No. 875,120. PATENTED DEC. 31, 1907.

W. A. D. SHORT.

AUTOMATIC ELECTRIC BLOCK SIGNAL.

APPLICATION FILED NOV. 25, 1905.

3 SHEETS—SHEET 1.

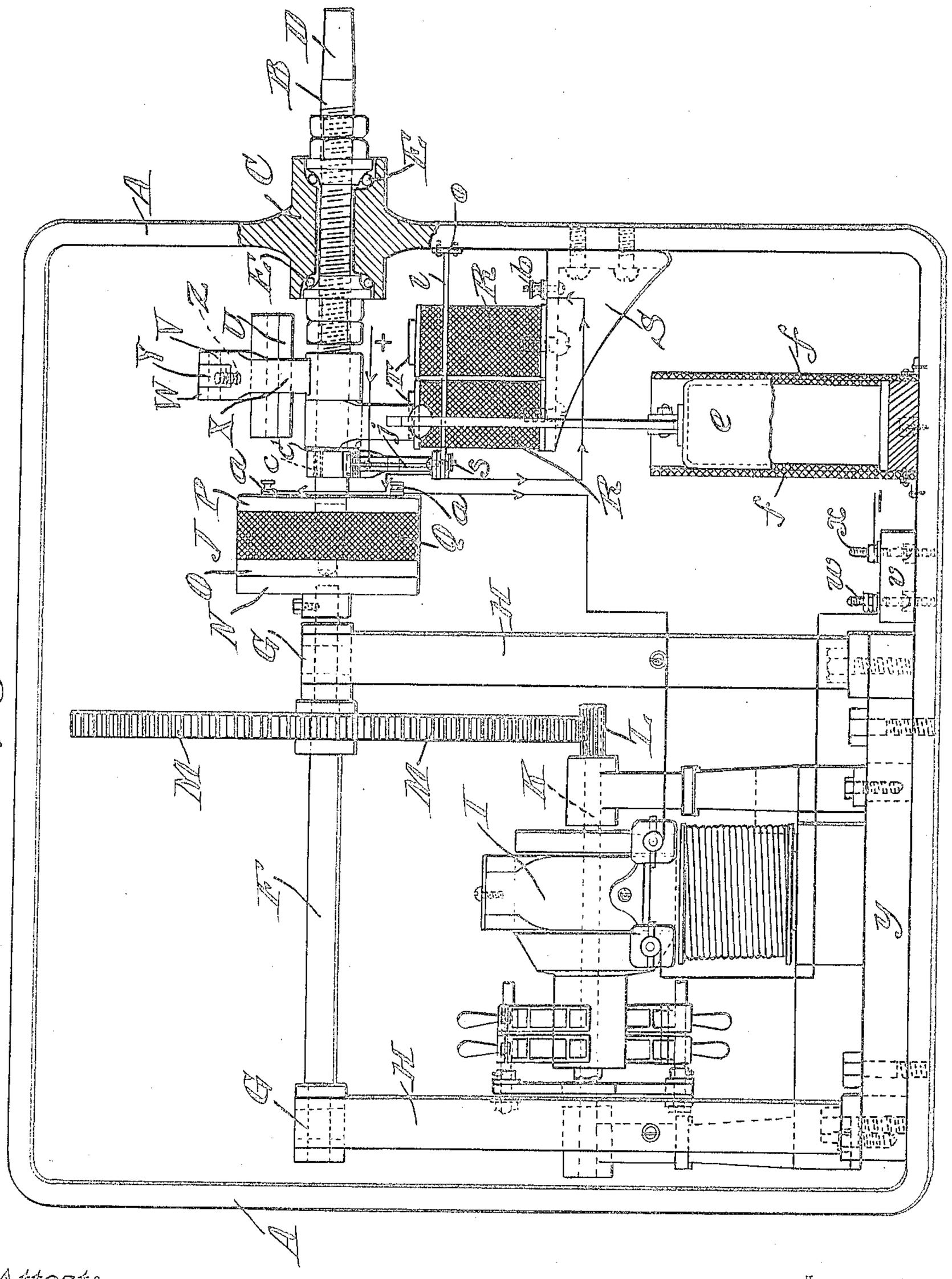

Fig. 1.

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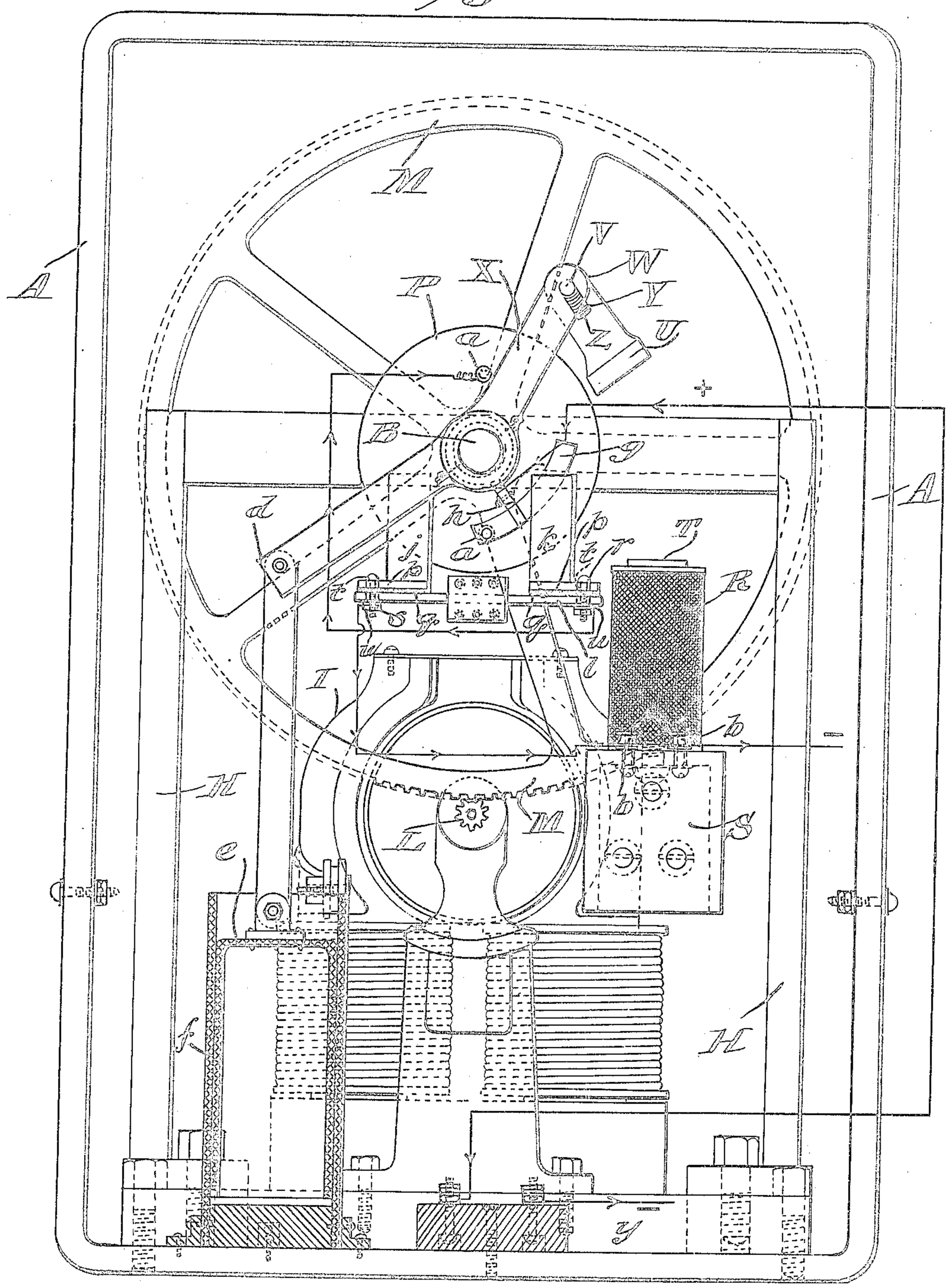
3 SHEETS—SHEET 2.

Fig. 2.



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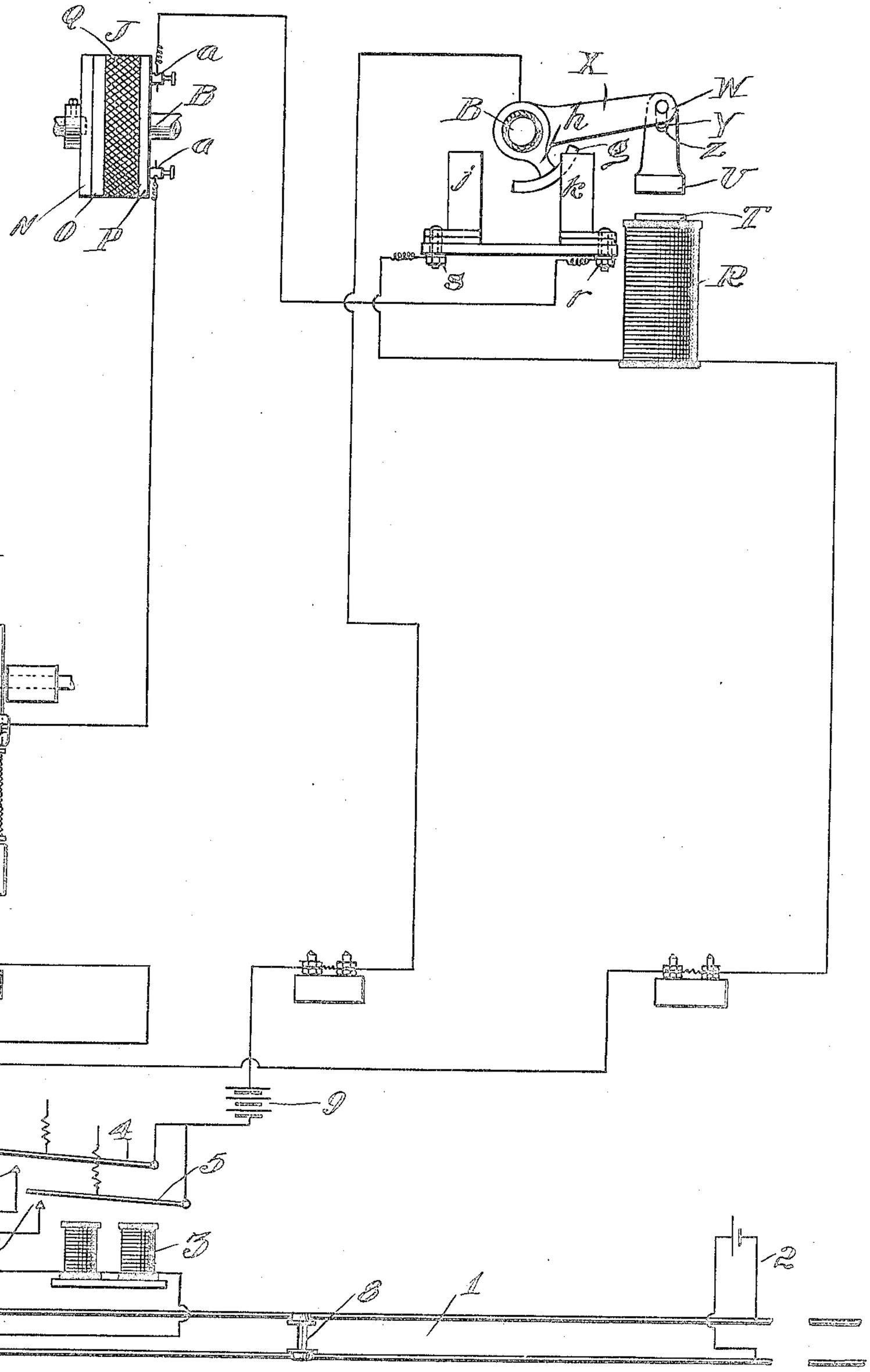
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC ELECTRIC BLOCK-SIGNAL.

No. 875,120. Specification of Letters Patent. Patented Dec. 31, 1907.

Application filed November 25, 1905. Serial No. 289,034.

To all whom it may concern:

Be it known that I, WILLIAM A. D. SHORT, a citizen of the United States, and resident of Lexington, Kentucky, have invented certain new and useful Improvements in Automatic Electric Block-Signals, of which the following is a specification, accompanied by drawings.

This invention relates to automatic electric block signals for railways, more particularly to that type of signal known as the spindle operated electric motor signal, in which the controlling mechanism is located directly in line with the spindle shaft on top of the signal post.

Some of the features of the invention as will hereinafter appear may be used in connection with a signal operated from an up and down rod, in which case the motor mechanism for operating the same is located in the motor case at the bottom of the post and suitable cranks, shafts, up and down rods and other mechanism are utilized for transmitting motion.

The objects of the invention are to prevent the liability of the parts of the signal sticking when in different positions, which is possible in other types of signals having purely mechanical connections, to simplify the construction and control of the operating mechanism and insure certainty of operation under all conditions.

Further objects of the invention will hereinafter appear and to these ends the invention consists of an automatic electric block signal for carrying out the above objects embodying the features of construction, combinations of elements, and arrangement of parts having the general mode of operation substantially as hereinafter fully described and claimed in this specification and shown in the accompanying drawings, in which,—

Figure 1 is a longitudinal side elevation partly in section of an automatic electric block signal embodying the invention, and Fig. 2 is a transverse end elevation partly in section of the apparatus. Fig. 3 is a diagram of the electric connections and also shows diagrammatically a relay controlling the signal and itself controlled by a track circuit arranged to be short circuited by the wheels of a train on the track.

Referring to the drawings A represents a suitable casing for the signaling apparatus and B is a spindle or shaft carried in a suitable bearing C and having a squared end D outside of the casing, to which the spectacle casting forming the semaphore or signal is adapted to be attached. In this instance a shaft B is shown preferably provided with ball bearings E and the inner ends of said shaft projects into the casing and is arranged in line with another transmission shaft F supported in suitable bearings G on the frames H.

Suitable means, as an electric motor I, are provided for driving the shaft F, and electric power transmission means in the form of an electric clutch mechanism J are provided for transmitting motion from the shaft F to the shaft B. The motor is shown provided with a motor shaft K having a pinion L meshing with a gear M fast on the shaft F, although any other suitable driving connections may be provided. Suitably secured to the inner end of the shaft F is a soft iron core in the form of a disk N, which is arranged opposite and is adapted to abut against the soft iron end O of a spool P of soft iron having a coil Q, which is suitably connected in circuit to be energized to operate the clutch when desired. The spool P, as shown, is carried on the inner end of the signal shaft or spindle B, and when the motor I is in operation and the clutch J is energized it will be seen that power will be transmitted from the motor through the gearing and shafts and clutch to the spectacle casting adapted to be placed upon the end D of shaft B. As shown, the spool P is provided with binding posts *a* for the attachment of electric connections in suitable circuits.

In accordance with this invention automatic means are provided for controlling the clear and danger positions of the signal through the operation of the electric motor I and clutch P. Suitably secured in any desired manner to the signal casing are retaining magnets R, in this instance carried upon a bracket S secured to the casing and provided with binding posts *b* suitably insulated from the bracket S for making electric connections with the retaining magnets. The cores T of the retaining magnets R cooperate with a soft iron armature U pivotally secured at V to one end W of a lever X, preferably of cast brass and sweated onto

the shaft B, or otherwise secured thereto in any suitable manner. Preferably the armature U is slotted at Y and provided with a spring Z which bears against the pivot V so that the shock is taken up when the armature is attracted against the cores T. At the other end *d* of lever X is connected a plunger *e* operating in the dash pot *f* to prevent the signal from being injured when the arm X is released by the retaining magnets and goes to danger position. An arm *h* is provided with a segmental contact *g* preferably of rolled copper. Said arm is suitably connected to the shaft B and insulated therefrom by a sleeve *c* of soft rubber or other suitable material. The arm *h* is also insulated from the lever X by means of fiber insulation *c'*. The segmental contact *g* coöperates with two other insulated split contacts *j* and *k*, shown in this instance carried upon the plate *l* supported at *o* from the casing A. As shown, the contacts *j* and *k* are split to receive the knife edged contact *g* and are carried on plates *p* insulated from the plate *l* by means of insulation *q*. Binding screws *r* and *s* are provided insulated from the plate *l* by means of insulating sleeves *t* and washers *u*. From the binding post *r* connection is adapted to be made to the electric clutch mechanism J and from the binding post *s* connection is adapted to be made to the retaining magnets.

The binding post *a* on the clutch mechanism J are adapted to be connected respectively to the motor and to the switch formed by contacts *g*, *j*, and *k*. It is understood that the construction of the switch formed by the blade *g* and contacts *j* and *k* may be of any desired character. A block of insulating material *v* is provided, preferably in the base of the apparatus for binding posts *w* and *x*, the post *w* being for the connections for the motor in controlling switch, and the post *x* being for the connections for the battery and fuses. The electric motor I may be of any suitable construction suitably supported within the casing A, preferably upon a base *y* secured to the base by means of bolts.

The casing A may be of any suitable construction, but preferably the side nearest to the spectacle signal is solid and the other sides are provided with doors to afford accessibility to the apparatus. The case is preferably solid on top and bottom and may be supported by iron piping, to which it may be secured in any suitable manner. The case should be of such thickness that it will withstand heavy jars and protect the apparatus within.

In Fig. 3 I have shown diagrammatically the electric connections. I have not shown the various parts of the apparatus mechanically connected, as the parts are sufficiently shown in operative relation in the preceding figures; and for clearness of illustration of the circuits, it is convenient in the diagram to show the parts detached from each other and in the positions in which they are most readily illustrated. In this figure, 1 designates an insulated section of track, the rails of which are bonded as usual in railway signal work, 2 is a track battery at one end of the block, 3 a relay connected to the rails at the other end of the block, 4 and 5 armatures of said relay and 6 and 7 contact points of said relay. Normally relay 3 is energized, but when the track circuit is short-circuited by the wheels of the train, as for example wheels 8, relay 3 is deënergized and contact between its armatures 4 and 5 and contact points 6 and 7 is broken. When this occurs the circuit of holding magnet R is broken and the signal arm moves to danger position by the action of its spectacle casting, as already described. When the train leaves the block and relay 3 is again energized, the closing of contact between armature 5 and point 7 closes circuit from point 7 through motor I, clutch J and switch contacts *k* and *g* through battery 9 back to armature 5. The motor then moves the shafts *f* and *b* and signal arm back to the safety position and near the end of its motion switch contact *g* makes contact with switch contact *j*, closing circuit from relay armature 4 through contact point 6, holding magnet R, switch contact pieces *j* and *g* to battery 9 and thence back to armature 4. An instant thereafter switch contact piece *g* leaves switch contact piece *k*, thereby breaking the circuit of the motor I and magnetic clutch J; but holding magnet R now being energized and its armature U in immediate proximity to its poles, shaft B is held against rotation.

In the operation of the apparatus the signal is supposed to stand normally at clear at an angle of about 60° to the horizontal, that is with the magnets R energized and holding the armature U against their cores T. The signal arm may, of course, be made to stand normally at danger, and if desired it may be constructed to stand at an angle of 75° to the horizontal, in which case the signaling apparatus should be changed to make the signal stand at the desired angle.

When a train first comes on the block, the line circuit will be broken in the usual manner, which will deënergize the magnets R, thereby releasing the armature U and permitting the lever X to fall into the position shown in Fig. 2, thereby permitting the signal to go to danger. When the signal is at danger position the circuit controlling switch is in such position that as the train leaves the block the motor will be energized and the magnetic clutch J will also be energized. A short time after the motor begins operation the position of the switch changes as the shafts rotate, thereby throwing the retaining magnets R into circuit. At this time the

retaining magnets, the magnetic clutch and the motor will all three be in circuit, but this will continue but for a short time before the controlling switch breaks the circuit with the magnetic clutch and motor and the signal is restored to clear position.

Obviously some features of this invention may be used without others and the invention may be embodied in widely varying forms, therefore, without limiting the invention to the devices shown and described, and without enumerating equivalents, I claim and desire to obtain by Letters Patent the following:

1. In an automatic electric block signal, the combination of a signal shaft, a power shaft arranged in line therewith, an electro-magnetic clutch for connecting one with the other, means for controlling said clutch and means for transmitting power to the power shaft, said clutch under normal conditions being adapted to be deënergized after the movement of the signal due to the source of power is completed.

2. In an automatic electric block signal, the combination with a signal shaft, a power shaft arranged in line therewith, an electro-magnetic clutch for connecting one with the other, means for controlling said clutch and means for transmitting power to the power shaft.

3. In an automatic electric block signal, the combination of a signal shaft, a switch arm connected thereto and insulated therefrom, insulated switch contacts, a lever arm connected to said shaft, provided with an armature, retaining magnets for controlling said armature, a power transmission shaft, an electro-magnetic clutch for connecting the two shafts and a source of power.

4. In an automatic electric block signal, the combination of signal and transmission shafts, an electro-magnetic clutch for connecting the same, retaining magnets, means on the signal shaft controlled by said retaining magnets for maintaining the shaft in a given position, a source of power and an electric switch controlled by the signal shaft for controlling the retaining magnets, the clutch and the source of power.

5. In an automatic electric block signal, the combination of an inclosing casing, a signal shaft supported by said casing, a transmission shaft supported in line therewith within the casing, an electric clutch mechanism for connecting one shaft to the other, a source of power for driving the transmission shaft, retaining magnets for maintaining the signal in a given position, and an electric switch controlled by the position of the signal shaft for controlling said retaining magnets, the clutch mechanism and the source of power.

6. In an automatic electric block signal, the combination of an inclosing casing, a signal shaft supported in bearings therein, a transmission shaft supported within the casing in line with the shaft, an electric clutch mechanism between said shafts, a source of power within the casing, retaining magnets supported within the casing for maintaining the signal in a given position, an electric switch controlled by the position of the signal shaft and insulated within the casing, said switch controlling the retaining magnets, the clutch mechanism and source of power.

7. In an automatic electric block signal, the combination of the signal shaft, a lever arm connected thereto and insulated therefrom, a segmental contact connected to the said shaft and insulated therefrom, a plurality of switch contacts adapted to coöperate with said segmental contact and insulated from each other and from the casing within the casing, an armature connected to one end of said lever arm and a dash pot connected to the other end, retaining magnets adapted to control said armature, a transmission shaft arranged within the casing substantially in line with the signal shaft, electro-magnetic clutch mechanism for connecting said shafts, an electric motor within the casing connected to drive said power shaft, the segmental switch contact and cooperating contacts being adapted to control the retaining magnets, the clutch mechanism and the motor.

8. In a railway signal, the combination of a semaphore arm, a divided shaft therefor, the two parts of the shaft being provided with clutch surfaces, and means for automatically controlling the engagement and disengagement of said clutch surfaces.

9. In a railway signal, the combination of a semaphore arm, a divided shaft therefor, the two parts of the shaft being provided with an electro-magnetic clutch device, a battery for controlling the signal mechanism and also controlling said electro-magnetic device.

10. A railway signal comprising in combination a signal shaft, means for driving the same comprising a magnetically operated clutch, a holding magnet, an armature therefor movable with said shaft and moving toward and from said magnet, and means for controlling said clutch and magnet

11. A railway signal comprising in combination a signal shaft, means for driving the same comprising a magnetically operated clutch, a holding magnet, an armature therefor, an armature-supporting arm mounted on said shaft and arranged to move said armature toward and away from said magnet as the shaft revolves, and means for controlling said clutch and magnet.

12. A railway signal comprising in combination a signal shaft, means for driving the same comprising a magnetically operated clutch, a holding magnet, an armature there-

for, an armature-supporting arm mounted on said shaft and arranged to move said armature toward and away from said magnet as the shaft revolves, means for controlling said clutch and magnet, and a dash pot likewise connected to and operated by said shaft.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

W. A. D. SHORT.

Witnesses:
A. McCULLOUGH,
HELLMUTH PETERS.