

No. 771,774.

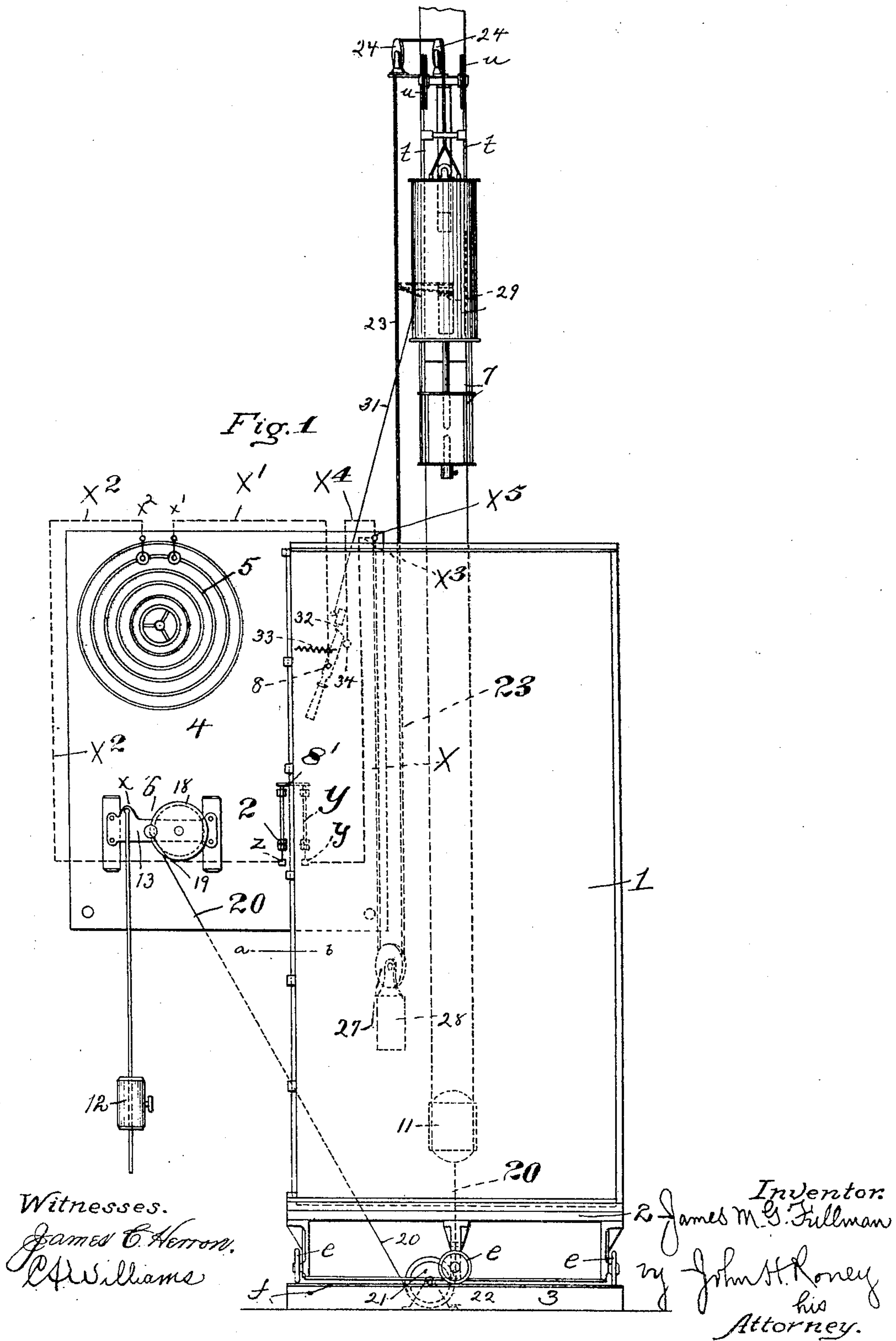
PATENTED OCT. 4, 1904.

J. M. G. FULLMAN.  
APPARATUS FOR COPYING DRAWINGS.

APPLICATION FILED JULY 24, 1901.

NO MODEL.

3 SHEETS—SHEET 1.



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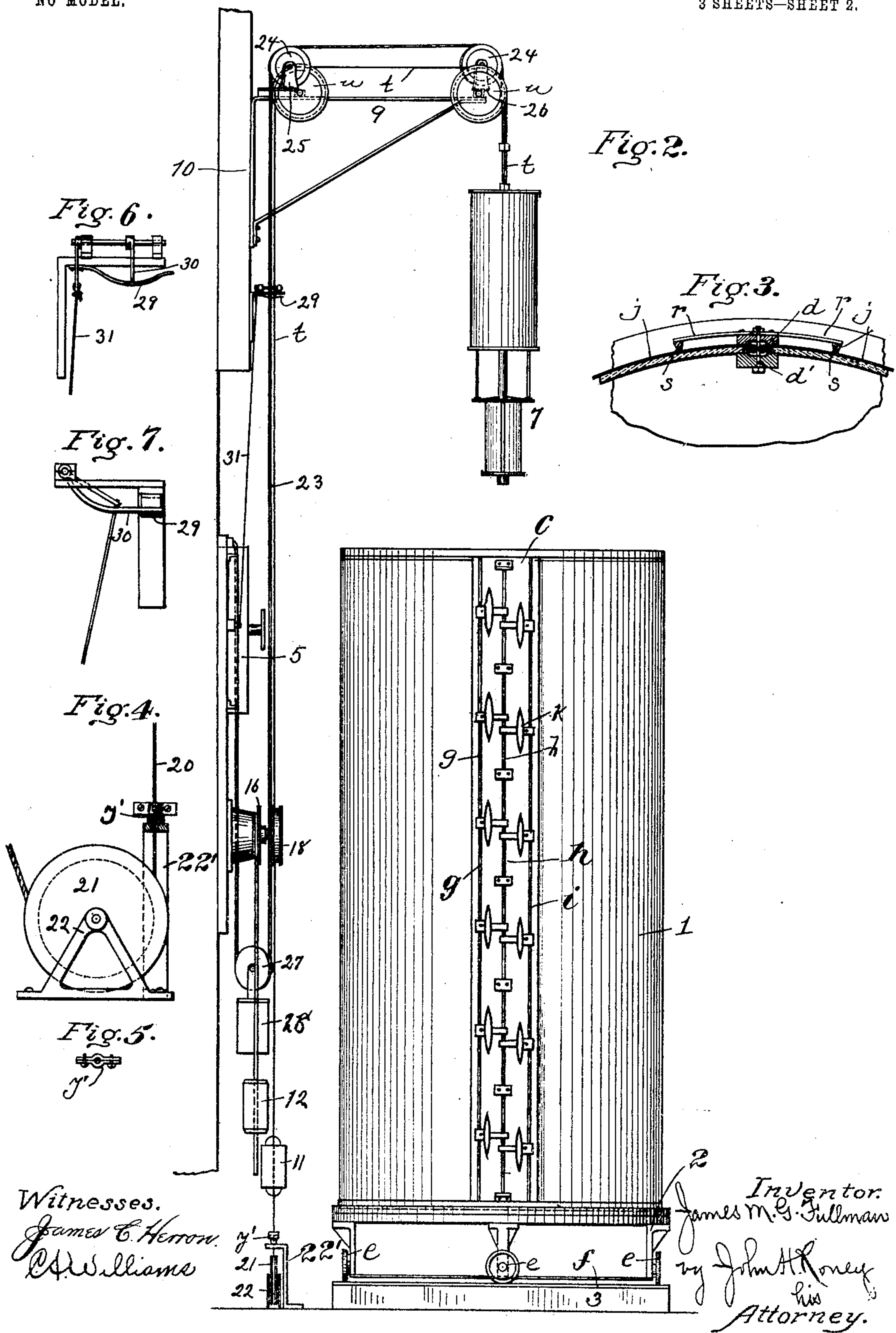
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

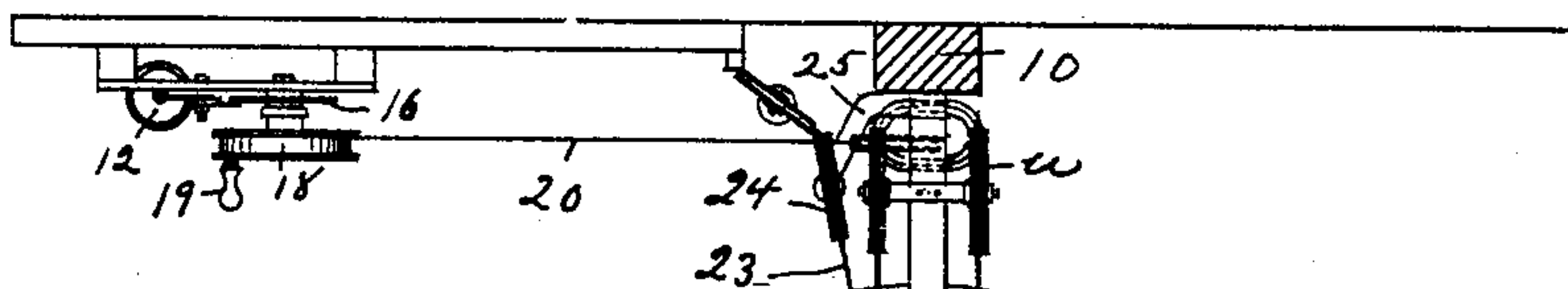


Fig. 8.

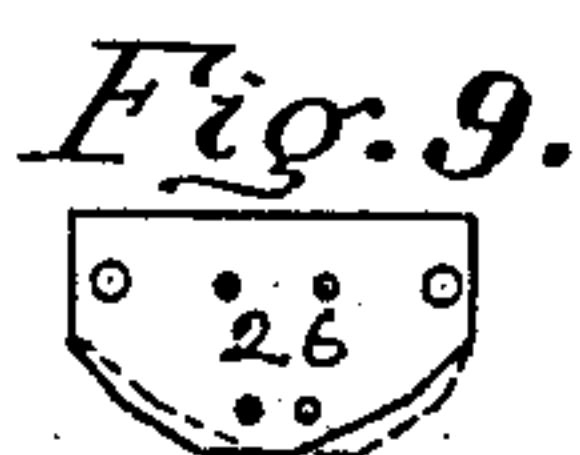


Fig. 9.

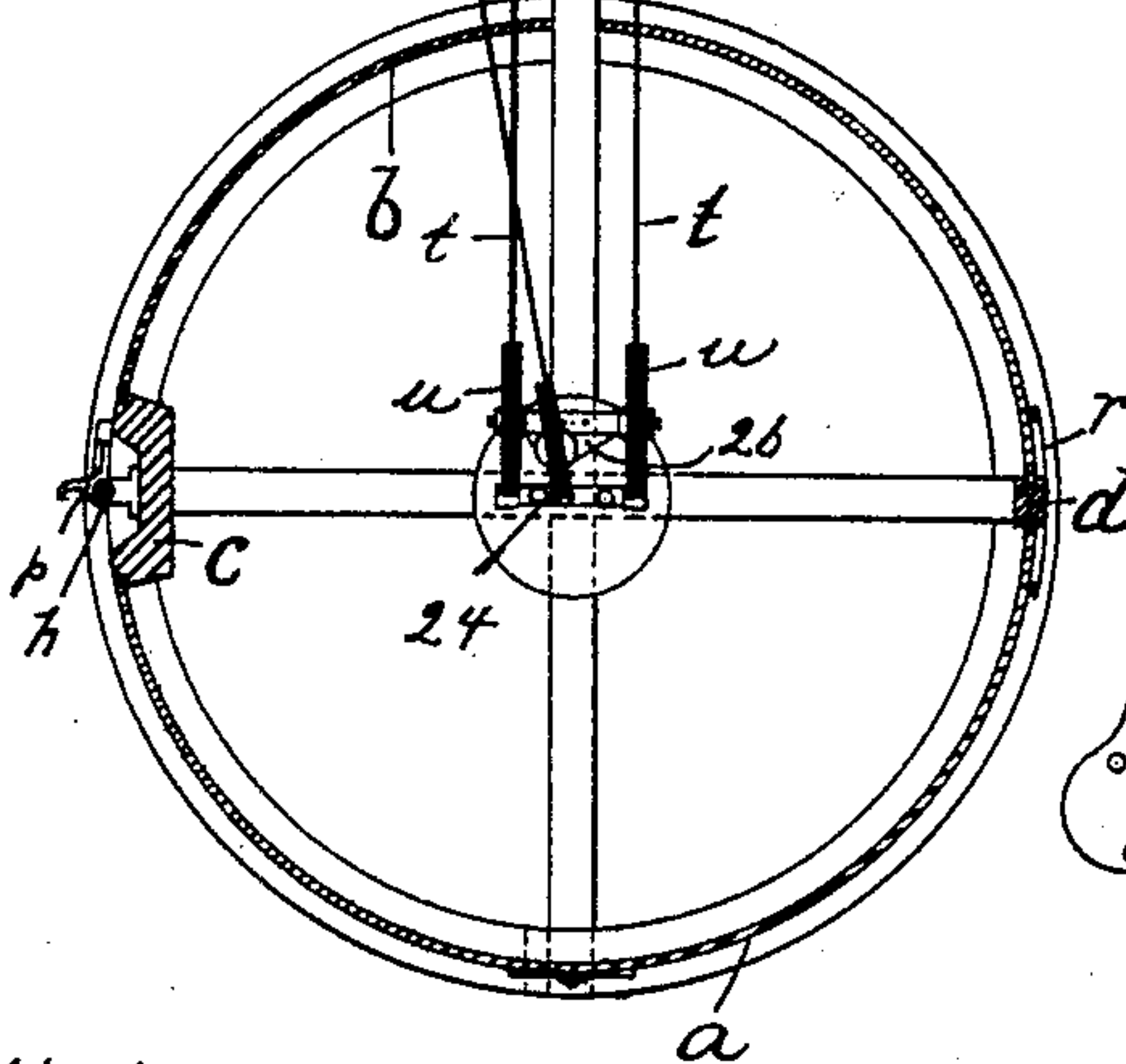


Fig. 10.

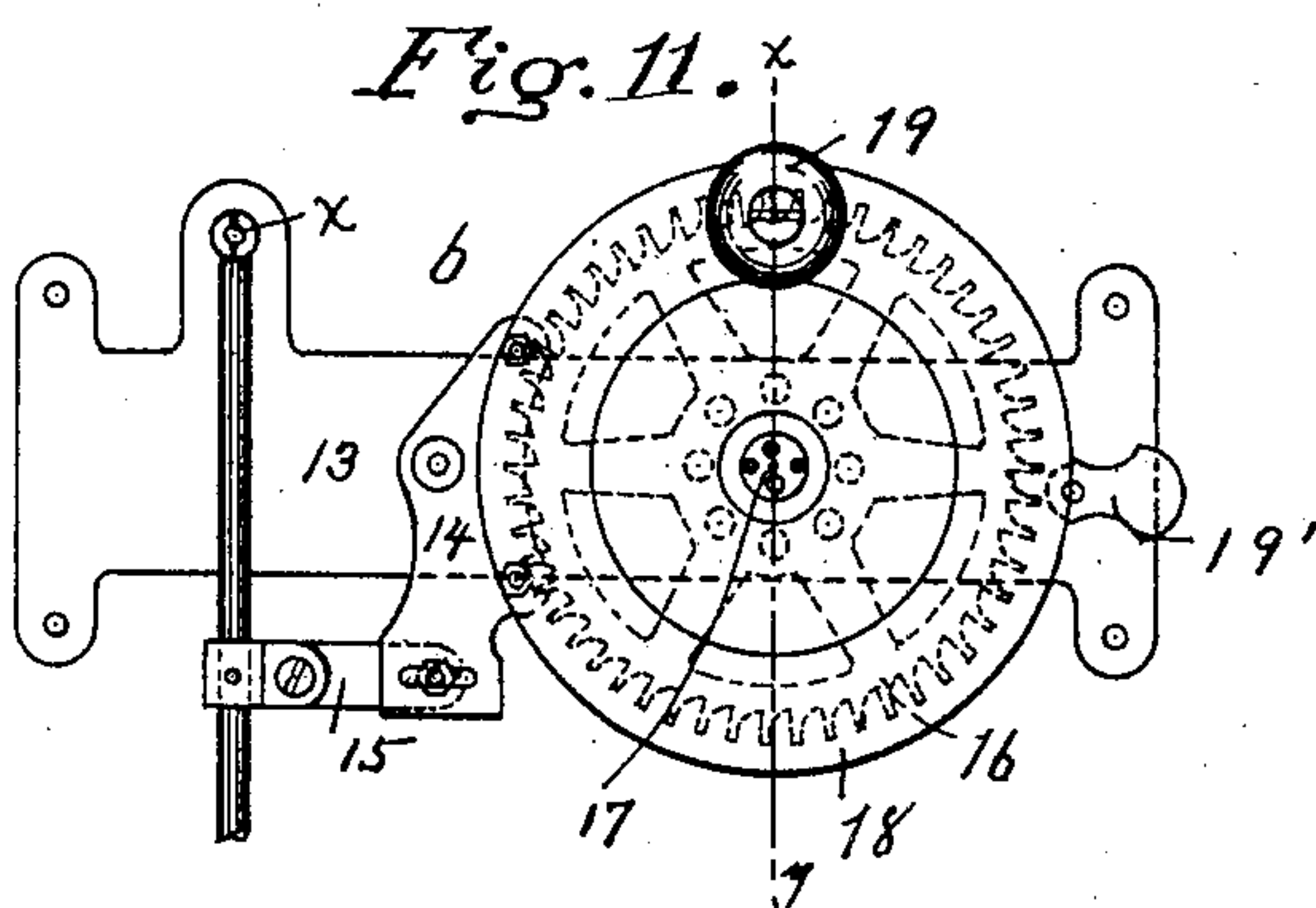


Fig. 11.

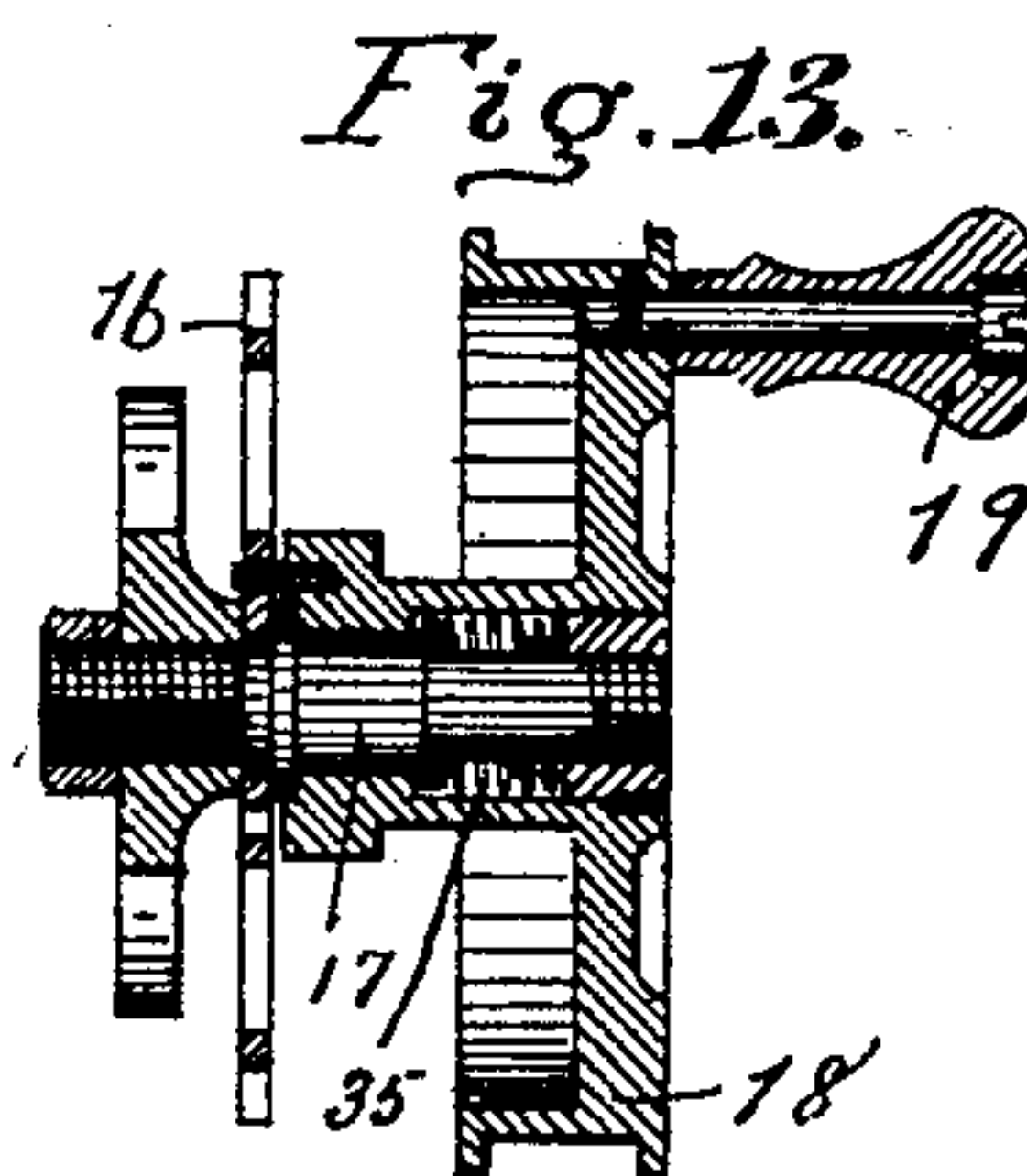


Fig. 12.

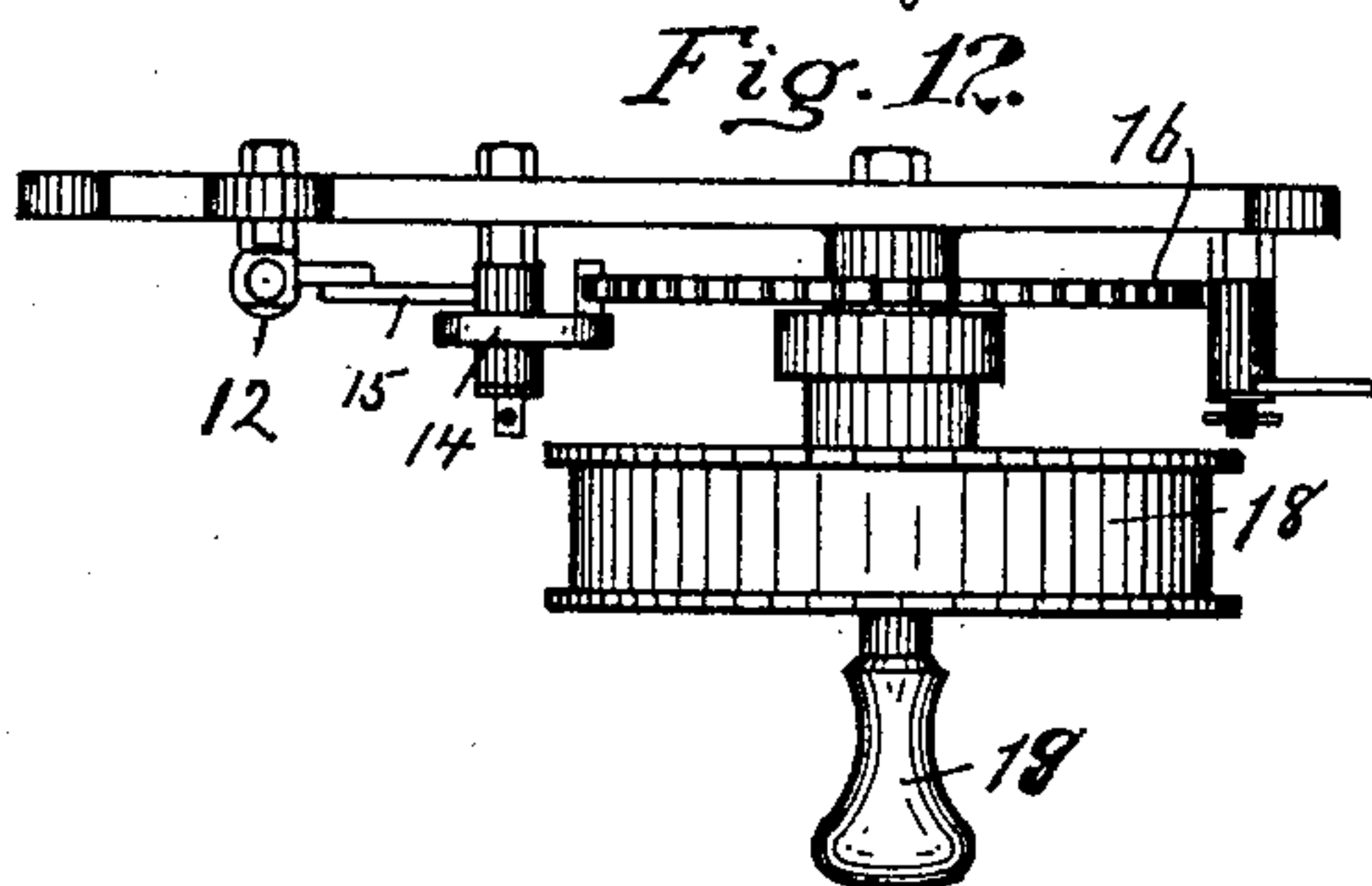


Fig. 13.

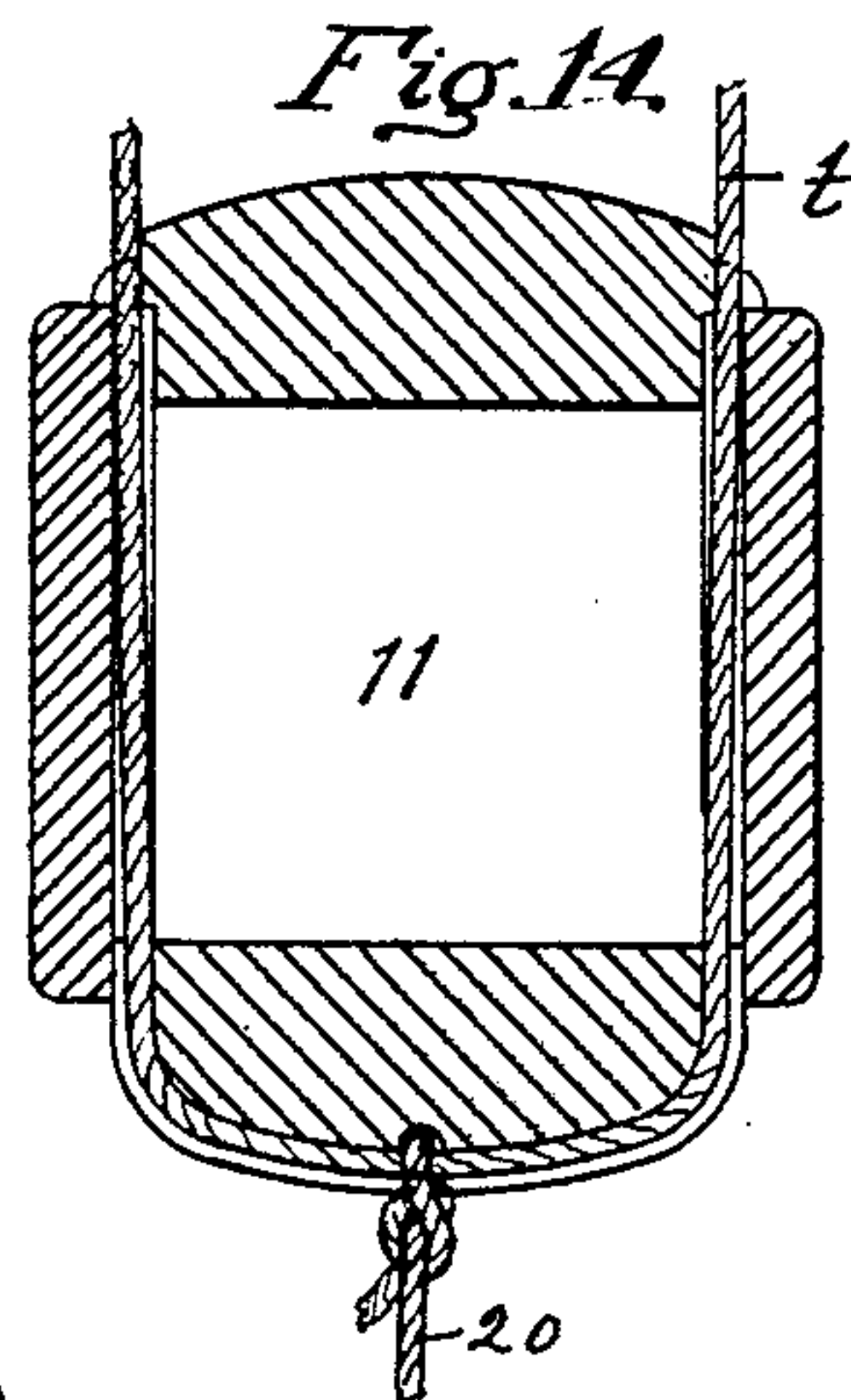


Fig. 14.

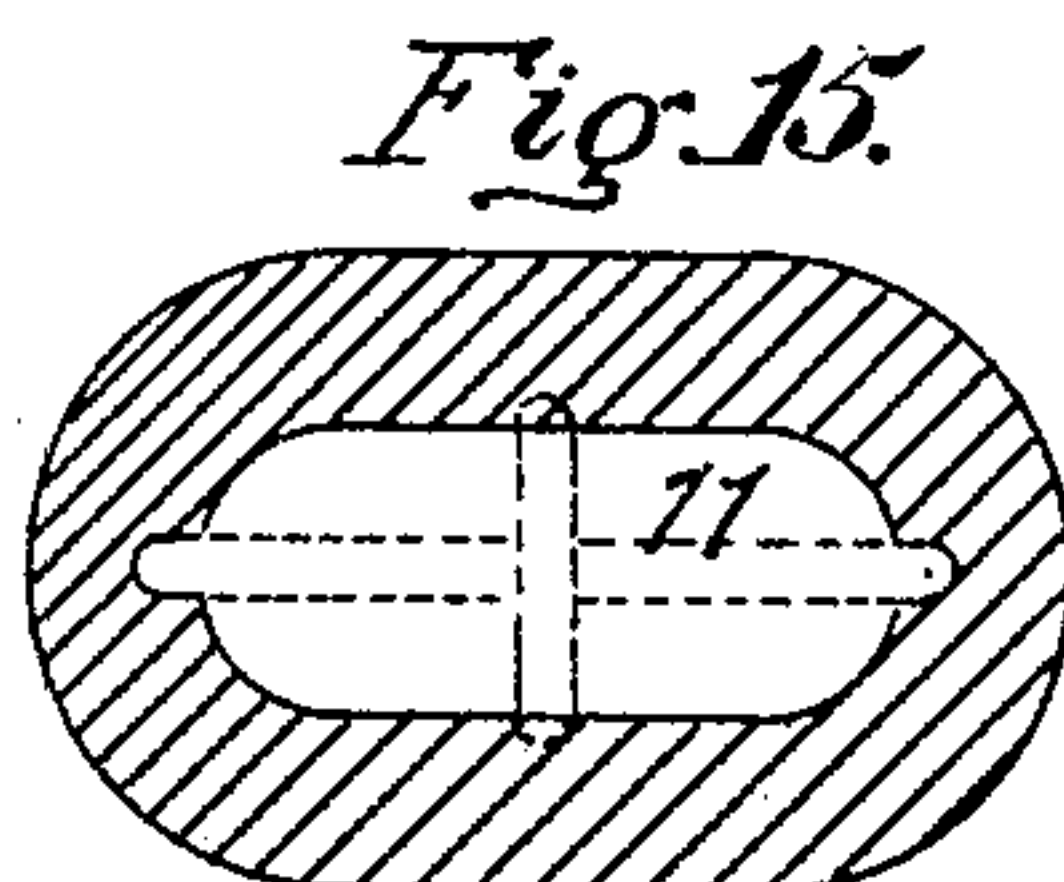


Fig. 15.

Witnesses.

James C. Heron.  
C. Williams

Inventor:  
James M. G. Fullman  
by John H. Roney  
his Attorney.



# UNITED STATES PATENT OFFICE.

JAMES M. G. FULLMAN, OF PITTSBURG, PENNSYLVANIA.

## APPARATUS FOR COPYING DRAWINGS.

SPECIFICATION forming part of Letters Patent No. 771,774, dated October 4, 1904.

Application filed July 24, 1901. Serial No. 69,562. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES M. G. FULLMAN, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Apparatus for Copying Drawings, &c., of which the following is a specification.

My invention relates to improvements in apparatus for reproducing or copying drawings, and particularly to that class of such devices in which the reproduction is obtained by electrically-produced light.

The objects of my invention are, first, to produce means to automatically break the electric circuit to extinguish the light when the lamp has completed its travel or upon the completion of the printing operation; second, an automatic gear mechanism for use in such devices, by the use of which the descent of the arc-lamp into the cylinder is automatically controlled and regulated; third, means to secure the cover, sensitized paper, print, drawing, or negative to be reproduced in contact with the exterior surface of the cylinder; fourth, suspending-brackets, and, fifth, automatic clutch-release for the automatic gear mechanism; and to accomplish these objects my invention consists in the novel construction, combination, and arrangement of parts hereinafter more specifically set forth, reference being had to the accompanying drawings, in which—

Figure 1 indicates a front elevation of my improved apparatus for copying or reproducing drawings, &c. Fig. 2 is a side elevation of the same. Fig. 3 is an enlarged sectional detail of rear part, showing application of canvas-clip. Fig. 4 is an elevation of the floor-pulley. Fig. 5 is a detail of the clamp. Fig. 6 is a side elevation of stop mechanism, counterweight, and latch-release. Fig. 7 is a front elevation of the same. Fig. 8 is a plan view, partly in section, of my improved copier. Figs. 9 and 10 are respectively plan of front and rear reversing-plate of lamp-brackets. Fig. 11 is a front elevation of automatic gear mechanism. Fig. 12 is a plan view of the same. Fig. 13 is a section of the same, taken on the line *x y* of Fig. 11. Fig. 14 is a cen-

tral longitudinal section of a counterweight, and Fig. 15 is a transverse section of the same.

Referring to said drawings, 1 is a vertically-disposed glass cylinder comprising two segmental sections *a b*, the ends of which are secured in the wooden blocks or holders *c d* on opposite sides of said cylinder and which extend the entire length thereof, the lower ends of said holders being secured in the revoluble base 2. The said block or holder *d* is formed in two sections, secured together by bolts *d'* or in any other suitable manner. The said cylinder is mounted on the said base 2 and is adapted to be carried thereby in a circle, the base being provided with wheels *e e*, adapted to travel on ways *f*, mounted on the subbase 3 to admit of this. On one side of said cylinder are arranged three vertically-disposed rods *g h i*, the rod *h* being secured in the block *c*. The rods *g* and *i*, to which the free ends of the canvas cover *j* is securely fastened, are formed of comparatively light material to which the flexible fastening devices *k* are secured, the outer or free ends of said fastening devices being adapted to engage the rod *h* for the purpose of holding the canvas cover upon the exterior of the cylinder during the printing or copying operation. I will not herein more specifically describe said fastening devices, as the same are the subject-matter of my copending application Serial No. 122,981. Upon the side of the cylinder opposite that on which said rods *g*, *h*, and *i* are located and secured to the blocks *d* are a series of blade-springs *r*, the ends of which are provided with downwardly-extending projections *s*, which impinge or press upon the ends of the canvas to hold the same in contact with the cylinder while the opposite ends are being adjusted around said cylinder by means of the fasteners.

4 is a board arranged at one side of the cylinder, upon which is arranged a rheostat 5, an automatic gear mechanism 6 for automatically regulating the descent of the arc-lamp 7 into the cylinder, and a switch 8 for making and automatically breaking an electric circuit from a source of supply (not shown) to the arc-lamp, as hereinafter set forth. The said arc-lamp 7 is suspended upon cords *t*, which



pass over pulleys *u*, mounted in the outer and inner ends of the bracket 9, which is secured upon the wall 10. The said cords *t* pass around and under the counterweight 11, which is somewhat lighter than the arc-lamp, so as to enable the lamp to descend gradually into the cylinder when the automatic gear is put in operation by the movement of the pendulum-bob 12, which is pivotally secured at its upper end at *x* upon the base-plate 13 of the automatic gear mechanism and is connected to an escapement or oscillating pallet 14 by means of the link 15. The said escapement is pivotally mounted upon the plate 13 and engages with the gear-wheel 16, mounted on the shaft 17, whereby movement is transmitted to said shaft and thence to the drum 18, which is detachably mounted upon the same shaft and is provided with a crank or handle 19, whereby the same may be turned or wound up or lowered. The gearing may be held against movement when wound up by the latch-lock 19', which is capable of being withdrawn and thrown out of engagement with said gearing to admit of this. I will not herein more specifically describe said automatic gear mechanism, as the same is the subject-matter of my copending application Serial No. 122,982.

The lower end of the cord which passes around the counterweight is connected to the cord 20, which passes under the pulley 21, mounted in the bracket 22, and is connected at its opposite end to the drum of the automatic gear mechanism. The said lamp is connected to one end of the flexible duplex electric cable or conductor 23, which passes over the pulleys 24, mounted, respectively, upon the arm 25 and the plate 26, both of which are capable of being adjusted—*i. e.*, arranged—in a manner opposite to that shown in Fig. 8, whereby the conductor can be brought into any alinement with the point of its connection with the lamp. The said conductor passes under the pulley 27, which is mounted in an extension of the counterweight 28 and is, as heretofore stated, connected at one end to the lamp, the other end being attached to the board at *w*. The said cable carries current from the main switch 8' through the member *y* thereof through the conductor *x* to the splice *x*<sup>3</sup> to the cable 23 to the lamp, the return circuit being through the cable, to the conductor *x*<sup>4</sup> through the automatic switch 8, through the conductors *x*<sup>1</sup> to the rheostat 5, from the rheostat through the conductor *x*<sup>2</sup> to and through the member *z* of the main switch. The said electric circuit is automatically broken immediately the lamp arrives at or near the bottom of the cylinder by the counterweight, which is then at its highest position, coming in contact with the spring 29, which, striking a finger 30, rotates the small shaft upon which said finger is mounted and draws the cord 31 upwardly, carrying the stop 32 away from the end of the auto-

matic switch 8 and permitting the coil-spring 33 to withdraw the switch from contact with the post 34, whereby the circuit is broken and the light extinguished. The lamp is then withdrawn from the cylinder by winding up the cord connected to the counterweight and the drum of the automatic gear mechanism, the drum being first disengaged from the gear by pulling it forward, thereby compressing the spring 35 and withdrawing the clutch mechanism on the sleeve from engagement with the gear-wheel of the automatic gear mechanism, permitting the drum to be rotated without interfering with the gear of the automatic gear mechanism. When the counterweight is drawn to a point almost on a plane with the bottom of the cylinder and the lamp entirely elevated out of the cylinder or at any intermediate point, if the operator desires the drum can again be engaged with the gear by releasing it when opposite the orifice or orifices in the gear. A stop *y*' is located on said cord 20 between the upper end of the bracket or standard 22 and the lower end of the counterweight 11 and adjusted to come in contact with the stationary stop 22' to limit the downward travel of the counterweight 11.

I claim as my invention and desire to secure by Letters Patent—

1. In an apparatus for copying or reproducing drawings, &c., the combination of a cylinder, means to support the subject-matter to be copied or reproduced upon the exterior of said cylinder, an arc-lamp adapted to be lowered into the interior of said cylinder, and means to automatically break the circuit for the purpose of extinguishing the light.

2. A printing-frame and a lamp, movable one in relation to the other, in combination with an automatic device to cut off the light upon the completion of the printing process.

3. In an apparatus for copying drawings, &c., the cylindrical printing-frame, the suspended electric-arc lamp and means for controlling its descent within the frame, an electric switch controlling the light-circuit, and means for automatically opening the switch when the lamp has completed its travel.

4. In an apparatus for copying drawings, &c., the cylindrical support for the drawing, a suspended lamp arranged to descend axially within the frame, a governing apparatus for controlling the descent of the lamp, and the automatically-operated switch controlling the light-circuit.

5. In an apparatus for copying or reproducing drawings, &c., the combination of a cylinder adapted to be rotated, means to support the subject-matter to be copied or reproduced upon the exterior of said cylinder, an arc-lamp adapted to be lowered into said cylinder, and means to automatically break the circuit for the purpose of extinguishing the light.

6. In an apparatus for copying drawings, &c., the cylindrical support for the drawings,



a suspended lamp arranged to descend axially within the frame, the counterweight, the time mechanism controlling the descent of the lamp, and the automatically-actuated switch controlling the circuit on both sides of the lamp.

5 7. In an apparatus for copying or reproducing drawings, &c., the combination of a cylinder, a counterweighted arc-lamp adapted to be lowered into said cylinder, and brackets

adapted to be adjusted to either side of the cylinder for carrying the electric conductors.

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

JAMES M. G. FULLMAN.

Witnesses:

CLARENCE A. WILLIAMS,  
JOHN H. RONEY.