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PATENTED JULY 9, 1907.

F. H. RICHARDS.
MECHANICAL MOVEMENT.

APPLICATION FILED JULY 24, 1902.

3 SHEETS—SHEET 1.

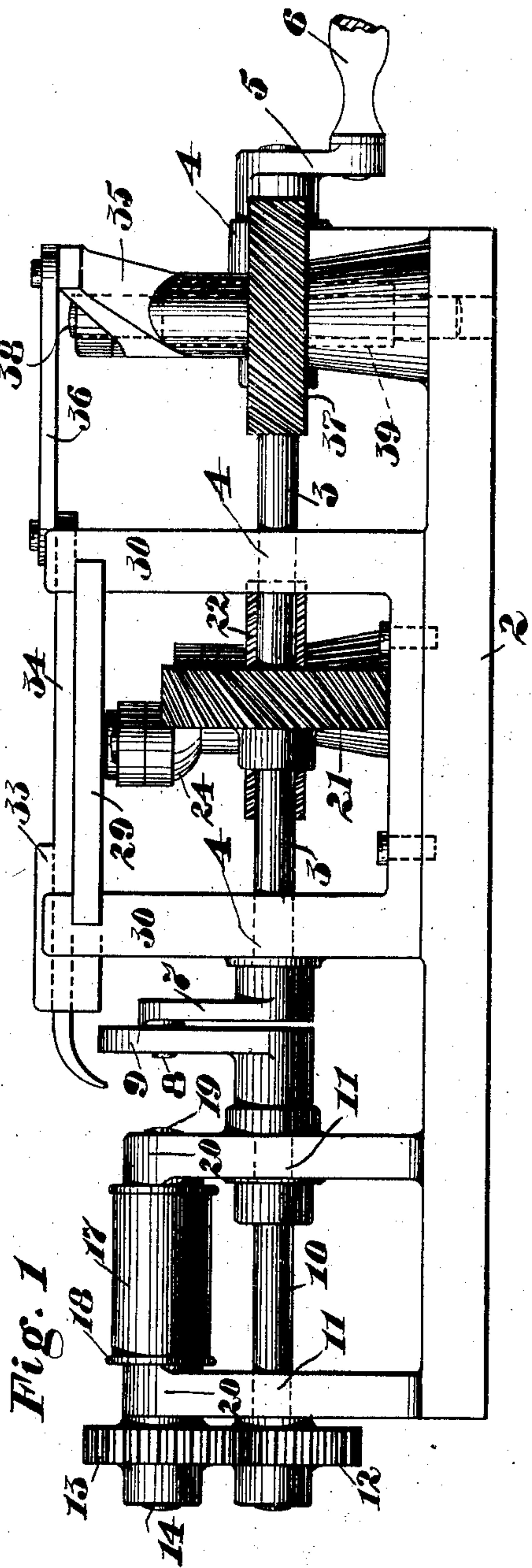


Fig. 1

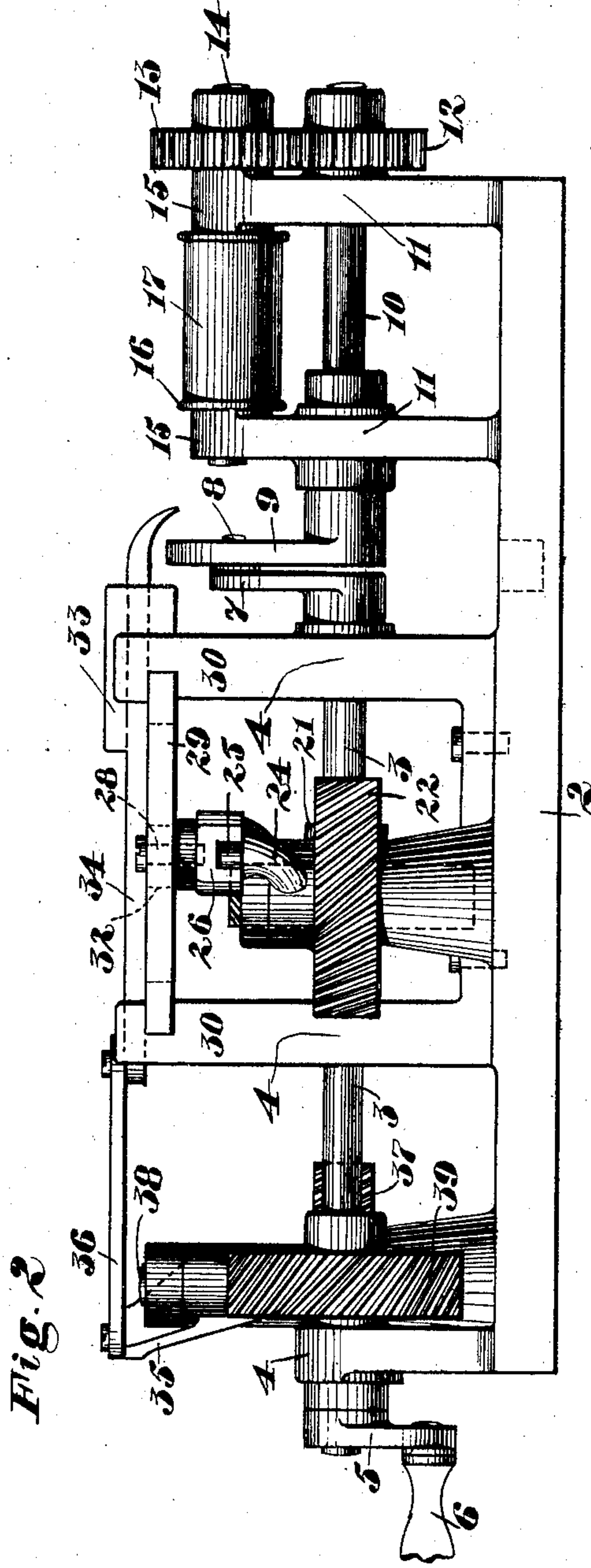


Fig. 2

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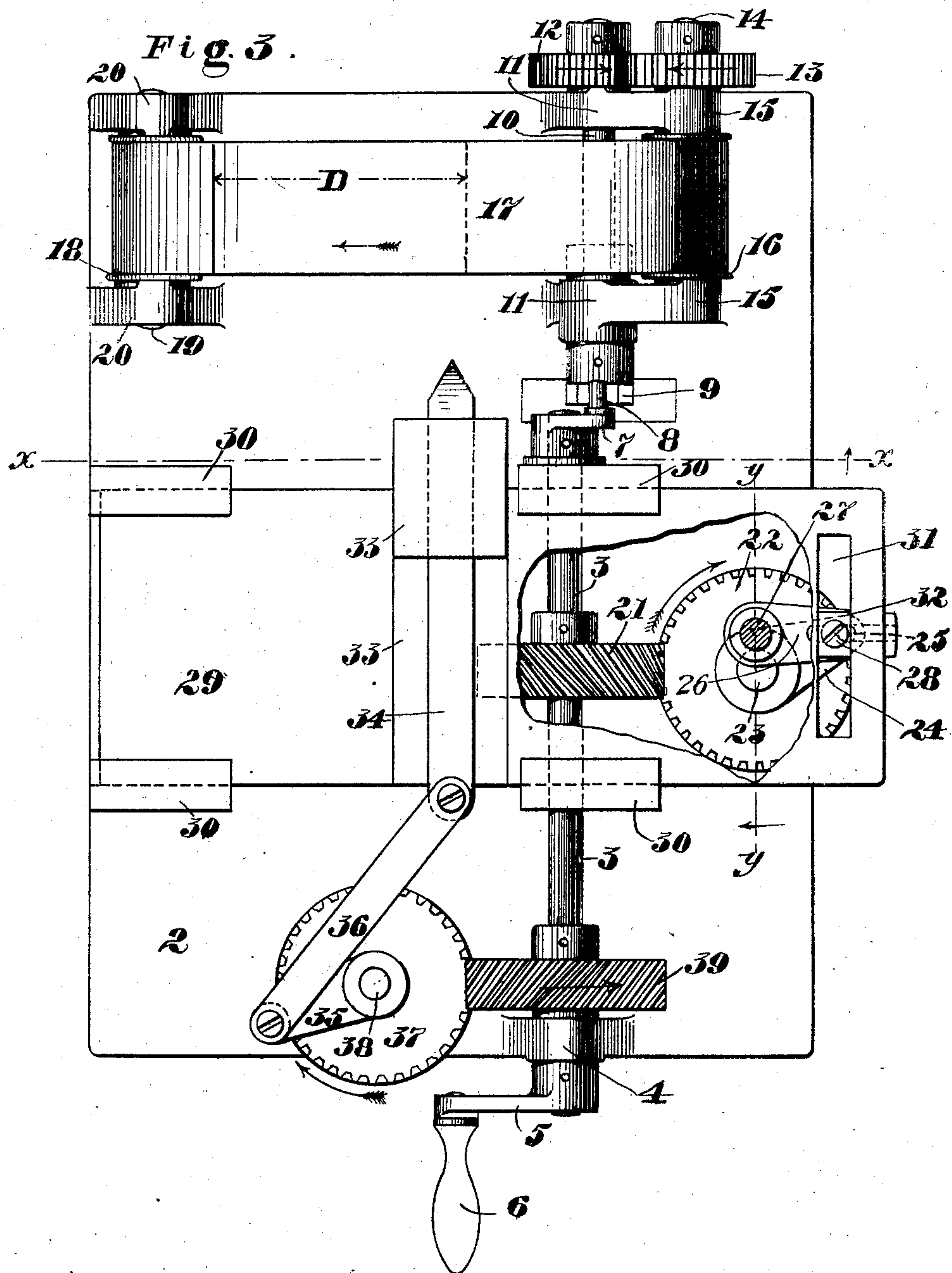
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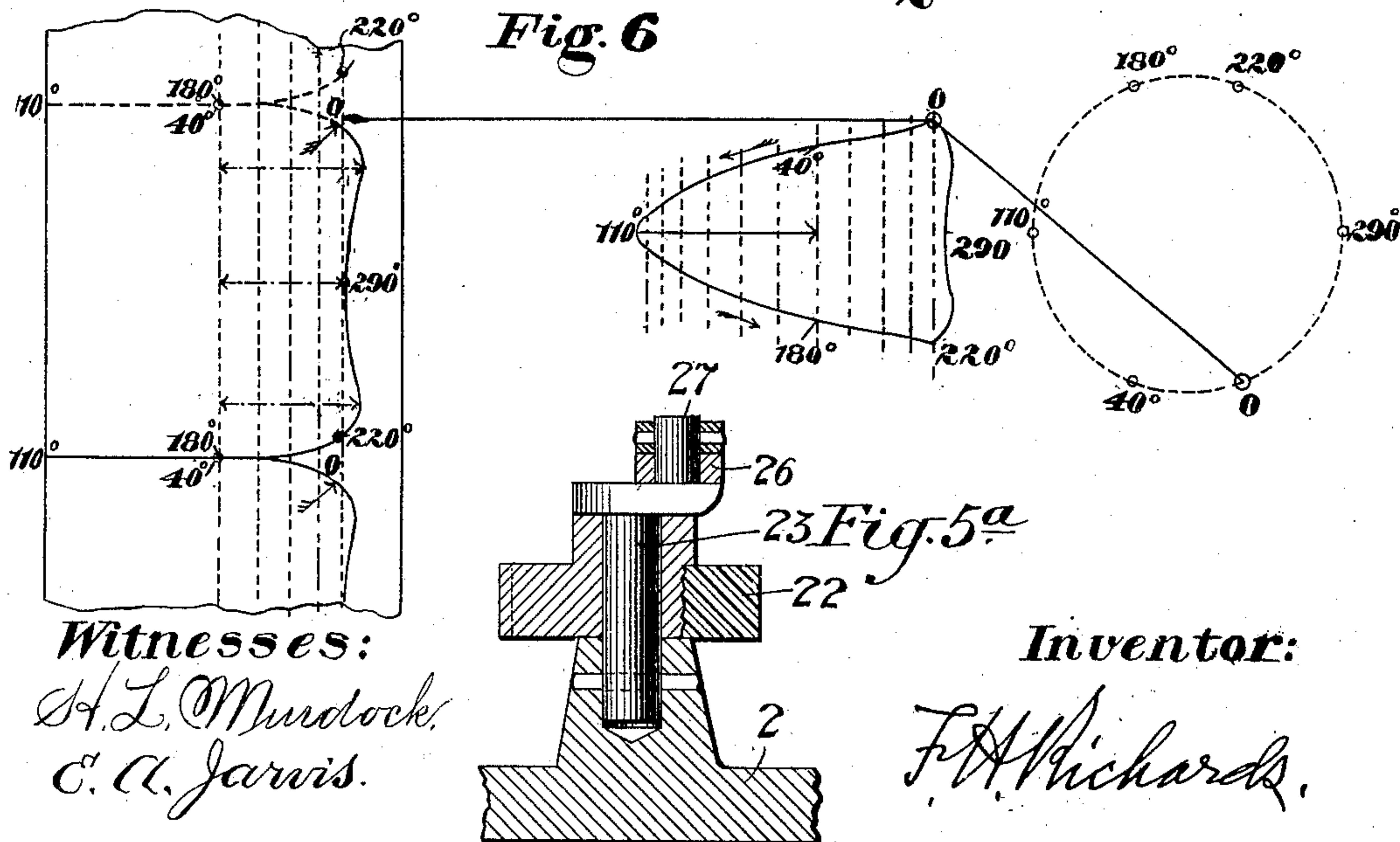
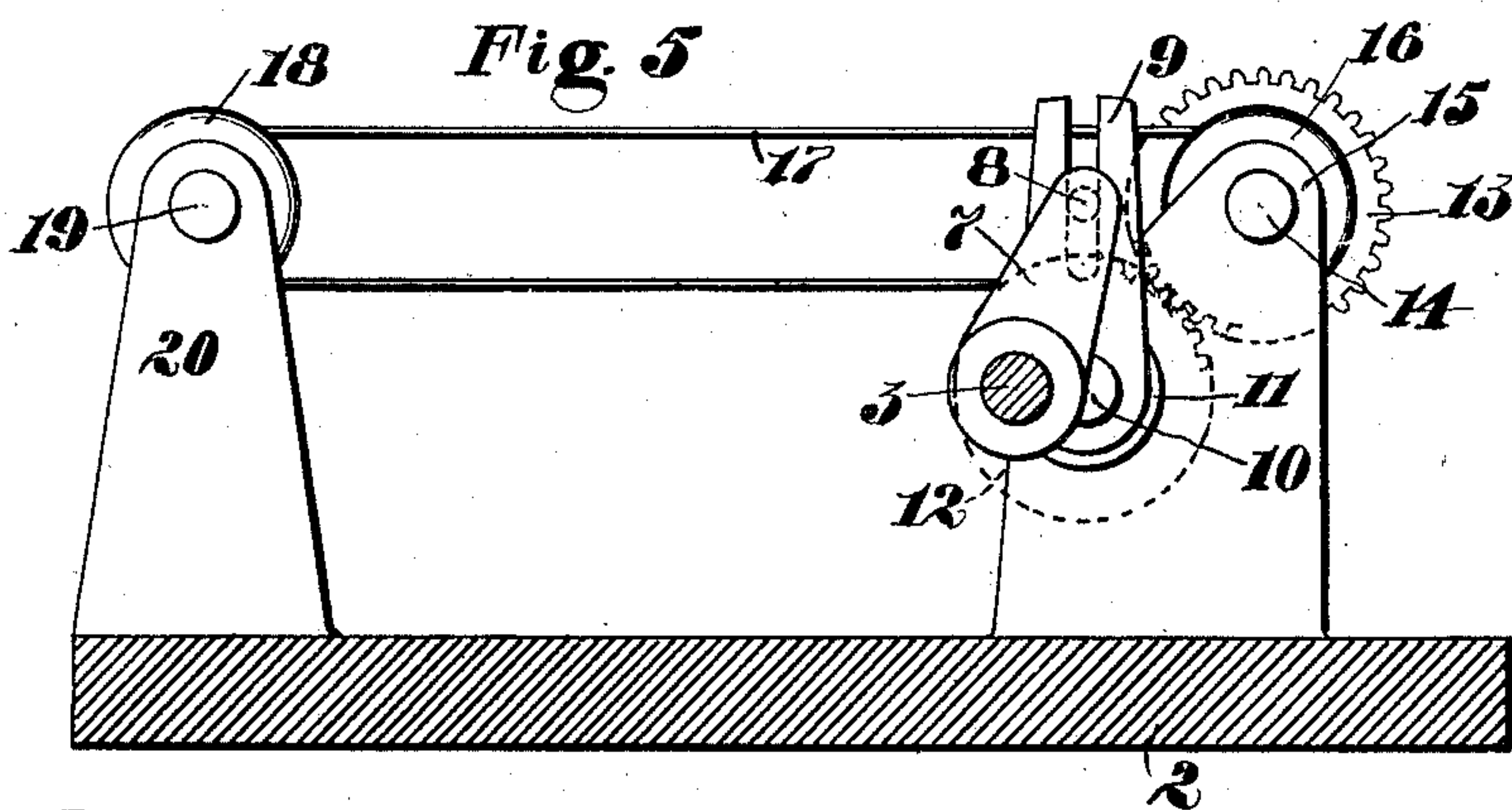
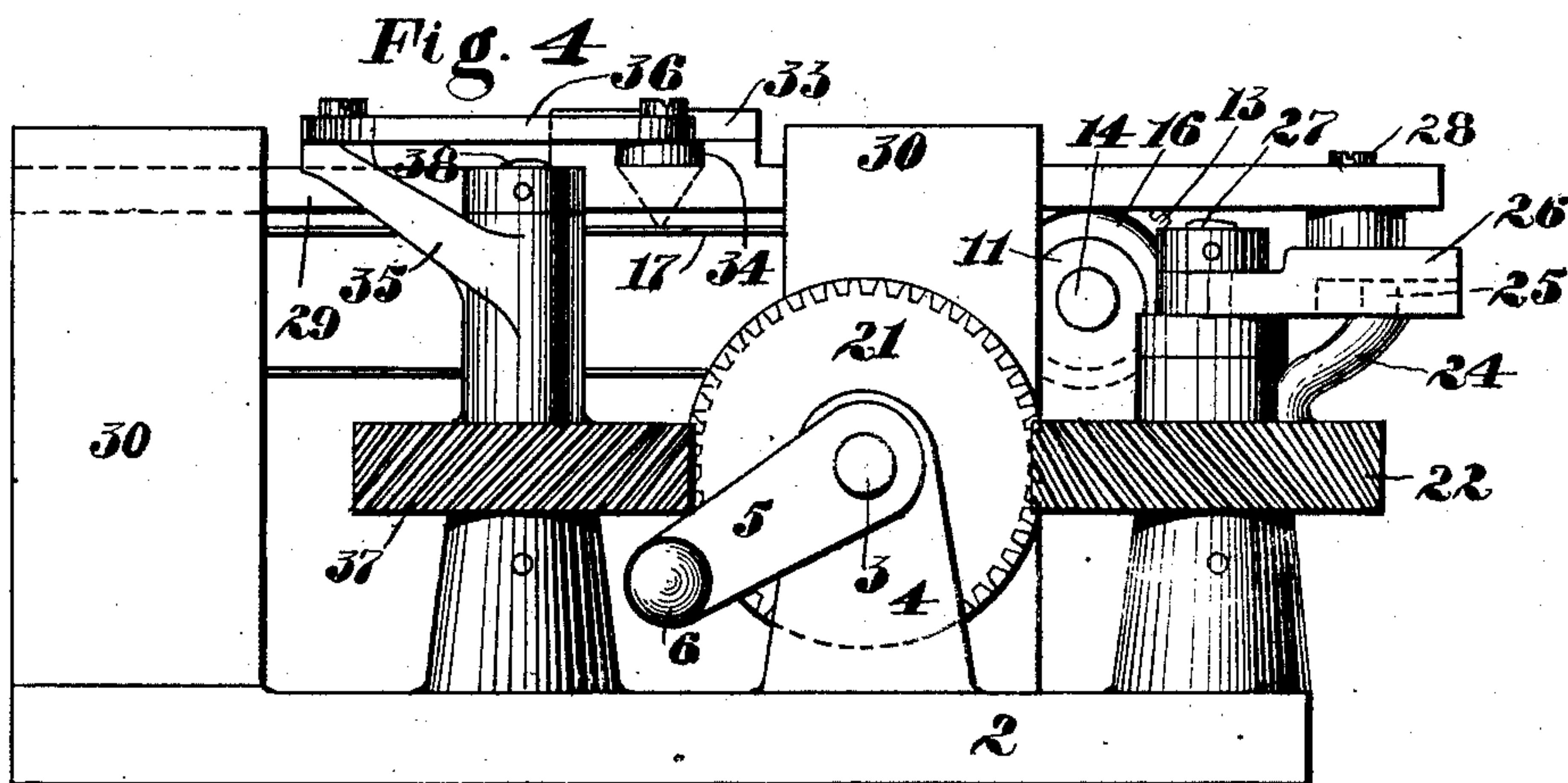
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3 SHEETS—SHEET 3.



Witnesses:
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C. A. Jarvis.

Inventor:

F. H. Richards.

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

MECHANICAL MOVEMENT.

No. 859,581.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed July 24, 1902. Serial No. 116,758.

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Mechanical Movements, of which the following is a specification.

My present invention pertains to mechanical movements, and relates to the organization of devices capable of modifying movements imparted thereto to attain a circumferential movement of an angularly movable member corresponding with the movements of an angularly movable member as measured upon the diameter of the circle it would describe with an advancing member and an advancing and retreating member to produce coincident movements of said members during an appreciable period in the advance of said advancing and retreating member and instrumentalities carried by said advancing and retreating member operative in connection with said advancing member during said coincident movement.

One of the objects of this invention is to provide an organization wherein the above functions are brought about in a simple manner with the employment of few parts and with little idle movement of the parts.

This invention consists of a modified form of the device shown in my pending application Serial No. 116,759, filed contemporaneously herewith and is applicable to many of the various devices named therein as illustrations of the use of such movements. And certain other features illustrated herein are claimed in my co-pending application Serial No. 119,045, filed August 9, 1902, which on December 26, 1905, matured into Letters Patent No. 808,404.

I have illustrated an organization comprising a mechanical movement involving the principles of this invention in the accompanying drawings in which like reference characters denote like parts throughout the several views.

Figure 1, is a left-side elevation; Fig. 2, a right side elevation; Fig. 3, a plan view; Fig. 4, a front elevation; Fig. 5, a vertical cross section on line $x-x$ of Fig. 3; Fig. 5^a is a vertical cross section on line $y-y$ of Fig. 3; and Fig. 6, a diagram of the movements of the several parts.

Referring to the drawings, I will describe in detail the mechanism shown which is one of the forms which the principle involved in this invention may take, and is merely illustrative of said principle.

The illustrative function of the device shown is to describe with a pointer straight lines at regular intervals transversely of a continuously advancing member.

The device is mounted upon a base 2, a driving shaft 3 is mounted in bearings 4 upstanding from the base 2. The driving shaft 3 is provided with a crank 5 and a handle 6 for rotating the same. Upon the end of the driving shaft 3 opposite the crank 5, is mounted a

crank 7, having a wrist pin 8. The wrist pin 8, of the crank 7 engages a slotted crank 9 fast on a shaft 10 mounted eccentrically of the driving shaft 3 in bearings 11 upstanding from the base 2.

Upon the rotation of the driving shaft 3 by the handle 6 the wrist pin 8 of crank 7 will drive the shaft 10 through the slotted crank 9 at varying velocities throughout the rotation of the driving-shaft 3. A gear 12 is mounted fast on the shaft 10 and meshes with a larger gear 13, fast on a shaft 14 mounted in bearings 15 upstanding from the base 2. Fast upon the shaft 14 is mounted a pulley 16 which carries and drives a belt 17, passing over a pulley 18 on a shaft 19 mounted in bearings 20 upstanding from the base 2.

It will be seen that the uniform rotation of driving shaft 3 will be transmitted to the shaft 10 as a continuing rotation of varying velocity, and that said continuous rotation of varying velocity will be imparted to the pulley 16 through the gears 12 and 13. The pulley 16 drives a belt 17 and the upper run of the belt 17 will be given a continuously advancing movement at varying velocities. The advancing movement of the upper run of the belt 17 will be the circumferential development of the pulley 16.

A spiral gear 21 is mounted fast upon the driving shaft 3 and meshes with the spiral gear 22 of like pitch and diameter mounted upon a stud 23 at right angles to the shaft 3. The spiral gear 22 is driven at the same speed as the driving shaft 3. A crank 24 projects from the hub of the spiral gear 22 and carries a wrist pin 25, the radius of the path of the wrist pin 25 being the same as the path of the wrist pin 8 on crank 7. The wrist pin 25 engages a slotted crank 26 mounted upon a pivot 27, which pivot 27 has the same eccentricity with the stud 23 as the shaft 10 has with the driving shaft 3. Therefore, it will be seen that the crank 26 will be driven at like velocities and with the same variation of velocity as the shaft 10.

The spiral gears 21 and 22 are set in mesh so that the wrist pin 8 of crank 7 will be passing downward (see Figs. 1 and 2) at the same time that the crank 26 is passing from right to left. (See Fig. 3).

The crank 26 carries a wrist pin 28. A carrier 29 is mounted in guideways 30, upstanding from the base 2, to slide parallelly of the belt 17, and said carrier 29 is provided with a transverse slot 31 in which a block 32 is adapted to slide. The block 32 is provided with a bearing in which the wrist pin 28 of the crank 26 is journaled. The slot 31 constitutes a yoke in which the wrist pin 28, guided by the block 32 is adapted to work. Upon the rotation of the driving shaft 3, the crank 26 driven at varying velocities as already described will, through the wrist pin 28 and the yoke connection just described, reciprocate the carrier 29 parallelly of the belt 17.

The parts are so arranged that a line may be drawn

through the centers of the pivot 27, stud 23, and wrist pin 28 substantially parallel with the line of length of the slot 31, when a substantially horizontal line may be drawn through the centers of the wrist pin 8 and the shafts 3 and 10.

To attain the coincidence of movement between the upper run of the belt and the carrier 29 during the advance of said carrier the speed varying devices should be set as set forth in my above named pending application when the coincidence is maintained throughout one hundred and forty degrees in the rotation of the driving shaft 3 or thereabout.

Upon the carrier 29 are provided transverse guides 33 in which a pointer 34 is mounted to slide transversely of the carrier 29. The pointer 34 is connected with a crank 35 by a link 36. The crank 35 is mounted fast on the hub of a spiral gear 37 mounted on a stud 38 upstanding from the base 2. The spiral gear 37 meshes with a spiral gear 39 of like pitch and diameter fast on the driving shaft 3. The teeth of the spirals 37 and 39 are inclined in the opposite direction to those of the spirals 21 and 22 and therefore the spirals 37 and 22 being upon opposite sides of the shaft 3, are driven in the same direction. The cranks 26 and 35 are set opposite so that the wrist pin 28 of crank 26 moves from right to left as the wrist pin of crank 35 moves from left to right.

In moving from left to right the crank 35 describes that half of its revolution nearest the belt 17 and drives the pointer 34 in that portion of its stroke furthest advanced in the direction of said belt. It is during the greater part of this half revolution of the crank 35 that the coincident movements of the belt and carrier occur and as the carrier 29 passes from right to left and the crank 35 from left to right the pointer 34 receives the resultant motion caused by the opposed movements of the carrier 29 and crank 35 and the advance movement of the crank 35 giving to said pointer an accelerated movement and causing it to travel a greater distance than would otherwise be the case. The pointer 34 is so disposed and is made of such length that it will reach the near edge of the belt 17 just as the coincidence of movement between the belt 17 and the carrier 29 is established and travel across said belt and back during its accelerated movement and leave the belt at the end of said coincidence as the crank 35 travels 140 degrees or thereabouts. Just before the pointer reaches the belt it is caused to acquire speed and just after it leaves the belt it slows down, these movements taking place during the periods before and after coincidence of movement has been established

between the belt and the carrier during the movement of the carrier from right to left, while during the return movement of the carrier from left to right there is practically a cessation of movement in the point, only a slight reciprocation taking place. These movements are clearly illustrated in the diagram at Fig. 6, that portion of the diagram to the left representing a line described upon the advancing member by the pointer, the blank portion to the extreme left representing the belt while that portion next to the right represents a line described upon an imaginary extension of the belt to the extreme backward travel of the pointer.

It is obvious that the principle involved in this invention may be applied in numerous ways for the accomplishment of a variety of results without departing from the spirit of my invention, and the form shown is merely illustrative of the application of said principle to one of many organizations. I have seen fit to use two of the variable transmitters to effect the coincidence of movement between the belt and carrier but one from which both movements may be taken may be used.

Having described my invention, I claim—

1. In a mechanical movement, the combination with a crank embodying a wrist, of a carriage reciprocatory in a path adjacent to the orbit of the crank wrist, a slide mounted on said carriage and reciprocatory in a path transverse to the path of movement of the carriage, the reciprocation of said carriage being so timed and the axis of the crank being so located relative to the said path of movement as to cause the line of the path of reciprocation of said slide, as this moves with the carriage, to approach and pass beyond the axis of the crank while the wrist is moving toward and then away from said slide, and to approach and pass beyond said axis in returning, and a connection between the wrist and slide.

2. In a mechanical movement, the combination with a member and means for imparting to the same a continuous variable linear motion, of a carrier reciprocable in a path parallel thereto, means for reciprocating the same with the motion of a portion of its forward excursion coincident with such linear motion, a slide mounted on the carrier and reciprocable transversely of the path of motion thereof and into and out of the path of movement of the linearly moving member, a crank embodying a wrist, and a link connecting the crank and slide, the axis of said crank being so located as to cause the line of the path of reciprocation of said slide, as this moves with the carriage, to approach and pass beyond the axis of the crank while the wrist is moving toward and then away from said slide, and to approach and pass beyond said axis in returning.

FRANCIS H. RICHARDS.

Witnesses:

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