

No. 696,330.

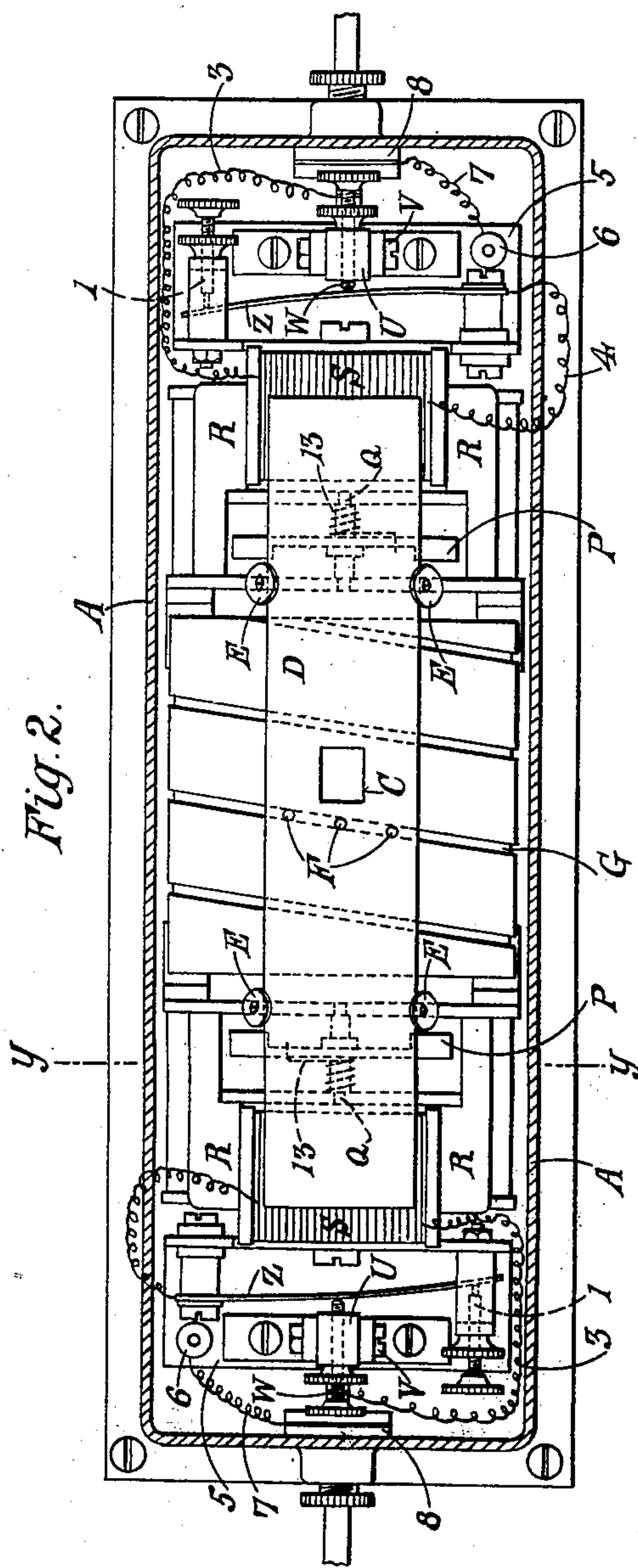
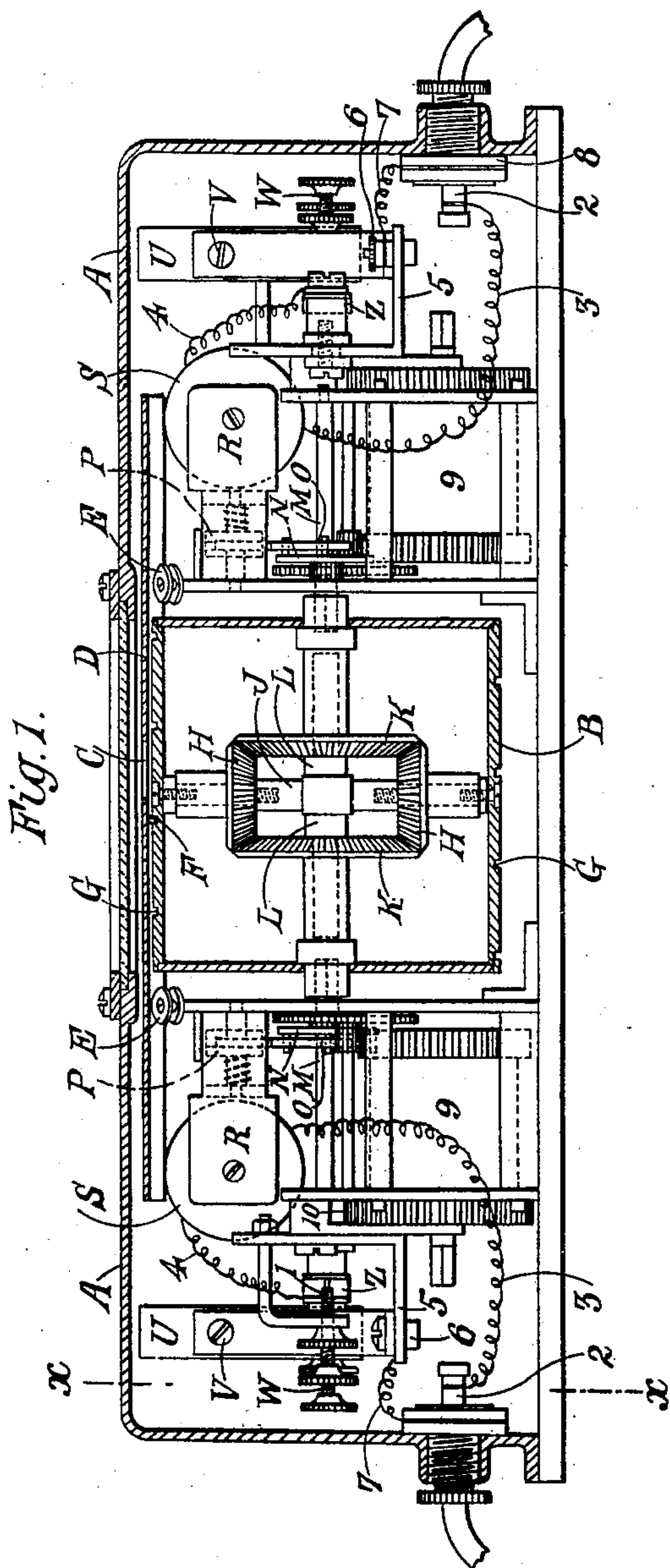
Patented Mar. 25, 1902.

H. H. GRENFELL.
SIGNALING APPARATUS.

(Application filed Aug. 5, 1901.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses.'

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Fig. 3.

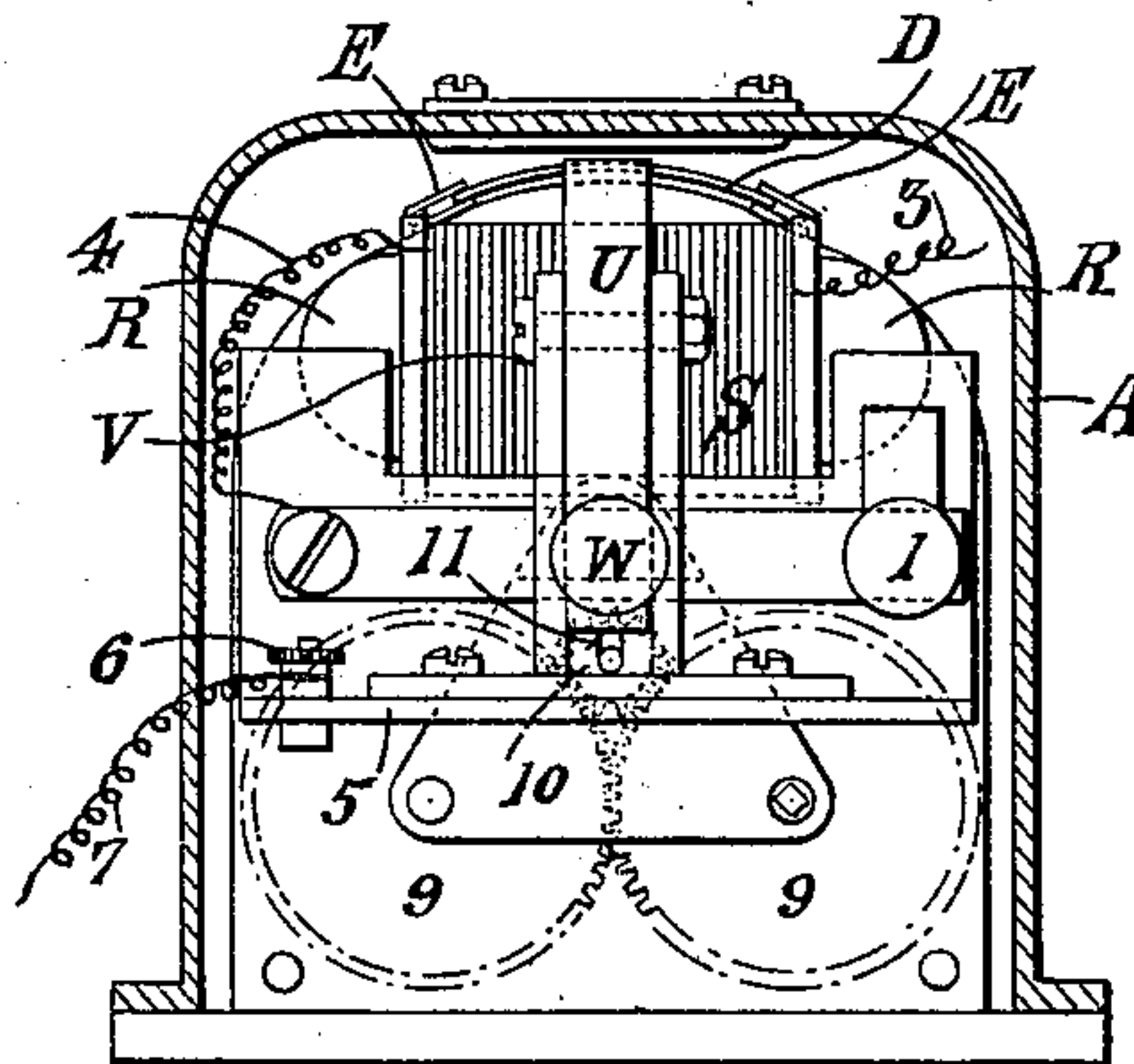
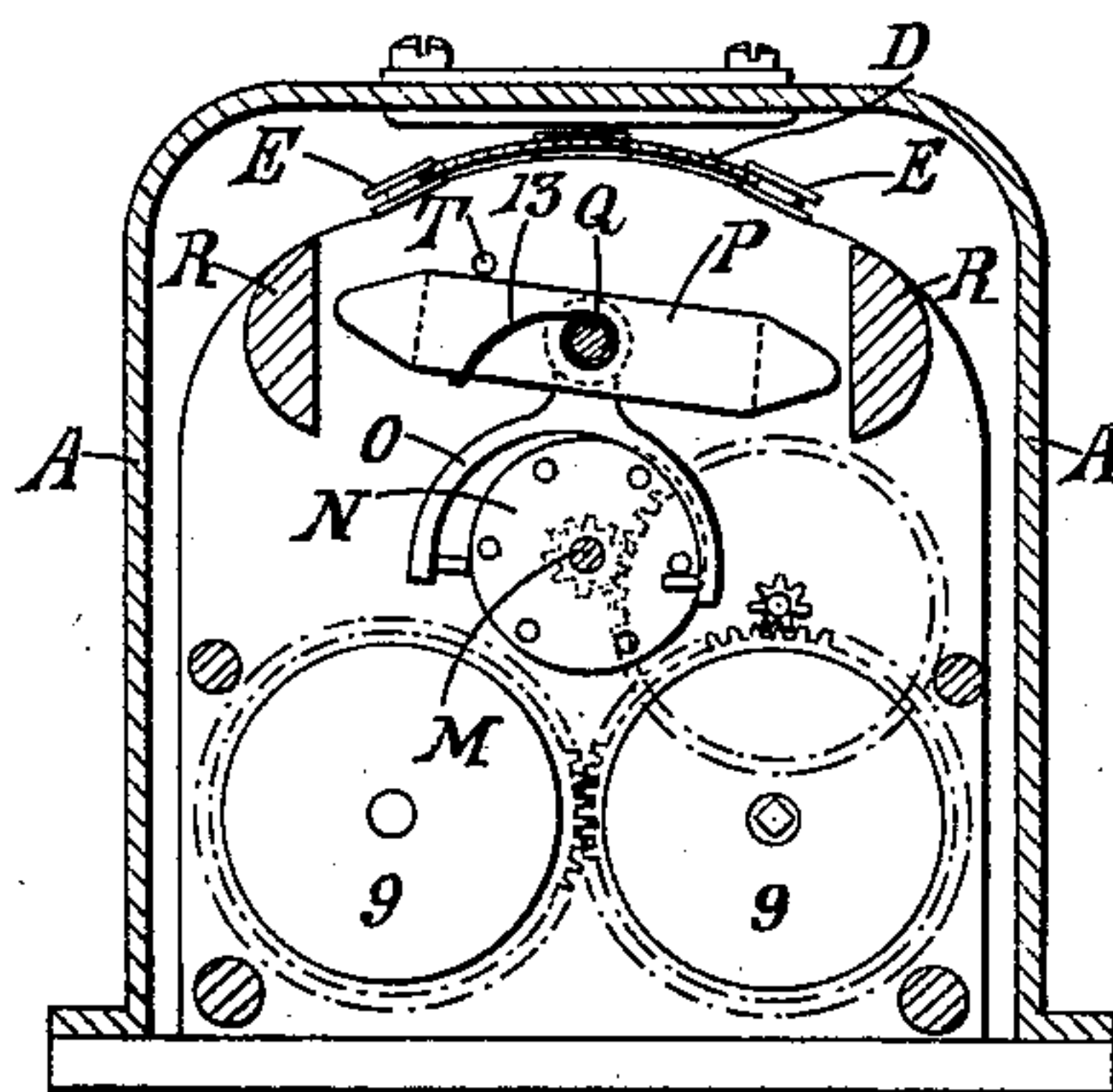


Fig. 4.



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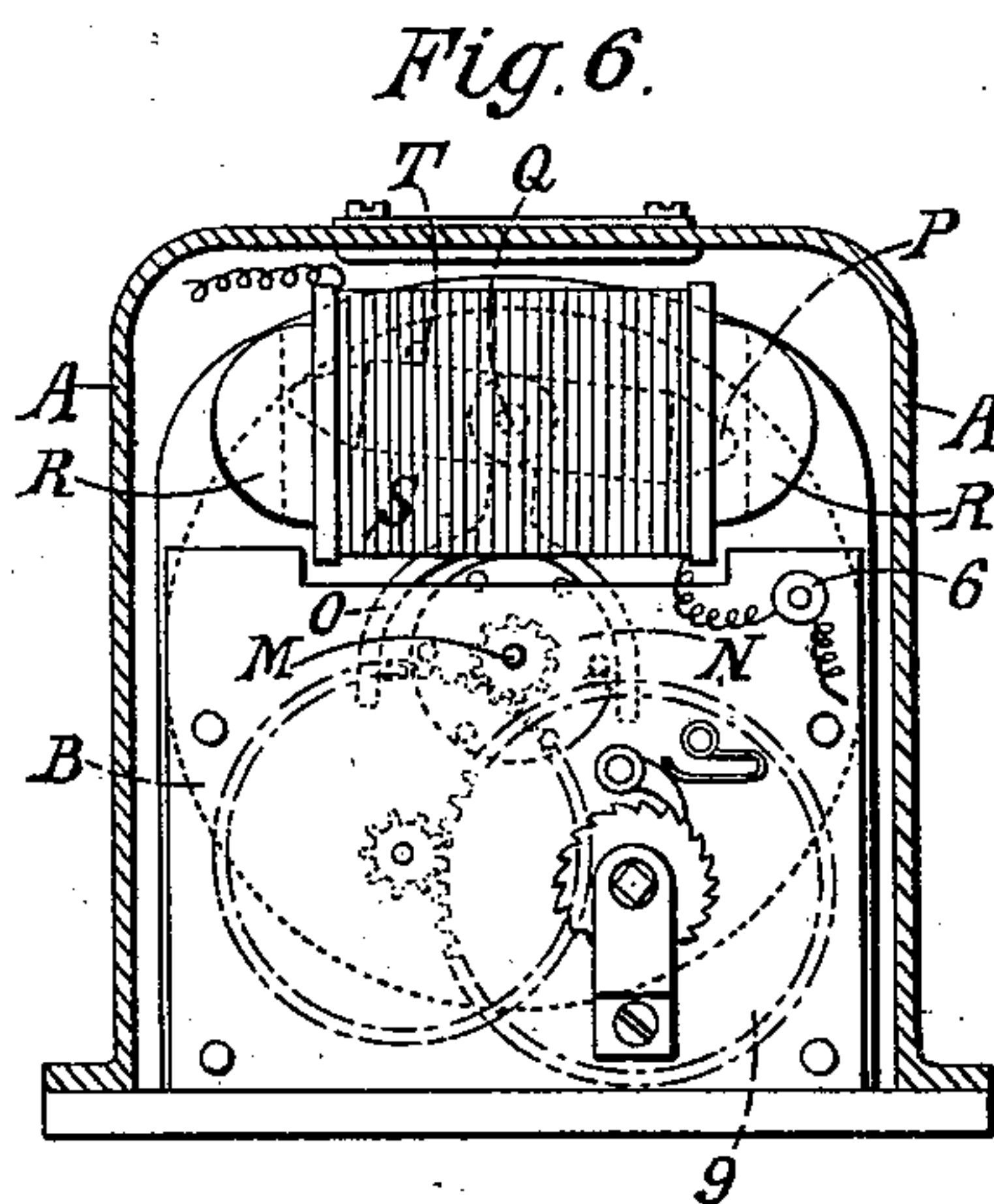
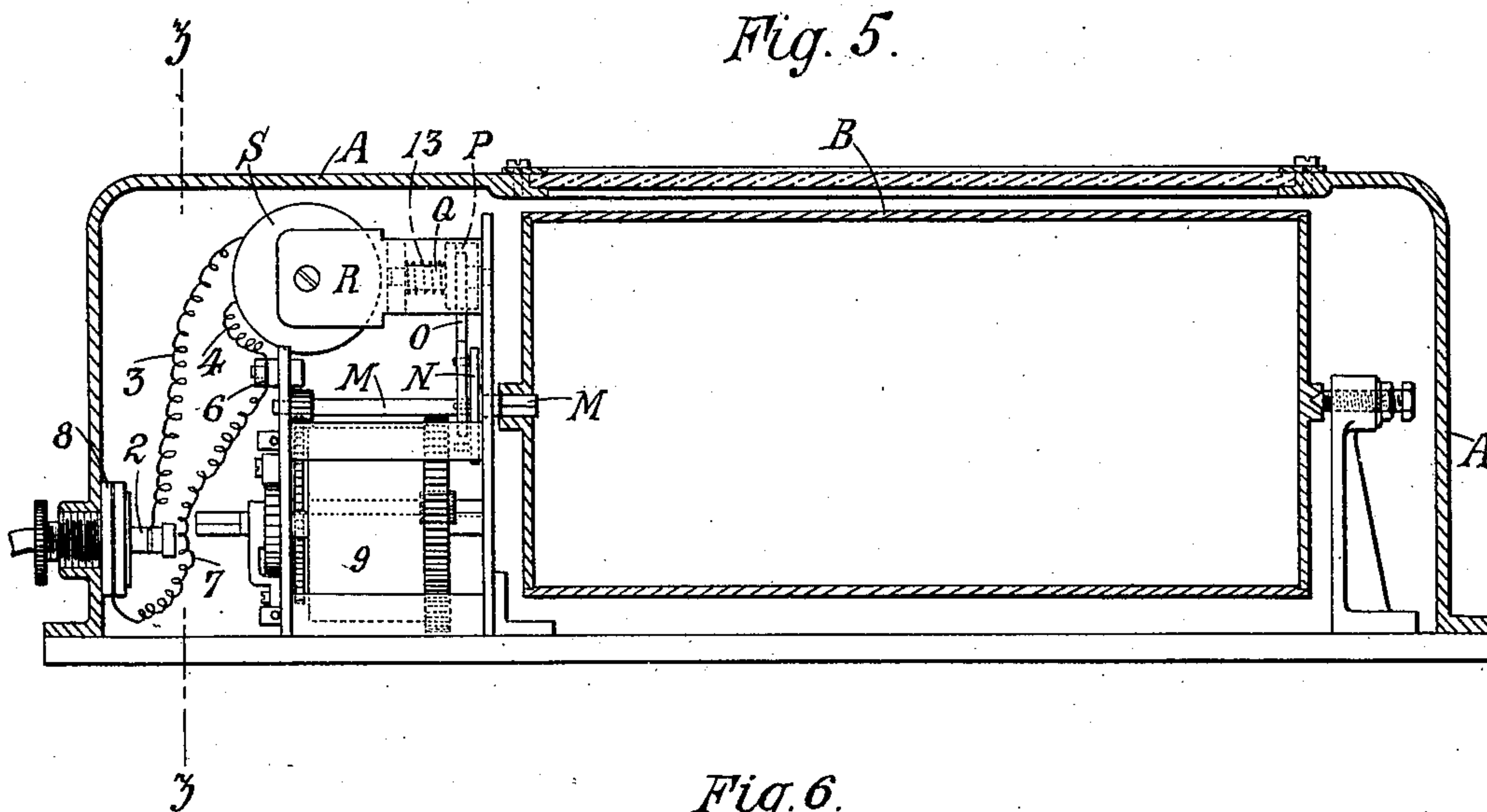
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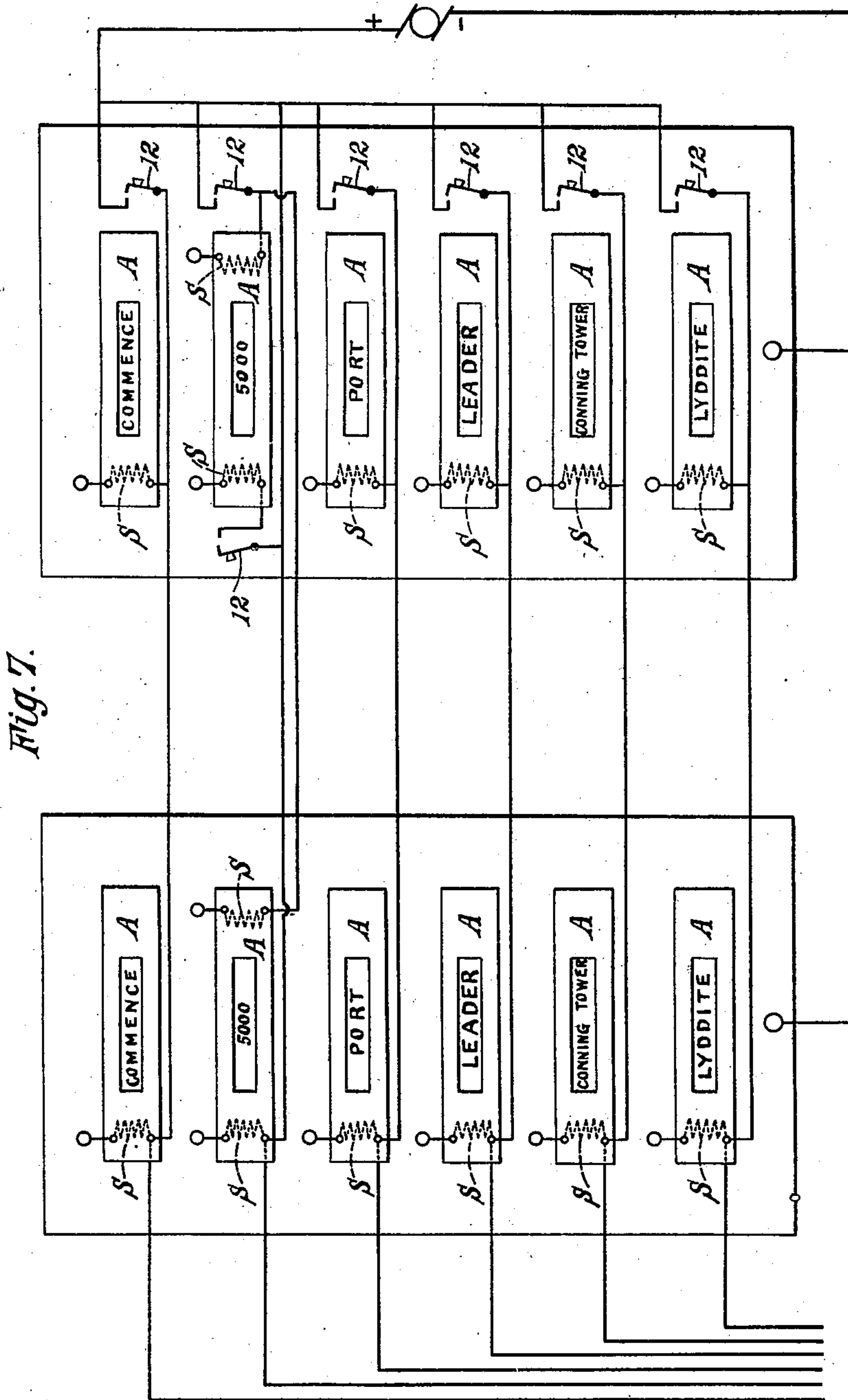


Fig. 7.

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UNITED STATES PATENT OFFICE.

HUBERT HENRY GRENFELL, OF ALVERSTOKE, ENGLAND.

SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 696,330, dated March 25, 1902.

Application filed August 5, 1901. Serial No. 70,993. (No model.)

To all whom it may concern:

Be it known that I, HUBERT HENRY GRENFELL, a subject of the King of Great Britain, residing in Alverstoke, county of Hants, England, have invented certain new and useful Improvements in Signaling Apparatus, of which the following is a specification.

My invention relates to a signaling apparatus adapted for transmitting electrically to a distant point or points and indicating at such point or points orders, numbers, words, signals, and the like issued from a central station. The orders, words, or the like to be indicated are arranged on the surface of a drum or cylinder, which is rotated by mechanism hereinafter described, whereby the orders, words, or the like thereon are caused to appear successively at an aperture in the casing which incloses the drum. The orders or the like in one form are arranged spirally on the drum, and the latter is either caused to move axially as it rotates in order to properly present the spirally-arranged orders at the aperture aforesaid or the drum may not move axially, in which case the aperture through which the orders are exposed is formed in a shutter that has a sliding movement imparted to it as the drum revolves. Such sliding movement of the drum or shutter may be conveniently effected by the engagement of spiral grooves in the drum with pins or projections on the casing or on the shutter. In another form of my invention the drum does not slide and no traveling shutter is required. The figures, words, orders, or the like to be indicated may be made very large, so as to be legible at a considerable distance without unduly increasing the size of the drum, and, moreover, only the particular order, number, word, or signal intended to be indicated is visible for the time being, so that there is no risk or liability of the indications being misread, as is sometimes the case with dial or like apparatuses where more than one order or indication is visible at the same time. I rotate the drum preferably by clockwork controlled by electromagnetic devices governed by a key at the central station where the orders are issued; but I may rotate the drum direct by the electromagnetic devices. In some cases the drum is rotatable in either direction, while in others it is rotatable only in

one direction. The several instruments controlled from one key at the central station are arranged in parallel, and each instrument is provided with means for throwing it out of circuit when the scale arrives at the zero position or starting-point, whereby all the instruments can be readily adjusted. I sometimes use a double drum connected by a tape, which is wound from one drum to the other and which carries the orders.

Referring to the accompanying drawings, which illustrate my invention, Figures 1 and 2 are sectional elevation and plan, respectively, of one form of my invention in which the drum is rotatable in either direction. Fig. 3 is a section on the line $x x$, Fig. 1. Fig. 4 is a section on the line $y y$, Fig. 2. Fig. 5 is a sectional elevation of a modification in which the drum is rotatable in one direction only. Fig. 6 is a section on the line $z z$, Fig. 5. Fig. 7 is a diagrammatic view illustrating two instruments and their connections, one instrument being at the central station and the other at one of the receiving-stations.

Like letters of reference denote corresponding parts in the several figures.

Referring to Figs. 1 to 4, A is a casing inclosing a drum B and clockwork mechanism for driving said drum. Two such mechanisms are provided, one for driving the drum forward and the other for driving it backward. The orders or signals to be indicated are arranged spirally on the periphery of the drum and are visible one at a time through an aperture C in a shutter D. Said shutter can slide between roller-guides E E, and it is furnished with pins F F, which engage with a spiral groove G in the periphery of the drum, so that when the drum revolves the said slide is moved axially between its guide-rollers, and the opening C is maintained in alinement with the successive indications on the drum. By these means a number of indications sufficiently large to be visible at a distance of several feet can be arranged on a drum of small diameter, besides which only one order or indication is exhibited at the same time, thus avoiding confusion or mistake. The drum is conveniently driven through a train of differential gear consisting of a pair of bevel-pinions H H, mounted loosely on a rod J, fixed diametrically across the drum, and

a pair of bevel-wheels K K, gearing with the pinions II H and having sleeve-like bosses loosely mounted on arms L L, projecting at right angles and centrally from the rod J.

5 The bosses of the wheels K project through the ends of the drum and form bearings, on which said drum can freely turn. The clockwork mechanisms for actuating the drum are arranged one at each end of the casing and

10 are similar in all respects. The driving-spindle M of one clockwork-train engages with the projecting boss of one of the wheels K, and the corresponding spindle of the other train engages with the boss of the other wheel

15 K, the arrangement being such that one train turns the drum in one direction and the other in the opposite direction. The said clockwork-trains are independent of each other and are controlled electrically, as will now be

20 described. For this purpose the spindle M is fitted with an escape-wheel N, adapted to engage a pallet O, secured to an armature P, pivoted at Q between the pole-pieces R R of an electromagnet S. The said pole-pieces are

25 fixed to the frame of the clock-movement and serve to carry the magnet. When said magnet is energized, the armature is attracted centrally between the poles R, thereby releasing the escape-wheel and allowing the latter to

30 turn until the tooth on the ascending side thereof is stopped by the pallet. When the electromagnet is deenergized, the pallet is tilted again by a spring 13, and the ascending tooth of the escape-wheel then passes the tooth on

35 the pallet and the said wheel turns until the next tooth on the descending side is stopped by the pallet, the latter being retained by a stop T. One movement of the drum is thus completed. It will be seen that by succes-

40 sively energizing and deenergizing the electromagnet a turning movement is imparted to the drum B. The movements of the pallet and armature are controlled by a spring 13, which tends to return the armature to the

45 normal position. (Shown in Fig. 4.) I sometimes provide a brake to insure the drum having a dead-beat action and to prevent oscillations of the drum. The electric circuit includes the terminal 2, conductor 3, coil S, con-

50 ductor 4, spring-contact piece Z, stop 1, frame 5, binding-screw 6, conductor 7, and terminal 8. When the sliding shutter arrives at the end of its travel, it presses against an insulated lever U and tilts said lever about its

55 pivot V, thereby causing an adjustable stop W, carried by the lever, to press against a spring-contact Z and raise the same from its contact-stop 1, thus breaking the electric circuit and preventing further movement of the

60 drum and shutter in that direction. This construction affords a means of adjusting the several instruments whenever required by running them all back until the zero-point of each instrument is reached. I have shown

65 the clockwork-train provided with two spring-barrels 9 9, geared together and locked by means of a pinion 10, resting on both gear-

wheels of the barrels. The axle of said pinion is free to move up and down in a slot 11, and when the spring-barrels are rotated to 70 wind up the springs the pinion 10 rises out of engagement with the gear-wheels and drops back into engagement when the winding ceases.

In Figs. 5 and 6 I have shown a simpler ap- 75 paratus in which the drum is intended to be driven in one direction only, and consequently having only one clockwork-train, from which the drum is driven direct without the intervention of differential gear. Moreover 80 the indications on the periphery of the drum are in this case read through an opening in the casing without the intervention of a sliding shutter.

In both arrangements the opening in the 85 casing may be covered with a glass or other transparent sheet to keep out water.

The diagrammatic view, Fig. 7, shows two sets of instruments and their electrical con- 90 nections for transmitting various kinds of orders or directions. One set of these instruments is placed at the central station, whence the orders are issued, and another correspond- ing set is placed at every point where the or- 95 ders are intended to be received. There may be any desired number of sets of receiving instruments, the corresponding instruments of each set being arranged in parallel, as indicated in the diagram. A push-key or other 100 contact-maker 12 is provided for each instrument at the central station, so that by successive taps of said key the corresponding instrument at the central station and all the other instruments in parallel therewith will be actuated and the drums thereof rotated 105 until the required signal or order is indicated thereby, which order will be the same in the operator's instrument and in all the receiving instruments. In this way orders can be trans- 110 mitted from the conning-tower, for example, to any part of a ship. The sets of instruments indicated in the diagram will enable the operator to signal when to commence and when to cease firing, the range of the object to be aimed at, the bearing of said object, the par- 115 ticular ship in a fleet of ships, the particular part of said ship to be hit, and the kind of projectile to be used.

What I claim is—

1. In a signaling apparatus, the combina- 120 tion of a drum adapted to carry signals, two sets of clockwork mechanism, oppositely-arranged gear-wheels connected respectively with said sets of clockwork mechanism, a gear-wheel on said drum engaging said oppo- 125 sitely-arranged gear-wheels, means controlled by electric currents for stopping and releasing said clockwork mechanisms as required, electric circuits, and keys for making and breaking said circuits, substantially as and 130 for the purposes, hereinbefore described.

2. In a signaling apparatus, the combina- tion of a drum adapted to carry signals, a spiral groove in the periphery of said drum, a

sliding perforated shutter or screen arranged in front of said drum, a projection on said shutter engaging said spiral groove, two sets of clockwork mechanism, differential gear connecting said sets of clockwork mechanism to said drum, means controlled by electric currents for stopping and releasing said sets of clockwork mechanism as required, electric circuits, and keys for making and breaking said electric circuits, substantially as, and for the purpose, hereinbefore described.

3. In a signaling apparatus, the combination of a drum adapted to carry signals, a spiral groove in the periphery of said drum, a sliding perforated shutter or screen arranged in front of said drum, a projection on said shutter engaging said spiral groove, two sets of clockwork mechanism, differential gear connecting said sets of clockwork mechanism to said drum, means controlled by electric currents for stopping and releasing said sets of clockwork mechanism as required, electric circuits, keys for making and breaking said contact-stops in said circuits, and fixed contact-stops in said circuits, and insulated pivoted levers arranged in the path of said sliding shutter and engaging said spring contact-arms, substantially as, and for the purpose, hereinbefore described.

4. In a signaling apparatus, the combination of a drum adapted to carry signals, a spiral groove in the periphery of said drum, a sliding screen arranged in front of said drum, a projection on said screen engaging said spiral groove, clockwork mechanism for driving said drum, means comprising an electromagnet for stopping and releasing said clockwork mechanism as required, an electric circuit including said electromagnet, an electric generator in said circuit, a key for making and breaking said circuit, a spring contact-arm and a fixed contact-stop in said circuit, an insulated pivoted lever arranged in the path of said sliding screen and engaging said spring contact-arm, substantially as described.

5. In a signaling apparatus the combination of a drum adapted to carry signals, a spiral groove in the periphery of said drum, a sliding shutter or screen arranged in front of said drum, a projection on said shutter engaging said spiral groove, two sets of clockwork mechanism, differential gears connecting said sets of clockwork mechanism to said

drum, escapement-wheels on said sets of clockwork mechanism, pallets engaging said escapement-wheels, armatures, pivoted arbors each bearing an armature and a pallet, stops, springs controlling said arbors, electromagnets controlling said armatures, electric generator in said circuits, keys for making and breaking said circuits, spring contact-arms and fixed contact-stops in said circuits, insulated pivoted levers arranged in the path of said sliding shutter and engaging said spring contact-arms, substantially as described.

6. In a signaling apparatus, the combination of a drum adapted to carry signals, a spiral groove in the periphery of said drum, a sliding shutter or screen arranged in front of said drum, a projection on said shutter engaging said spiral groove, two sets of clockwork mechanism, differential gear connecting said sets of clockwork mechanism to said drum, escapement-wheels on said sets of clockwork mechanism, pallets engaging said escapement-wheels, armatures, pivoted arbors each bearing an armature and a pallet, stops, springs controlling said arbors, electromagnets controlling said armatures, electric circuits including said electromagnets, an electric generator in said circuits, and keys for making and breaking said circuits, substantially as described.

7. In a signaling apparatus, the combination of a multiple number of drums on the periphery of each of which the signals are arranged, clockwork mechanism for rotating each of said drums in one direction, and other clockwork mechanism for rotating each of said drums in the opposite direction, differential gear connecting said clockwork mechanisms to said drum, means controlled by an electric current for stopping and releasing said clockwork mechanisms as required, an electric circuit including one set of clockwork mechanisms, a parallel electric circuit including the other set of clockwork mechanisms, and a key in each circuit for making and breaking the circuit, substantially as described.

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

HUBERT HENRY GRENFELL.

Witnesses:
GEORGE HARRISON,
HERBERT A. BEESTON.