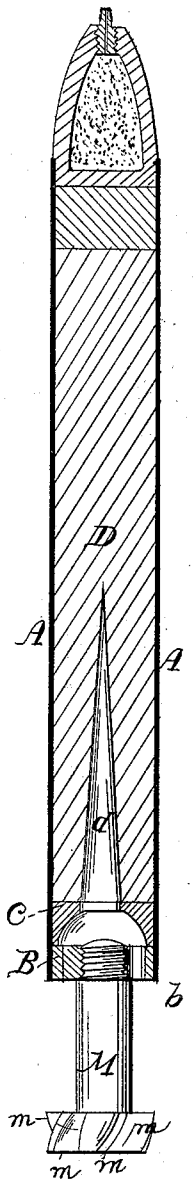
ROYS & LILLIENDAHL.

Rocket.

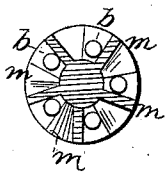
No. 35,977. Patented July 22, 1862.



Witnesses.

Thomas L. Nelson

G. H. Babcock



Signature.

Thomas W. Roy

G. A. Lilliendahl

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS W. ROYS AND GUSTAVUS A. LILLIENDAHL, OF NEW YORK, N. Y., ASSIGNORS TO SAID G. A. LILLIENDAHL.

IMPROVEMENT IN WAR ROCKETS.

Specification forming part of Letters Patent No. **35,977**, dated July 22, 1862.

To all whom it may concern:

Be it known that we, THOMAS W. ROYS and GUSTAVUS A. LILLIENDAHL, both of New York, in the county and State of New York, have invented a certain new and important Improvement in War Rockets; and we do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a longitudinal section, and Fig. 2 is a rear view.

Similar letters refer to like parts in both drawings.

In order to induce a proper rifle motion in rockets as ordinarily constructed, it is common to bore the several holes, through which the gases issue, in lines which are oblique to the axis, so that the gases are projected therefrom in directions not exactly in the path of the rocket. If the gases were projected in lines directly in the path of the rocket, they would be most efficient in propelling the mass forward; but in such case they would not, without some extraneous means, induce any rifle motion, and it usually is deemed necessary for that purpose to cause them to diverge from such path by a considerable angle. In our invention the holes may be bored in lines strictly parallel to the axis of the rocket, and a suitable additional part having a form analogous to the most approved style of screw-propellers is mounted a little in the rear thereof, being rigidly fixed to the rocket by suitable means, so as to compel the rotation of the latter therewith. The gases consequently issue in the proper line to produce the maximum effect in propelling, and subsequently act upon the screw to produce a rifle motion in the entire mass.

In the interior of the rocket, at the rear end, we introduce another novel feature. As such rockets have been heretofore made, the action through the several holes has been liable to great irregularities, due to a want of uniformity in the condition of the composition and of the holes. We equalize the action by employing a kind of inverted cup or dome covering over all the holes and leaving a sufficient aperture in its top to allow the gases to freely enter and be distributed equally to the vent-holes.

We have tested the invention practically and found a marked advantage to accrue from this construction of rocket. We have shown the proper arrangement of the parts in the drawings, and to enable others skilled in the art to make and use our invention we will describe the construction more minutely by the aid of the letters of reference denoted thereon.

At the upper or forward end of our rocket is a percussion-cap and a reservoir of grain powder inclosed in a stout case, so as to act as an explosive shell at the moment of striking any object. These parts are defended from the intense heat of the burning composition by a stratum of clay. We need not minutely describe these parts, because they are well known, and may be made in any other manner without affecting the action of our invention.

A is a case of thin iron properly welded together, and also welded to a thick base, B, in which latter are bored the holes for the issuing of the jets of gas or fire. These holes are designated by *b*, and are of the usual size and number for a rocket of this power, and are bored in lines parallel to the axis of the rocket. C is an open-topped dome or dishing washer placed above it, as represented; and D is the rocket composition, which is partly traversed by a conical hole, *d*, in the usual manner.

M is a cylindrical piece of cast-iron tapped firmly into the base B of the rocket in the line of the axis, as represented, and *m m* are spiral wings or blades cast thereon in the manner shown. The distance between the holes *b* and these wings is such that the issuing gases may expand and exert nearly their full force in propelling the rocket before they strike the screw to cause the rotation.

Our rocket is directed and fired in any of the ordinary methods, and while in its flight moves more rapidly, and can travel farther and with less divergence from the line desired than other rockets of equal weight and power.

It is not absolutely necessary to the success of our invention that the orifices *b* shall be at

the rear of the case A, or that the deflectors *m* be mounted upon a central stem. The orifices may be located further forward, and the wings *m* may be fixed in any other manner, so long as they are arranged to operate together, as described.

Having now fully described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. Causing the issuing gases to impinge upon spiral wings or equivalent deflectors at a little distance in the rear of the orifice or orifices, substantially as and for the purpose herein set forth.

2. The use of the internal casing, C, within the rocket, arranged in the manner, and so as to equalize the issuing of the gases, as herein set forth.

THOMAS W. ROYS.
G. A. LILLIENDAHL.

Witnesses:
THOMAS D. STETSON,
G. H. BABCOCK.