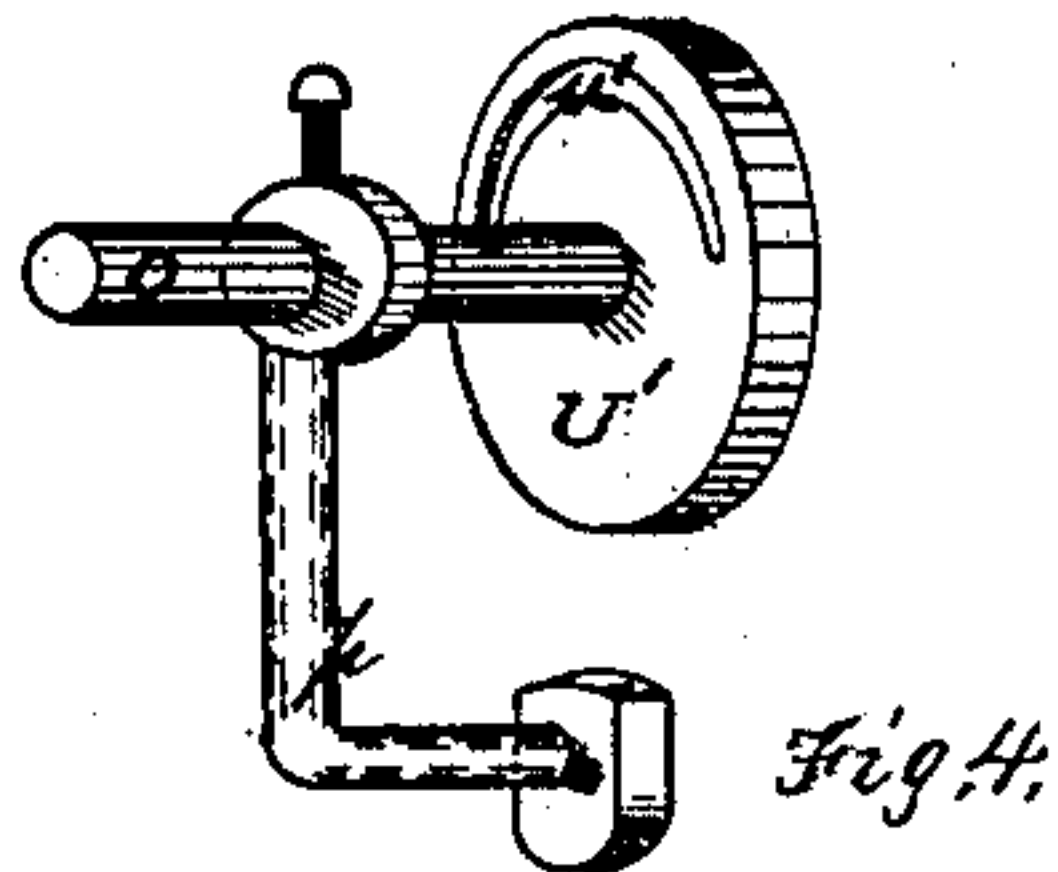
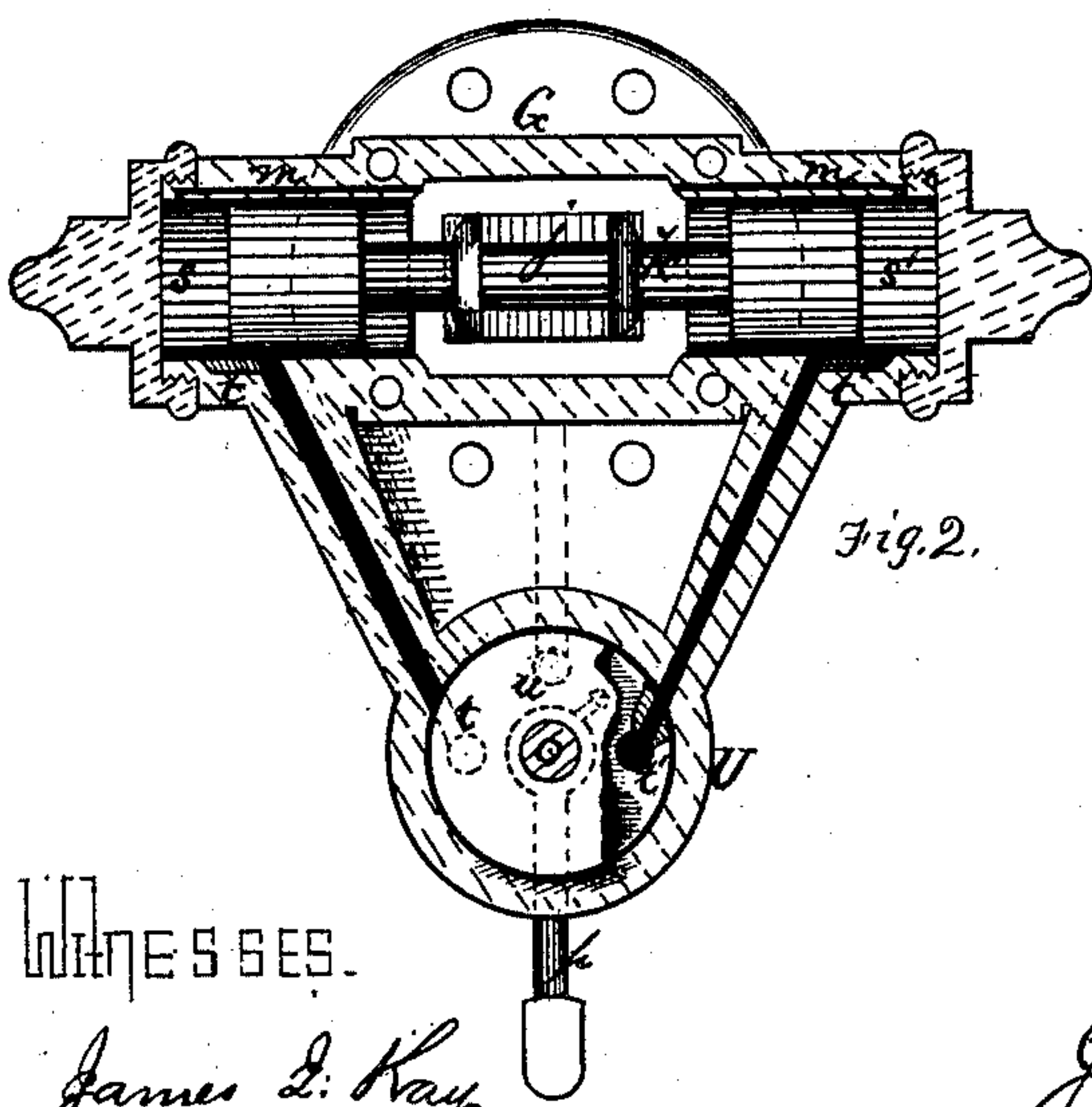
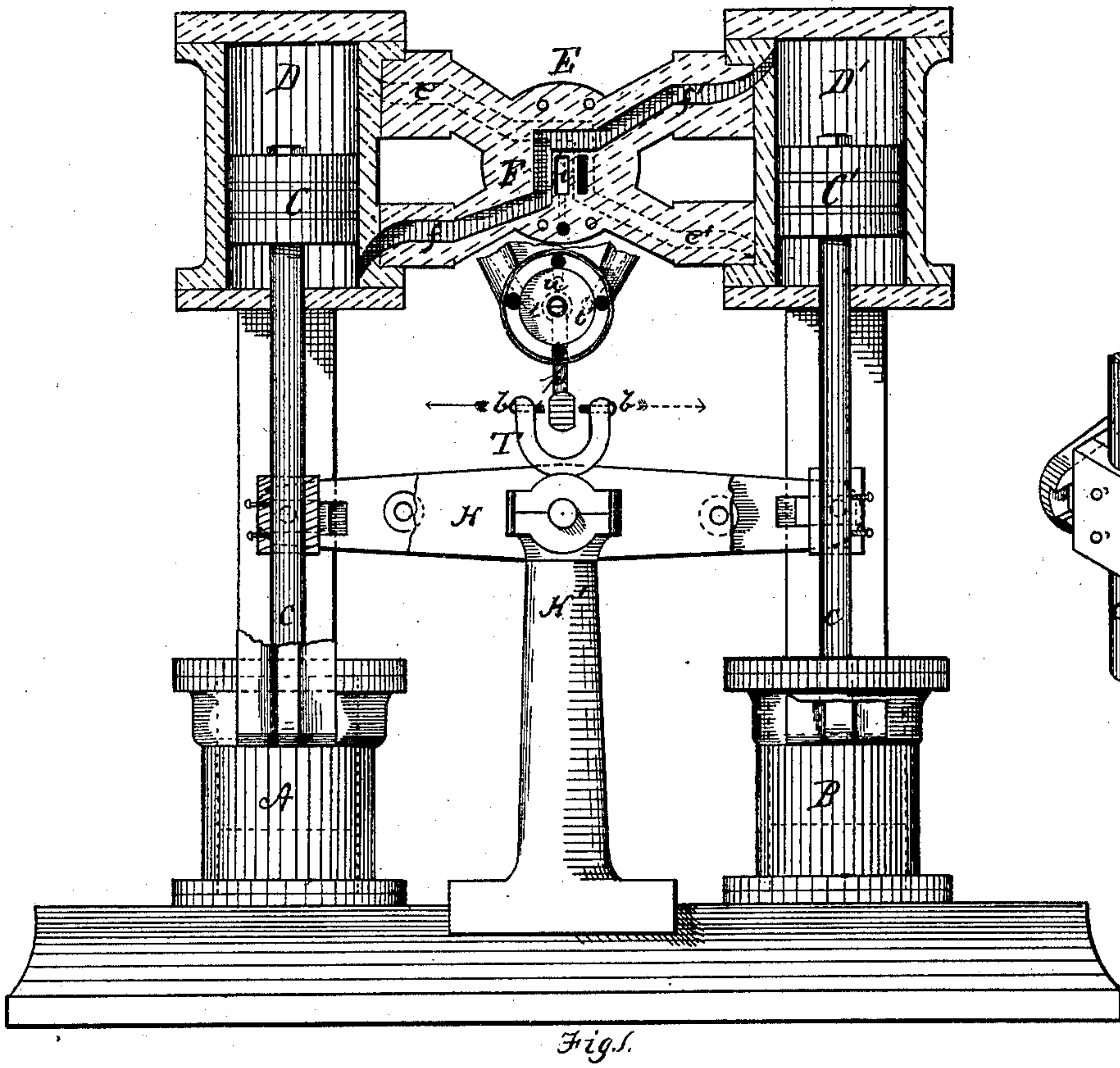


J. A. HUTCHISON & J. W. GOVIER.
VALVE-GEAR FOR DOUBLE-ACTING PUMP.

No. 175,989.

Patented April 11, 1876.



WITNESSES.

James L. Kay
Rochester

INVENTORS.

James A. Hutchison
John W. Govier
By Bakewell & Kerr
Attys

UNITED STATES PATENT OFFICE

JAMES A. HUTCHISON AND JOHN W. GOVIER, OF PITTSBURG, PA.; SAID GOVIER ASSIGNOR TO SAID HUTCHISON.

IMPROVEMENT IN VALVE-GEARS FOR DOUBLE-ACTING PUMPS.

Specification forming part of Letters Patent No. **175,989**, dated April 11, 1876; application filed January 14, 1876.

To all whom it may concern:

Be it known that we, JAMES A. HUTCHISON and JOHN W. GOVIER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steam-Engine Valve-Gear for Double-Acting Pumps; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, forming a part of this specification, in which—

Figure 1 is a vertical section of portions of a double-acting steam-pump to which our improvements have been applied. Fig. 2 is a sectional view of a steam-chest. Fig. 3 is a view illustrating the manner of coupling the walking-beam and piston-rods. Fig. 4 is a view of a disk-valve for the exhaust of the auxiliary plunger.

Like letters refer to like parts wherever they occur.

Our invention relates to the method of operating the valve-gear of the engines of double-acting steam-pumps; and for illustration of the devices employed we have elected to show them in connection with the double-acting steam-pump patented to Charles Rogers September 29, 1874, No. 155,464, we having devised them with reference to, and used them with, such a pump; but we do not wish to be understood as limiting them to such a combination.

We will now proceed to describe our invention, so that others skilled in the art to which it appertains may apply the same.

A B indicate pump-cylinders provided with plungers, connected directly to the piston-rods *c c* of pistons C C'. D D' are steam-cylinders, supported by suitable uprights, and braced above by a casting or brace-piece, E, through which pass the ports *e e'* and *f f'* and the main exhaust-port *i*. The steam-ports *e e'* and *f f'* cross each other, so that one piston will take steam upon one side, while the other piston will take steam upon the opposite side, and exhaust in like manner. The face of F is finished to form the seat of the slide-valve, and to give attachment to the steam-chest G. H

indicates a walking-beam, journaled in the uprights H', and having forked ends slotted for the reception of pins or journals upon blocks keyed to the piston-rods *c c*, or otherwise suitably connected, so that the walking-beam shall receive motion from the piston-rods.

To the extent of the devices above specified the construction may be that shown in the patent before cited, or of any approved construction, and need not be herein more definitely described.

G is the steam-chest, the two ends *s s'* of which form the cylinders for the auxiliary piston or plunger *k*, which operates the D-valve *j*. Through each end of the steam-chest is a steam-port, *m*, to admit live steam to each end of plunger *k*; and from each end of the auxiliary cylinders of the steam-chest exhaust-ports *t t'* lead to a valve-chamber, U, from which a single exhaust-port, *u*, leads to the main exhaust *i*. Within the valve chamber U is a disk or other suitable valve, U', having a channel or port, *w'*, by means of which the exhaust-ports *t t'* are alternately connected with exhaust-port *u*, which leads to the main exhaust. To this disk-valve U' is attached a spindle or shaft, *o*, which projects through the valve-chamber U, and is provided with an arm, *p*, which engages with a forked tappet, T. T is a forked tappet secured to the walking-beam H, or the shaft or journal thereof, and having an oscillatory or vibratory motion, which it transmits through arm *p* to the disk U', so that the exhaust of the auxiliary cylinder *s s'* is effected through intermediate devices by the piston-rods. The tines of the forked tappet are provided with set-screws *b*, or similar devices by means of which the length of stroke of the pistons may be controlled.

The operation of these devices is as follows: Supposing the slide-valve *j* be in such position as to connect the ports *f f'* with the main exhaust *i*, the two cylinders will be taking steam through *e e'*, which will force up piston C', and C down, causing the piston-rods and walking-beam to vibrate the forked tap-

pet and arm p in the direction of the full-line arrow, rotating the exhaust-valve U' of the auxiliary plunger or piston, so as to connect ports u and t' , and close port t , thus opening the exhaust from s' of the auxiliary cylinder while it is taking steam through m on the opposite head, thus changing the throw of the plunger, and moving the slide-valve so as to connect e e' with the main exhaust, and permit the main cylinder to take steam through f f' , reversing the travel of the piston-rods, and causing the forked tappet to vibrate in the direction of the dotted arrow, oscillating disk-valve U' , so as to close port t' and again connect t u . When it is desired to shorten the stroke of the main pistons the screws are screwed in, so as to operate the exhaust of the auxiliary plunger sooner, and the reverse is done when the stroke is to be lengthened.

The advantages derived by our manner of operating the slide-valve are, first, that we avoid all frictional cam or crank movements; secondly, we dispense with the fly-wheel, thereby obviating any jar or irregularity in the working of the engines, and the strain arising from the momentum of the fly-wheel upon the changing of the stroke, or when the pumps from any cause work irregularly. Finally, the exhaust of the auxiliary plunger or piston being dependent on the motion of the pistons, the slide-valve will not be reversed until the instant the rods finish their

stroke, and then will be instantaneously instead of gradually reversed, thus causing the engines to accommodate their action to the working of the pumps.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a steam-pump having two pump-cylinders, the combination of two steam-cylinders, having a single steam-chest and slide-valve, with an auxiliary plunger or piston for operating the valve, the entire stroke of the auxiliary or valve piston being effected by steam, substantially as and for the purpose specified.

2. In a steam-pump having two pump-cylinders, the combination of two steam-cylinders, having a single steam-chest and slide-valve, with an auxiliary piston or plunger for operating the slide-valve, and an exhaust valve or disk operated from the piston-rods through a walking-beam, its shaft, or suitable intermediate mechanism, substantially as and for the purpose specified.

In testimony whereof we, the said JAMES A. HUTCHISON and JOHN W. GOVIER, have hereunto set our hands.

JAMES A. HUTCHISON.
JOHN W. GOVIER.

Witnesses:

T. B. KERR,

F. W. RITTER, Jr.