

E. F. LINTON.
PYROTECHNIC STAR.

No. 175,360.

Patented March 28, 1876.

Fig. 1.

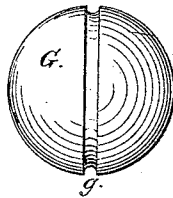


Fig. 2.

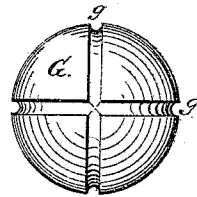


Fig. 3.

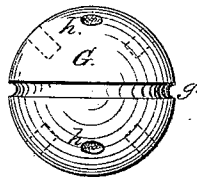


Fig. 4.

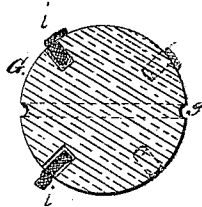


Fig. 5.

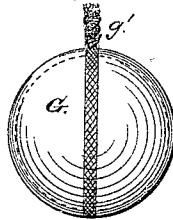
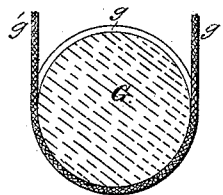


Fig. 6.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWARD F. LINTON, OF EAST NEW YORK, N. Y.

IMPROVEMENT IN PYROTECHNIC STARS.

Specification forming part of Letters Patent No. **175,360**, dated March 28, 1876; application filed March 18, 1876.

To all whom it may concern :

Be it known that I, EDWARD F. LINTON, of East New York, in the county of Kings and State of New York, have invented an Improved Pyrotechnic Star, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, and the letters of reference marked thereon, making part of this specification, in which—

Figures 1 and 2 are side views of the star. Fig. 3 is a side view of the star with chambers for the reception of the quick-match. Fig. 4 is a vertical sectional view of the star. Figs. 5 and 6 are side and sectional views of the star with quick-matches inserted in the grooves or channels.

The nature of my invention is essentially a new article of manufacture, and consists in constructing a pyrotechnic star in the form of a sphere or ball, and, as in the case of the star described and claimed in an application for Letters Patent of the United States, filed by me February 14, 1876, and which was ordered to issue February 19, 1876, I dispense with the central groove or channel extending through the composition, as is the invariable practice in molding or forming the pyrotechnic stars of the ordinary Roman candle, and thereby avoid the weakening of the star at its center and at the point where it is desirable to concentrate the greatest explosive force of the powder to project the star, and which weakening of the same at this point constantly endangers the disintegration or breaking up of the mass of composition that composes the star, when the same is projected with force, and which liability of the star being scattered in fragments has hitherto rendered impracticable all attempts successfully to utilize and render positively reliable the principle of the Roman candle for the purpose of night signaling with different colored lights, as the sudden extinguishment of either of the succession of stars through its breaking up or going to pieces at the instant of its being projected would render the signal worse than useless, as it would either be entirely unintelligible or speak a meaning entirely different from that intended. Owing to the form of the star which constitutes my present inven-

tion it is impossible to adhere to the form of the lateral grooves for igniting the powder in the chamber below, as in the star claimed in my application hereinbefore referred to, yet I adhere to the principle of these lateral grooves on the surface by molding or forming the round or spherical star with one or more belt grooves or channels, which completely girdle the same.

Another valuable feature claimed in connection with the star described in my application hereinbefore referred to, and which is preserved and adhered to in my present improvement thereon, is molding or forming the star with narrow socket-chambers, which extend from the surface into the body of the composition to a depth, say, of a quarter or half inch, and which chambers receive fire from the time fuse or other source, and insure the ignition of the mass of composition that composes the star and within the body of the same, in such manner as to insure of its being so thoroughly lighted as not to be extinguished or blown out by the draft incident to its rapid propulsion through the air. These little igniting-chambers are scattered at intervals around the circumferential surface of the star, and at such points as the judgment of the manufacturer may deem most desirable.

I have in this recital of invention stated fully in what my present improvement consists, and enumerated the features of construction which were common to the stars embraced in this and my application hereinbefore referred to, and I will now briefly allude to some of the prominent advantages which this round or spherical star possesses over and above the cylindrical star of the ordinary Roman candle, and which form or outline of star I substantially adhered to in my application hereinbefore referred to.

In the construction of signals and other similar pyrotechnic devices it is desirable that the least possible quantity of powder that will propel the star to the desired altitude or distance should be used, as in the degree the quantity of powder which constitutes the charge is reduced, the danger of the bursting of the case through its explosion is lessened; and it is also desirable in order that the case, acting, as it were, as a barrel, should give proper direction to the star, that

the same should fit closely or snugly within its chamber. Now these conditions have only to be named to cause, in a certain degree at least, their necessary antagonism to be recognized.

The star cannot impinge against the wall of the case without, through its contact therewith, engendering a certain frictional resistance, and in overcoming which a certain portion of the force of the charge is necessarily to be spent. In stars of the form of those used in the Roman candle, and which have a tendency to hug the wall of the case throughout their entire length, the degree of frictional resistance thus produced is far from being insignificant. And, again, the flat-headed cylindrical star now invariably used, owing to its form, invites the greatest atmospheric resistance to its passage through the air.

In my present improvement, if these difficulties are not entirely obviated, they are at least so lessened as to insure great advantages in connection with the use of a round or spherical star, as it is impossible, in being projected, that it should touch the case at but one or the other of its diametrical points, the surface of contact being necessarily so small, the degree of resistance produced thereby is proportionately small; and, again, the round or spherical form offers far less surface of resistance to the atmosphere, and, consequently, the full force of the powder is utilized in the utmost degree to the direct propulsion of the star, and in the degree the resistance to be overcome is lessened in the same degree may the quantity of the charge be reduced; and another most important advantage which the round or spherical star possesses over the flat-headed cylindrical star of the Roman candle, and over the star of the form shown in my application, hereinbefore referred to, is that it is so much less liable of being constantly inverted or turned over while being projected, and which always has a tendency to endanger its extinguishment.

The construction and operation of my invention are as follows:

In the accompanying drawing, as my present invention is confined entirely to the star, this feature alone is illustrated. In manufacturing the star *G* the composition is molded into the form of a round ball or sphere, having a belt groove or channel, *g*, as shown in Figs. 1 and 3, and which girdles or encircles the star; or the star may be formed with two or more of said grooves or channels, *g g*, running or extending in opposite directions, as shown in Fig. 2. In these grooves or chan-

nels may be inserted and secured quick-matches *g' g'*, the ends of the quick-match being left free, as shown in Fig. 6, or the match drawn so as to entirely fill the groove, and its ends then twisted so as to form, as it were, a center wick, as shown in Fig. 5. The object of the groove or grooves *g* (of course, either with or without the quick-match *g'*) is to secure the ignition of the powder in a chamber below the star, through the fire which the burning of the time-fuse above produces. The star or stars *G* are also formed or molded with chambers *h h*, the same being countersunk or socket-shaped, and which are in form and function similar to the chamber in the upper surface of the star described in my application hereinbefore referred to.

There may be one or more of these chambers in each star. When several are employed, as shown in Figs. 3 and 4, they may be scattered or interspersed at intervals around the circumferential surface of the star, and at such points thereon as the judgment of the manufacturing pyrotechnist may deem best to insure the ignition of the composition which composes the star within the body of the mass, and in a manner the most thoroughly to insure the proper burning of the same.

These chambers *h h*, if desired, may be provided with quick-matches *i i*, secured therein with any mucilage or paste suited to the purpose, as shown in Fig. 4.

While this star *G* is admirably adapted for use in night-signaling, I do not at all desire to restrict myself in its use to its employment in connection with signals alone, as it may advantageously be substituted for any other class of stars now used in connection with any branch of pyrotechnic works.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The colored star or stars *G*, for night-signals and other pyrotechnic devices, constructed or molded in the form of a sphere, and having one or more annular or belt grooves, *g*, encircling the same, substantially as and for the purpose specified.

2. The star or stars *G*, molded in the form of a sphere, and having one or more belt-grooves, *g*, and one or more chambers, *h*, substantially as and for the purpose specified.

In testimony whereof I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

EDWARD F. LINTON.

Witnesses:

CHAS. NELSON,
RICH'D. PICKERING.