H. M. ABERNETHY.

DWARF RAILWAY SEMAPHORE SIGNAL.

APPLICATION FILED DEC. 31, 1906.

936,283.

Patented Oct. 12, 1909.

3 SHEETS—SHEET 1.

FIG. 2

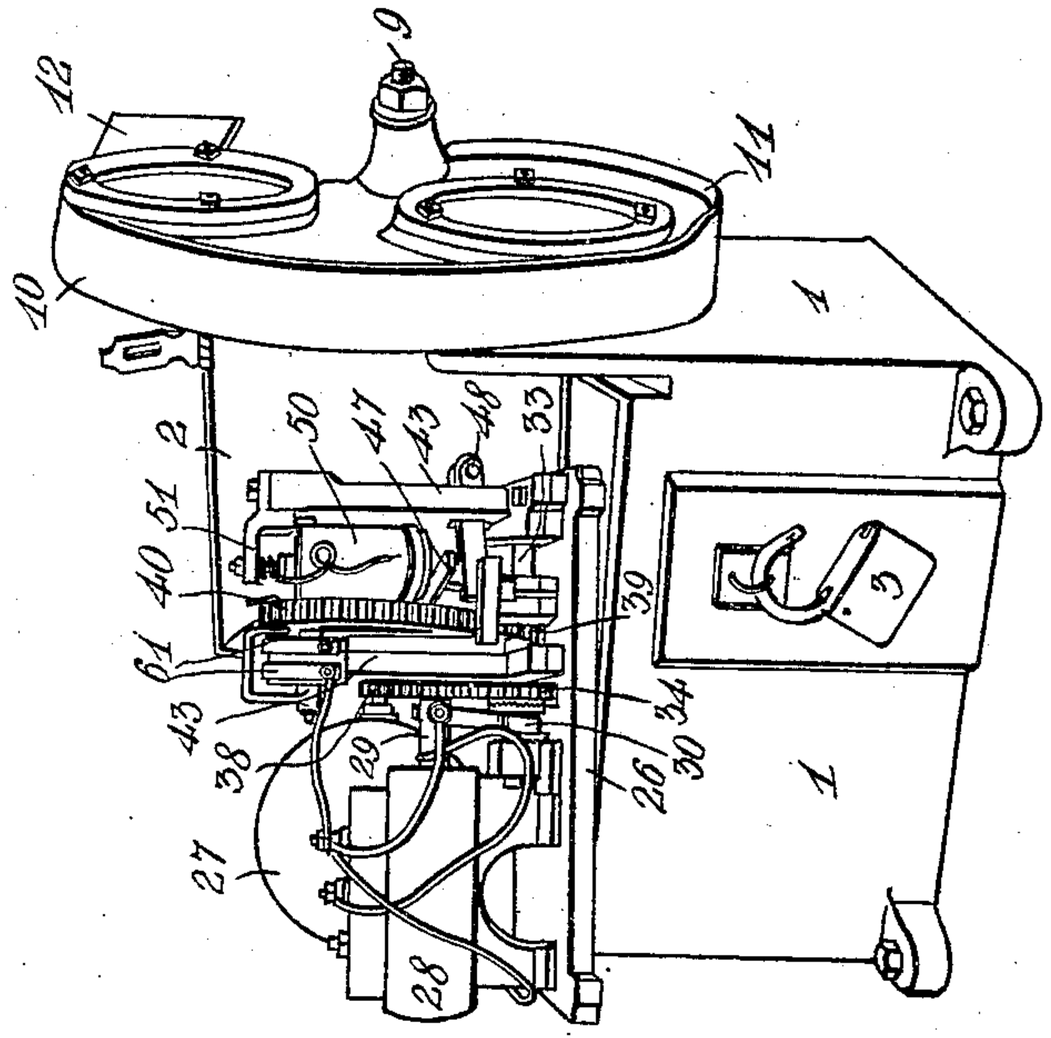
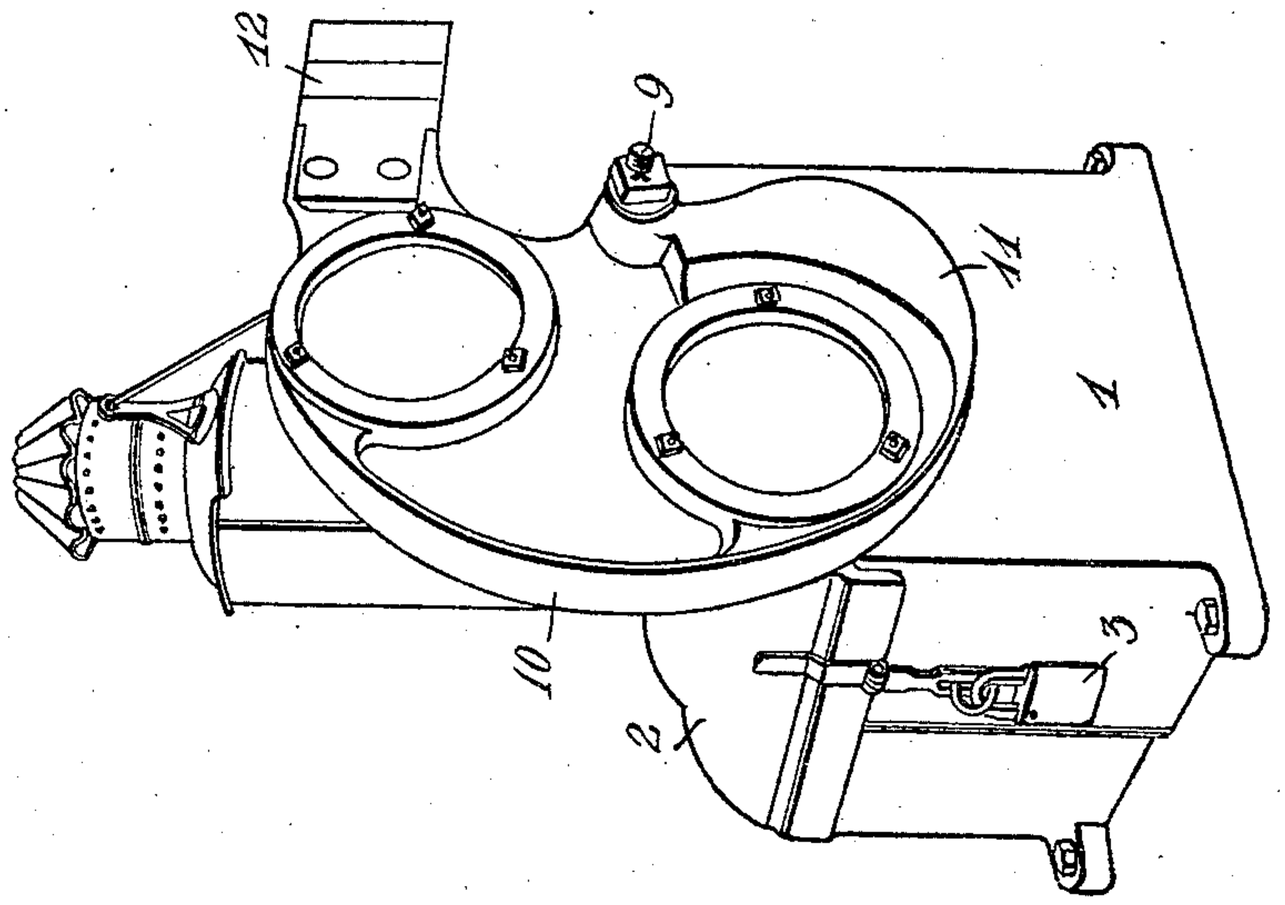


FIG. 1



Witnesses

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3 SHEETS—SHEET 2.

FIG. 2

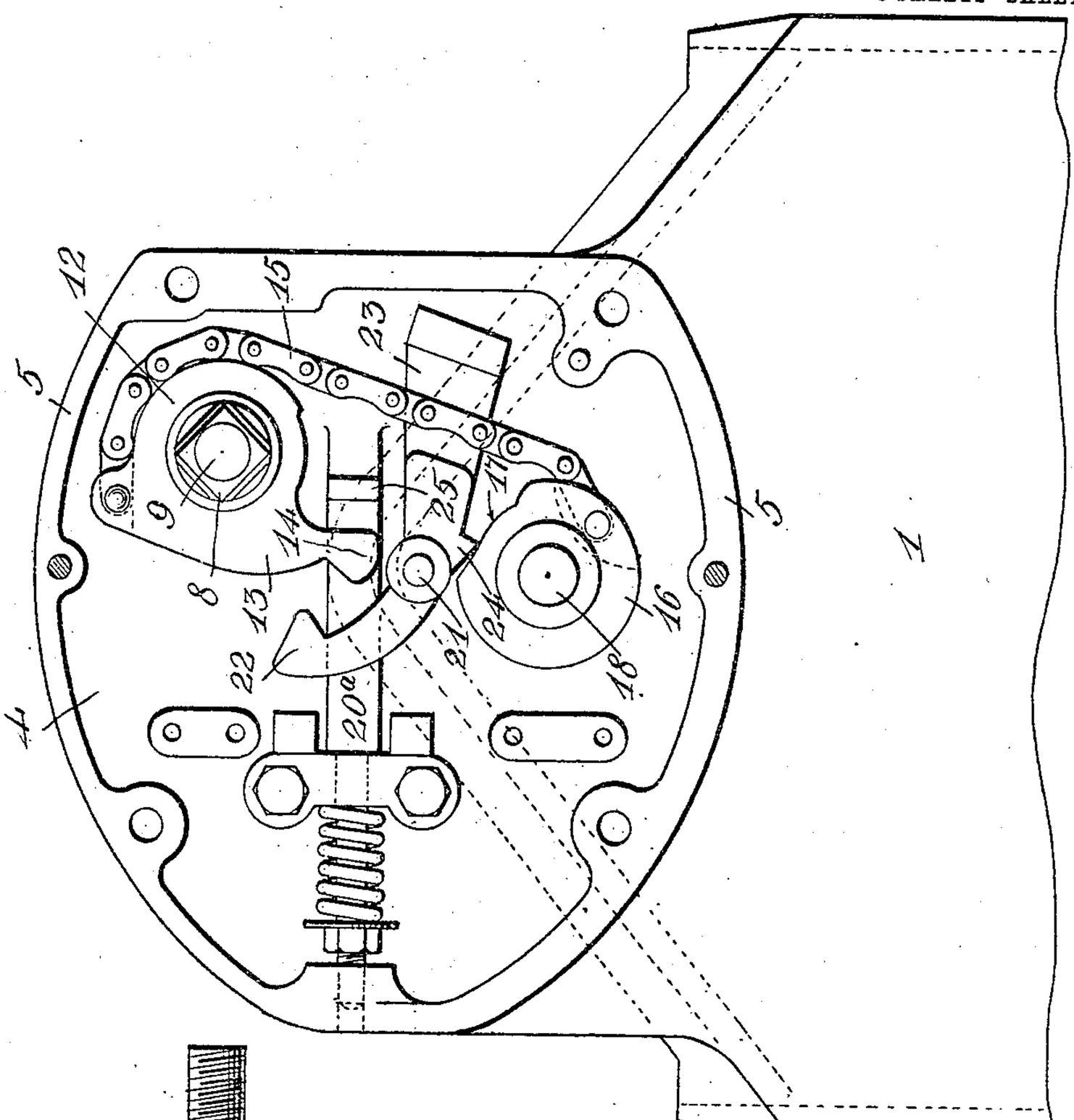
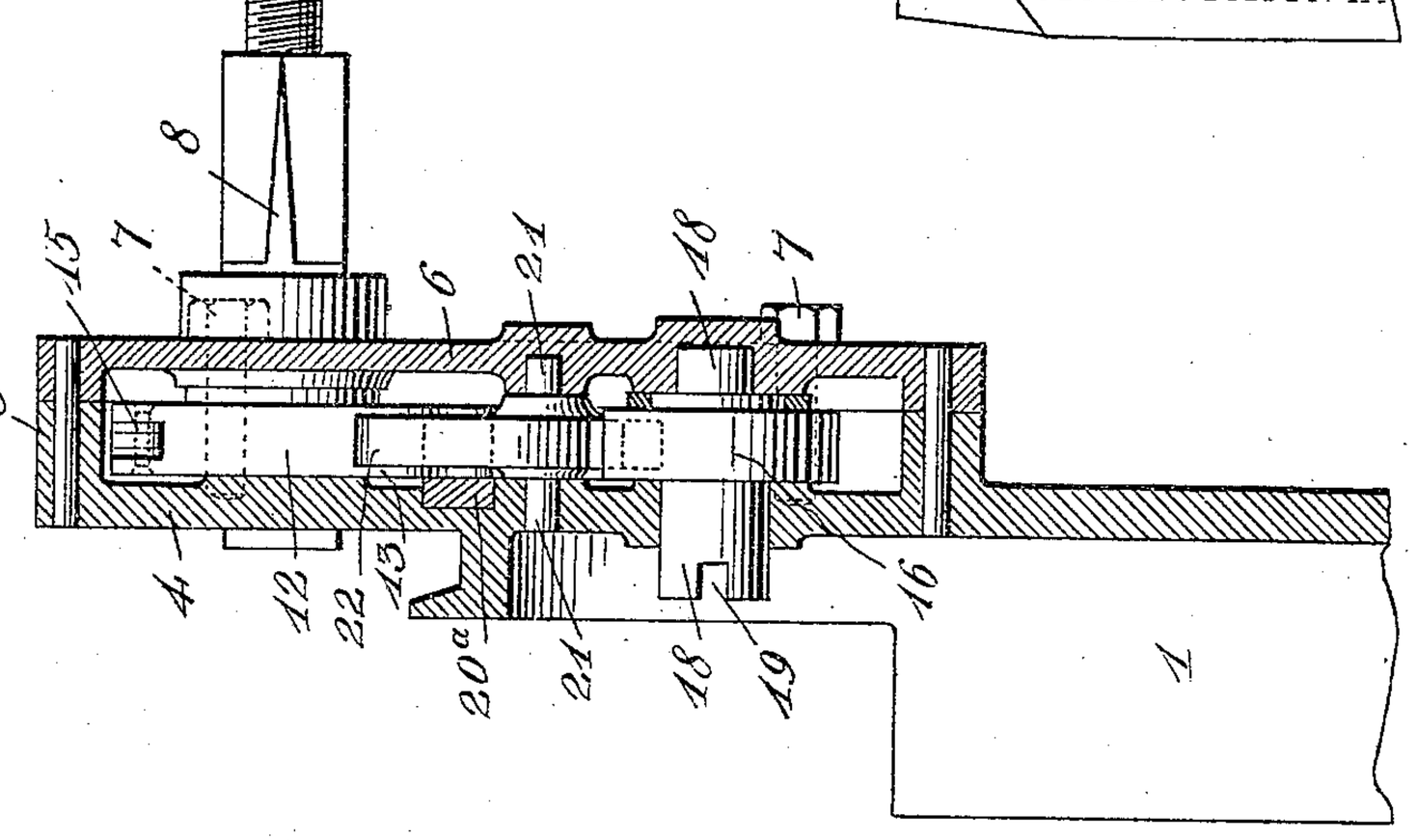


FIG. 4



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3 SHEETS—SHEET 3.

FIG. 5

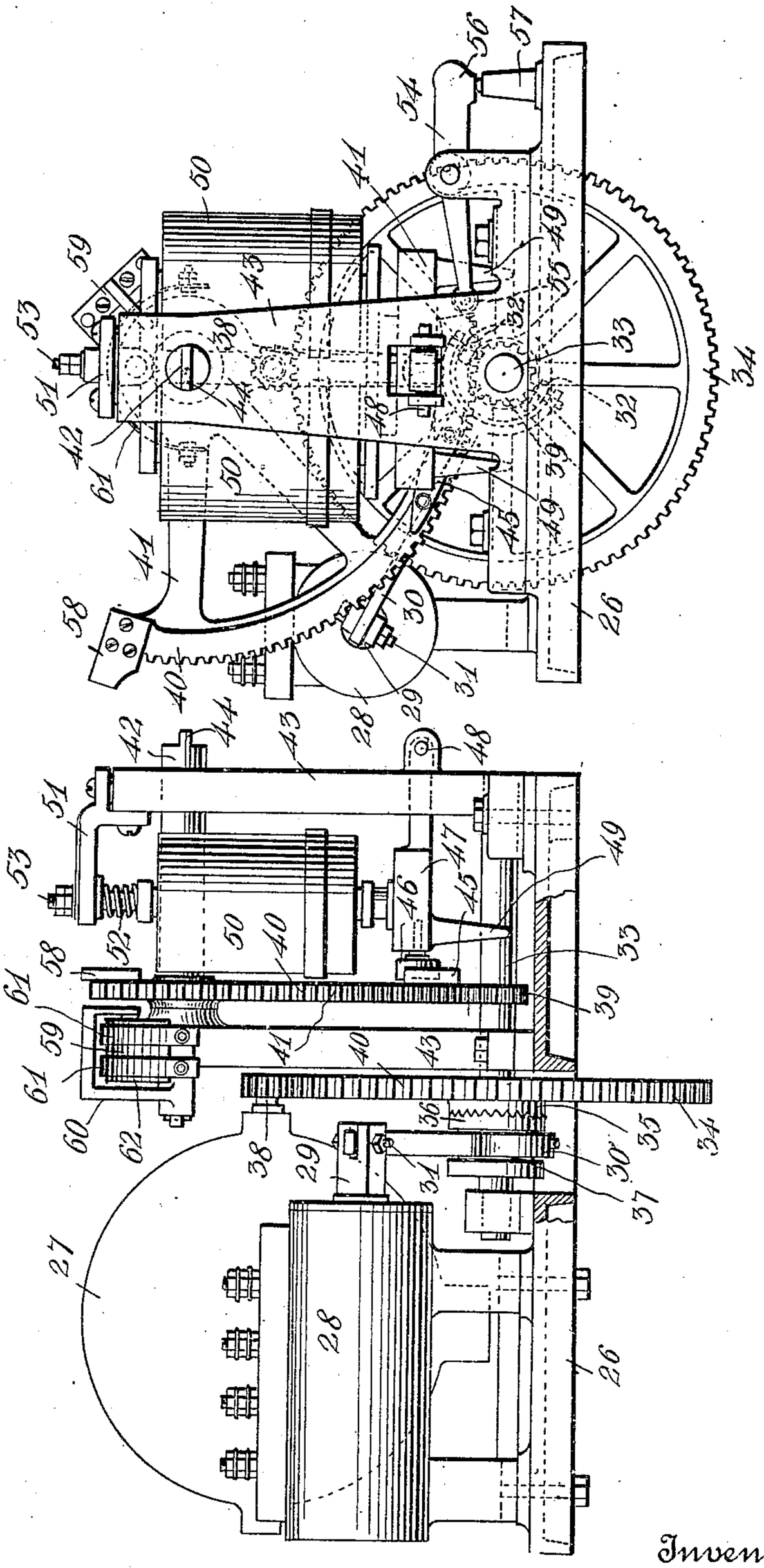

FIG. 5

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UNITED STATES PATENT OFFICE.

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DWARF RAILWAY SEMAPHORE-SIGNAL.

936,283. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed December 31, 1906. Serial No. 350,183.

To all whom it may concern:

Be it known that I, HARRY M. ABERNETHY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Dwarf Railway Semaphore-Signals, of which the following is a specification.

This invention relates to electrically controlled dwarf railway signals, and the principal object of the invention is to provide a device of this character in which the semaphore arm is securely locked by mechanical means at the safety or danger position, and in which the operative mechanism can be unlocked only by an electric circuit controlled by a switch in the signal tower.

Another object of my invention is to provide a simpler and compact electro-mechanical dwarf signal, in which all the parts but the semaphore arm are incased in a comparatively small water tight casing.

Still another object of the invention is to provide a reliable, safe and efficient device of the character described which can be operated by low voltage and in which the semaphore arm is moved into safety position by electrical means, and moved into the danger position by gravity, the arm being positively locked by mechanical means at each position, and unlocked by electrical means.

In signals of this character now in use, the semaphore arm is usually held at the safety position by an electro-magnet, and by taking hold of the arm it may be moved to danger position by disengaging the armature from its magnets. Moreover, many of the signals of this type in present use require a constant electrical current to control the locking mechanism, and when the signal is at the danger position the blade is held locked at the expense of the battery current. The danger position being the normal one in this class of signals, the frequent renewal of batteries is necessary.

To overcome the foregoing and other defects in dwarf signals is the prime object of my invention.

In the accompanying drawings:—Figure 1 is a perspective view of a dwarf signal made in accordance with my invention. Fig. 2 is a similar view, showing the operative mechanism removed from the casing and supported upon the top of the open case or box. Fig. 3 is a view in elevation of the inner side of one end of the casing, and showing certain parts of the mechanism mounted thereon. Fig. 4 is a central vertical section of the same. Fig. 5 is a side elevation of the detached mechanism which is removed from the casing, and Fig. 6 is an end elevation of the same.

Referring to the drawings for a more particular description of my invention, the numeral 1 designates a casing for inclosing the operative parts of the signal, said casing being practically water tight, and provided with a cover 2, which may be locked in closed position by the pad lock 3. One end of the casing is extended above the top edge of the casing, to provide a support for the semaphore arm on the outside and for supporting the locking mechanism on the inside.

Figs. 3 and 4 show the extended portion 4, of the casing, having a surrounding flange 5 which is fitted with a cap plate 6, connected thereto by screws 7. The locking mechanism is contained between the extended portion 4 and the cap plate 6.

The locking mechanism comprises a shaft 8, journaled in the wall 4 and in the cap 6, said shaft extending out through the cap 6 and provided with a threaded outer end 9 for securing the semaphore arm 10 thereto. This semaphore arm or spectacle frame is weighted at 11, so that the arm has a constant tendency to hold the blade 12 in a horizontal position by gravity, and when the locking mechanism is disengaged or unlocked, the blade 11 assumes the horizontal position owing to the preponderance of weight of the semaphore casting. On the shaft 8 is secured, between the wall 4 and the cap 6, a plate 12^a having an outwardly extending arm 13, terminating in a lug or toe 14, for a purpose which will presently appear. Connected to the plate 12 is a chain 15, the opposite end of which is attached to a disk 16, provided with a notch 17, said disk having stub axles journaled in the wall 4 and cap 6, one of said axles 18 extending through the wall 4 and provided with an open slot or recess 19. A lever 20 provided with stub shafts 21 journaled in the wall 4 and cap 6, is provided with a beveled head 22 on one end, the opposite end being weighted and having an opening 23 therein through which the chain 15 passes. A beveled lug 24 on the lower side of the lever is designed to engage the notch 17

in the disk 16 and lock said disk against rotation, in one direction, viz:—toward the left in Fig. 3. A stop lug 25 on a spring bolt 20ª serves to prevent the jar of the toe 14 in coming to a sudden stop, and when the disk 16 is rotated toward the right in said figure, by electrical means, hereinafter described, the beveled lug 24 rides up and out of the notch 17, thus permitting the toe 14 to pass the beveled head 22 on the lever 20.

Referring now to Figs. 5 and 6, which illustrate the electrically controlled mechanism for unlocking the locking mechanism just described, 26 represents the base, upon which is supported a suitable motor 27 and a solenoid 28, the core 29 of which is connected to a lever 30, pivoted at 31, and provided with a bifurcated free end to which the rollers 32 are journaled. A shaft 33, journaled at the upper side of the base 26 has a large gear wheel 34 loosely mounted thereon, said wheel being provided with a hub 35 having an annular series of clutch teeth thereon, and thus comprising one member of a clutch, the other member 36 of which is mounted to slide on the shaft 33 and to rotate therewith. The clutch member 36 is provided with a surrounding groove 37 which is engaged by the rollers 32, said clutch member 36 being moved into and out of engagement with the member 35 by the movements of the solenoid core 29. The gear wheel 34 extends through an opening in the base 26, and a pinion 38, mounted on the outer end of the motor shaft engages and rotates said gear wheel when the solenoid is energized and the motor is started. A small pinion 39 on the shaft 33 engages the teeth 40 on a sector 41 fixed upon a shaft 42 journaled in uprights 43 rising from the base 26. The outer end of the shaft 42 is provided with a lug or key 44 which engages the open slot or recess 19 of the axle 18 of the locking mechanism. By this means the electrically operated mechanism may be removed from the casing without disturbing the locking mechanism.

A lug 45 projecting out at the side of the lower end of the sector 41 is disposed in the path of a roller 46 mounted on the end of an armature 47, pivoted at 48 on one of the uprights of the frame, said armature having a weight 49, which normally holds the armature out of contact with the electro-magnets 50, supported by a bracket 51, provided with a spring 52, which surrounds the bolt 53. A lever 54, provided with a roller 55 at one end is disposed in the path of the armature 47 during its downward movement, and said lever is provided with a weighted end 56 which is normally supported upon a vertical pin or stop 57. The roller 55 carried by the lever 54 contacts with the adjacent end of the sector 40 when said lever is in the position shown in Fig. 6, thus locking the sector and holding the semaphore in vertical or clear position. The armature 47 at this time is held up by the energy of the magnets 50. When the magnets are de-energized the armature 47 drops upon an arm projecting from the lever 54 tilting the lever upon its pivotal support and permitting the sector to clear the roller 55 and move the semaphore blade to horizontal position. A lug or stop 58 on the upper end of the sector 41 prevents the same from moving beyond the pinion 39. A circuit controller 59 is connected to an arm 60 fixed to the shaft 42, and carries contact springs 61 adapted to bear upon the semi-circular plates 62.

The operation of the apparatus may be briefly described as follows:—A tower or telegraph office is provided with a switch from which extends one terminal leading to a battery, and the other terminal leads from the battery to the motor-terminal. A wire leads from the motor to the solenoid, and the other terminal leads to the circuit controller. From the controller a wire is led to the other terminal of the switch. The operator by closing the switch causes the circuit to flow from the battery to the switch, through the switch to the circuit controller, to the solenoid, to the motor, and from the motor back to the battery. The magnets 50, being shunted in this circuit, would also be energized. The motor would thus move simultaneously with the solenoid, engaging the clutch, and moving the semaphore blade to a vertical position and lock it in this position. The lug on the sector passing under the roller on the armature would leave the same in contact with the magnets 50. When the blade reaches the vertical position, the circuit controller will open and no current will pass through the motor and solenoid, the clutch is disengaged and the motor will stop. The motor now being cut out, the blade is held in vertical position by the action of the magnets 50. When the operator opens the switch, the magnet 50 is demagnetized, allowing the weighted armature to drop, releasing the sector and permitting the blade to assume a horizontal position. The current required to move the motor is about one and one-half amperes, and should the blade be held at clear for a great length of time this would be too great a tax on the battery. By introducing the lock magnets, this great consumption of current is saved, the magnets being wound with a high resistance, thus requiring but a fraction of an ampere to hold the armature.

From the foregoing it will be obvious that the blade is locked in both positions and cannot be operated except by the movement of the switch, and that the current is only used to unlock the blade and to move it to

the vertical position, the blade coming to the horizontal position by gravity and locking automatically.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. In a signal, a casing, a semaphore blade mounted on a shaft journaled in the casing, locking mechanism for holding the blade in either position, and electrical means for unlocking said mechanism and moving said blade in one direction, said blade moving in the other direction by gravity.

2. In a signal, a casing, a semaphore blade mounted on a shaft journaled in said casing, a locking mechanism in a compartment in said casing, and electric controlling mechanism detachably connected to said locking mechanism in another compartment in said casing.

3. In a signal, a casing, a shaft journaled therein, a semaphore blade on said shaft, a locking mechanism in said casing, said mechanism embodying a plate, a notched disk, a weighted lever and a chain connecting said plate and disk.

4. A signal comprising a casing, a shaft journaled therein, a semaphore blade on said shaft outside the casing, a locking mechanism within the casing, said locking mechanism comprising a plate carried by the shaft, a projection on the plate, a notched disk, a lever having a projection to engage said notch, a chain connecting said plate and disk, and a spring seated bolt.

5. A signal comprising a casing, a shaft journaled therein, a semaphore blade on said shaft, a locking mechanism in said casing comprising a plate carried by said shaft, and provided with a projection, a notched disk, a lever to engage said notch, and a chain connecting said plate and disk, an electric controlling mechanism in said casing, said controlling mechanism embodying a motor, a circuit controller, a clutch, a solenoid and electro-magnets.

6. A signal comprising a semaphore arm, means for locking said arm in two positions, electrical means for moving said arm in one direction and means for unlocking said locking means, and permitting said arm to drop by gravity to the other position.

7. A signal comprising a water-tight casing, a shaft journaled therein, a semaphore arm mounted on said shaft, locking mechanism for said arm within the casing, said locking mechanism comprising a plate, an arm, a disk, a chain, and a weighted lever.

8. In a signal, a semaphore blade, means for locking said blade in two positions, electrical means for unlocking said blade and moving it to the safety position, said electrical means embodying a sector, electromagnets, an armature and a circuit controller.

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In presence of—
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