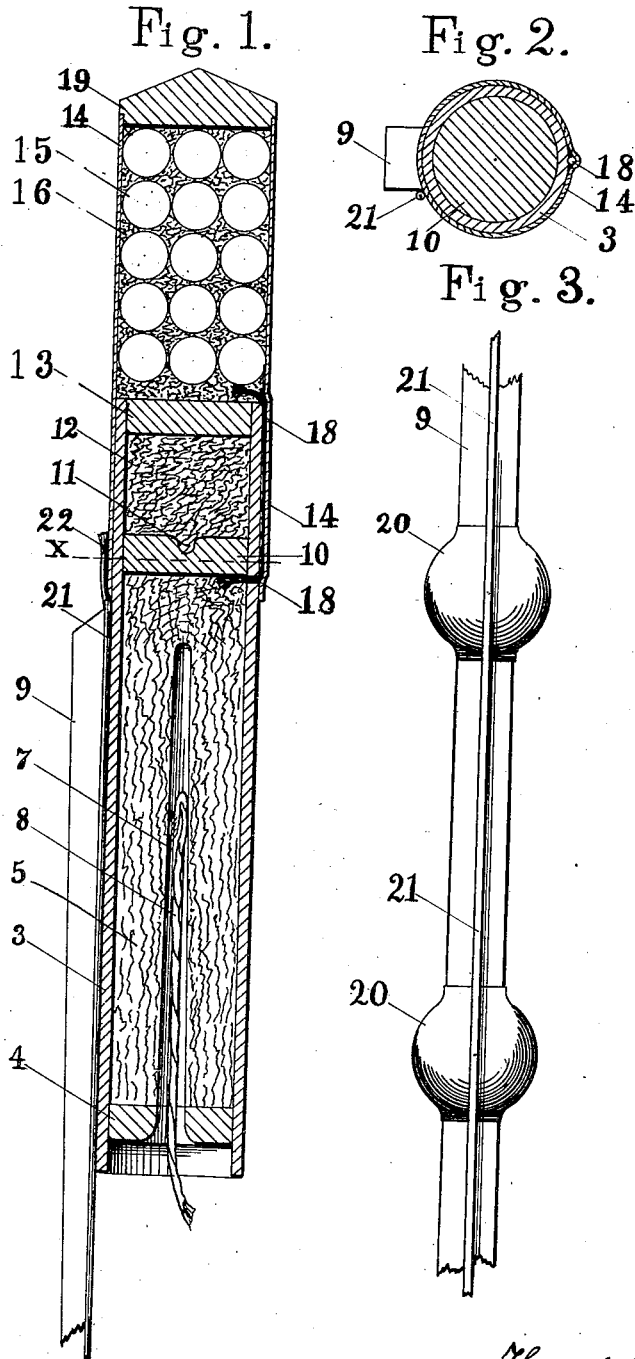


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ROCKET.

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957,210.

Patented May 10, 1910.



Witness

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# UNITED STATES PATENT OFFICE.

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ROCKET.

957,210.

Specification of Letters Patent.

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Application filed June 11, 1909. Serial No. 501,856.

To all whom it may concern:

Be it known that I, THOMAS G. HITT, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Rockets, of which the following is a specification.

This invention relates to the pyrotechnic devices called rockets. Its object is to adapt a rocket to carry up into the sky and to spread broadcast, stars, parachutes and other devices for display or for signaling; to produce two explosions with loud reports; to dispose of the guiding stick with safety, and to utilize the falling stick as an added means for display.

To this end my invention consists in the construction and combination of parts forming a rocket hereinafter more fully described and particularly set forth in the claims, reference being had to the accompanying drawings in which—

Figure 1 represents in central longitudinal section a rocket with a portion of its guiding stick, according to my invention. Fig. 2 shows a transverse section of the same at line *x* of Fig. 1. Fig. 3 represents a portion of the guiding stick with fireworks attached.

Numeral 3 represents the shell or body of the rocket; 4 a centrally perforated plug of clay; 5 the propelling charge of powder having an open bore 7, in which a quick match 8, is fixed, and 9 the guiding stick.

Thus far the description refers to what is common and well known.

A plug 10, of quick-burning composition, such as meal powder, is to be rammed hard upon the propelling charge 5, and it is preferably reduced in thickness at the center by forming an indentation 11, in order that it may burn through there first and light the charge 12, at the center. This charge 12, is highly explosive powder—usually strong gunpowder—filling the upper portion of the main shell 3, up to a plug 13, which is of wood or similarly strong material and is glued or otherwise firmly secured to the shell. An extension shell 14, forms a head above the rocket body 3, to carry stars 15, or parachutes, or other pyrotechnic devices for spectacular display or for signaling purposes, and powder 16, for suddenly spreading them in the sky. A quick-match 18, passes by the plug 10, and charge 12, and communicates between the top of the pro-

PELLING charge 5, and the spreading charge 16. A cap or plug 19, closes the head of the rocket in any usual manner. In common rockets of this class there is no quick-burning plug 10, and no exploding charge 12, but in place thereof is a clay plug centrally perforated and a quick-match passing through to communicate between the propelling charge 5, and the spreading charge 16.

Fireworks 20, may be attached to the stick 9, to be lighted by a fuse 21, whose combustible end 22, is located above the path of the rocket-propelling discharge and near to the powder 12, where it will be ignited when that charge explodes. These fireworks 20, and their fuse 21, are protected by their closed construction from being ignited below the end of the fuse.

In operation the quick-match 8, is to be lighted to set the powder 5, to burning on its whole surface within the bore 7. This being confined by the ring-shaped plug 4, the gas acquires great pressure and pours out at the rear so forcibly as to drive the rocket up into the sky with the flare and roar of a rushing meteor. When the propelling charge 5, burns out the limit of upward flight is reached, the quick-match 18, is lighted and communicating with the powder 16, that charge bursts the light shell 14, spreading broadcast the stars 15, or whatever is thus to be fired for display or for signaling. Now the quick-burning plug 10, having been lighted by the driving charge, has expanded in the shell; and, driving out at the rear it gives the rocket a little forward impulse just when it is in a horizontal position at the zenith of its flight. At the same moment it ignites the charge 12, which explodes, reducing the shell and the clay of the plug to dust, and sets the stick to spinning around its own longitudinal axis with great velocity. This has the gyroscopic effect of maintaining the stick in a horizontal position while falling, and retarding its normal descent to the earth. The spinning motion of the stick is due to its receiving the force of the explosion a little to one side of its central line. In binding a cylindrical shell along the flat side of the stick it is nearly impossible to secure it perfectly central. If, in the rapid handling of manufacture, it were possible to locate the shell or body exactly central on the width of the stick, my instructions are to avoid so doing, for the purpose in question. This does not require any unusual construc-

tion, because it would be very difficult to mount the stick on the shell so perfectly central that it would not be set to spinning by the force of the bursting charge. But, as the force of the driving charge is gradually expended, the rocket turns toward the apex of its parabolic curve of flight, and it reaches its horizontal line when the propelling charge burns out and sets fire to the quick burning plug 10; that burning plug propels the rocket in this horizontal direction until after the charge 16, spreads the display works 15; and the exploding charge 12, is ignited at the indenture 11, while the plug 10, is still propelling with its full force. Were it not for this bursting charge relieving the stick of the heavy shell the stick with the shell attached, would continue its course like an arrow and come down heavy end foremost, to the great danger of anything below. Heavy sticks carried high by large display rockets in the usual manner, come down with sufficient force to kill men or animals, or even to penetrate the roof of a house. But the sticks of similar rockets using my timed bursting charge, invariably come down sailing horizontally and so slowly that they may be safely caught by hand. The fireworks 20, rotating rapidly with the spinning and slowly descending stick, are susceptible of many designs to produce unique effects. The bursting charge acting on the expanded gas of the quick-burning plug 10, and coming as a twin to the explosion of the display spreading charge, gives a detonation truly startling. This bursting charge timed by the quick-burning plug will have the same effect on the stick of a rocket that does not carry display fireworks in its head.

By means of this invention rockets of unlimited size may use guiding sticks of any required weight with safety. The loudest bomb detonations and most brilliant sky displays may be produced without the dangers of the bomb mortar, and the exciting road of the rocket's meteoric rush may still be retained, and ever-new designs may be illustrated with the spinning stick. Having thus fully described my invention, what I believe to be new and desire to secure by Letters Patent is set forth in the following claims.

1. In a rocket, a body; a propelling charge therein; a guiding stick attached thereto; a plug formed of quick-burning powder tamped upon the propelling charge; a bursting charge located over the plug of powder; a plug of strong material rigidly secured in the shell above the bursting charge; a shell head extending above the plug of strong material; material for display mixed with powder for spreading it and located in the shell head; a closing cap, and a quick-match

communicating past the bursting charge, between the said propelling charge and the powder for spreading the display material.

2. In a rocket, a shell having in its lower portion a propelling charge and in its head a display and distributing charge; a guiding stick secured to the shell; a bursting charge located between the propelling charge and the charge in the head and separated from the latter charge by a firmly fixed plug; a plug of quick-burning powder located between the propelling charge and the bursting charge, and a quick-match communicating between the propelling charge and the charge in the head.

3. In a rocket, a body; a propelling charge therein; a guiding stick attached to the body; a plug of quick-burning powder on top of the propelling charge; a bursting charge on top of the said plug, and a plug of strong material rigidly secured in the body over the bursting charge.

4. In a rocket, a shell; a guiding stick secured thereto; fireworks attached to the stick; a propelling charge and a bursting charge in the shell, and a quick-burning plug located between these two charges, whereby the rocket, in turning after the propelling charge burns out, is propelled in a different direction from its course of ascension.

5. In a rocket, a body; a guiding stick therefor; fireworks secured on the stick, and means for propelling the body, means for bursting it at its highest point of flight, and means for lighting the fireworks on the stick when at that highest point.

6. In a rocket, a shell; a guiding stick therefor; a propelling charge; a bursting charge, and a quick-burning plug located between these charges; the said plug having an indentation in it whereby fire will be communicated to the bursting charge before the force of the quick-burning plug is expended.

7. In a rocket, a body; a guiding stick therefor; a propelling charge; a bursting charge; fireworks located upon the stick; means for igniting the said fireworks by the bursting charge, and means for protecting the said fireworks from ignition by the propelling charge.

8. In a rocket, a body and means for propelling it upward; means for guiding its flight; means for propelling it horizontally at the zenith of its flight, and means for exploding the shell while it is horizontal.

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

THOMAS GABRIEL HITT.

Witnesses:

A. H. HEPLER,  
M. NEWELL.