

No. 704,323.

Patented July 8, 1902.

J. N. HARPER.

AUTOMATIC ELECTRIC SEMAPHORE SIGNAL.

(Application filed Apr. 25, 1901.)

(No Model.)

3 Sheets—Sheet 1.

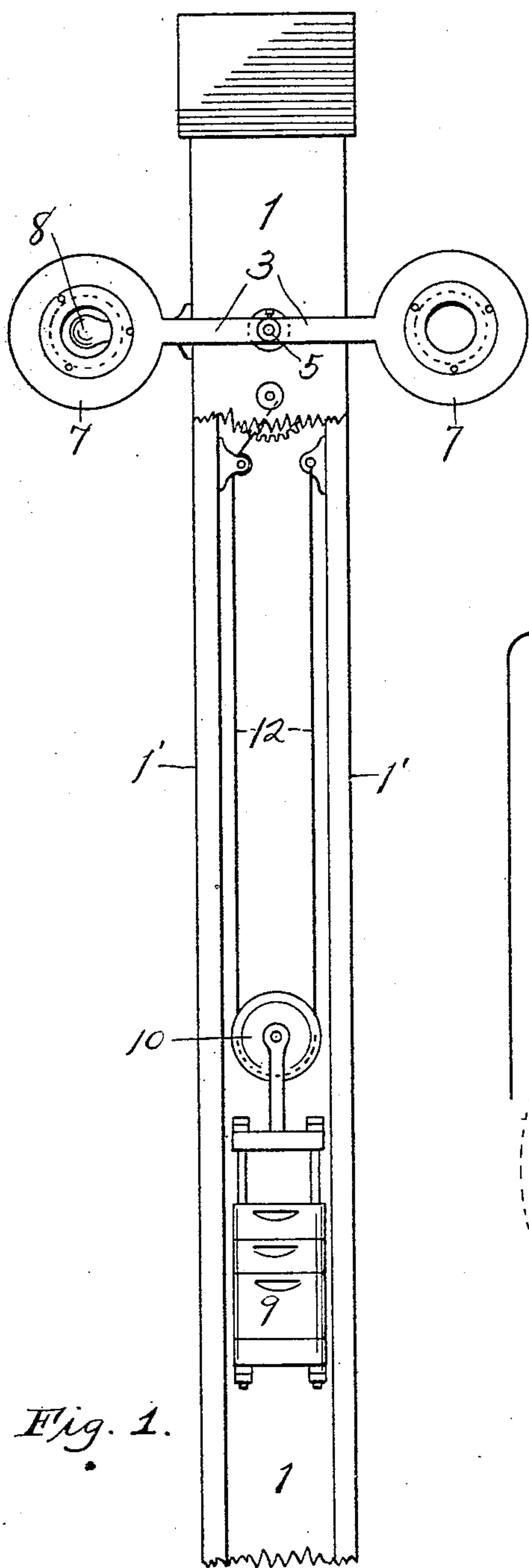


Fig. 1.

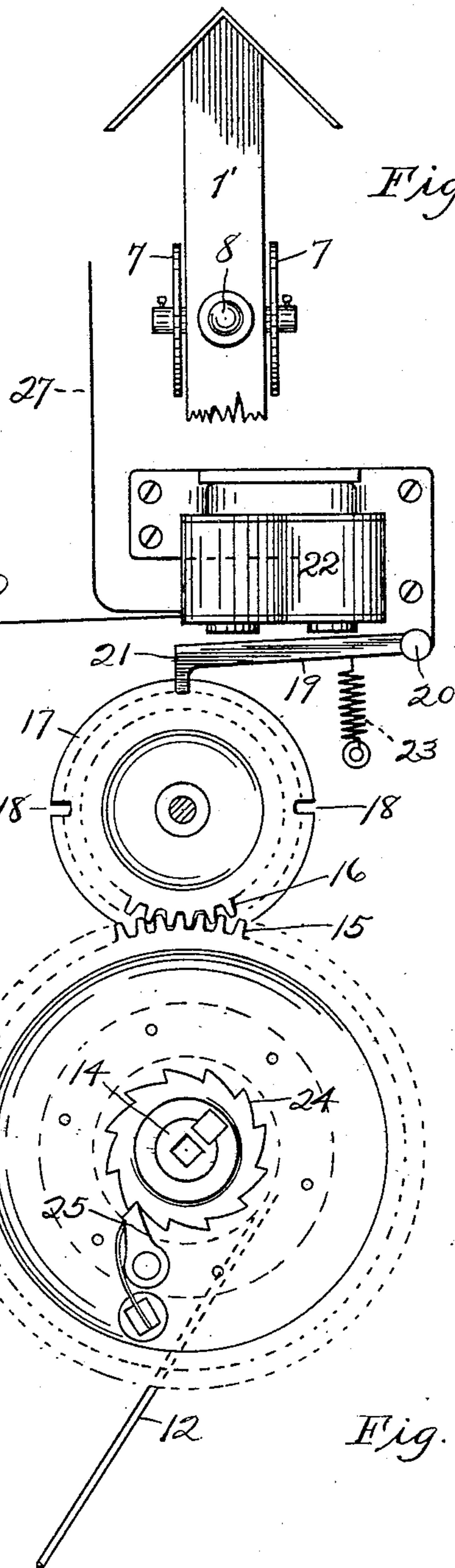


Fig. 2.

Fig. 3.

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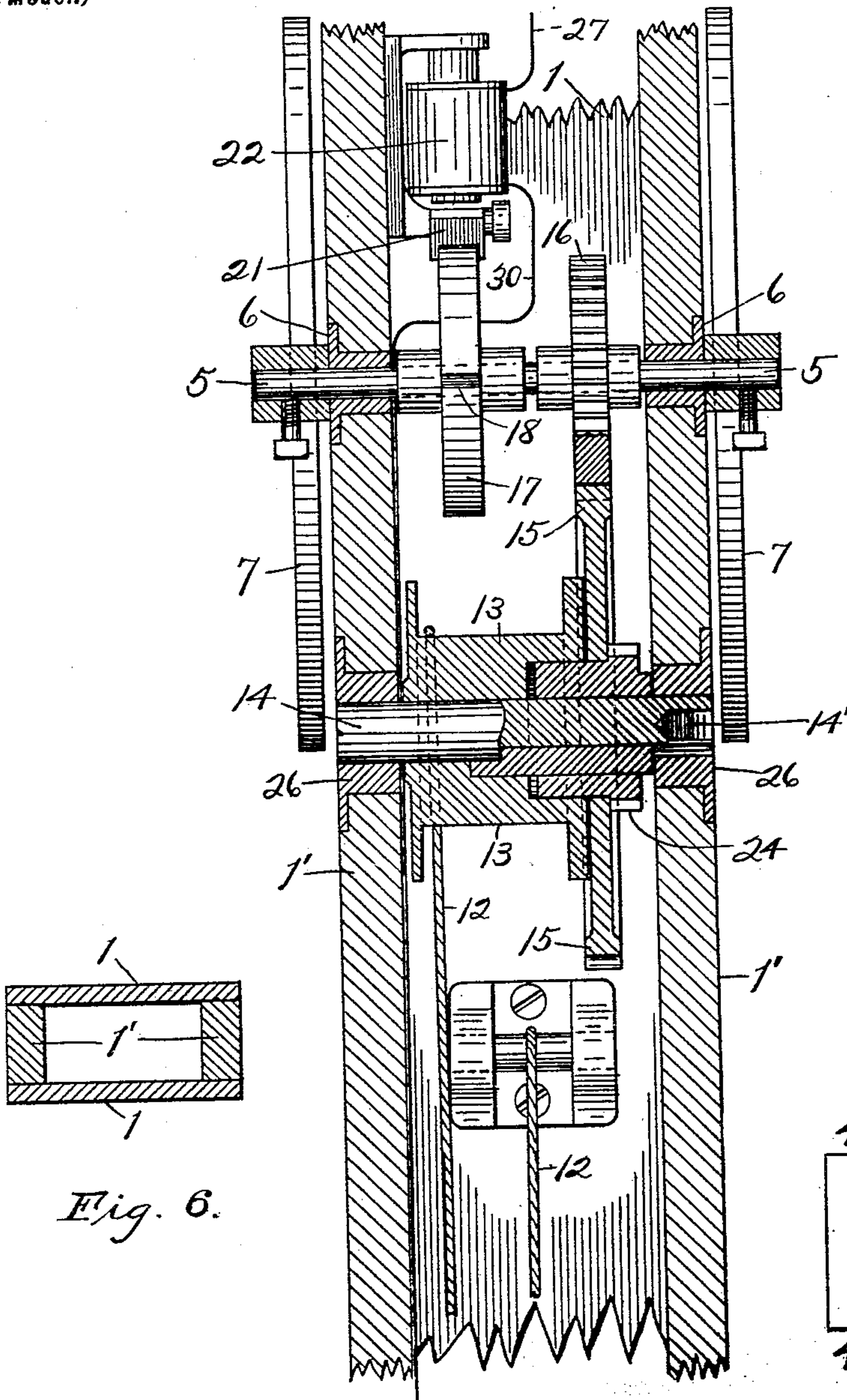


Fig. 4.

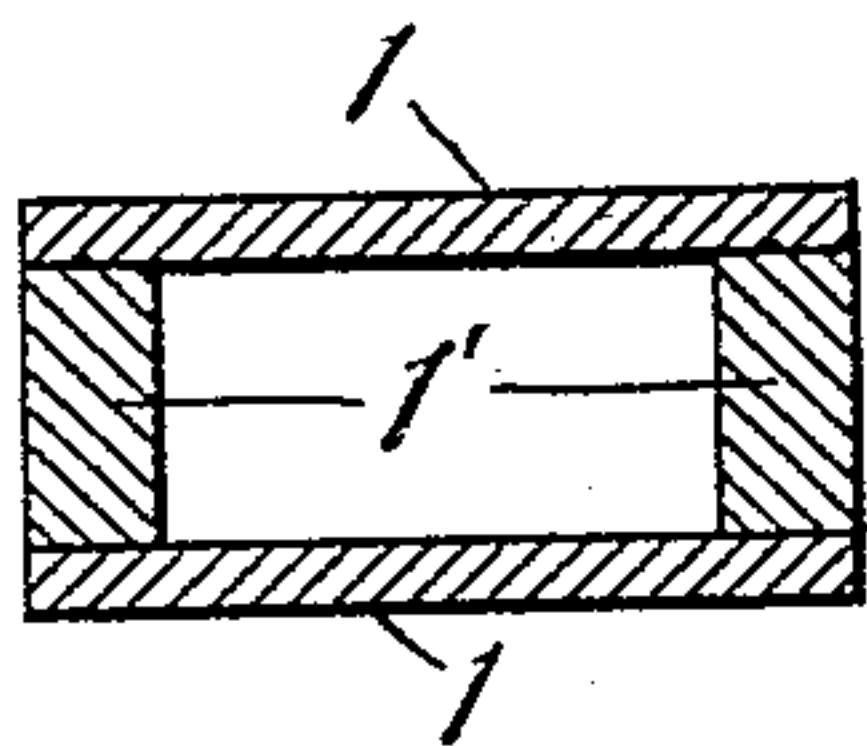


Fig. 6.

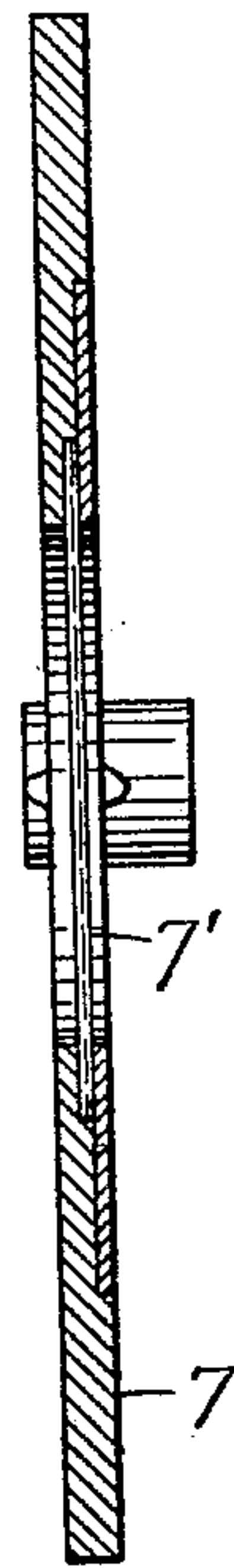


Fig. 5.

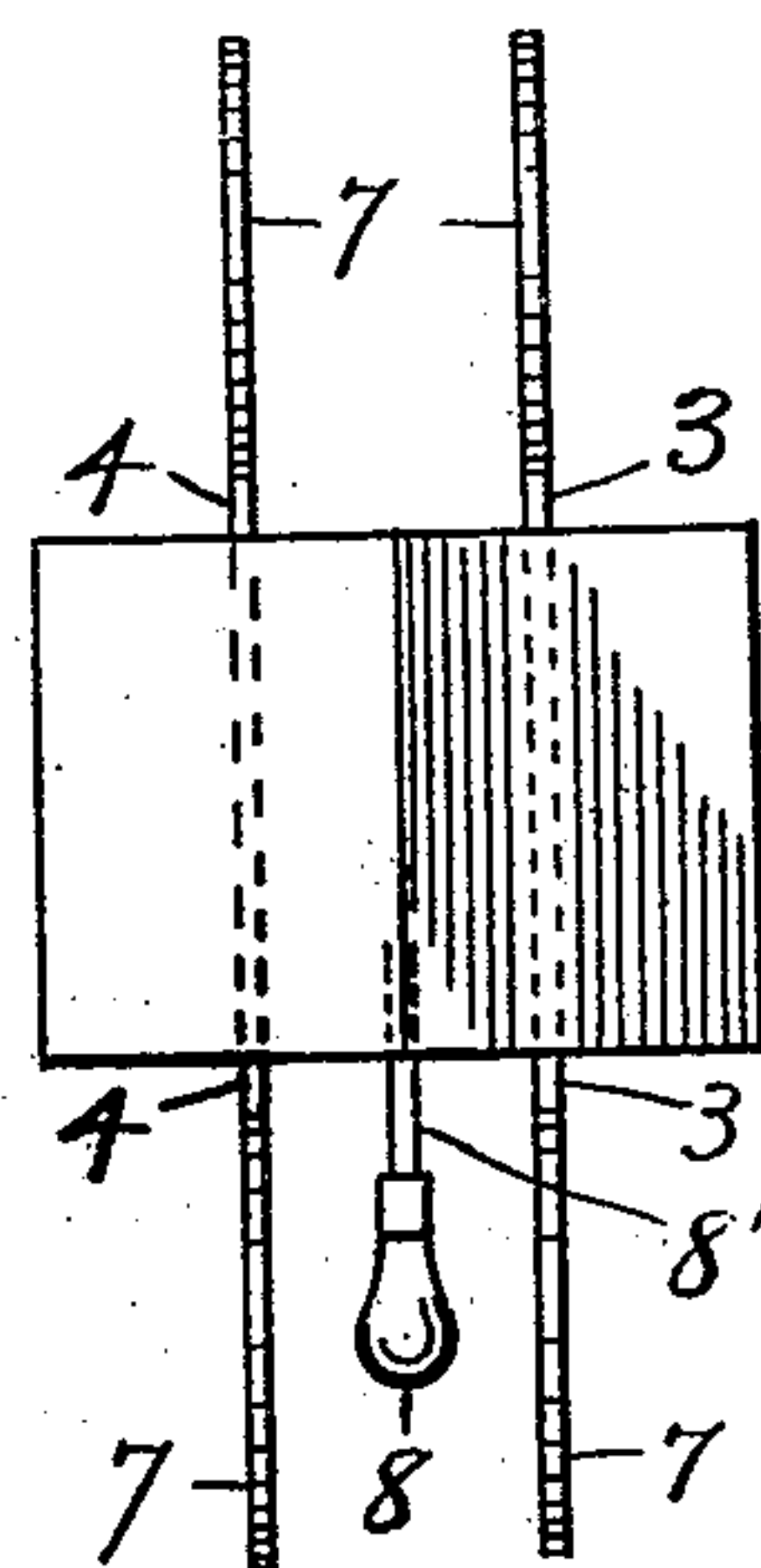


Fig. 10.

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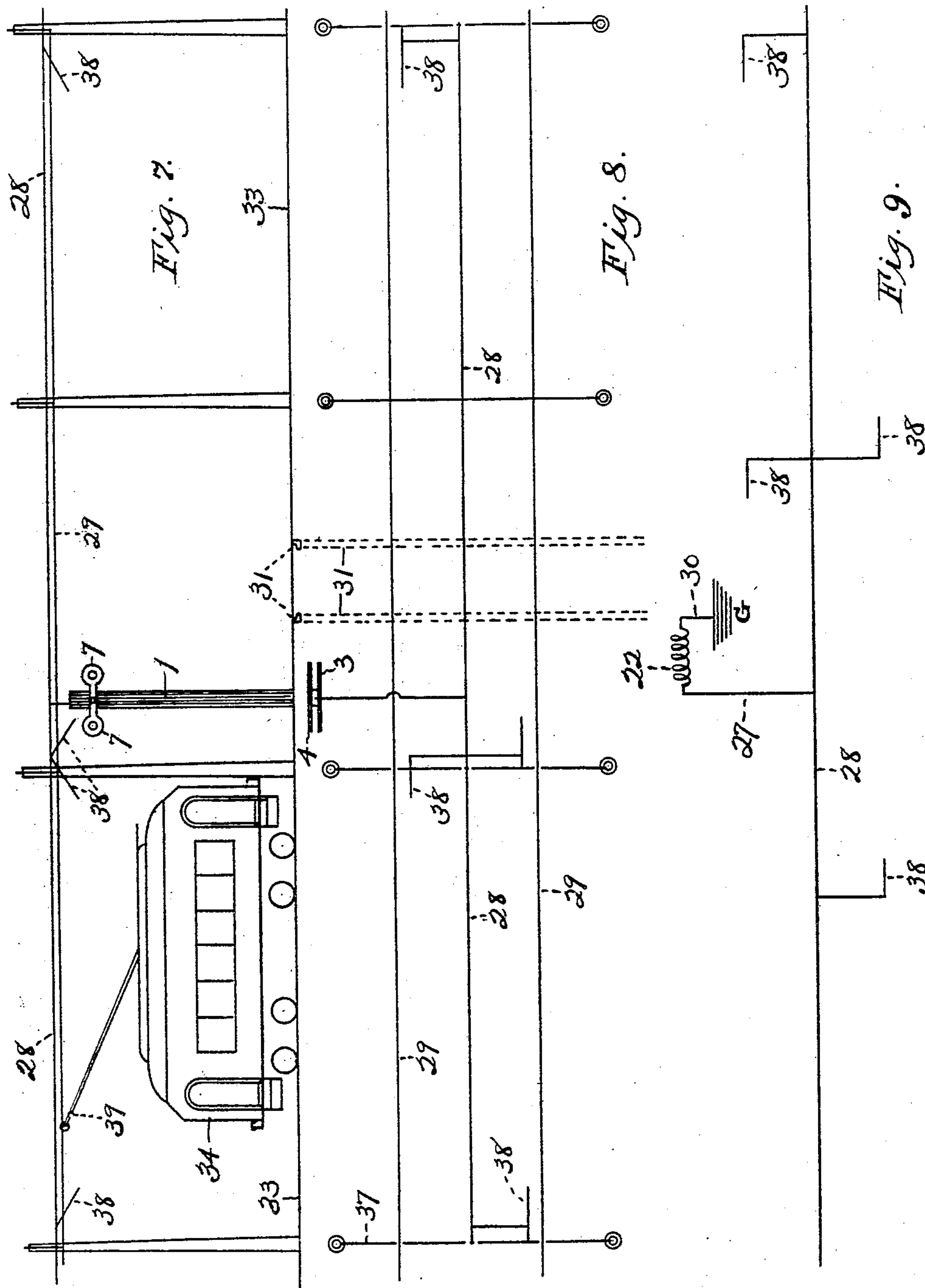
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

JAMES N. HARPER, OF KANSAS CITY, MISSOURI.

AUTOMATIC ELECTRIC SEMAPHORE-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 704,323, dated July 8, 1902.

Application filed April 25, 1901. Serial No. 57,386. (No model.)

To all whom it may concern:

Be it known that I, JAMES N. HARPER, a citizen of the United States, and a resident of Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Automatic Electric Semaphore-Signals, of which the following is a specification.

My invention relates to automatic semaphore-signals for railways, the form shown in the present invention being especially adapted for electric railways.

My invention consists in a semaphore of novel construction, together with novel means for operating the semaphore by the passage of a car or cars, as described hereinafter.

The objects of my invention are to produce a semaphore of simple construction to be operated by electric currents and, further, to provide simple, cheap, and efficient contact devices by which a circuit is closed for energizing the semaphore-magnets by the passage of the cars, said contact devices being secured to the usual span-wires and to the trolley-pole of each car and connected to and by a special line-wire, as hereinafter described.

I will now proceed to describe fully my invention with reference to the accompanying drawings, in which—

Figure 1 is an elevation of a semaphore constructed in accordance with my invention, a part of the columns being broken away to expose the interior. Fig. 2 is a side elevation of the semaphore proper, taken ninety degrees from the view shown in Fig. 1. Fig. 3 is an enlarged view of the interior mechanism of the semaphore, the near side of the supporting-column being removed, the signal-shaft in section. Fig. 4 is an enlarged view, partly in central vertical section, through the supporting-column and the semaphore mechanism. Fig. 5 is a central section of one of the signal-disks shown in Fig. 4. Fig. 6 is a transverse or horizontal section of the semaphore-column on a smaller scale than Fig. 4. Fig. 7 is a diagrammatic view of two intersecting lines of railway provided with one of the semaphores. Fig. 8 is a plan view of the same. Fig. 9 is a diagram showing the line-wire, the semaphore-magnet, the contact-wires, and the connections for said magnet. Fig. 10 is a plan view of the semaphore.

1 1' designate the hollow vertical column for the semaphore-arms and the mechanism

for moving the arms, said column being constructed, preferably, as shown in Fig. 6, a transverse section having two broad sides 1 secured to two narrow sides 1'. The two double signal-arms 3 4, Figs. 1 and 10, are secured on a transverse shaft 5, journaled in bearings 6, let into the sides 1, respectively. Each arm 3 4 carries two annular plates 7, each of which has a concentric sight-opening or bull's-eye across which a plate of colored glass 7' is secured, as shown in Fig. 5, or in any preferred manner.

A lamp 8, preferably electric, having its globe of white glass, is supported by a bracket-arm 8' between two of the colored glass plates 7' when the arms 3 4 are horizontal, the lamp-bracket 8' being secured to the column 1 1'. Thus at night when the lamp 8 is lighted a colored light is displayed at one end of each arm 3 and 4. When said arms are turned to vertical position by the means to be described hereinafter, the light from the lamp 8 is of course uncolored and will be termed "white" when referred to hereinafter.

The arms 3 4 are turned simultaneously through their shaft 5 by a weight 9, hung by a yoke and a pulley 10 from a cable 12, one end of which is secured to the inside of the column 1 1', its other end being secured to the face of a drum 13, Fig. 4, keyed on a winding-shaft 14. A winding-ratchet 24, described hereinafter, is also keyed on shaft 14, and may be integral with drum 13, if preferred. Mounted rotatably upon the hub of ratchet 24 is a gear-wheel 15, which drives a pinion 16, rigidly secured on the aforesaid shaft 5, carrying the arms 3 4. The shaft 5 is rotated ninety degrees at a time by the weight 9 acting through the above mechanism, and the means by which I prefer to start and stop said arms comprises a wheel 17, rigidly secured on shaft 5 and provided with four notches 18, arranged ninety degrees apart in its periphery, an armature 19, pivoted at 20, and carrying a detent 21 on its movable end, and an electromagnet 22, rigidly secured to one of the side plates 1 above said armature. The detent 21 rests normally in one of the notches 18 in wheel 17, and thereby prevents rotation of shaft 5 and arms 3 4. When the magnet 22 is energized momentarily by a suitable electric current, it lifts the detent 21 from the notch in wheel 17; but as the circuit is only closed for an instant the detent

is free to enter the next notch in said wheel 17, and a spring 23 may be employed to make the entrance of the detent more certain.

The purpose of rotating the shaft 5 a quarter-turn intermittently is to cause the arms 3 4 to assume alternately the horizontal and vertical positions, thereby displaying white and colored lights alternately.

When the weight 9 reaches the bottom of the column 1 1', it is raised to starting position by inserting a winding-crank provided with a squared bit into a square socket 14', formed in one end of the winding-shaft 14, and rotating said shaft thereby in the direction of the arrow in Fig. 3. The socket 14' may be an internally-threaded recess to be entered by an externally-threaded bit on the crank, if so preferred.

To permit the winding-drum 13 to rotate while the gear 15 remains stationary when raising the weight 9, a ratchet-wheel 24 is keyed on shaft 14 and is engaged by a pawl 25, secured to said gear-wheel, as shown in Fig. 3.

The bearings 26 for shaft 13 and the bearings 6 for shaft 5 may be constructed as shown for cheapness and for the reason that it is desirable to mount the arms 3 4 close to the column 1 1', and therefore said bearings should not project outwardly from the column; but these bearings may be modified in favor of any preferred form.

When the semaphore is used in connection with an ordinary electric railway, the conductors for the lamp 8 are led to the trolley wire or feeder and to the ground, respectively, a suitable resistance being interposed in series with the lamp to limit the current to that required for the lamp. The conductors leading from the electromagnet 22 are connected as shown in Fig. 9, a diagram, in which 27 designates a wire connecting the magnet with a special wire 28, supported above, between, and parallel to the two trolley-wires 29. (See also Figs. 7 and 8.) The other terminal of the magnet is connected to earth or to the railway-track by a wire, as 30.

In Fig. 7 a railway-line 31 is provided with a semaphore 7, constructed as described heretofore. 33 designates a line crossing line 31, 34 a car thereon, 29 one of the trolley-wires, and 28 my special line-wire, supported a little above the trolley-wires by the span-wires 37, which support also the trolley-wires. The object is for every car on line 33 to set the semaphore-arms 3 4 crosswise or to "danger" when passing a predetermined point and approaching the semaphore and for the same car to set said arms vertically or to "safety" when crossing or adjacent to the other line 31. To this end I connect a lateral and then obliquely depending bare contact-wire 38 to the line-wire 28 at every point where the cars are to operate the semaphore. The upper end of each contact-wire 38 is supported by one of the span-wires 37 by any preferred form of insulating-clip, though these clips need not

necessarily insulate the wires 38 from the span-wires 37, as the latter are always insulated from the trolley-wires. Said depending contact-wires 38 are struck and lifted with a rubbing contact by a contact-arm 39, mounted on the trolley-pole of each car. Each contact arm 39 is connected to the trolley-wheel yoke or to the conductor leading from the trolley-wheel, so that whenever a car passes under one of the contact-wires 38 the arm 39 contacts with said wire 38, and thereby shunts a part of the electric current through the line-wire 28, the magnet of the semaphore 1, thence to the ground, thereby closing a circuit through said magnet and causing the arms 3 4 to stand horizontally and indicate to the line 31 the vicinity of a car on line 33. When the car on line 33 reaches the cross-line 31 or the semaphore 1, the contact-arm 39 strikes another overhead contact-wire 38, again closing the circuit through the semaphore-magnet and turning the signal-arms to vertical position. In the case of a two-track road, as shown in Fig. 8, contact-wires 39 are provided above each track for causing cars approaching the semaphore 1 to set the arms horizontally and to reset them vertically when the cars pass the semaphore or the cross-line 31.

When this system is employed for railways not using electricity, batteries would be provided for energizing the semaphore-magnets and different circuit-closing devices would be employed for this operation of the semaphores by the cars or engines.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

In a semaphore, a hollow supporting-column, a transverse rotatable shaft extending therethrough, a signal-arm secured centrally on each end of said shaft and extending in opposite directions therefrom, annular plates carried by the ends of said arms, colored media secured within said annular plates, an electric lamp held at one side of said column between an adjacent pair of said media when said arms are in horizontal position, a notched controller-wheel secured on said transverse shaft within said column, a movable detent for arresting the rotation of said wheel, an electromagnet for disengaging the detent therefrom, a spur-pinion secured on said shaft, a winding-shaft, a winding-drum and a ratchet secured thereon, a gear-wheel mounted rotatably on said winding-shaft, and engaging said pinion, a pawl secured to said gear and engaging said ratchet, a cable secured to said winding-drum, and a weight hung from the cable, for actuating the aforesaid wheels, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

JAMES N. HARPER.

Witnesses:

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K. M. IMBODEN.