To all whom it may concern:

Be it known that I, NOAH O. BATY, a citizen of the United States, residing at Springfield, in the county of Greene and State of Missouri, have invented new and useful Improvements in Bridge Signal Apparatus, of which the following is a specification.

This invention relates to improvements in signal apparatus for bridges and has particular application to signal apparatus for railroad bridges for indicating to the engineer of a train approaching the bridge the destruction of the bridge by fire or water and to advise such engineer of the movement of the bridge or of high water.

In carrying out the present invention, it is my purpose to provide signal apparatus for railroad bridges which will embody in its construction, among other features, a semaphore and a lamp arranged at each end of the bridge and a motor for operating the signal blade of the semaphore, in combination with a relay controlling the motor circuit and the lamp circuit and connected in circuit with circuit breakers arranged along the bridge structure and adapted to be operated, respectively, by movement of the bridge, burning of the bridge and high water. This bridge circuit is normally closed and holds the relay energized, while the motor circuit and the lamp circuit are normally open at the relay and when the relay is deenergized incident to the rupture of the circuit, the local circuit of the motor and lamp is closed. Connected in circuit with the motor is a circuit breaker that is under the control of a signal blade. After the signal blade has been actuated to danger position, this circuit breaker is operated to open the motor circuit and the lamp circuit and at the same time lock the signal blade at danger so that the signal blade may remain in the danger position after the operation of the motor.

The invention consists in the construction, combination and arrangement of parts hereinafter set forth in and falling within the scope of the claims.

In the accompanying drawings: Figure 1 is a view in side elevation of a bridge structure showing my improved signal apparatus installed. Fig. 2 is a cross sectional view through the structure showing the float operated circuit breaker. Fig. 3 is a similar view showing the contacts for breaking the circuit upon movement of the bridge structure. Fig. 4 is an enlarged side elevation of one of the signal devices, one end wall of the casing being removed. Fig. 5 is a vertical sectional view through the same. Fig. 6 is a similar view taken at right angles to Fig. 5. Fig. 7 is a sectional view through the semaphore. Fig. 8 is a sectional view on the line 8-8 of Fig. 7. Fig. 9 is an enlarged sectional view through the float operated circuit closer. Fig. 10 is a diagrammatic view showing the circuit connections. Fig. 11 is a front elevation of the semaphore.

Referring now to the drawings in detail, designates a bridge structure. Secured to the under side of the bridge structure at each end thereof are binding posts 2' and secured to the binding posts 2' are jaws 4 respectively engaging blades 3 carried by the adjacent end pier of the bridge and these jaws remain in engagement with the respective blades as long as the bridge structure is in proper position. When, however, the bridge structure is swung out of position or washed away, the blades 3 disengage the jaws 4. Extending longitudinally of the bridge structure are conductors 5 composed of lead or other fusible material and having the extremities thereof secured to the binding posts 2' respectively. Connected in one of the conductors 5 is a float actuated circuit breaker 6. In the present instance, this float actuated circuit breaker comprises a base plate 7 suspended from the under side of the bridge structure preferably at the center of the latter. Mounted upon the base plate 7 adjacent to one end thereof and projecting upwardly therefrom is a contact strip 8, while pivoted upon the plate 7 adjacent to the other end thereof is one end of a contact arm 9 and the other end of the arm 9 normally engages the contact strip 8. Pivoted to the contact arm 9 is the upper end of a vertical rod 10 and secured to the lower end of the rod 10 is a float 11 normally arranged at a point corresponding to the high water mark. Secured to the upper side of the base plate 7 and projecting upwardly therefrom is a strip 12 having the upper end thereof bent across the contact arm 9 and then bent downwardly and terminating in a latching hook 13 adapted to receive the arm 9 in the upward movement of the latter incident to the rise of the float and in the upward
movement of the contact arm 9 under the action of the float, such arm disengages the contact strip 8 with the effect to break the electrical continuity of the particular conductor 3. The arm, in its upward movement, engages the hook 13 and the hook holds the arm elevated.

Arranged at the ends of the bridge structure and suitably spaced apart from such ends are signal devices 14 respectively. Each signal device comprises a casing 15 and a semaphore 16 uprising from the casing 15 and embodying a vertical tubular standard 17 and a signal blade 18 pivoted upon the standard 17 adjacent to the upper end thereof. Secured to the upper end of the standard is an electric lamp receptacle 19 in which is mounted a lamp bulb. Surrounding the lamp bulb and fixed to the standard is a casing 21 arranged longitudinally of the bridge structure and having the ends thereof closed by transparent plates 22 preferably colored red. The signal blade 18 is preferably mounted upon one end of a casing shaft 23 journaled in the standard and secured to the crank portion of the shaft 23 and extending downwardly through the tubular standard and projecting into the casing is an operating rod 24. Projecting upwardly from the bottom of the casing is an upright 25 and pivoted upon the upper end of the upright 25 is a lever 26. The lower end of the rod 24 is pivotally connected to one end of the lever 26, while adjustably mounted upon the other end of the lever is a weight 27. Arranged at one side of the upright 25 is an electric motor 28 and fixed upon the upper end of the shaft of the motor 28 is a worm 29 meshing with a worm wheel 30 journaled in standards 31 secured to the bottom wall of the casing 15. Fixed upon the shaft of the worm wheel 30 is an arm 32 and secured to the end of the lever 26 to which the rod 24 is connected is a pin 33 disposed in the path of movement of the arm 32. Arranged upon the other side of the upright 25 is a circuit breaker 34 embodying, in this instance, a vertical metallic post 35 insulated from the casing 15 and having one side provided with a binding post 36 and the upper end equipped with a contact block 37. Also secured to the bottom wall of the casing 15 adjacent to the post 35 and insulated therefrom is a spring arm 38 projecting upwardly from the casing and equipped with a binding post 39 and secured to the upper end of the spring arm 38 is a horizontal plate 40 having one end normally abutting the contact block 37, and the upper surface, adjacent to the other end, formed with a shoulder 41. Secured to the lower end of the lever 26 and depending therefrom is a latch member 42 adapted to engage behind the shoulder 41 in the movement of the lever 26 in one direction to separate the plate 40 from the block 37 and hold the lever 26 in operated position. Arranged within the casing 15 is a relay 42' having the terminals thereof connected to the respective contact blades 3 on the adjacent pier. This relay 42' controls a circuit 43 including the motor 28, the circuit breaker 34 and a suitable source of electrical energy as a battery 44. Connected across this circuit 43 is the lamp 20 and connected in series with the lamp 20 is a resistance coil 45 acting to cut down the voltage of the current flowing through the lamp so as to prevent burning out of the filament.

Connected in circuit with the conductors 5 is a source of electrical energy as a battery 46. As long as the conductors 5 forming the controlling circuit for the relays 42' remain intact, the relays 42' are energized and hold the circuits 43 of the respective signal devices open so that the motors 28 are inactive, the signal blades in the vertical or clear position and the lamps deenergized. The circuits 43 are preferably extended along the embankments at the respective ends of the bridge and include blades and jaws identical to the blades and jaws 3 and 4 and as long as these blades and jaws in the circuits 43 remain intact the circuits are closed at these points, but in the event of a wash-out the jaws and blades will be disengaged and the circuits broken. When, however, the electrical continuity of the conductors 5 is broken, incident to the operation of the float operated circuit closer, or the disengagement of the blades 3 from the jaws 4, incident to the movement of the bridge structure relative to the piers, the circuit of the relays 42' is broken, thereby deenergizing such relays and upon the deenergization of the relays 42', the respective local circuits 43 are closed, thereby energizing the motors 28 and the lamps 20. Upon the energization of each motor 28, motion is transmitted through the worm 29 and worm wheel 30 to the arm 32 and in the downward movement of the arm 32 the latter engages the pin 33 with the effect to draw the rod 24 downwardly and so rotate the crank shaft 23 to swing the signal blade 18 to danger position. In the downward movement of the rod 24, the lever 26 is swung to elevate the weight end thereof and in this movement of the lever, the latch member 42 engages behind the shoulder 41 and breaks the circuit 43 at the circuit breaker 34 and at the same time holds the signal blade in danger position after the motor has been deenergized.

To reset the apparatus, it is only necessary to relieve the horn 42 of the influence of the shoulder 41 on the plate 40 whereby the plate 40 will reengage the contact rod 37 to close this break in the motor circuit and upon the release of the horn 42, the weight 27 swings the lever 26 downwardly.
and the rod 24 upwardly, thereby restoring the signal blade to safety position.

While I have herein shown and described the preferred form of my invention by way of illustration, I wish it to be understood that I do not limit or confine myself to the precise details of construction herein described and delineated, as modification and variation may be made within the scope of the claims and without departing from the spirit of the invention.

I claim:

1. In signal apparatus of the class described, a semaphore, an operating rod connected to the signal blade of the semaphore, a lever pivoted between its ends and having one end connected to said rod, a pin projecting outwardly from the rod end of said lever, an arm adapted for rotary movement, an electric motor, connections between said motor and arm for operating the arm to engage said pin to swing the lever to move the signal blade to danger position, a normally open electric circuit for said motor, a relay controlling said circuit, and a float actuated circuit closer controlling said relay.

2. In signal apparatus of the class described, a semaphore, an operating rod connected to the signal blade of the semaphore, a lever pivoted between its ends and having one end connected to said rod, a pin projecting outwardly from the rod end of said lever, an arm adapted for rotary movement, an electric motor, connections between said motor and arm for operating the arm to engage said pin to swing the lever to move the signal blade to danger position, a normally open electric circuit for said motor, a relay controlling said circuit, and a bridge structure, fusible conductors extending longitudinally of the bridge structure and connected with said relay, a source of energy connected in said fusible conductors and holding said relay normally energized, and means carried by the bridge structure and connected in said fusible conductors and operable upon movement of the bridge structure to break the continuity of said conductors whereby the relay will be deenergized.

4. In signal apparatus of the class described, signal mechanism, a motor controlling the operation of said signal mechanism, an electromotive device controlling the operation of said motor, a bridge structure, fusible conductors extending longitudinally of the bridge structure and connected with said relay, and a source of energy connected in said fusible conductors and holding said relay normally energized.

5. In signal apparatus of the class described, signal mechanism, a motor controlling the operation of said signal mechanism, an electromotive device controlling the operation of said motor, a bridge structure, fusible conductors extending longitudinally of the bridge structure and connected with said relay, a source of energy connected in said fusible conductors and holding said relay normally energized, and means carried by the bridge structure and connected in said fusible conductors and operable upon movement of the bridge structure to break the continuity of said conductors whereby the electromotive device will be deenergized.

In testimony whereof I affix my signature in presence of two witnesses.

NOAH O. BATY.

Witnesses:

Val Mason,
J. H. Fairman.