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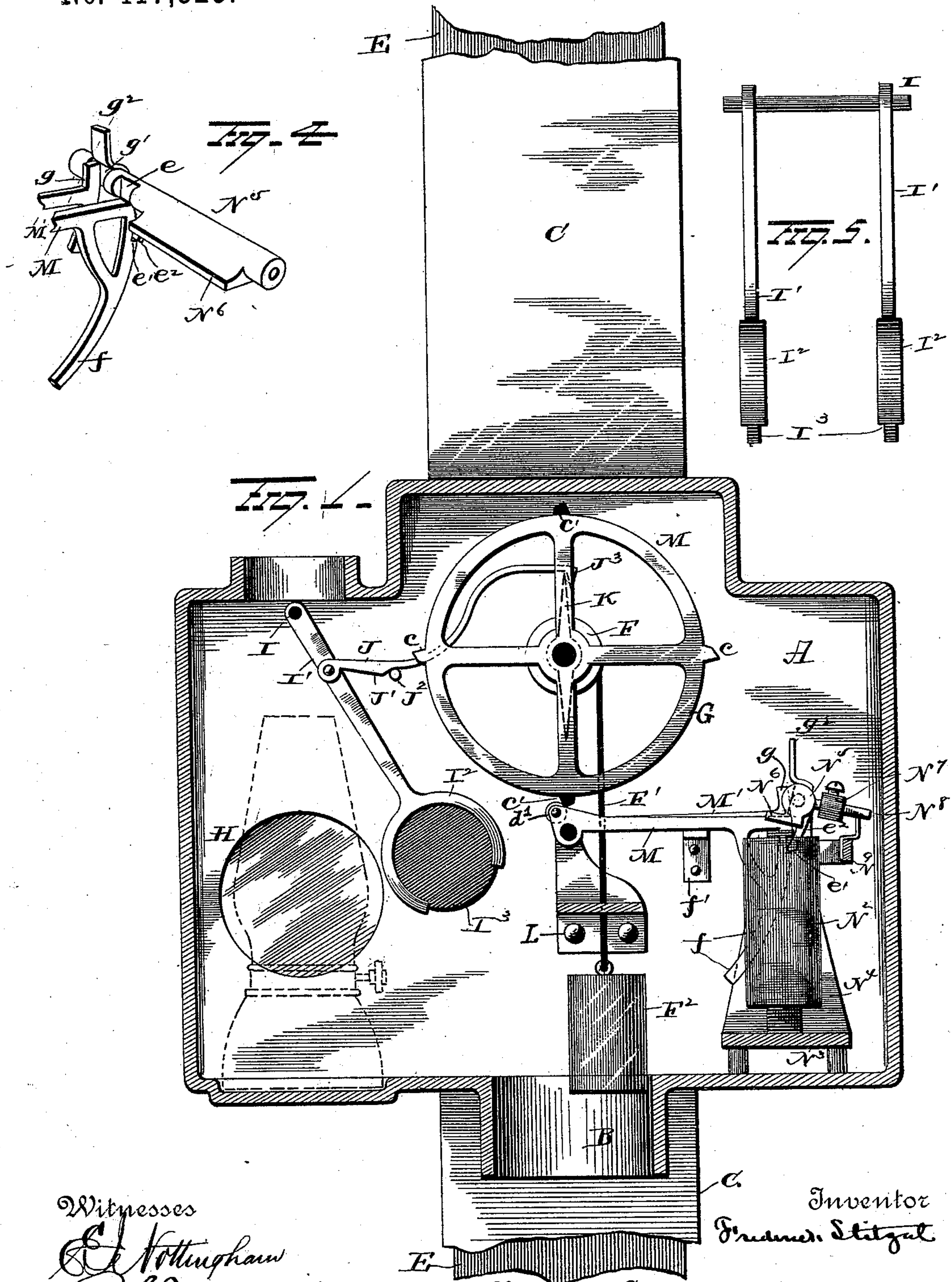
3 Sheets—Sheet 1.

F. STITZEL.

ELECTRIC SEMAPHORE SETTING APPARATUS.

No. 417,525.

Patented Dec. 17, 1889.



Witnesses

Leeds  
W. S. Ferguson

Inventor

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By *his* Attorney

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(No Model.)

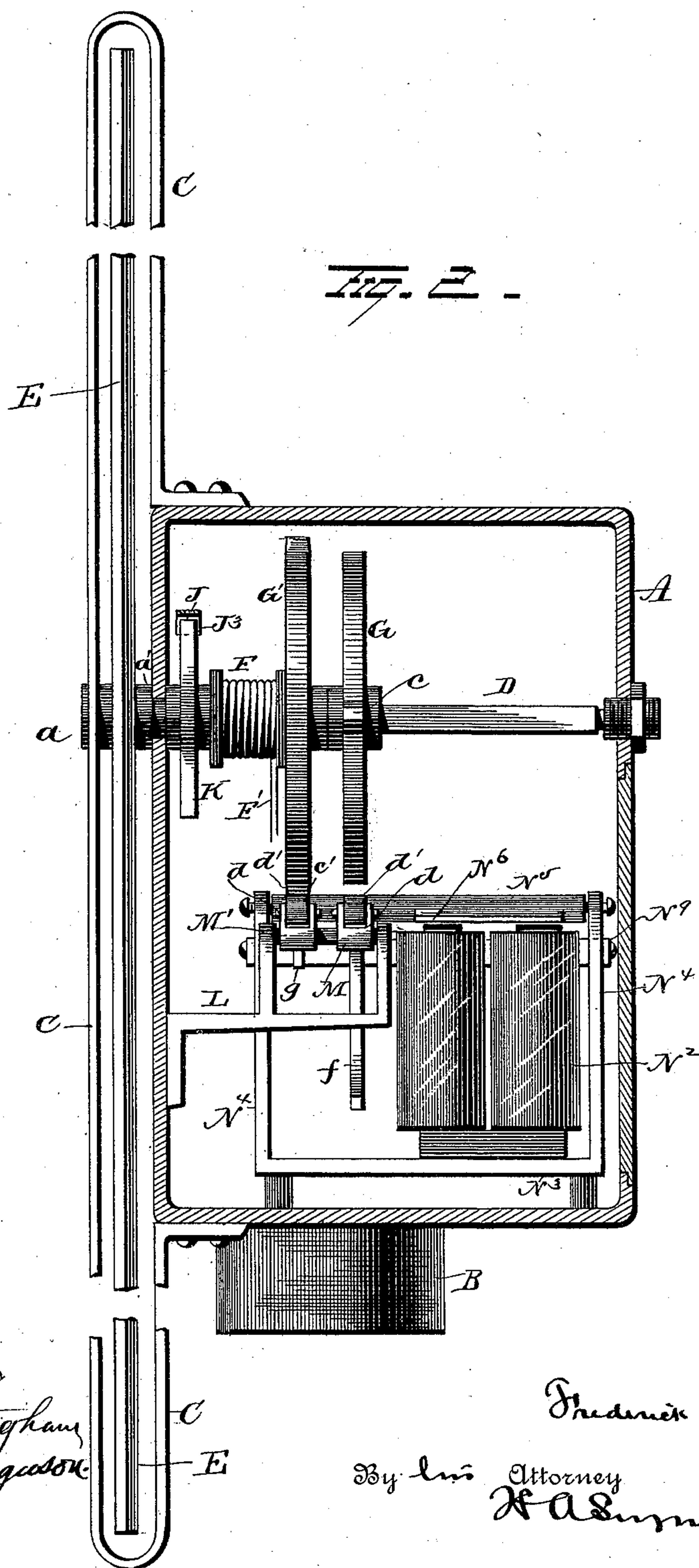
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Witnesses  
*E. Nottingham*  
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(No Model.)

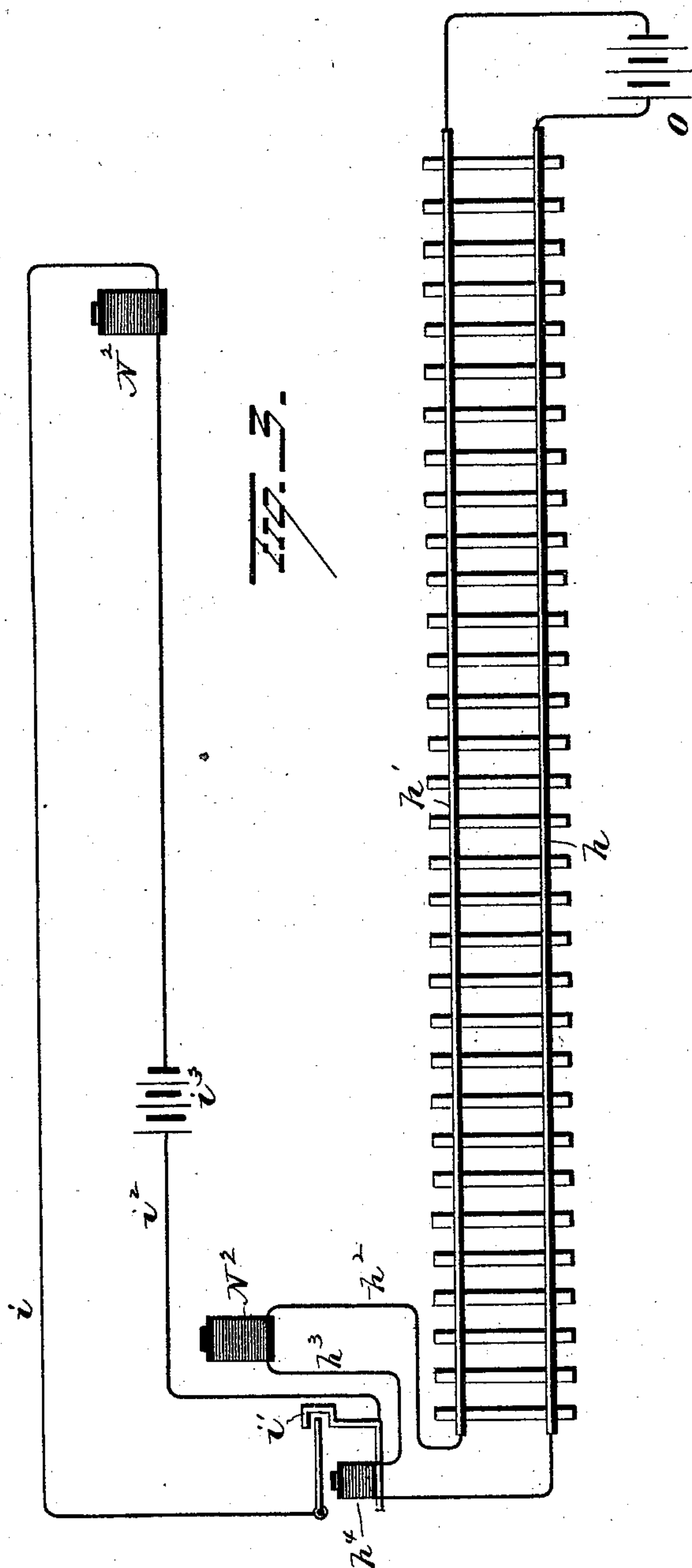
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# UNITED STATES PATENT OFFICE.

FREDERICK STITZEL, OF LOUISVILLE, KENTUCKY, ASSIGNOR TO THE  
AMERICAN SEMAPHORE COMPANY, OF SAME PLACE.

## ELECTRIC SEMAPHORE-SETTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 417,525, dated December 17, 1889.

Application filed March 8, 1889. Serial No. 302,471. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK STITZEL, a citizen of Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Electric Semaphores; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in electric semaphores for signaling railroad-trains, and more particularly to that class of signals adapted for use in connection with the "block" system.

Prior to my present invention it has been proposed to change the color of the light in a railroad-signal through the action of an electro-magnet, the energizing-current of which was made and broken by a train of cars passing over the track. For the accomplishment of this purpose a circular case or head has been provided with a centrally-located shaft having a pulley affixed thereto. A cord is secured to and passes around said pulley at one end and is connected at its lower end to the free end of the armature of an electro-magnet, which latter is in a normally-closed circuit. An arm or blade is carried by the same shaft as the pulley above mentioned, and is provided at or near one end with an opening fitted with colored glass adapted to line with an opening in the case when the blade is in a horizontal position. A lamp is affixed to the outside of the casing in line with the opening in the casing. When the magnets are energized, the white light is displayed; but when the magnets are short-circuited the arm falls and a colored light is displayed. When the train leaves the block, the magnets are alone depended upon to return the blade to change the signal. Now it is evident that a magnet capable of operating such prior arrangements must be very large, and a proportionately-large amount of battery would be required to sufficiently energize such large magnets.

It is the object of my present invention to obviate the objections of such prior constructions and to provide an electric semaphore

apparatus which shall be simple in construction and effective in operation.

A further object is to provide an electric semaphore apparatus which shall be sensitive and positive in operation and require but a small amount of battery to operate it.

A further object is to so construct the device that its signal-blade may be made to stop at each half-revolution to impart different information, according to its position, said blade being entirely hid within a shield when in a vertical or "safety" position.

A further object is to construct an electric semaphore apparatus in such a manner that a visual blade and a night-signal may be operated by the same mechanism.

A further object is to provide an electrical semaphore apparatus with a rotary signal-blade and a night-signal, both of said signals being operated simultaneously by the same mechanism.

With these objects in view my invention consists in certain novel features of construction and peculiar combinations and arrangements of parts, as hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation of a semaphore-head partly broken away to show the operating mechanism. Fig. 2 is an end view of the same. Fig. 3 is a view showing the arrangement of circuits. Figs. 4 and 5 are views of certain details.

A represents a suitable head mounted on a hollow standard B. Secured to one face of the head A is a frame or shield C, open at its longitudinal edges. A bracket or journal-bearing *a* is arranged centrally within the shield for the reception of one end of a shaft D, which passes through a perforation *a'* in the head and is journaled at the opposite end in the head A. Fixed upon the shaft D within the shield is a visual signal-blade E, which, when in a vertical or "safety" position is inclosed in the shield C, which latter is painted white, so that when the blade is inclosed in the shield a white or safety signal will be displayed. The blade E is preferably painted red, so that when said blade is turned at right angles to the shield a danger-signal



is displayed. In this way the signal-blade is protected from the weather except at such times as the signal is at "danger," which is usually of comparatively short duration.

5 Secured upon the shaft D within the head A is a drum F, to which a rope or chain F' is secured and adapted to be wound, a weight F<sup>2</sup> being attached to the free end of said cord.

10 Two disks G G' are secured upon the shaft D at points between its ends, and preferably near each other. The disks G G' are provided on their peripheries at diametrically-opposite points with stops or projections c c', having beveled ends. The disks are so arranged on the shaft that the stops c of disk G will project at right angles to the stops c' of disk G', for a purpose explained farther on.

20 The front and rear walls of the head A are provided with openings H at points below and to one side of the shaft D. These openings are filled with, preferably, white glass, and between the two openings a lamp of any preferred construction is located.

25 Journaled between the front and rear walls of the head A is a shaft I, having two rigidly-attached arms or hangers I' projecting downwardly therefrom. A frame or holder I<sup>2</sup> is secured to the free end of each arm I' for the accommodation of colored glass plates I<sup>3</sup>, said arms or hangers being so arranged that when in a vertical position a colored glass will be interposed between the lamp and the openings H in the head, and thus display a danger-signal. An arm or lever J, having a cam J' thereon, is pivoted to one of the arms I', and is normally supported in a horizontal position by means of a pin J<sup>2</sup>, which projects from the interior wall of the head A.

35 An arm K is secured upon the shaft D near one end and projects therefrom in opposite directions, said arm being made tapering toward both ends, as shown in Figs. 1 and 2.

45 The ends of arm K are adapted to engage a hook J<sup>3</sup>, formed at the free end of the arm J, when said arm K and the signal-blade are in a vertical position, as hereinafter explained.

50 Secured to the interior wall of the head A is a bracket L, in which are journaled, near their inner ends, two levers M M'. The levers M M' are provided at one end, in rear of their pivots, with recesses d, in which rollers d' are journaled. The inner or rear ends of the levers M M' are arranged immediately beneath the disks G G', respectively, the stops on the periphery of the disk G being adapted to engage the roller of lever M and tilt said lever when the latter is released, while the projections c' of the disk G' engage the roller of the lever M' and tilt the same when it is released.

65 Placed in the head A at or near one end thereof is an electro-magnet N<sup>2</sup>, which is preferably mounted upon a stand N<sup>3</sup>. The stand N<sup>3</sup> is provided at each end with up-

rights N<sup>4</sup>, which project somewhat above the tops of the cores of the magnets and are provided at their upper ends with perfora- 70 tions for the reception of screws or pins that serve as bearings for a shaft N<sup>5</sup>. This shaft is provided with a flat under face immediately over the magnet-poles for the reception of a soft-iron armature N<sup>6</sup>, the longitudinal 75 edge of which projects beyond the shaft, and by means of which the shaft is given an oscillatory movement in one direction through the medium of magnet N<sup>2</sup>. When the magnets are demagnetized, the armature is of course released, and the shaft is caused to oscillate in the reverse direction by means of an adjustable weight N<sup>7</sup> on an arm N<sup>8</sup>, projecting from the shaft N<sup>5</sup> in the opposite direction from the armature N<sup>6</sup>. A yoke N<sup>9</sup> is secured 85 at its ends to the uprights N<sup>4</sup>, upon which the arm N<sup>8</sup> is adapted to fall, and thus form a stop for said arm to limit the upward movement of the armature N<sup>6</sup>. At a point on the shaft N<sup>5</sup> beyond the magnet a notch e is made 90 in said shaft, which, when the armature N<sup>6</sup> is attracted by the magnet, will permit the passage through it of the free end of the lever M. When the armature is released and the shaft has oscillated in the reverse direction, the notch e will have moved out of alignment 95 with the free end of the lever M, and said lever will be retained in a fixed position by engagement with the shaft N<sup>5</sup> until the magnet shall have again attracted its armature. 100

The free end of the lever M may be furnished with a downwardly-extending curved arm f, adapted to pass through the notch e, and thus guide the movements of the lever M. The downwardly-extending arm f is provided 105 at its upper end with a bend or notch e', adapted to receive a small bent arm e<sup>2</sup>, projecting from the shaft N<sup>5</sup>, and thus affords additional security against the upward movement of the arm or lever M when the armature is released. 110

The arm or lever M, as well as the lever M', rest when in their normal positions upon a bracket f', fixed to the interior of the head A.

The free end of the lever M' may be furnished with a cross-arm g, which is adapted to pass through a notch g' in the shaft N<sup>5</sup>, and is maintained in a normal downward position by means of an upwardly-extending arm g<sup>2</sup>, secured to and projecting from the 120 shaft N<sup>5</sup>. When, however, the armature is released and the shaft N<sup>5</sup> permitted to oscillate, the arm g<sup>2</sup> moves out of the path of the free end of the lever M', and thus permits said lever to perform its function. 125

A comparatively small battery O will be provided at one end of the block of railroad, having its respective poles connected with the rails h h' of the track. At the opposite end of the block one of the rails is connected 130 by a wire h<sup>2</sup> with one end of the helix of a main semaphore-magnet N<sup>2</sup>. The other extremity of said helix is connected by wire h<sup>3</sup> with one end of the helix of a relay-magnet



$h^4$ . The other end of the helix of the relay-magnet  $h^4$  is connected with the other rail of the track, thus maintaining the semaphore-magnet  $N^2$  and relay  $h^4$  at one end of the block normally in a closed circuit. One end of the helix of the semaphore-magnet at the opposite end of the block is connected by a line-wire  $i$  with the armature-lever of the relay  $h^4$ , the other end of said helix being connected with the contact-post  $i'$  of the relay by means of a line-wire  $i^2$ , which passes through a battery  $i^3$ . By this arrangement of circuits the instruments at both ends of a block are in normally-closed circuits, adapted to be operated simultaneously by the occupancy of the track of the block by a train of cars. It is evident that other arrangements of circuits may be employed for operating my improved semaphores without departing from the spirit of my invention.

The semaphore apparatus, being constructed and electrically connected in circuit as above described, operates in the manner now to be explained.

If a train enters the block from either direction, the wheels and axles of the train bridging the rails will short-circuit the battery  $O$  and cause the signal-blade and night-signal of both apparatus to fall to "danger" and to so remain as long as the block is occupied by the train. The battery  $O$  being short-circuited, the magnets of both semaphores are consequently demagnetized. The armatures  $N^6$  being thus released, the shafts  $N^5$  will rock and bring the notches  $e$  out of line with the levers  $M$ , and thus cause said levers to be locked. At the same time the arms  $g^2$ , projecting from the shafts  $N^5$ , will move out of the paths of the levers  $M'$ , and thus release said levers. The lever  $M'$  of each apparatus being now free, the engagement of one of the pins  $c'$  of the disk  $G'$  will tilt said lever and ride over its roller  $d'$ , after which the lever will fall to its normal position by gravity. This movement of parts will be caused by the rotation of the shaft  $D$  by the weight  $F^2$ . The shaft  $D$  and attached devices continue to rotate until a stop  $c$  on the wheel  $G$  comes into contact with the roller  $d'$  of lever  $M$ , which, being locked, prevents the further rotation of the shaft  $D$ . During this movement of the shaft, &c., (which is one-fourth revolution,) the colored signal-blade  $E$  will have been turned from a vertical or "safety" position to a horizontal position, thus denoting "danger." At the beginning of the movements above described one end of the double-pointed arm  $K$  held the hanger  $I'$  out of line with the openings  $H$  of the head  $A$  by engagement with the hooked end of the lever  $J$ . When the shafts begin to rotate, the arm  $K$  pulls the arm  $J$  farther rearwardly and causes the cam projection to engage the pin  $J^2$ , and thus raise said arm  $K$  sufficiently to disengage its free hooked end from the arm  $K$ . The arm  $J$  being thus released, the hangers containing the colored glass are permitted to

swing in alignment with the openings  $H$  of the head  $A$  and produce a danger-signal to be used at night. When the train leaves the block, the circuits are established, as above explained, and the magnets of the semaphores at both ends of the block energized and caused to attract their armatures. As soon as the magnets  $N^2$  become again energized the armature  $N^6$  will be attracted and shaft  $N^5$  rotated. This movement of the shaft will bring the notch  $e$  in said shaft in alignment with the free end of lever  $M$ , and thus render said lever capable of being raised. This movement of the shaft  $N^5$  will also move the arm  $g^2$  into the path of the lever  $M'$ , and thus prevent said lever from rising as long as the magnets remain energized.

The main shaft  $D$  has a tendency at all times to rotate in one direction through the medium of the weighted rope or chain  $F'$ , and consequently as soon as the lever  $M$  is released one of the stops or projections  $c$  on the periphery of disk  $G$  will tilt said lever and ride past the roller in the end thereof, after which the lever  $M$  will fall to its normal position by gravity. The shaft  $D$  will continue its rotation (carrying with it the signal-blade  $E$ ) until one of the stops  $c'$  of the periphery of disk  $G'$  engages the roller in the end of the lever  $M'$ , at which time the signal-blade  $E$  will have assumed a vertical position within the shield, denoting "safety." As the lever  $M'$  is prevented from tilting by engagement of its free end with the arm  $g^2$  on shaft  $N^5$ , the shaft  $D$  and the parts carried thereby will be brought to a standstill. As shaft  $D$  of each apparatus makes a quarter-revolution, one end of the pointed arm  $K$  will engage the hooked end of arm  $J$  and oscillate the hangers  $I'$  backwardly out of alignment with the openings  $H$  of the head, thus removing the colored or danger light and displaying the white or safety light.

It will be perceived from the above description that the shaft which carries the blade rotates always in the same direction, being stopped at each quarter-revolution to cause either a danger or a safety signal to be displayed, as the case may be. It is also apparent that but very little current will be required to operate the device compared with what has been required to operate prior devices of this kind.

In this apparatus I have adopted certain details of construction which are described in two other cases filed by myself, in conjunction with Charles Weinedel, on the 21st of March, 1889, and April 11, 1889, and bearing Serial Nos. 304,133 and 306,774, respectively, and I do not wish to be understood as claiming in this application such details *per se*, but only in combination with other features, which combinations I believe to produce a new apparatus.

With the device constructed and arranged as herein set forth it will be seen that both a "visual blade" or "day-signal" and a "lan-



tern" or "night-signal" are provided to indicate "safety" or "danger," that both are operated simultaneously, and that the signal-blade is protected from the weather when in the safety position.

The device comprises comparatively few parts and is simple in construction and effective in operation.

Slight changes might be made in the constructive details of my invention without departing from the spirit thereof or limiting its scope. Hence I do not wish to limit myself to the precise details of construction herein described; but,

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

1. In a semaphore, the combination, with a head having openings in the opposing walls for the emanation of light and a lamp in said head, of a revoluble shaft mounted in the head, a visual signal-blade carried by the shaft, vibrating hangers carrying colored transparent material adapted to be interposed between the lamp and openings in the opposing walls of the head, a motor, and devices for controlling the operations of the motor, whereby the shaft may be stopped and released and both signals caused to display "Safety" or "Danger," substantially as set forth.

2. In a semaphore, the combination, with a head, of a revoluble shaft mounted therein, a signal-blade fixed to said shaft, a motor to rotate the shaft, disks carrying stops secured to the shaft, a pivoted lever in proximity to each disk and in line with the stops thereon, and an electro-magnetic device for controlling the operation of said levers, substantially as set forth.

3. In a semaphore, the combination, with a head, of a revoluble shaft mounted therein, a signal-blade fixed to said shaft, a motor for rotating said shaft, disks fixed to the shaft, stops projecting from the peripheries of the disks at diametrically-opposite points, the stops of one disk projecting in a direction at right angles to those of the other disk, pivoted levers in the paths of said stops, and electro-magnetic devices for controlling the operation of the levers, substantially as set forth.

4. In a semaphore, the combination, with a head, of a revoluble shaft mounted therein, a signal-blade fixed to said shaft, a motor for revolving the shaft, two disks on the shaft, stops projecting from the disks, the stops on one disk projecting at right angles to the stops on the other disk, a lever pivoted in the path of the stops of each disk, and devices for releasing the levers to release the disks alternately, substantially as set forth.

5. In a semaphore, the combination, with a head, of a shaft mounted therein and carrying a signal-blade, a motor for rotating said shaft, disks fixed to the shaft and provided with stops, a pivoted lever for each disk, a

roller in each lever with which said stops engage, and means for releasing the levers to release the disks alternately, substantially as set forth.

6. In a semaphore, the combination, with a head, of a revoluble shaft mounted therein, a signal-blade carried thereby, a drum secured on the shaft, a weighted cord attached to said drum, two disks secured upon the shaft, stops projecting from the disks, a lever in the path of the stops of each disk, and devices for controlling the operation of said levers, substantially as set forth.

7. In a semaphore, the combination, with a head, of a revoluble shaft mounted therein, a motor for rotating said shaft, disks carried by the shaft, stops projecting from the disks, pivoted levers with which said stops engage, an electro-magnet, and an armature therefor carried by a shaft, said shaft being so arranged relatively to the pivoted levers that said levers shall be released alternately as the shaft oscillates, substantially as set forth.

8. In a semaphore, the combination, with a head, of a revoluble shaft mounted therein, a motor for revolving said shaft, disks carried by the shaft, stops projecting from the disks, pivoted levers with which said stops engage, an electro-magnet, and an armature therefor carried by an oscillatory shaft, said shaft being provided with a notch to receive the end of one pivoted lever and an arm on said shaft to engage the other pivoted lever, whereby the pivoted levers are released and locked alternately as the shaft oscillates, substantially as set forth.

9. In a semaphore, the combination, with a head having openings for the emanation of light, of a revoluble shaft mounted therein, devices for periodically rotating said shaft, vibratory hangers pivoted in the head and carrying plates of colored transparent material, an arm pivoted to said hangers, and an arm on the shaft to engage the arm of the hangers to hold the hangers out of line of the openings in the head, substantially as set forth.

10. In a semaphore, the combination, with a head having openings for the emanation of light, of a revoluble shaft mounted therein, devices for periodically rotating said shaft, a pivoted hanger carrying a plate of colored material, an arm pivoted to said hanger, an arm on the shaft to engage the arm on the hanger, a cam on the latter arm, and a pin in the head, whereby a continued movement of the arm on the shaft will cause the hangers to be released, substantially as set forth.

11. In a semaphore, the combination, with a head having light-emanating openings, of a shaft journaled therein, a signal-blade carried by the shaft, two disks also carried by the shaft, stops on the peripheries of said disks, a pivoted lever in proximity to each disk and in line with the stops thereof, devices for releasing the levers alternately, a

pivoted hanger carrying plates of colored transparent material, an arm projecting from the shaft, and an arm pivoted at one end to the hanger and adapted to engage the arm on the shaft at its other end, substantially as set forth.

In testimony whereof I have signed this

specification in the presence of two subscribing witnesses.

FREDERICK STITZEL.

Witnesses:

JNO. MAAS, Jr.,  
C. L. KRIEGER.