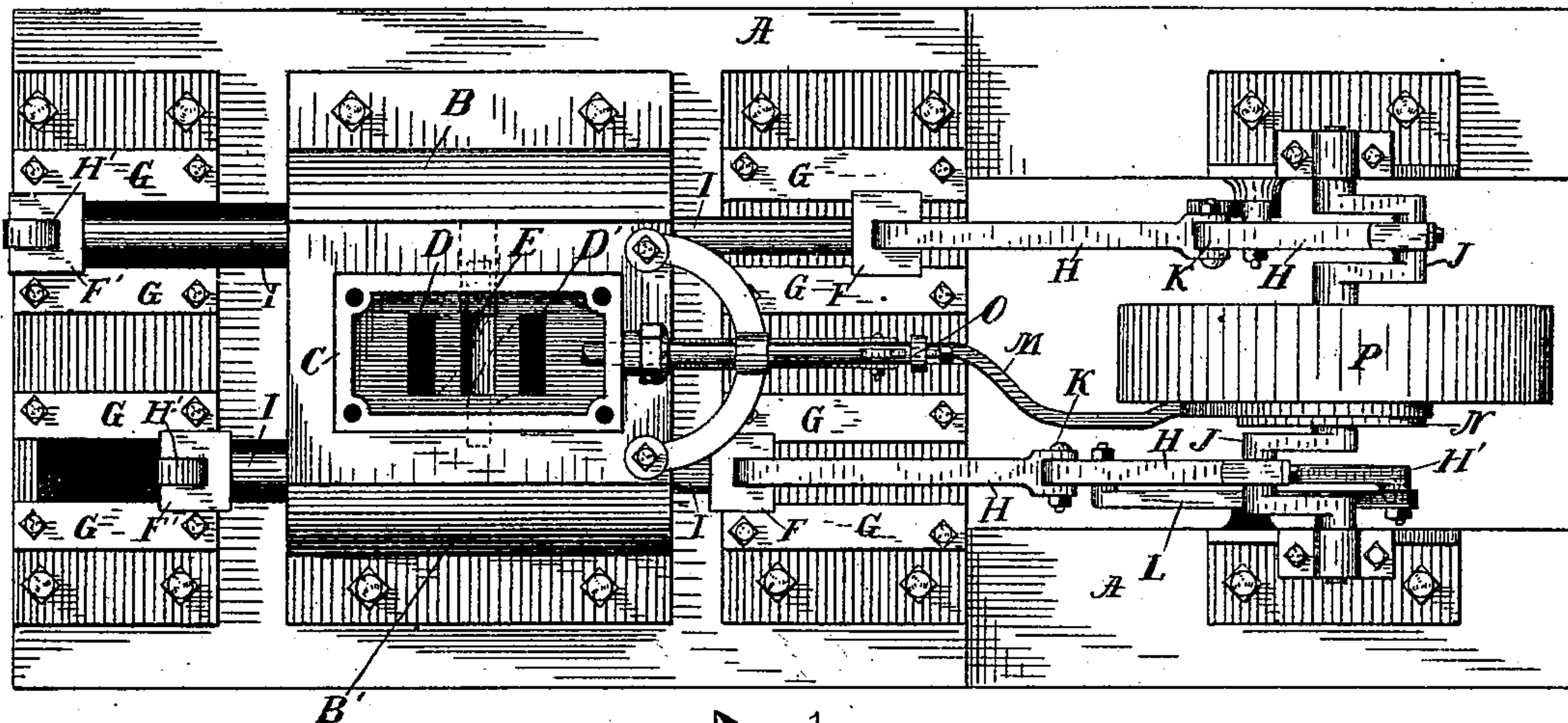


FIG. 1.

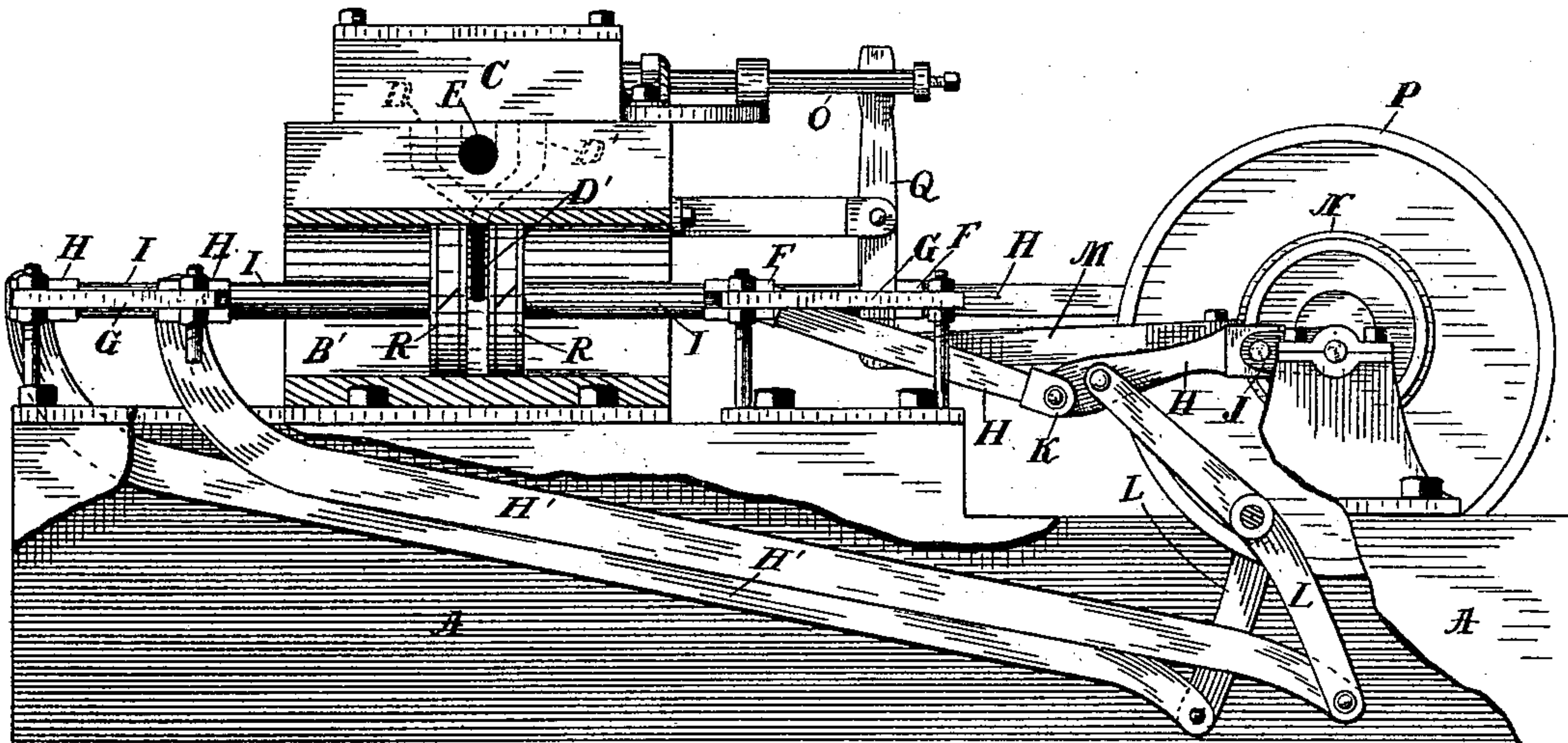


FIG. 2.

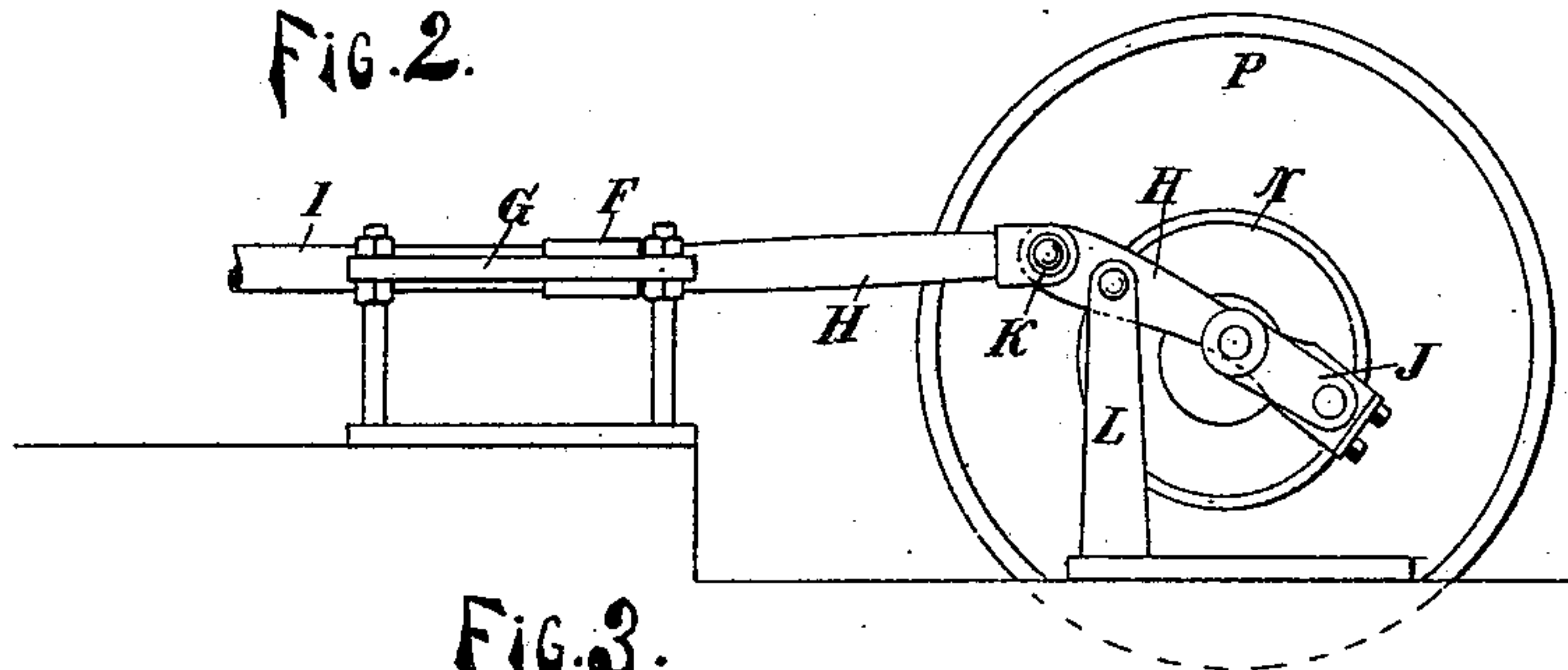


FIG. 3.

Witnesses.

Mark M. Powers.
John H. Reupers

Inventor.

Daniel A. Frazer.

By his Attorney

Luther V. Moulton.

UNITED STATES PATENT OFFICE.

DANIEL A. FRAZER, OF MANCELONA, MICHIGAN.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 395,822, dated January 8, 1889.

Application filed August 30, 1888. Serial No. 284,200. (No model.)

To all whom it may concern:

Be it known that I, DANIEL A. FRAZER, a citizen of the United States, residing at Mancelona, in the county of Antrim and State of Michigan, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in that class of steam-engines known as "single acting;" and the objects of my invention are, first, to reduce friction upon the crank-shaft and secure a more nearly tangential action of the connecting-rod upon the crank; second, to cause the pressure of steam at each stroke to act during more than one-half of the revolution; third, to avoid dead-centers; fourth, to "lap" the action of steam in the respective cylinders and secure a more uniform action upon the shaft. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of an engine embodying my invention; Fig. 2, a side elevation of the same with part of the frame broken away and one cylinder in longitudinal section, and Fig. 3 a detail showing position of crank and connections at the termination of the outstroke of the piston.

Like letters refer to like parts in all the figures.

A represents any suitable frame; B B', two cylinders of equal dimensions side by side and parallel to each other and open at both ends; C, a steam-chest connecting with the middle of each by live-steam ports D D' and with the open air by the exhaust-port E, one live-steam port, D, connecting with each cylinder, which are each provided with two piston-heads, R R', which traverse the respective ends of said cylinders from the ports D outward and return at each revolution of the crank, the steam acting against both on the outstroke and exhausting on the return-stroke. Said heads are provided with rods I, cross-heads H, and guides G, or the cylinders may be made longer and suitable cupped pistons may be used, omitting the rods, cross-heads, and guides and attaching the connecting-rods directly to the pistons.

J is the crank-shaft, set a little below the axis of the cylinders, having cranks set opposite each other and in front of the respective cylinders. From these cranks to the adjacent (or front) cross-heads extend connecting-rods H H, having joints K K near the middle of each.

L L are levers fulcrumed near the middle of each to the frame A, pivoted at their upper ends to the connecting-rods H H near the joints K and between said joints and the cranks, the lower ends of said levers L L being connected to the rear cross-heads by pivoted connecting-rods H' H'.

P is a pulley on the crank-shaft.

N is an eccentric, which operates an ordinary D-valve in the steam-chest C by means of the connecting-rod M, rock-shaft Q, and valve-rod O.

The operation of my device is as follows: The steam in the chest C is admitted to and exhausted from each cylinder alternately, the same as in case of the respective ends of an ordinary double-acting engine. Passing through the ports D D, the steam is confined between the pistons R R and forces them apart, each cylinder acting alternately upon its respective crank. The pressure upon the rear piston tends to throw the upper end of the lever L toward the crank-shaft and aids in turning the shaft. The pressure upon the forward piston tends to force the joint K forward and downward, and the lever L, acting as a fulcrum, tends to throw the crank upward, thus reducing the friction upon the shaft-bearings and throwing the crank off the center, also directing the force in a more nearly tangential line to the path of the crank. As the crank approaches the forward center, the joint K rises above the end of the lever L. The pressure upon the crank is then forward and downward, thus securing like results at the termination of the stroke. By thus changing the direction of the pressure upon the crank I am able to exert a forward pressure upon the same both before and after it passes the level of the axis or the usual dead-centers, thus securing action of the steam upon the crank during considerably more than one-half of the revolution in each case. I am also thus enabled to lap the action of the steam in the respective cylinders, the action commencing in one cylinder before it ceases in the other. I

can also secure a much steadier forward pressure upon the crank than by the usual direct connecting-rod. It will also be observed that the pressure upon the connections between the pistons and cranks is constantly in one direction, thus avoiding any "knocking" in case the joints become loosened or worn.

In place of the rear piston-heads stationary heads may be substituted, the rear half of the cylinder omitted, together with all parts connecting said piston-heads to and including the lower ends of the levers L, and an operative engine will remain of less capacity and cost.

What I claim and wish to secure is as follows:

1. In a steam-engine, in combination with a piston and crank, a connecting-rod having a joint near its middle and a lever pivoted to the frame and to said rod between the said joint and the crank, substantially as described.

2. In a steam-engine, a cylinder having a steam-port at or near its middle and two single-acting pistons moving in opposite directions from said port and connected to a common crank-shaft, substantially as described.

3. In a steam-engine, a cylinder having a central steam-port, two single-acting pistons moving in opposite directions from said port, one of said pistons attached to the crank by a

connecting-rod, and a lever having a fulcrum near its middle and attached at one end to said connecting-rod and connected at the other end to the other of said pistons, substantially as described.

4. In a steam-engine, a cylinder open at both ends having a central steam-port, two pistons moving in opposite directions from said port, one piston attached to the crank by a rod having a joint near its middle, and a lever pivoted near its middle and connected at one end to said rod between said joint and crank and at its other end to the other of said pistons by a connecting-rod, substantially as described.

5. In a steam-engine, two cylinders arranged parallel to each other and open at both ends, each having a central port connecting it to a common steam-chest and opening under the respective ends of a D-valve, in combination with connecting-rods attaching said pistons to a common crank-shaft, whereby each cylinder acts alternately and the pistons in each cylinder operate in opposite directions to turn said shaft, substantially as described.

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

DANIEL A. FRAZER.

Witnesses:

C. L. BAILEY,
N. W. BURDICK.