

No. 685,241.

Patented Oct. 29, 1901.

C. A. ANDERSON, E. A. ERICKSON & J. WICKSTROM.

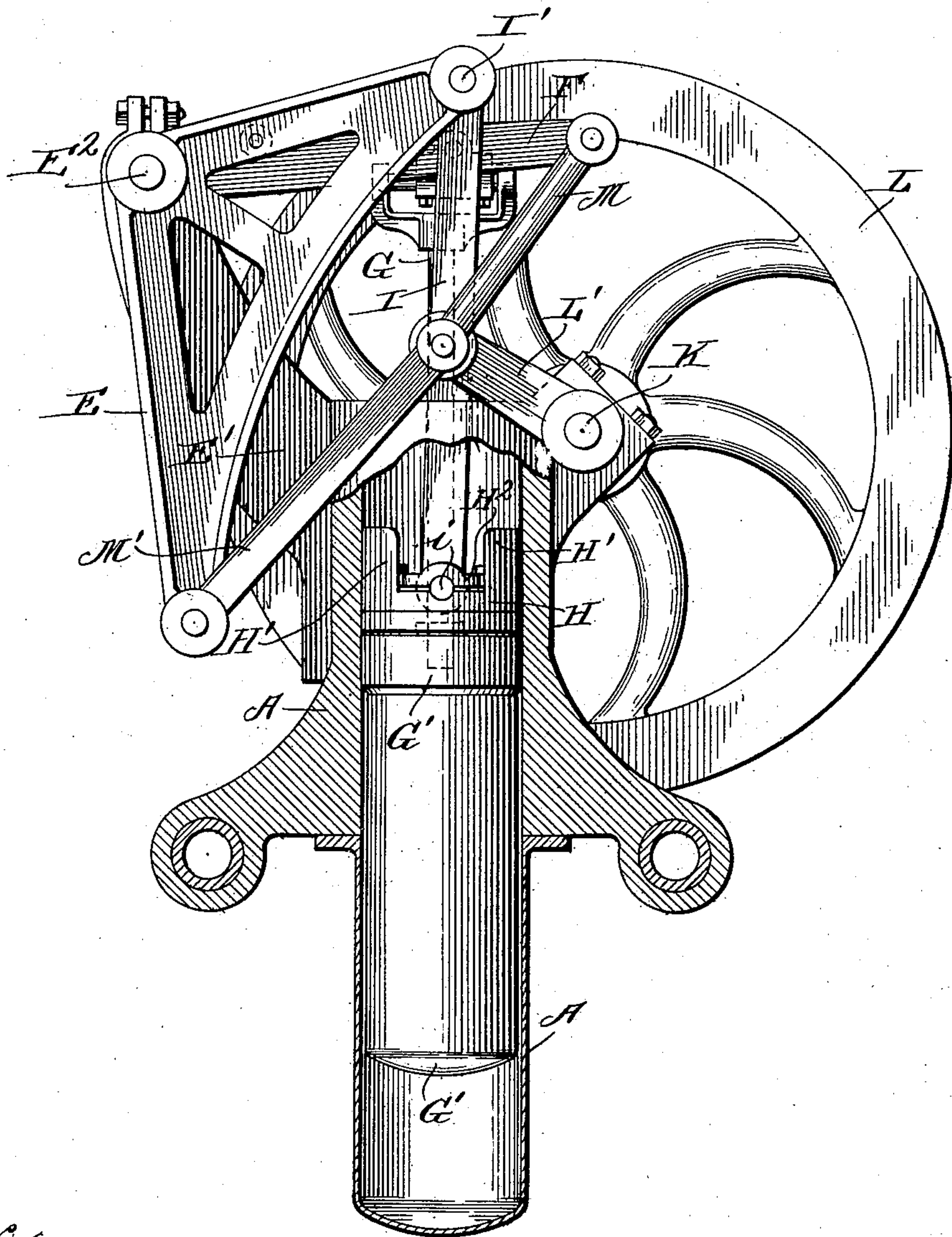
MECHANICAL MOVEMENT.

(Application filed Aug. 25, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



Witnesses

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Fig. 2.

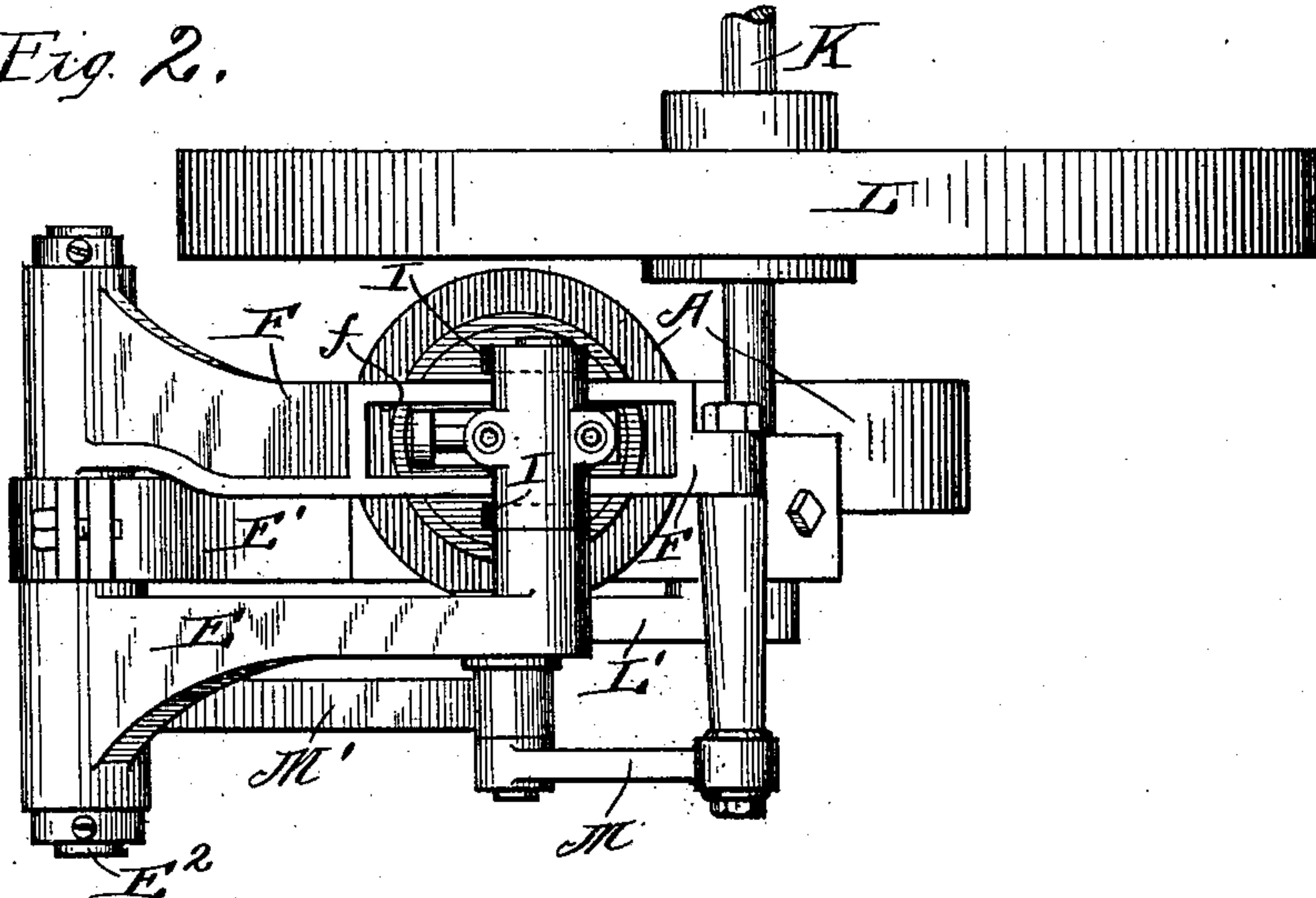


Fig. 3.

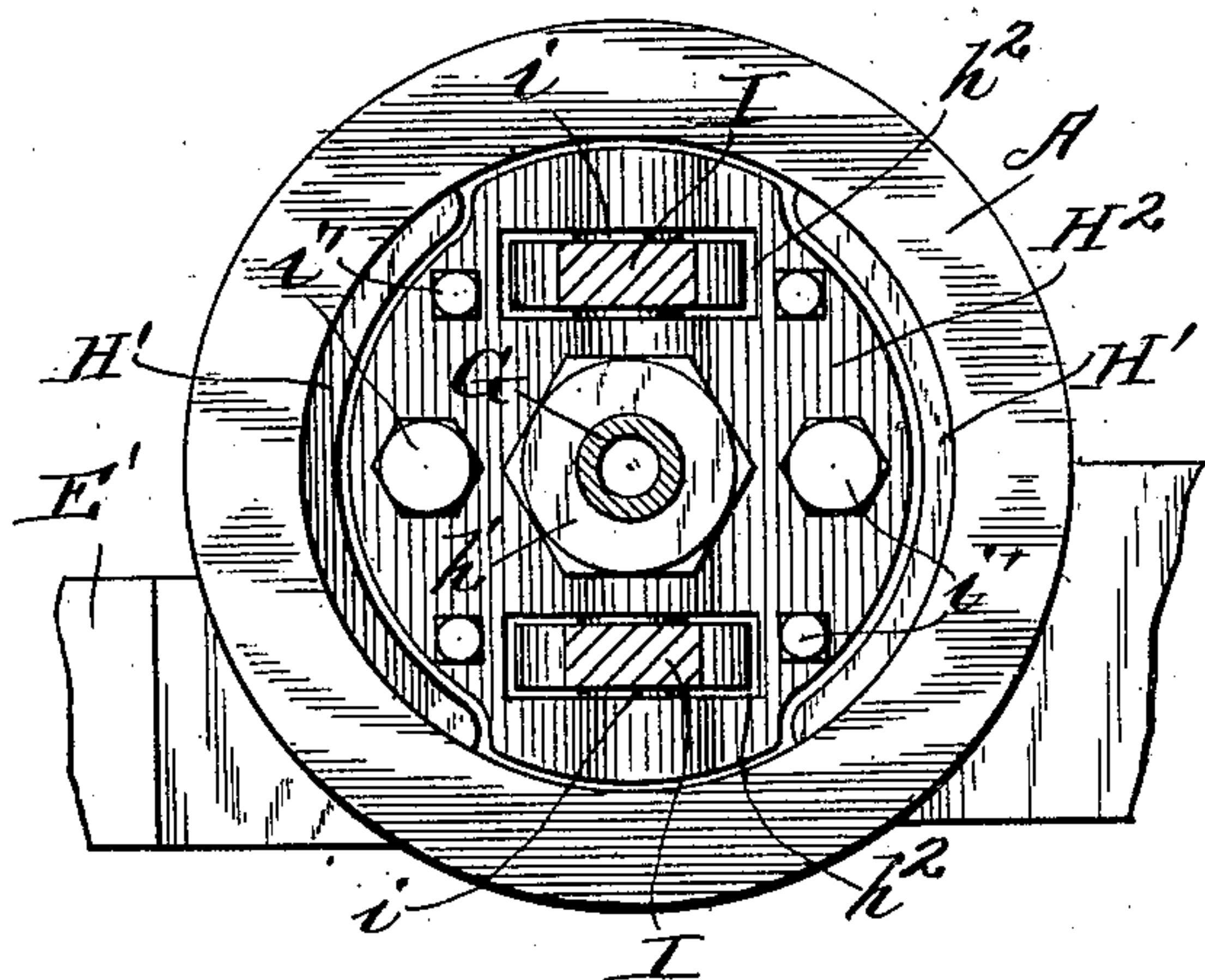
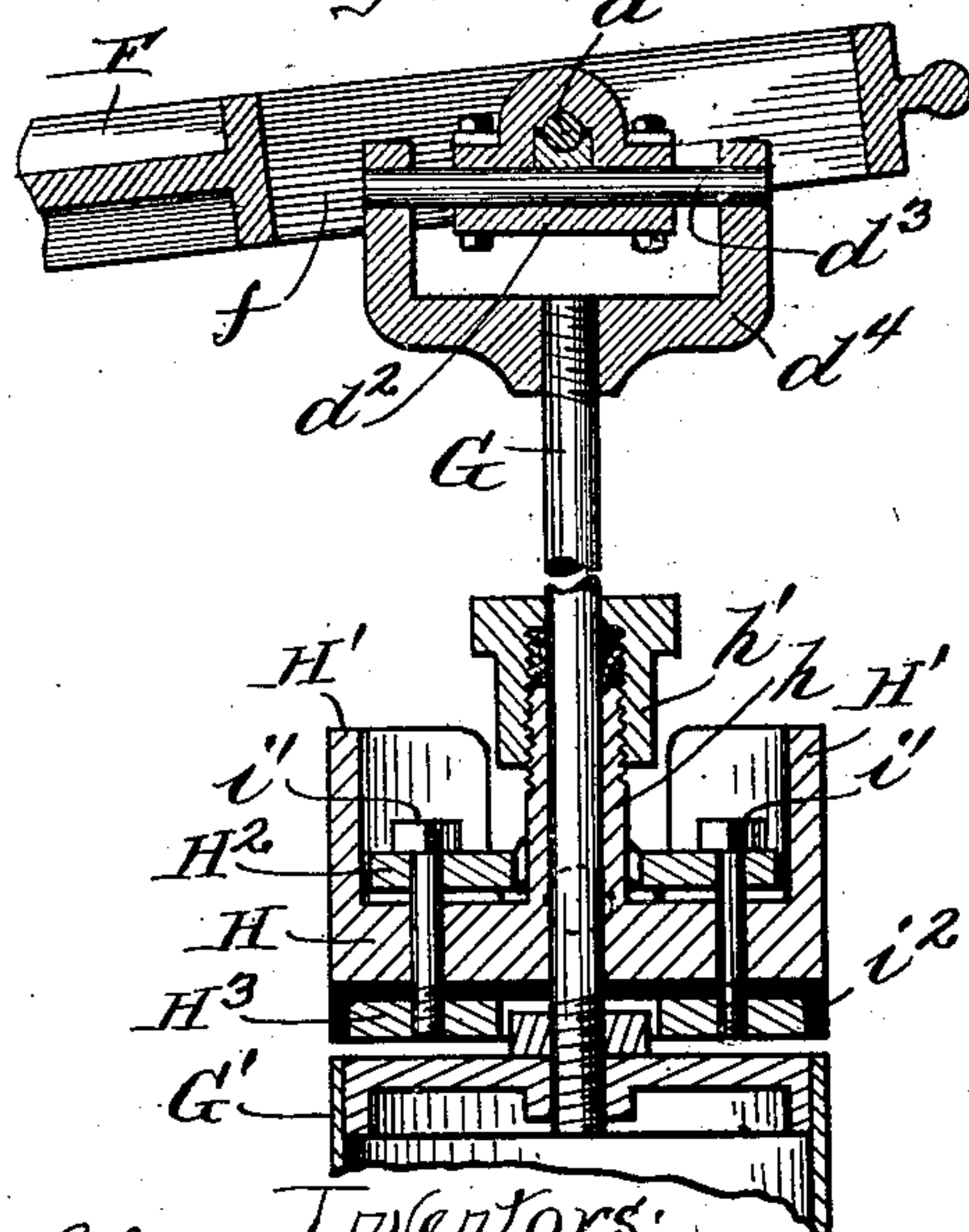


Fig. 4. d'



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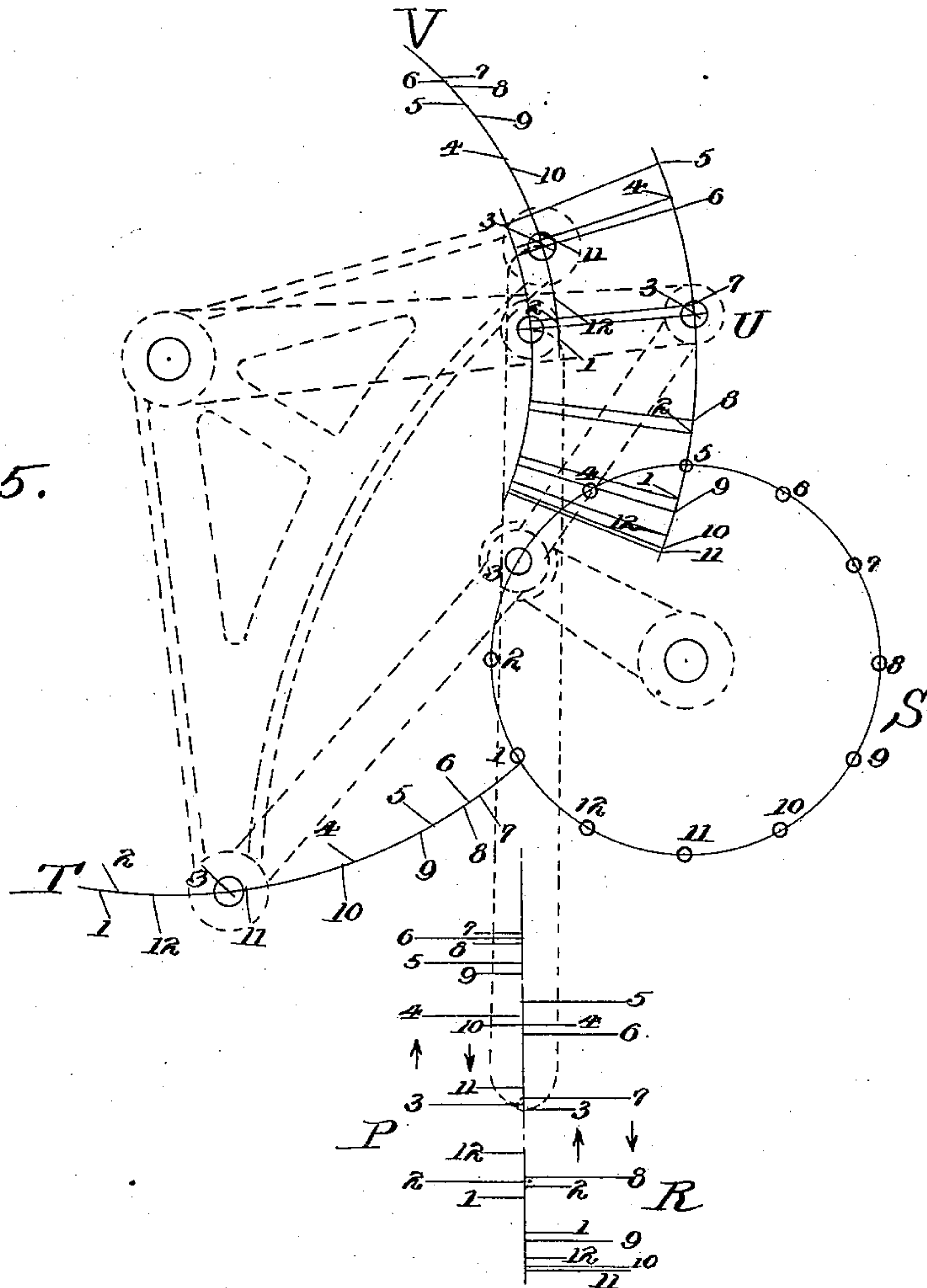
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3 Sheets—Sheet 3.

Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES A. ANDERSON, ERICK A. ERICKSON, AND JOHN WICKSTROM, OF
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MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 685,241, dated October 29, 1901.

Original application filed March 27, 1899, Serial No. 710,577. Divided and this application filed August 25, 1900. Serial No. 27,978. (No model.)

To all whom it may concern:

Be it known that we, CHARLES A. ANDERSON, ERICK A. ERICKSON, and JOHN WICKSTROM, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Mechanical Movements, of which the following is a specification.

This invention relates to improvements in mechanical movements to be used for producing variable or differential speed motion employed for various purposes; and it consists in certain peculiarities of the construction, novel arrangement, and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

In our application Serial No. 710,577, filed March 27, 1899, we have shown and described, but do not therein claim, the invention disclosed and claimed in this application, and our present application may be considered as a division of said application, Serial No. 710,577; but in the present instance we have shown the movements as applied to a single-cylinder hot-air engine, while in application Serial No. 710,577 we have shown them as applied to an engine having two cylinders. However, we do not desire to limit ourselves in the application or use of our mechanical movements, but may use them for any purpose and upon any apparatus or device for which they may prove applicable or suitable, and in showing them applied to the cylinder of a hot-air engine we have done so to conveniently demonstrate the construction and operation of the different parts.

In order to enable others skilled in the art to which our invention pertains to make and use the same, we will now proceed to describe it, referring to the accompanying drawings, in which—

Figure 1 is a view in side elevation, partly in section, of our improved mechanism, showing it applied to a closed-cycle hot-air engine. Fig. 2 is a plan view thereof. Fig. 3 is a plan view of the cylinder, showing the piston rods or bars in section. Fig. 4 is a fragmental sectional view of an arm of the device and a portion of one of the piston-rods and a part

of the power-piston, showing the means for connecting them; and Fig. 5 is a diagrammatical view illustrating the relative movements of the parts of the mechanism.

Similar characters refer to like parts throughout the different views of the drawings.

A represents the cylinder, which in the present instance is shown as that of a hot-air engine and as having a displacer-piston G' and a power-piston H and which may be of the ordinary or any preferred construction or for any desired purpose. The cylinder A is shown as being provided with a bracket E', on which is fulcrumed a bell-crank lever. On a shaft E², which is secured in the upper portion of the bracket E' and on which the bell-crank lever E is journaled, is also journaled so as to extend diametrically over the top of the cylinder an arm F, which is provided with a longitudinal slot or opening f, in which the upper end of the displacer-piston rod G is journaled. Extending across the slot or opening f in the arm F is a shaft d', on which is mounted a journal-box d², through the lower portion of which passes at right angles to the shaft d' a shaft d³, whose ends are secured to a forked piece d⁴, located on the upper end of the rod G, which is preferably hollow and has its other end secured to and communicating with the upper portion of the displacer-piston. Located in the upper portion of the cylinder A and above the displacer-piston G' is the power-piston H, which is preferably formed with two segmental flanges H', which serve to strengthen as well as guide the said piston. This piston is preferably provided in its center with an upwardly-extending tubular portion h, through which the displacer-piston rod G passes and on which may be secured a stuffing-box h', of the ordinary or any preferred construction. Located on the upper surface of the piston H is a plate H², which is provided with slots h² for the reception and operation of the piston rods or bars I, whose lower ends are journaled on pins or shafts i, located in suitable bearings furnished by the piston H and the plate H², which is secured to the piston by means of

bolts i' , whose lower ends engage a ring H^3 , located on the lower surface of the piston H , and between which ring and piston is interposed a washer i^2 , of leather or other flexible material, to cause the piston to fit the cylinder closely. The piston H may be otherwise constructed and the lower ends of the bars or rods I may be pivotally connected to said piston in any other desired manner. The upper ends of the piston rods or bars I are journaled on a suitable shaft I' on the upper arm of the bell-crank lever E and are arranged parallel with one another and at a sufficient distance apart to allow of the free movement therebetween of the arm F , which carries the displacer-piston rod. Journaled in suitable bearings on the upper portion of the cylinder is the main or driving shaft K , on which the balance-wheel L is mounted. This shaft is provided at or near one of its ends with a crank L' , which is pivotally connected to the pitman rods or bars M and M' , whose other ends are pivotally secured to the arm F and lower arm of the bell-crank lever E , respectively.

In Fig. 5 of the drawings we have illustrated by a diagrammatical view the relative positions of the moving parts of our mechanism, in which view the group of numerals indicated by the letter P represent the various positions assumed by the power-piston in its downward and upward strokes, while the group R indicate the positions of the displacer-piston, the arrows in said groups showing the direction of the movement of said pistons. The group of numerals S indicates the relative positions of the crank, while the group T shows the positions of the lower end of the bell-crank lever. The group U indicates the positions of the outer bearing of the displacer-piston-carrying arm F , and V is the group indicating the positions of the upper end of the bell-crank lever.

In the foregoing we have described our movements as if the cylinder were in an upright position, and have spoken of the "upper" and "lower" positions thereof; but the cylinder may be placed in a horizontal position, in which arrangement the terms "upper" and "upward" should be construed as synonymous with "outer" and "outward" and the terms "lower" and "downward" should be construed as synonymous with "inner" and "inward," and in the following we may so use the said terms.

By reference to Fig. 5 of the drawings it will be seen and readily understood that when the displacer-piston is at 5, group R , and is ready to begin its downward or inward stroke the power-piston will be at 5, group P , some distance from the limit of its upper or outward stroke. When the displacer-piston shall have traveled to 7, group R , the power-piston will have reached 7, group P , or the limit of its outward stroke. When the displacer-piston shall have reached the point 9, group R , the power-piston will have only

traveled to 9, group P , a small fraction of its downward or inward stroke. At the points indicated by 10, 11, 12, group R , the displacer-piston remains practically stationary, while the power-piston makes the greater part of its downward or inward stroke. While the power-piston travels over its dead-center or from 12, 1 to 2, group P , the displacer-piston approaches the power-piston very rapidly.

In the operation of the bell-crank lever E and arm F , which carry the piston rods or bars I and G , respectively, it is apparent that the said lever and arm will describe arcs of a circle, and to permit of this the bars I are journaled at their upper ends to a shaft I' on the upper end of said lever and to pins or shafts i on the power-piston, which construction permits of the necessary oscillating movement thereof; but the piston-rod G of the displacer-piston must operate with a rectilinear movement, and to permit this it is movably journaled on the arm F , as above explained.

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

1. A mechanical movement comprising the following instrumentalities, viz., a guide, a bell-crank lever, a main or driving shaft, a crank on said shaft, a pitman pivotally secured at one of its ends to the crank and at its other end to the lower portion of the bell-crank lever, rods or bars journaled at one of their ends to the upper arm or portion of the bell-crank lever, a part moving in said guide, and on the opposite ends of said bars or rods, an arm journaled at one of its ends and extending between the said rods or bars, a transverse shaft journaled near its other end, a journal-box on said shaft, another shaft movably mounted in the journal-box at right angles to its shaft, a rod secured at one of its ends to the movable shaft and passing through the said part on the first-named rods or bars, another part secured on the other end of said rod, a pitman pivotally secured at one of its ends to the crank and at its other end to the said arm.

2. A mechanical movement comprising the following instrumentalities, viz., a guide, an arm journaled at one of its ends and provided with a transverse shaft near its other end, a journal on said shaft, another shaft movably mounted in said journal at right angles to its shaft, a part moving in said guide and secured at one of its ends to the movable shaft, and having on its other end another guided part, and means to cause the arm to describe an arc of a circle.

3. A mechanical movement, comprising the following instrumentalities, viz: a cylinder, a bell-crank lever, a main or driving shaft, a crank on said shaft, a pitman pivotally secured at one of its ends to the crank and at its other end to the lower portion of the bell-crank lever, piston rods or bars journaled at

one of their ends to the upper arm or portion of the bell-crank lever, a piston on the opposite ends of said rods or bars, an arm journaled at one of its ends and extending between the said piston rods or bars, a transverse shaft journaled near its other end, a journal-box on said shaft, another shaft movably mounted in the journal-box at right angles to its shaft, a piston-rod secured at one of its ends to the movable shaft and passing through the piston on the first-named rods or bars, a piston secured on the other end of said piston-rod, a pitman pivotally secured at one of its ends to the crank and at its other end to the said arm, substantially as described.

4. A mechanical movement comprising the following instrumentalities, viz: a cylinder, an arm journaled at one of its ends and provided with a transverse shaft near its other end, a journal-box on said shaft, another shaft movably mounted in the journal-box at right angles to its shaft, a piston-rod secured at one of its ends to the movable shaft, and having on its other end a piston and means to cause the arm to describe an arc of a circle, substantially as described.

5. A mechanical movement comprising the following instrumentalities, viz: a crank suit-

ably journaled, a bell-crank lever and an arm suitably journaled on a common axis, connections uniting the bell-crank lever and arm with the crank, said lever and arm describing in their movements arcs, which if extended would intersect the arc described by the crank, substantially as described.

6. The combination with a cylinder, of a piston within said cylinder, a crank journaled at the side of the cylinder and adapted to move in a plane parallel to an axial line through the cylinder, the said crank adapted to intersect a line drawn through the center of the cylinder parallel to and on a horizontal plane with a line drawn through the axis of the crank-shaft, a bell-crank lever and an arm having a common axis, a pitman pivotally secured to the lower portion of the bell-crank lever at one of its ends and to the crank at its other end, a pitman pivotally secured at one of its ends to the crank and at its other end to the said arm, substantially as described.

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