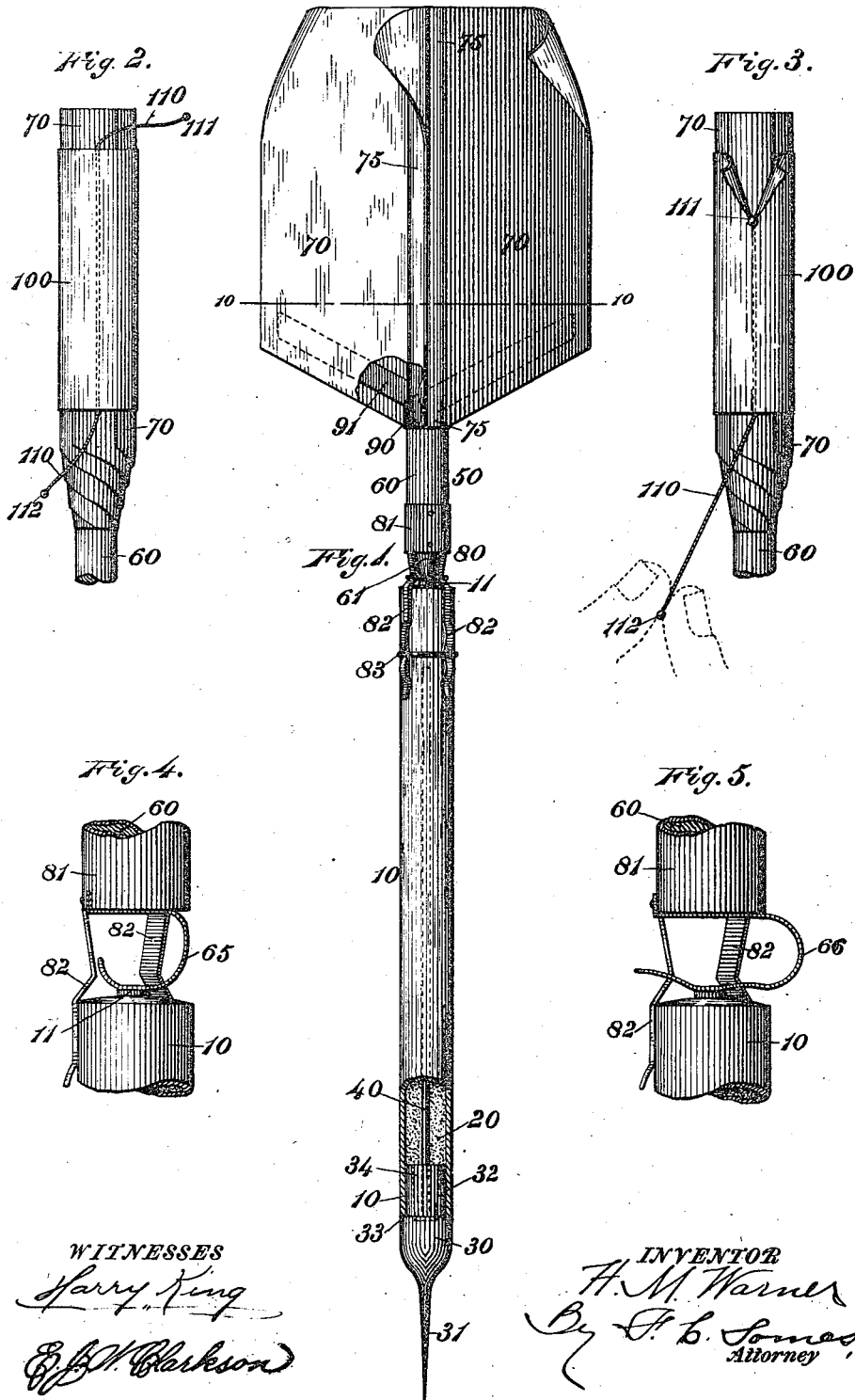


(No Model.)

(Application filed May 26, 1899.)

3 Sheets—Sheet 1.



No. 648,817.

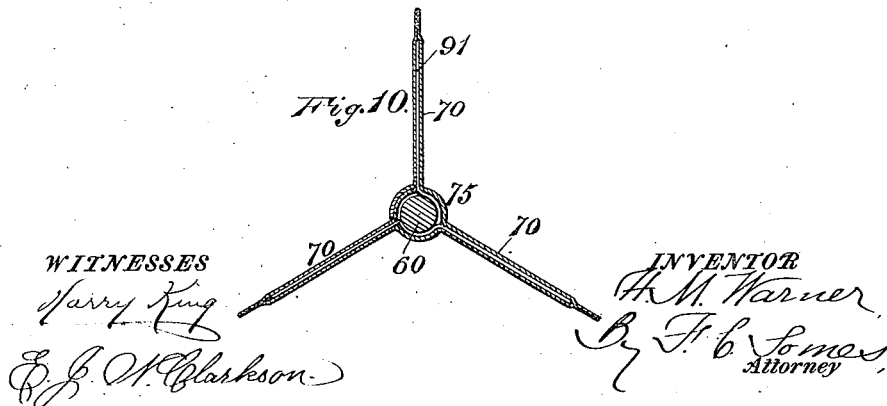
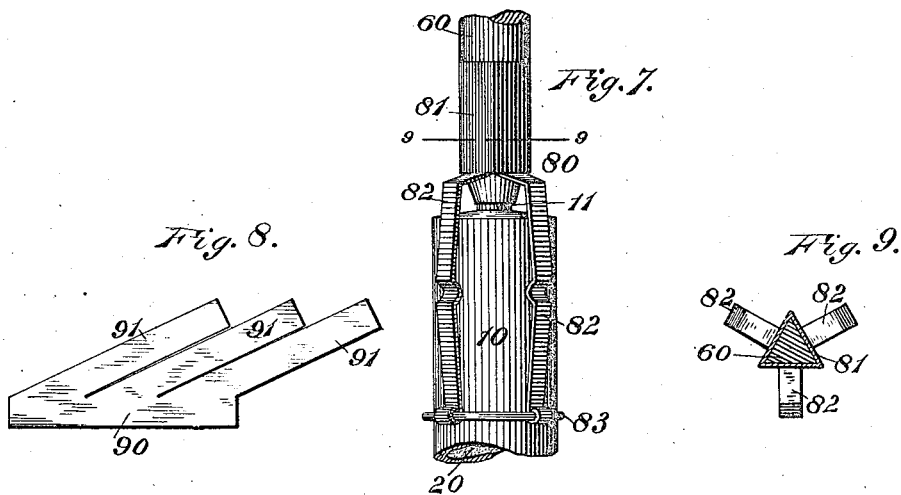
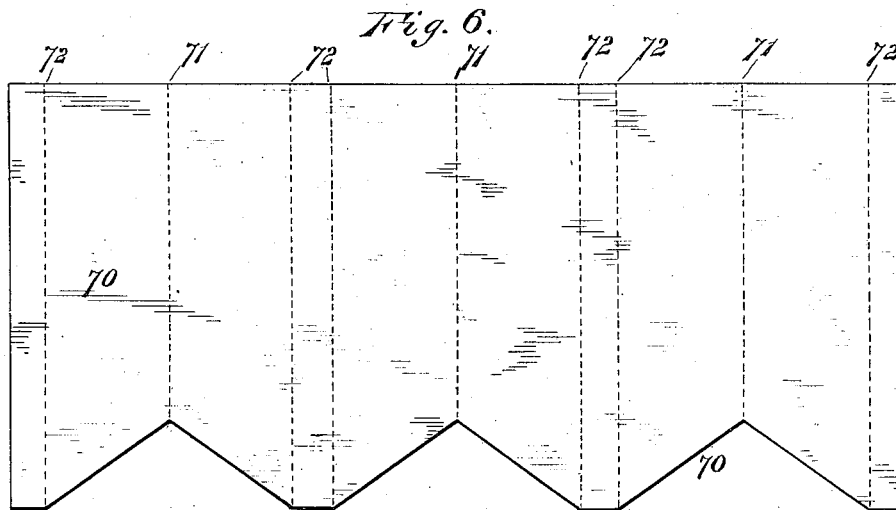
Patented May 1, 1900.

H. M. WARNER.
PYROTECHNIC SIGNAL.

(Application filed May 26, 1899.)

(No Model.)

3 Sheets—Sheet 2.



No. 648,817.

Patented May 1, 1900.

H. M. WARNER.
PYROTECHNIC SIGNAL.

(Application filed May 28, 1898.)

(No Model.)

3 Sheets—Sheet 3.

Fig. 11.

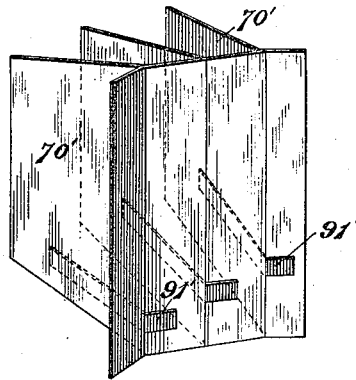
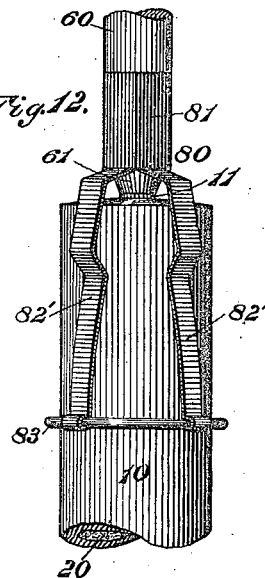


Fig. 12.



WITNESSES

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PYROTECHNIC SIGNAL.

SPECIFICATION forming part of Letters Patent No. 648,817, dated May 1, 1900.

Application filed May 26, 1899. Serial No. 718,339. (No model.)

To all whom it may concern:

Be it known that I, HARRY MARTINE WARNER, a citizen of the United States of America, residing at Somerville, in the county of Middlesex, in the State of Massachusetts, have invented certain new and useful Improvements in Pyrotechnic Signals, of which the following is a specification.

This invention relates to a pyrotechnic signal which when thrown through the air will penetrate the ground and remain standing in an upright or inclined position and being ignited will serve for some minutes as a signal device. It is especially useful to be thrown from a delayed railway-train, whether in motion or stopped, to give warning to an approaching train.

One object of the invention is to provide a pyrotechnic signal of this character which will neither fall on its side nor be broken off on striking the ground.

Another object of the invention is to secure steadiness of flight through the air.

Another object of the invention is to provide a steadying extension whereby the length of the signal is increased to insure its proper flight and alightment.

Another object of the invention is to secure automatic ignition of the pyrotechnic signal on striking the ground.

Another object of the invention is to provide a steadying device which may be packed separately from the fuse and readily applied thereto when the signal is to be used.

These and other objects of the invention are accomplished by the construction herein-after described.

Figure 1 of the accompanying drawings represents a side elevation of this pyrotechnic signal ready for use, parts being broken out to show the interior of the signal body or fuse and of the wings. Fig. 2 represents a side elevation of the steadying device rolled up ready for packing, the lower part of said device being broken off. Fig. 3 represents a similar view to that illustrated in Fig. 2, showing the means in operation for tearing off the wrapper. Fig. 4 represents, on an enlarged scale, an igniter disposed between the signal-body and steadying device. Fig. 5 represents a similar view to Fig. 4, the igniter being in

the form of a spring of somewhat-different shape from that shown in Fig. 4. Fig. 6 represents a plan view of the blank from which the wings of the steadying device are preferably formed. Fig. 7 represents, on an enlarged scale, a form of clamp attached to the steadying device and grasping the signal-body and an igniter in the form of a hammer disposed between said parts. Fig. 8 represents a blank for forming the stiffener for the wings of the steadying device. Fig. 9 represents a transverse section looking downward from line 9 9 of Fig. 7. Fig. 10 represents a transverse section on line 10 10 of Fig. 1. Fig. 11 represents a perspective view of a stiffening device in which the wings are provided with separate stiffening-arms. Fig. 12 represents an enlarged perspective view of one form of clamp for holding the steadying device on the fuse.

The same reference-numbers indicate corresponding parts in all the figures.

This pyrotechnic signal comprises a signal body or fuse in the form of a tube 10 for containing an illuminant 20, a pointed head 30 at the front end of said body for penetrating the earth and holding the signal in standing position, and a steadying device 50 for insuring a proper flight thereof.

The signal-body 10 is preferably made of paper or any other suitable material. The illuminant 20, with which the tube 10 is charged, may consist of any suitable slow-burning material which produces a red or other suitable signal-light.

The pointed head 30 is composed of metal or other suitable substance, preferably cast-iron, and it is provided with a point or prong 31, adapted to penetrate the ground or other substance when the pyrotechnic signal alights after being thrown through the air. This point is preferably in tapering form to better adapt the signal to stand in soft earth, and it is sufficiently sharp to enable it to penetrate a track-sleeper. The head 30 is provided at its upper end with a reduced shank 32, adapted to fit the interior of the tube 10, and at the base of said shank with a shoulder 33 of a depth equal to the thickness of the tube, so that the body of the head is flush therewith. This shank may be hollow and adapted to re-

ceive a plug 34, of wood or other suitable material, or the shank may be solid and provided with a small central opening.

A stiffening-rod 40 extends from the head 30 longitudinally through the tube 10, preferably to the upper end thereof, and serves to prevent the signal from being broken off after it lands by the momentum imparted by the moving train, which operates in a lateral

direction with respect to the standing signal. This rod may be cast with the head or inserted in a hole therein or in a hole in the plug 34.

To aid in securing a proper flight and alightment, the body of the signal or fuse proper is preferably provided with an extension of any suitable form which serves to elongate it, and this extension may be detachable and may be provided with guide-wings. In the form shown in the drawings the extension is represented as a detachable rod carrying wings and constituting a steadying device 50.

A detachable steadying device 50 applied to the body 10 tends to impart a rotary motion to the signal and to steady it in its flight through the air, and thereby to better insure its landing in upright or inclined position. Should the signal-body fall on its side or lighted end, it would be ineffective as a signal.

This steadying device is preferably detachable and can be applied to the body or fuse when it is desired to use the latter, and it may subsequently be picked up by trackmen and saved for further use, if desired. This steadying device comprises a body 60 in the form of a tube or rod, wings 70, secured to said body, and a clamp 80, also secured to said body below said wings and adapted to engage the upper end of the body. The wings may be formed from a blank of suitable material, such as paper or other substance, in the form shown in Fig. 6. The blank is folded on the lines 71 to form the outer edges of the wings and on the lines 72 to form the inner edges thereof. The lines 71 are disposed relatively

distant from one another sufficient to constitute the width of the wings, and the lines 72 are disposed in pairs between the lines 71 and parallel therewith, the lines of each pair being adjacent to each other and the space between them forming a segment of a tube 75, which fits over the body of the steadying device. The wings are preferably provided with a stiffener, which serves to hold them in adjusted position, whether open or closed. The device herein shown for this purpose is struck from flexible sheet metal, such as tin or brass, in the form of a blank, substantially as shown in Fig. 8, and comprises a collar 90, having arms 91 extending therefrom. Each wing when constructed in its preferable form, as described, is composed of two thicknesses of paper or other suitable material folded upon itself, and the arms 91 extend into the wings between the folds thereof and are cemented thereinto in any desired manner. When the pyrotechnic signal is placed on the market, the wings 70 are closely rolled around the body 75 and se-

curely held in closed position by a wrapper 100, of paper or other suitable material, which is cemented around them.

A convenient device for opening the wrapper consists of a string 110, disposed underneath the wrapper 100 and having both its ends projecting beyond said wrapper and provided with knots or protuberances 111 and 112, either of which acts as a severing device. On pulling either end of the string the knot or projection at the other end thereof severs the wrapper from end to end and releases the wings.

The clamp 80 (shown in the drawings) comprises a collar 81, adapted for attachment to the lower end of the rod 60, and jaws 82, extending downward from said collar and adapted to embrace the upper end of the signal-body. These jaws are provided with notches for receiving a ring 83, which may slide loosely thereon or be soldered permanently to the jaws. This ring serves to hold said jaws firmly against the body, so as to rigidly connect the steadying device therewith.

An igniting device for the pyrotechnic signal is disposed between the lower end of the steadying device and the upper end of the signal-body, said body being provided with a fulminating cap 11. Several forms of igniting devices are shown. In the form shown in Fig. 1 the end of the rod 60 is provided with a hammer 61 in the form of a tapered block, which rests on the fulminating cap 11, and the impact produced by the pyrotechnic signal striking the ground causes the cap to ignite, whereby the signal is lighted.

In the form shown in Fig. 4 a spring 65, attached to the rod 60, has its free end resting on the cap 11. In Fig. 5 another form of spring 66 is shown, which operates in a similar manner to that shown in Fig. 4. In either case the cap may be exploded automatically when the signal strikes the ground or by the use of the spring before the throwing of the signal, or the pyrotechnic signal may be lighted by an ordinary match.

In Fig. 11 the wings of the steadying-guide are shown as reinforced by individual strips 91, which are disposed at different heights, so as not to interfere with one another when the wings are rolled up.

In Fig. 12 a form of clamp is shown for uniting the steadying-guide with the signal-body, the jaws 82' of said clamp being more expanded at their upper ends to impart a stronger grasp.

In the use of this pyrotechnic signal the string 110 is pulled and the wrapper 100 torn off. The wings are then unrolled and adjusted in the desired position, the upper corners being preferably bent or curved so as to impart a rotary motion to the pyrotechnic signal in its flight. The signal is then thrown up in the air, and the weight of the head and illuminating material, together with the steadying device, causes it to alight in upright position, or nearly so, the spike-like point pene-

trating the ground and holding it in such position. The pyrotechnic signal being ignited, the slow-burning material contained therein burns for some minutes, giving forth a red or other signal light, as desired, so that an approaching train is warned against proceeding too rapidly.

I claim as my invention—

1. A flight-steadying device for a pyrotechnic signal comprising an elongated body provided with means for attachment to a signal-fuse and adapted to constitute a body extension of said fuse when applied thereto.

2. A flight-steadying device for a pyrotechnic signal comprising an elongated body provided with means for attachment to a signal-fuse and adapted to constitute a body extension of said fuse when applied thereto, said elongated body being provided with wings.

3. A flight-steadying device for a pyrotechnic signal comprising an elongated body provided with a spring-clamp for attachment to a signal-fuse and adapted to constitute a body extension of said fuse when applied thereto.

4. A pyrotechnic signal comprising a signal-body for containing the illuminant, a pointed head at one end of said body, and a detachable flight-steadying device secured to the other end of said body and having a body which serves as an extension of the signal-body.

5. A pyrotechnic signal comprising a signal-body for containing the illuminant, a pointed head at one end of said body, and a detachable flight-steadying device secured to the other end of said body and having a body

which serves as an extension of the signal-body, said extension-body being provided with wings.

6. A flight-steadying device for a pyrotechnic signal comprising an elongated body provided with wings adapted to fold thereon, and with means for attachment to a signal-fuse, said elongated body being adapted to constitute a body extension of the fuse when applied thereto.

7. The combination of a signal-body for containing illuminating material, a steadying device connected therewith, and an igniter between said steadying device and said body.

8. A steadying device comprising folding wings, a wrapper inclosing said wings, and an unattached opening-string inclosed in said wrapper and provided with means for severing said wrapper.

9. A steadying device comprising folding wings, a wrapper inclosing said wings, and an unattached opening-string inclosed in said wrapper and provided at both ends with means for severing said wrapper.

10. A flight-guide comprising a central tube, and wings extending therefrom, said tube and wings being formed from a rectangular flexible sheet folded on distant lines to form the outer edges of the wings, and on parallel adjacent lines disposed between the distant lines to form the central tube, said wings being composed of two thicknesses of the material.

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