

(No Model.)

4 Sheets—Sheet 1.

J. W. COLE.  
Direct Acting Steam Engine.  
No. 233,208. Patented Oct. 12, 1880.

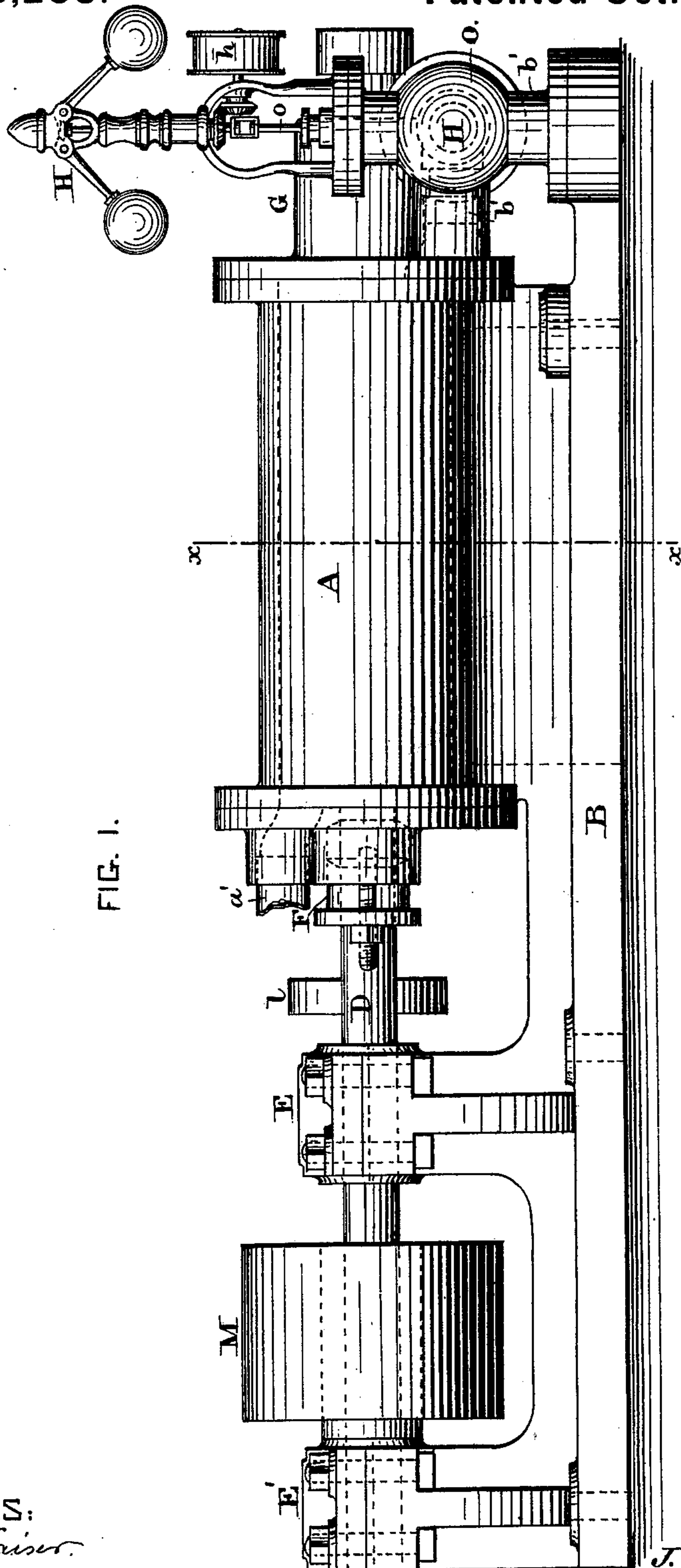


FIG. 1.

WITNESSES:

*J. Henry Kaiser.*  
*J. Rutherford.*

INVENTOR:

*J. Wendell Cole,*

By

*James L. Norris*  
Attorney.

(No Model.)

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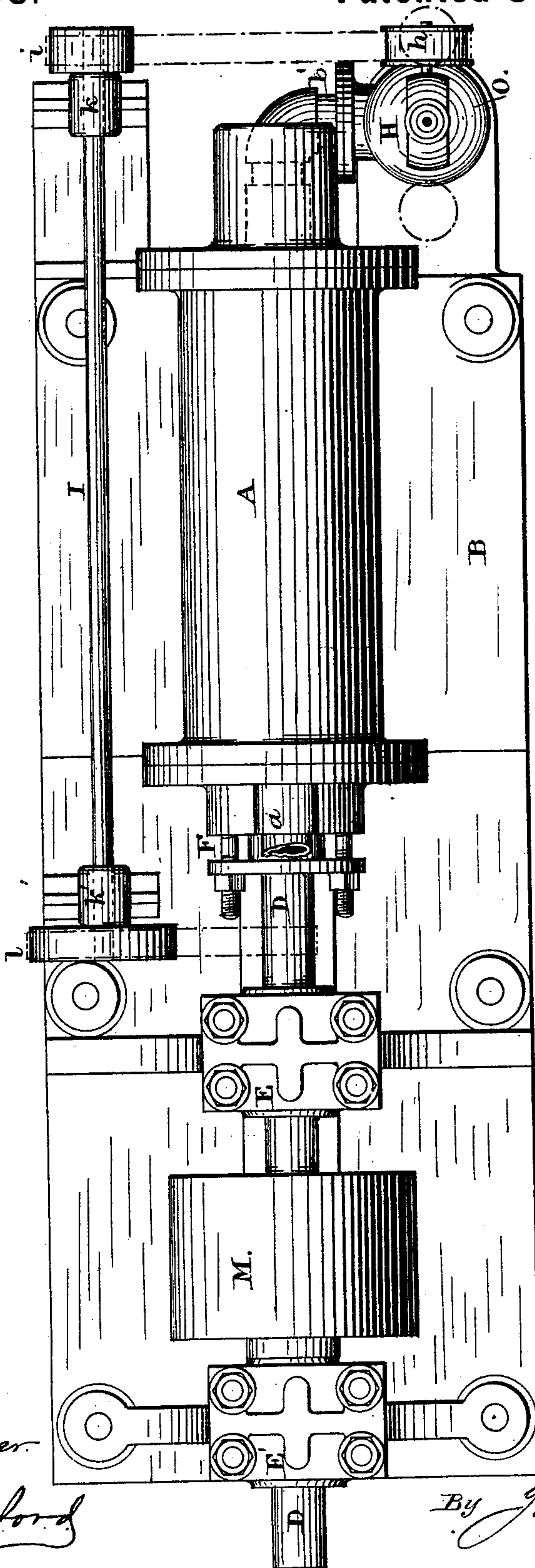
J. W. COLE.

## Direct Acting Steam Engine.

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**Patented Oct. 12, 1880.**

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WITNESSES

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(No Model.)

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J. W. COLE.

Direct Acting Steam Engine.

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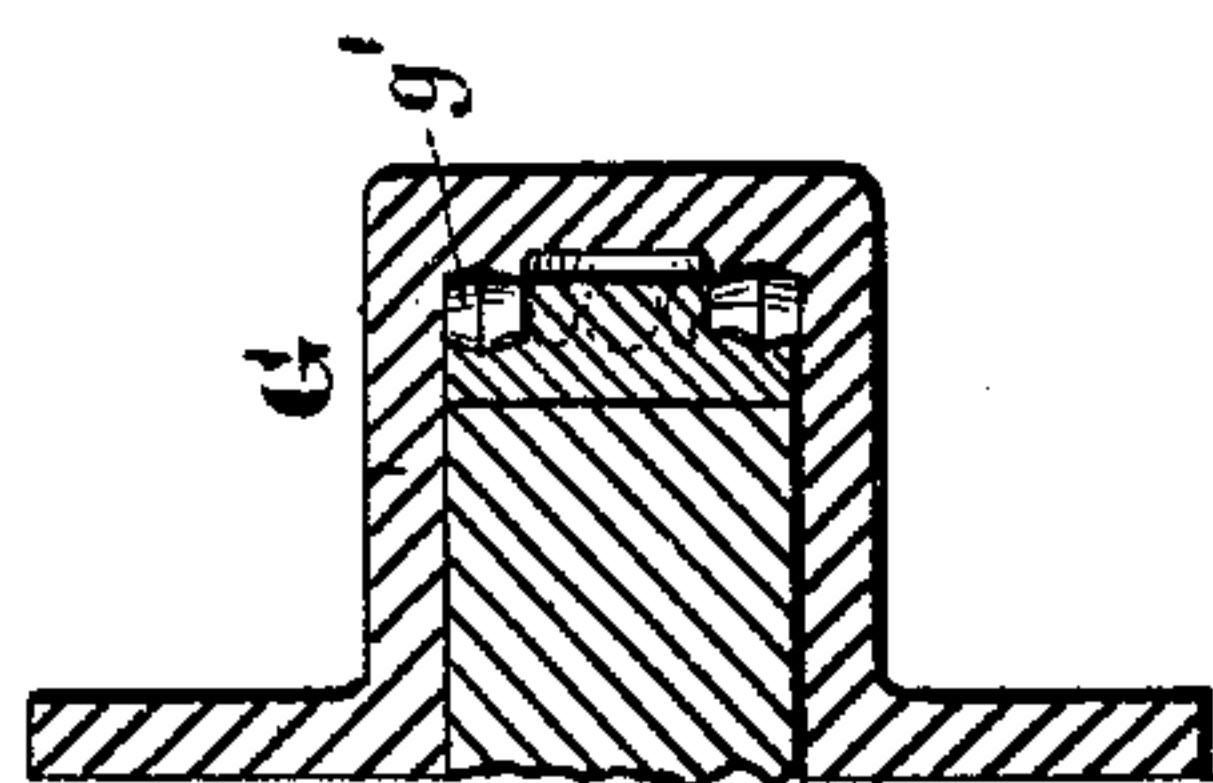
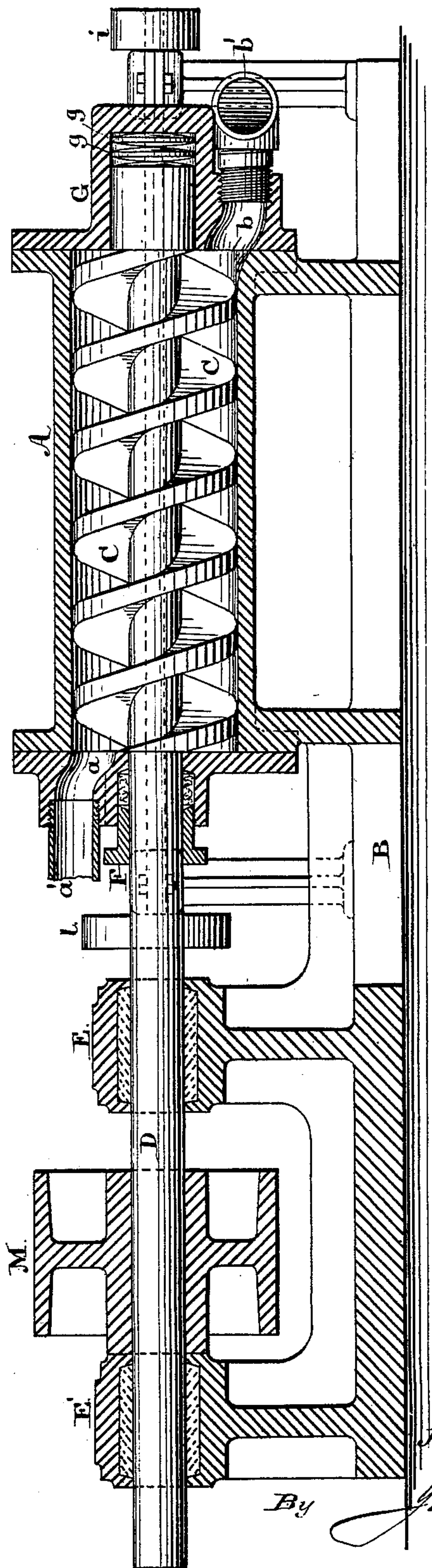


FIG. III.



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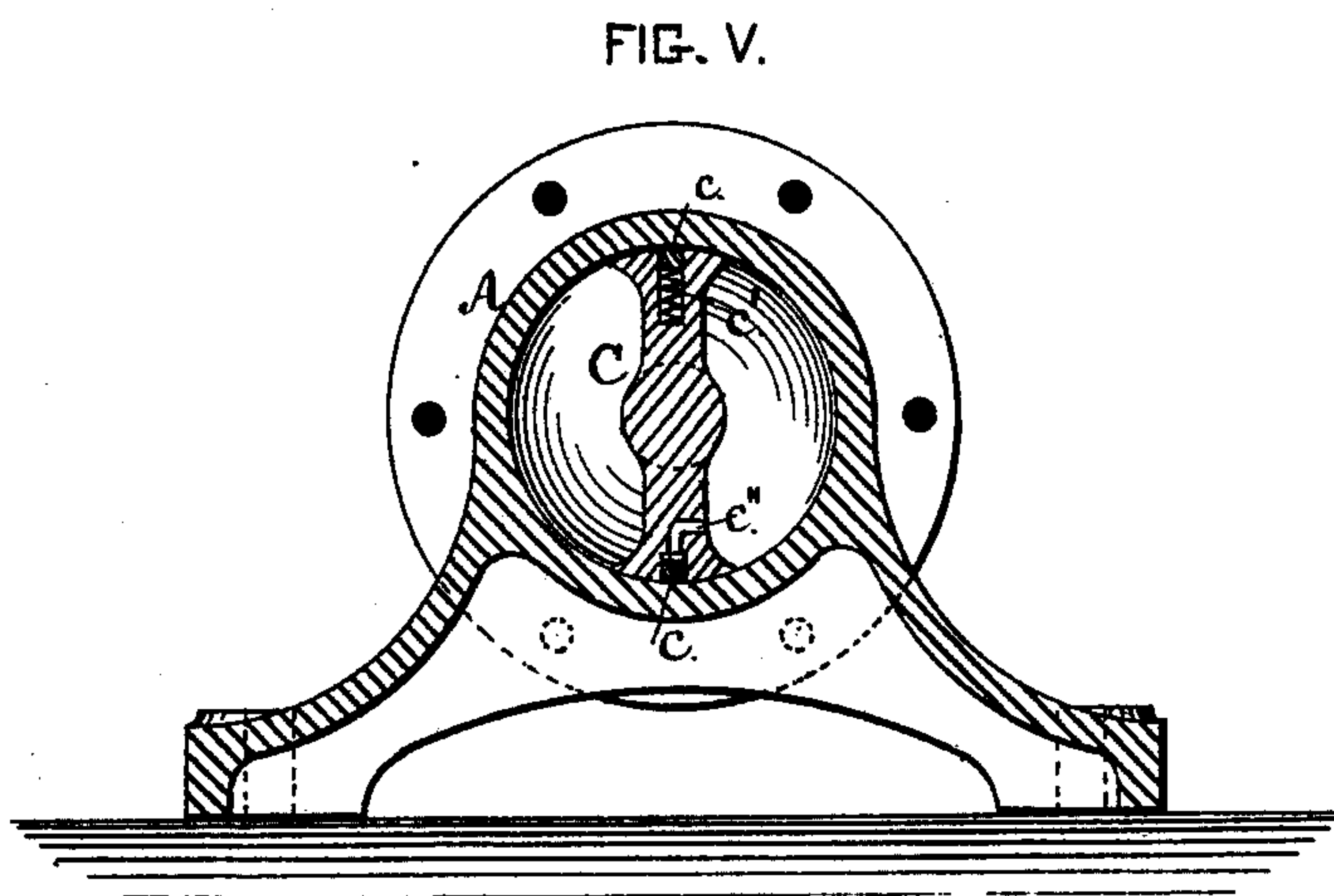
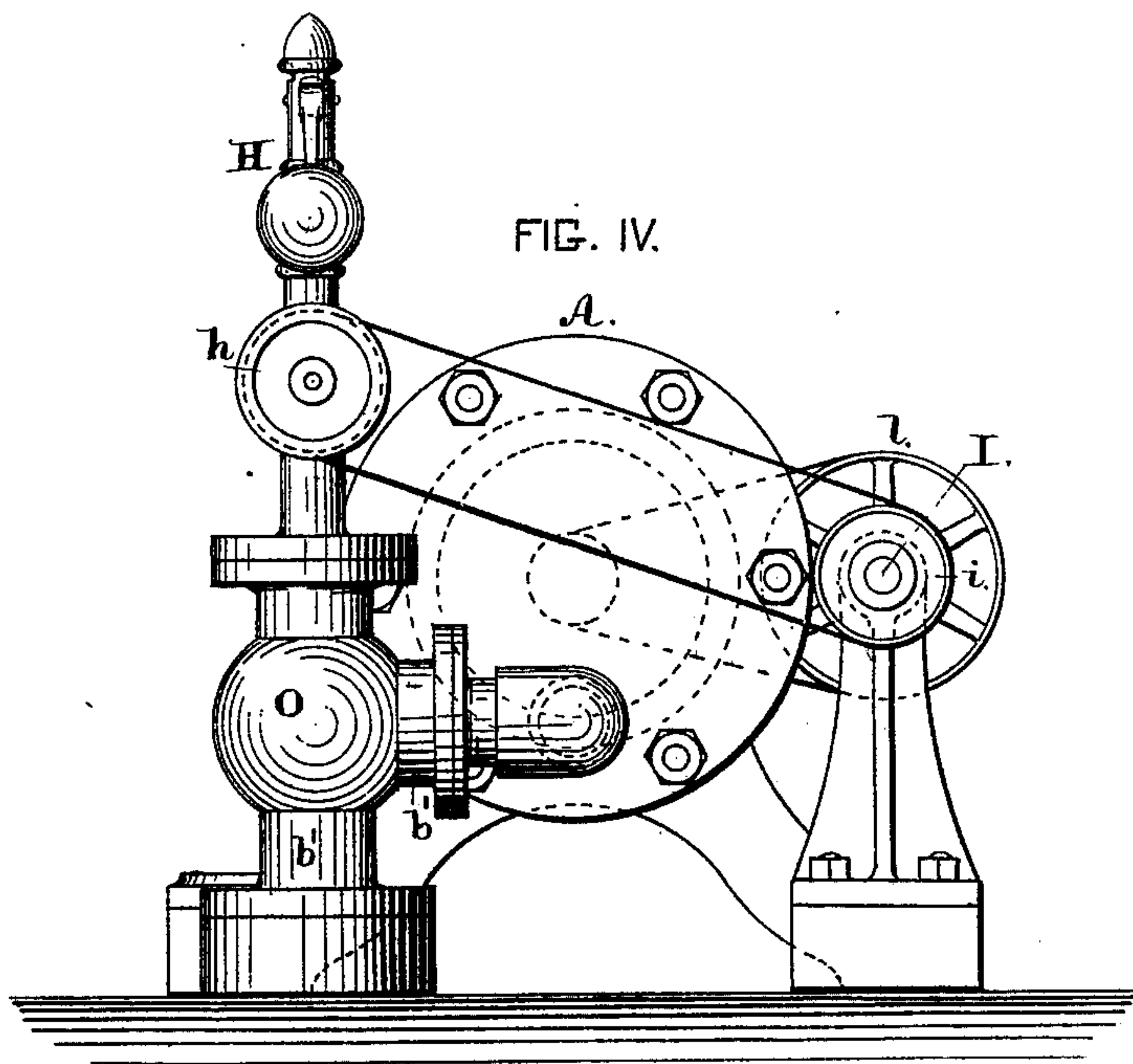
By

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(No Model.)

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J. W. COLE.  
Direct Acting Steam Engine.  
No. 233,208. Patented Oct. 12, 1880.



WITNESSES:

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INVENTOR:

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# UNITED STATES PATENT OFFICE.

J. WENDELL COLE, OF COLUMBUS, OHIO.

## DIRECT-ACTING STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 233,208, dated October 12, 1880.

Application filed August 30, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, J. WENDELL COLE, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented new and useful Improvements in Direct-Acting Steam-Engines, of which the following is a specification.

My invention relates to what are usually called "direct-acting steam-engines;" and its object is to increase the efficiency of such engines in such manner that a much smaller cylinder will give a much greater power per square inch of piston-surface than can possibly be obtained by the ordinary direct-acting engine; and my invention, therefore, consists, first, in admitting the steam at boiler-pressure direct to a piston, filling the cylinder its entire length, and having a spiral exposed surface, by which a much greater piston-surface is obtained, and the steam must exert its full pressure to the end of the cylinder, or until it is exhausted at the opposite end from where it enters.

It also consists in regulating the steam by a suitable governor of any approved description, arranged in the exhaust or outlet pipe, instead of in the inlet-pipe, as is now the case. By this arrangement the steam is permitted to exert its full boiler-pressure the entire length of the spiral blade or helix, instead of being throttled or wire-drawn, as ordinarily done.

Another important feature of my invention is that the connecting-rod, cross-head, guides, crank, and all usual appendages used in the ordinary direct-acting engine are entirely dispensed with, and the engine is far more compact and comprises less pieces, and of course has less friction and less parts to get out of order than any direct-acting engine in existence that I am aware of.

In the drawings, Figure I is a side elevation of my engine, showing the governor arranged in the exhaust-pipe. Fig. II is a plan view of the same. Fig. III is a longitudinal vertical section of the same. Fig. IV is an end elevation of the same. Fig. V is a vertical cross-section on line *xx* of Fig. I. Fig. VI illustrates a modified form of thrust-bearing.

In the drawings, A is the cylinder, connected and secured to the bed-plate B, or it

may be cast in one piece with it and the pillow-blocks of the shaft or piston-rod. In this cylinder is closely fitted a piston, C, made in the form of a screw or helix, which may have a broad or extended bearing-surface in contact with the cylinder, as shown in Fig. V, and in this surface suitable packing *c*, set out by springs *c'*, or by steam acting upon it through a passage, *c''*, may be inserted, so as to prevent any leakage of steam.

To the piston is connected the piston-rod D, which forms at the same time the shaft, and is supported in suitable bearings E E'. It passes through an ordinary stuffing-box, F, at the front end of the cylinder, while its rear end is supported in a hollow hub or bearing, G, formed in the rear cylinder-head, in which hub or bearing may be placed one or more tempered-steel disks, *g*, by which the end-thrust is taken up. Instead of these disks a friction-roller thrust-bearing, as shown in Fig. VI, may be employed with conoidal rollers *g'*.

At one end of the cylinder is arranged the inlet-port *a*, and at the other the outlet-port *b*, from which leads the exhaust-pipe *b'*.

The letter H designates a governor of ordinary construction, provided with pulley *h*, which receives motion from pulley *i* on shaft I, journaled in bearings *k k*, and to the shaft motion is imparted by pulley *l*, driven direct from the shaft or piston-rod D. The governor, through the stem *o*, controls a throttle or regulating valve, which is located at O in the exhaust-pipe *b'*, instead of being arranged in the inlet steam-pipe, as heretofore. By this arrangement, as before stated, the steam is permitted to exert its full pressure upon the piston, instead of being throttled or wire-drawn, as is the case when the regulating-valve is located in the inlet-pipe.

Secured to the piston-rod or shaft D, between the bearings E and E', is a belt-pulley, M, by which and a suitable belt motion may be transmitted direct to any kind of machinery adapted to receive it. A fly-wheel, N, may be mounted upon the shaft D at its end or other suitable point.

From the inlet-port *a* of the cylinder A a steam-pipe, *a'*, leads, and may be connected to a steam-boiler, and in this steam-pipe may be arranged the usual cut-off.



When steam is admitted to the cylinder through the steam-pipe *a'* and inlet-port *a* it strikes the blade or blades of the piston and causes said piston and its shaft or rod to rotate, and as the steam traverses the entire surface of the blades, it escapes through the exhaust-port *b*. Now, if the regulating-valve be changed in position—that is, opened or closed more or less—the flow of steam from the boiler will be increased or decreased accordingly; but this is after it has acted upon the piston.

Having now fully described my invention, I claim—

1. In a direct-acting steam-engine, the combination, with a cylinder provided with suitable inlet and exhaust ports, of a piston consisting of a continuous spiral or screw-like blade fitting snugly within said cylinder, and

provided with a shaft or piston-rod extending through one of the cylinder-heads and supported in the other, substantially as described, and for the purpose set forth.

2. The combination, with the exhaust-pipe leading from the cylinder of a direct-acting steam-engine and an automatic governor, of a regulating-valve arranged in said exhaust-pipe and controlled by said governor, substantially as and for the purpose set forth.

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

J. WENDELL COLE.

Witnesses:

JAMES L. NORRIS,  
ALBERT H. NORRIS.