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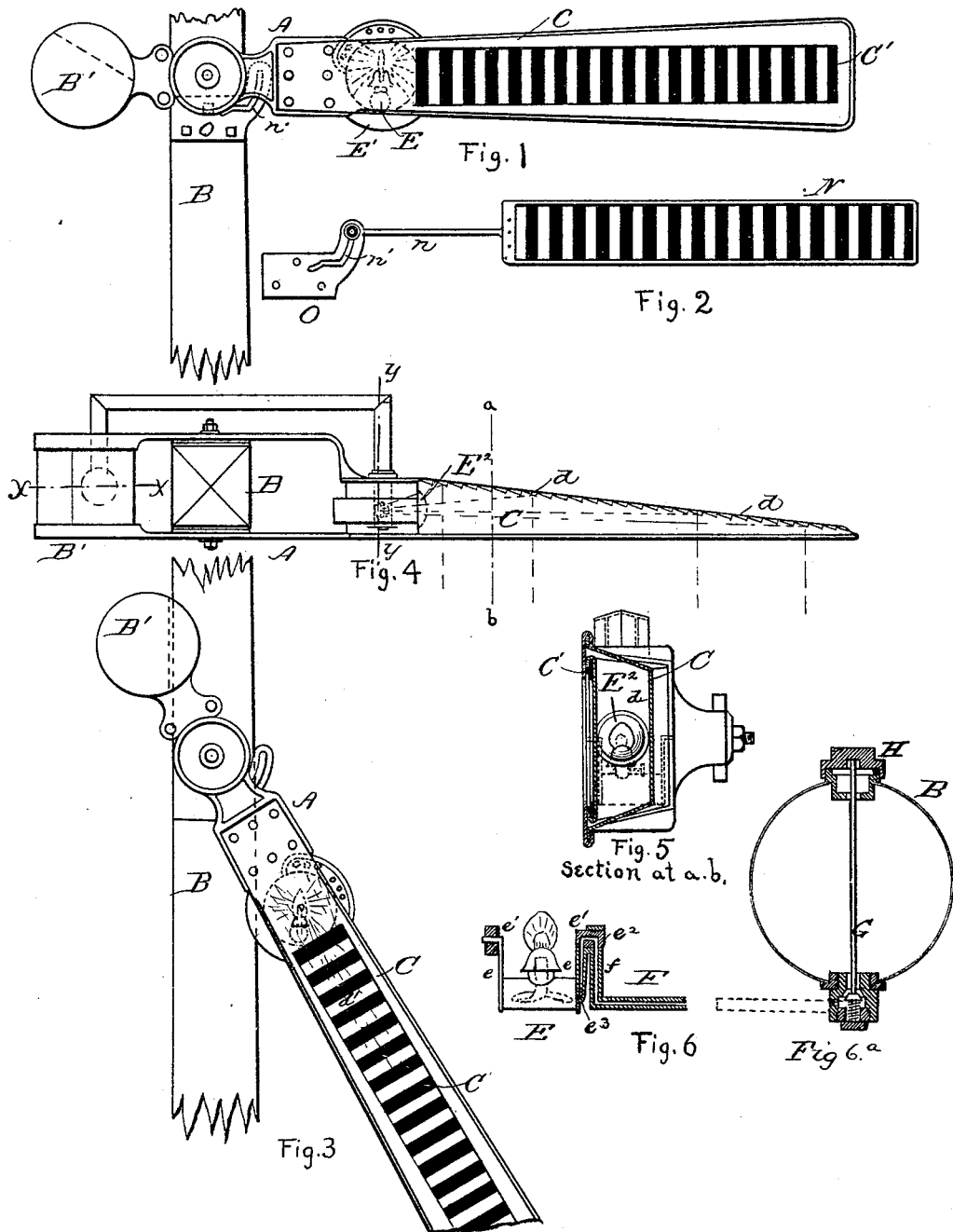
3 Sheets—Sheet 1.

V. SPICER & J. SCHREUDER.

SEMAPHORE SIGNAL.

No. 346,387.

Patented July 27, 1886.



WITNESSES:

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(No Model.)

3 Sheets—Sheet 2.

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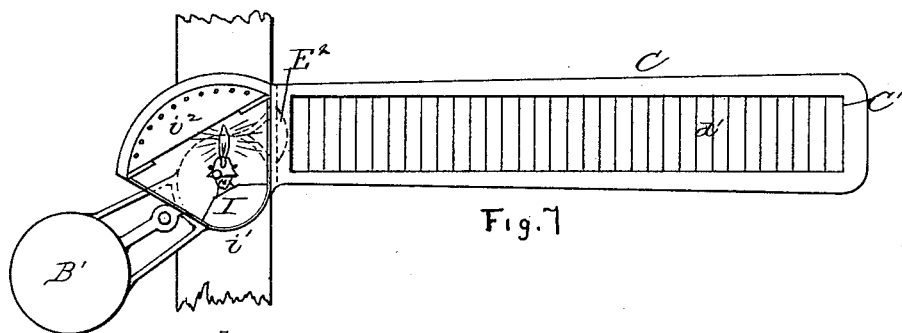


Fig. 7

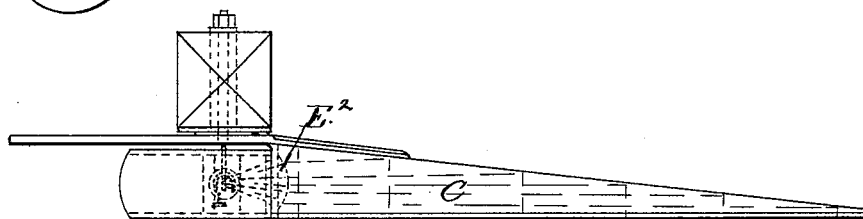


Fig. 9

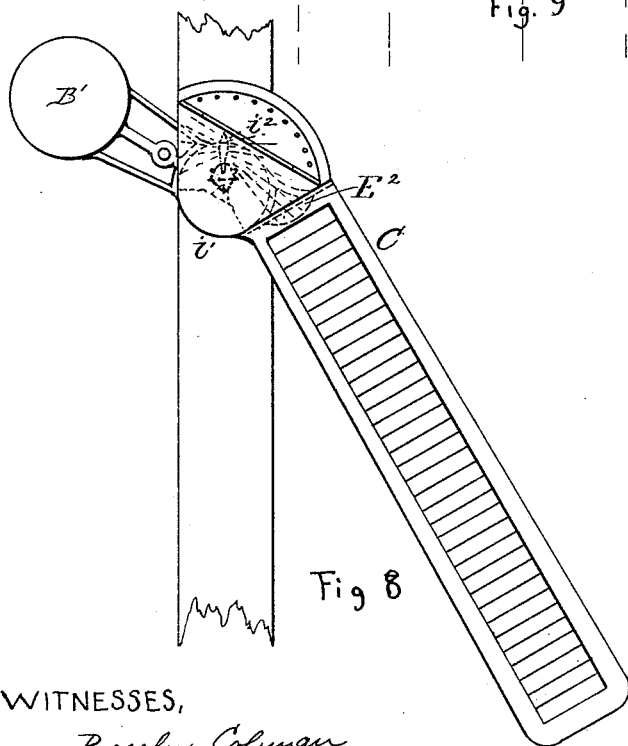


Fig. 8

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3 Sheets—Sheet 3.

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Fig. 11.

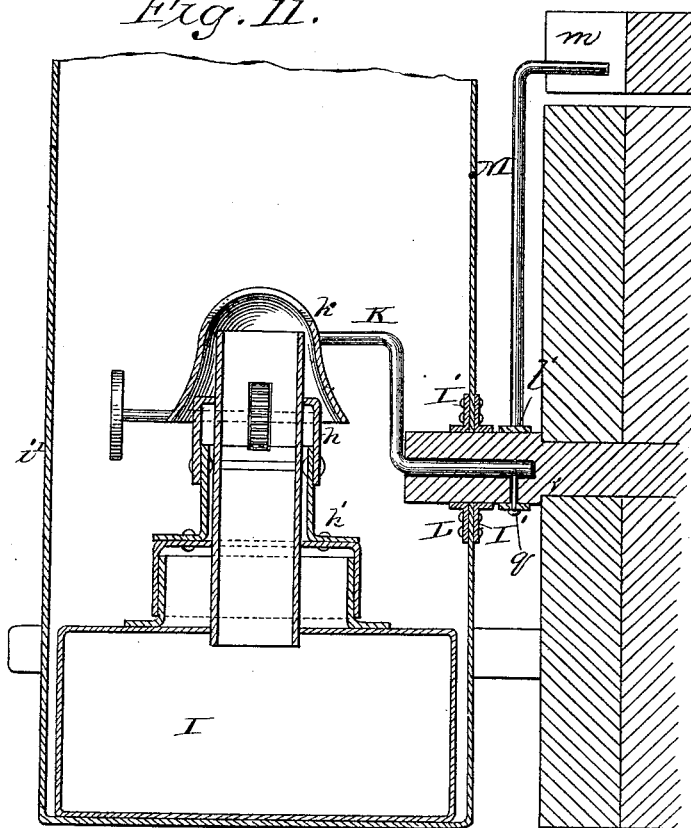


Fig. 10.

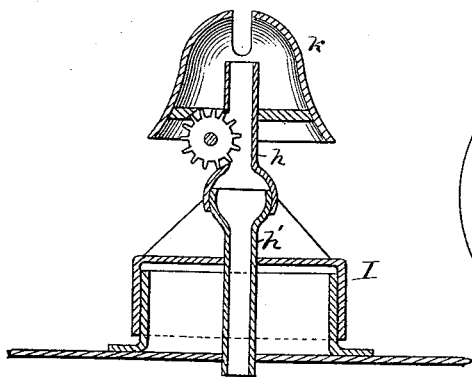
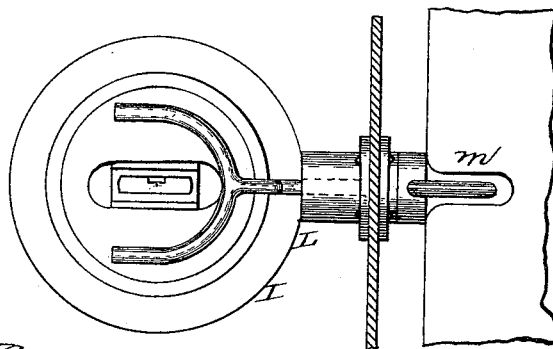


Fig. 12.



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UNITED STATES PATENT OFFICE.

VIBE SPICER AND JENS SCHREUDER, OF PITTSBURG, PENNSYLVANIA.

SEMAPHORE-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 346,387, dated July 27, 1886.

Application filed December 11, 1885. Serial No. 185,367. (No model.)

To all whom it may concern:

Be it known that we, VIBE SPICER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, and JENS SCHREUDER, a subject of the King of Norway, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Semaphore-Signals; and we do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

Our invention has relation to semaphore-signals for railways, and pertains to that class of signals in which is employed a swinging or pivoted arm or blade capable of assuming different positions, and thereby indicating the several conditions of "danger," "caution," and "safety" according to its position.

The advantages of the swinging arm or blade as a signaling expedient for railways are so well understood and appreciated that reference to the same is unnecessary.

The swinging arm is the only medium in use or capable of practical employment which will indicate with certainty by its position as well as by its color the conditions required to be understood in order to insure safe and expeditious travel on railways.

Our invention contemplates the adaptation and employment of the swinging semaphore arm or blade for night as well as day signaling in all situations and under all conditions where such a device may be made available and used to advantage.

Our invention consists, first, of a semaphore-signal comprising a hollow or box-like-signal arm or blade having one or both sides covered or closed by glass or other transparent medium in different colors; secondly, in the combination, with a semaphore-signal comprising a hollow or box-like-swinging arm or blade having one or both its sides covered by glass in different colors, of a screen or slide by the movement or adjustment of which different colors may be exposed; thirdly, in the combination with a semaphore-signal having one or both its sides covered or closed by glass or other transparent medium in different colors

or alternately opaque and clear, of a color-changing slide or screen which will move automatically and change the color of the exposed light to correspond with the position of the arm or blade and indicate the same conditions; and, fourthly, in the novel construction, combination, and arrangement of parts hereinafter described.

Referring to the accompanying drawings, illustrating our invention, Figure 1 is a side elevation of a signal-post and swinging arm, the latter being in the position of "danger." Fig. 2 is a side view of the slide used in connection with the blade to change colors and expose light. Fig. 3 is a side view of a signal-post with the swinging arm lowered to "safety." Fig. 4 is a top view of the signal arm and post. Fig. 5 is a sectional view on the line *a b* of Fig. 4. Fig. 6 is a sectional view through the lamp-holder and a portion of the supply-tube on line *y y* of Fig. 4. Fig. 6^a is a sectional view of the oil reservoir on line *x x* of Fig. 4. Fig. 7 is a side view of a signal-arm with modified form of lamp, the arm being in position of "danger." Fig. 8 is a side view of the arm shown in Fig. 7, but lowered to position of "safety." Fig. 9 is a top view of the arm or blade represented in Figs. 7 and 8. Figs. 10, 11, and 12 are detail views showing the modified form of lamp and fittings.

Our invention may be carried into practical effect in a great variety of ways, and hence in specifying the best methods and means for producing the illumination of the signal blade or arm and controlling such illumination under different conditions, we do not wish to be understood as confining ourselves to any special form or construction of blade or to any of the details in the mechanism which we, by preference, employ.

We may take as the basis of our improvements the semaphore devices now in use on the principal railways, or we may construct special apparatus with a view to the embodiment of our invention in the most practicable, economical, and effective shape.

The standard semaphore signal now in use on the lines of the Pennsylvania Central Railway may be taken as a form or construction of signal to which our improvements are ap-

plicable, and such form is represented in the drawings, particularly in Figs. 1, 3, and 4, wherein are shown the standard or usual casting, A, which is pivoted to the signal-post B, and carries the disk B' on one end, and the blade or arm on the other end.

For the purposes of our invention we substitute for the usual arm, which consists of a strip of wood or metal, a hollow arm or casing, C, which corresponds in length and width to the ordinary strip and generally resembles the same in outline. If desired, the front and rear walls of the hollow blade may converge toward the outer extremity of the blade, as shown in Fig. 4, so as to render the blade light and less bulky. In the simplest form of an illuminated semaphore-blade the latter would consist of a casing having one or both sides made of glass of any color, with or without reflecting-surfaces, while a lamp would be located at one end and so arranged as to illuminate the interior of the blade and show its character and position. But we have elaborated our invention so as to comprehend other features, and thereby render the semaphore more perfect and better adapted to the purpose in view. As shown in Figs. 1, 3, and 4, for instance, we close one side of the hollow blade and against or upon its inner surface, as at *d*, we arrange a reflector, such as burnished metal, silvered glass, or any other medium adapted to serve as a reflector of light, and we make such reflecting-surface either plain, ribbed, fluted, or other shape to produce the proper reflection and diffusion of the light for obtaining the best effects.

The front of the hollow blade C is formed with an elongated aperture approximating in width and length the dimensions of the blade, and in this opening or slot C' is arranged the glass, preferably in narrow strips, vertically disposed, as shown at *d'*, not only to increase the stability of the glass, but to provide a convenient and serviceable means for changing the color of the light. A single pane of glass, however, colored red and in stripes alternating with the colorless portion, may be employed.

The light to illuminate the signal is preferably an oil-lamp; but gas, candles, electricity, or other mediums may be employed, such changes and adaptations being made in the light fittings and appurtenances as circumstances may require, the special character or disposition of the source of light not being a constituent part of our invention, except as hereinafter particularly pointed out. We have, however, shown two different methods or appliances for the convenient and effective use of oil-lamps, as such means of lighting are the most commonly employed, and the most serviceable for railway purposes. According to the plan illustrated in Figs. 1, 2, and 4, we utilize the disk B' as an oil-reservoir, making the disk hollow and leading therefrom to the lamp a supply-tube, through which the lamp is kept constantly supplied with oil. We locate the lamp (lettered E) at the inner end of the hol-

low blade in a suitable box or casing, E', fitted between the sides of the casting A, or between the front and back walls of the hollow blade. The lamp is suspended, by means of arms *e*, from trunnions *e'* *e'*, having their bearings in the casting A on a line coincident with the longitudinal center of the flame. The lamp, therefore, hangs below the center of its oscillation, and as its casing E' moves with the signal-arm the lamp remains in the one position—that is, with its wick tube and burner vertical. Thus there can be no overturning or displacement of the lamp whatever by the action of the signal. The supply-tube F extends from the lower side or bottom of the reservoir B', and is bent upward at *f*, terminating at the end of the branch *f* in a sleeve, which encircles one of the trunnions *e'* *e'*. The latter is formed with a passage, *e''*, which is in communication with an oil tube, *e'''*, located at the adjacent side of the lamp, entering the lamp at any suitable point near its bottom part. The arrangement of the oil-supply tube and reservoir in relation to the lamp is similar to that of the ordinary "students' lamp," the lamp taking a fresh supply of oil whenever the oil in the lamp falls below the inlet from the tube *e'''*, and allows the air to enter the supply-tube and pass into the reservoir. A spring-valve, G, is located in the reservoir and kept open by the closed cap H, except when it is required to replenish the reservoir, the valve closing when the cap is removed. The lamp and reservoir are always in the same relative position, the passage-way in the trunnion *e'* being always in communication with the supply-tube and with the tube *e'''*.

In Figs. 7, 8, 9, 10, 11, and 12 we show a modified form of lamp, wherein the latter is situated in a chamber or box formed upon the bearing or axial point of the blade. I designates such lamp, and *i'* the casing, which incloses the same. The casing *i'* is of prismatic form, and is provided with a lid or cover, *i''*, by opening which access is afforded to the lamp. The lamp is adapted to contain a supply of oil, no other or separate reservoir being required, although such may be employed, if desired. The lamp is located at the bottom of the casing, to which it is secured or of which it may be a part, and is adapted to move with the casing, the latter moving with the signal-arm. To compensate for this movement and allow the lamp-burner to remain in one position—that is, upright or vertical—the burner is made in two sections or parts, *h* *h'*, pivoted together, as shown, the upper part carrying the wick-tube; or the wick-tube itself may be made in two parts hinged or jointed together, as shown in Fig. 10, the object being to allow the lamp to move independently of the burner appliances. To maintain the burner in a vertical position we employ the expedient shown in Figs. 11 and 12, wherein K designates a rod or wire forked at one end, as shown at *k*, so as to embrace the burner. This rod or wire is bent down and passed into and through the hub L

and fastened to a collar which encircles the hub at l' , by means of a pin, g , passing through a slot, r , in the hub L , as shown. To this collar is attached another rod, M , which extends upwardly, and has its upper end bent over horizontally and inserted between the projections or pins m , attached to the signal-post. Now, when the lamp I moves, the rods K M being stationary and the burner held thereby, it is obvious that the lamp-burner will always remain in an upright position, and at all times effectually diffuse its light into and through the blade.

Between the lamp and the cavity of the blade, in any construction within the spirit of our invention, we may use lenses or other devices for concentrating or modifying the light; and we may use for this purpose or in addition thereto glass screens of any color so as to impart to the blade any color required. The interposition of a transparent screen serves also to prevent the products of combustion from entering the cavity of the blade, and in Figs. 4, 5, 7, 9, and 10 we have shown a "bull's-eye" (lettered E) in position between the lamp-flame and the cavity of the blade.

With reference to the means for exhibiting different-colored light and for effecting the transitions from one color to another, so that the displayed color will correspond with the position of the blade according as the indication is "danger," "safety," or "caution," and in keeping with the conventional or arbitrary signification of the colors employed in railway signaling, let it be supposed that the strips of glass in the blade are alternately, say, red and colorless. At a distance corresponding with the point of view under which the signal is observed, the appearance while the light is shining through the red glass is that of uniform and unbroken red, and hence the indication is "danger." Now, to change the color from red to white we employ a slide (shown at N , Fig. 2) consisting of a frame containing strips of colorless glass alternating with strips of opaque glass or other material, or merely strips of opaque material. The frame is adapted to slide upon or in suitable guides, and is in the position of a screen with reference to the "window" of the blade. The strips in the slide correspond with those in the blade, and when the latter is in the position of "danger"—that is, horizontal—the colorless glass strips in the blade are covered by the opaque strips in the slide, the light then shining through the red glass. Thus it will be seen the position of the blade indicating "danger" is in keeping with the color displayed, which is also "danger." When the slide is moved, so as to uncover the colorless glass of the blade and cover the red portions, the light displayed is white and the indication is "safety." In order that the movement of the slide may be coincident with the movement of the blade, it is made to work automatically and by the following means: For the purpose in view the slide is

provided with a rod or arm, n , which is bent at its free end so as to enter a slot, n' , in a plate or bracket, O , attached to the signal-post below the pivot of the blade. This slot is of peculiar shape, being curved at its upper portion on a line concentric with the axis of motion of the blade, so that during the descent of the blade and until the position of "safety" is reached there will be no movement of the slide, and hence the indication will be "danger," should it happen through any accident that a complete fall of the blade should not take place or that the blade should accidentally fall to nearly a "safety" position without a corresponding adjustment of the switches or other devices of the road. No accident can therefore occur by reason of the signal appliances failing to perform their functions, since "danger" is necessarily indicated under every condition except that of absolute "safety." Near its lower end the slot is extended horizontally, and when the end of the slide-rod enters this portion of the slot the slide is suddenly moved, causing the exposure or display of white light and the color indication of "safety." In practice it will be advisable to have this movement of the slide take place suddenly, and, if possible, after actual safety is obtained, so that the indication of "safety" cannot be given unless there is positive safety. This may be accomplished by allowing the blade a little extra motion after a point of actual safety is reached. At its lower extremity the slot may continue a short distance on a curve concentric with the axis of motion of the blade, as no further movement of the slide will take place. In the reverse movement of the blade—that is, from "safety" to "danger"—the arrangement above described produces a sudden and rapid change from "safety" to "danger" upon the slightest movement of the blade.

In our description we have confined ourselves to indications under red and white light; but we may employ the same devices substantially for displaying other colors by a suitable modification of the blade and slide. It is also within the spirit of our invention to display three or more colors, or to use colors for special signaling.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a semaphore-signal, a hollow or box-like signal arm or blade having its side or face covered or closed by glass or other transparent medium in different colors, substantially as described.

2. In semaphore-signals, a hollow or box-like swinging arm or blade having its face or side covered or closed by glass in different colors, in combination with a slide or screen, by the movement or adjustment of which different colors may be exposed, substantially as described.

3. In semaphore-signals, a hollow or box-like swinging arm or blade having its face or

side covered or closed by glass or other transparent medium in different colors, in combination with a color-changing slide or screen which will move automatically and change
 5 the color of the exposed light to correspond with the position of the arm or blade and indicate the same conditions, substantially as described.

4. In semaphore-signals, the combination,
 10 with a hollow or box-like signal arm or blade capable of artificial illumination, and having one side covered or closed by glass or other transparent medium, of a slide or sliding-screen attached to said arm, and a slotted plate
 15 or bracket attached to the signal-post and engaging an arm or rod extending from the slide, whereby said slide will be automatically adjusted to correspond with the position of the arm and to expose a colored light of the same
 20 indication.

5. In semaphore-signals, the combination, with the artificially-illuminated signal-arm and the slide by which the light is changed or its exposure governed, of a cam plate or bracket
 25 connected to the slide, and adapted to automatically move the latter at the moment of actual danger or safety, substantially as described.

6. In semaphore-signals, a signal-arm adapted to move in a vertical plane only and upon
 30 a horizontal axis, said arm or blade being hollow or box-like in form, and having one of its sides or faces made of transparent material or provided with strips or sections of transparent material, in combination with a lamp for illuminating said blade in the direction of its length,
 35 and means, substantially as described, for changing the color of the reflected beam of light, as set forth.

7. In an illuminated semaphore-signal, the
 40 combination, with a hollow box-like swinging arm mounted upon and projecting from a hollow box or casing, of a lamp located within said casing, and constructed, substantially as described, so as to cause the light to adapt
 45 itself to the varying positions of the arm and maintain constantly an upright position, said box or casing being located at the pivotal center or point of oscillation of the blade and coincident therewith, as set forth.

8. In an illuminated semaphore-signal, the
 50 combination, with a hollow box-like swinging arm having an open end, of a lamp arranged at the open end of said arm, and a reflector arranged in a vertical plane or between the upper and lower sides, and lengthwise of the
 55 arm and at an angle to its face, whereby the light from the lamp is reflected through the transparent side of the arm, substantially as described.

9. In a semaphore-signal, the combination,
 60 with a hollow box-like swinging arm and a lamp, arranged at one end thereof and adapted to light the interior of the same, of a corrugated reflector arranged lengthwise of said arm, substantially as described. 65

10. An illuminated semaphore-signal, consisting, essentially, of a hollow wedge-shaped arm pivotally attached to a post or standard, and having a glass window or screen on its face or side, and an interior reflecting-surface
 70 opposed to said screen and arranged so as to reflect the light from the lamp through said windows or transparent screens, in combination with a lamp located at the pivotal or
 75 axial point of said blade, and a casing inclosing said lamp, the interior of the casing and the cavity of the arm being separated by a transparent screen or window which will admit light to the arm in all positions of the latter, substantially as described. 80

11. In semaphore-signals, the combination, with a wedge-shaped hollow arm having a transparent side, of a suitably-located lamp arranged and adapted to illuminate said arm
 85 in all positions, said lamp being pivotally suspended and said arm supported on a horizontal axis and adapted to oscillate in a vertical plane only.

In testimony that we claim the foregoing we have hereunto set our hands.

VIBE SPICER.
 JENS SCHREUDER.

Witnesses:

A. E. BOCKMAN,
 N. H. NORDLANDER.

Witnesses as to Spicer's signature:

A. A. MOORE,
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