2 Sheets—Sheet 1.

J. B. HYDE.

Rocket.

No. 40,041.

Patented Sept. 22, 1863.

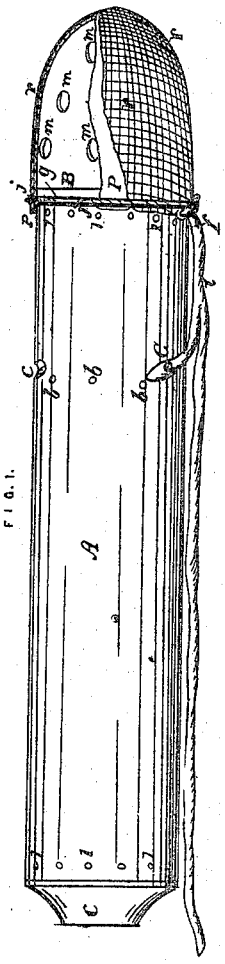

FIG. I.

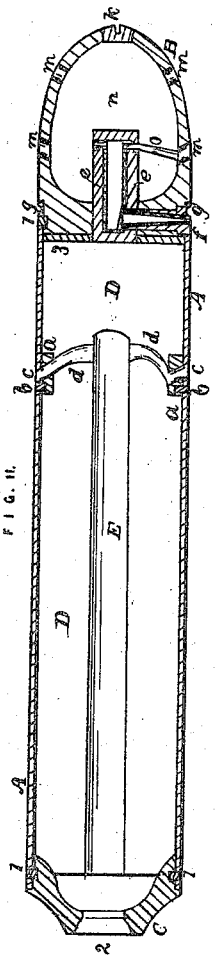

FIG. II.

Witness
C. E. Hyde
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J. Burrows Hyde

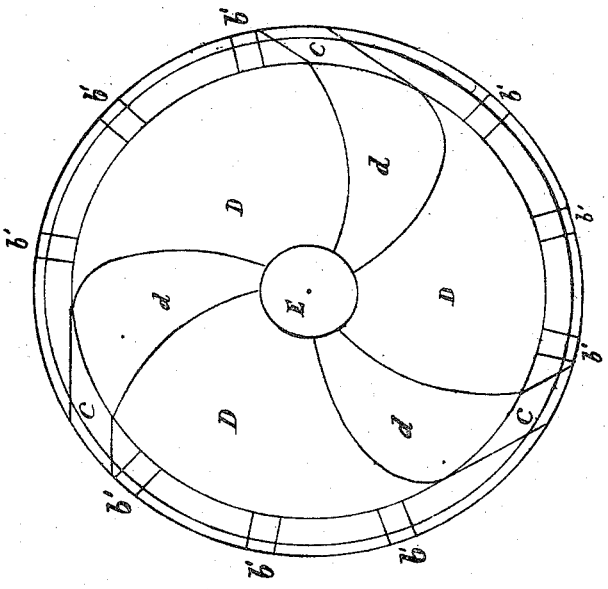
2 Sheets—Sheet 2.

J. B. HYDE.

Rocket.

No. 40,041. Patented Sept. 22, 1863.

FIG. III.



UNITED STATES PATENT OFFICE.

J. BURROWS HYDE, OF NEWARK, NEW JERSEY.

IMPROVEMENT IN WAR-ROCKETS.

Specification forming part of Letters Patent No. **40,041**, dated September 22, 1863; antedated April 25, 1863.

To all whom it may concern:

Be it known that I, J. BURROWS HYDE, of the city of Newark, county of Essex, and State of New Jersey, have invented certain Improvements in War and other Rockets; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings and the letters of reference marked thereon.

The nature of my invention consists, first, in an improved construction or arrangement of that part of the rocket which gives it rotation from lateral or tangential holes for the escape of the burning gases therefrom; and, secondly, in an improved means for igniting the contents of the shell or head of the rocket; and, thirdly, it consists in an improved method of firing the contents of the shell when charged with incendiary composition.

Rockets are usually guided in their flight by some caudal appendage, generally a long rod, but sometimes a short tail provided with lateral wings or flanges, which wings have sometimes been made of a spiral shape, to give rotation to the rocket. Rockets have also been successfully used without any tail, but are made to rotate by the escape of gas from holes bored tangentially through the tail end of the rocket into the composition. These holes have also been bored into a recess in the head of the rocket, which must necessarily, therefore, be a shot-head instead of a shell, as the great heat would ignite the contents and burst the shell prematurely. These holes have also been placed near the central part of the rocket by cutting the tube into two lengths, and so charging each piece with composition as to leave a separate and distinct core or cell in each for burning-surfaces. The two pieces are then united by riveting them to a disk or diaphragm, through the sides of which the tangential rotating holes are bored into the upper core or cell, which is designed to furnish the rotating-gas, while the lower section is intended to supply the propelling-gas for the rocket. This plan is inconvenient, expensive, and weakens the rocket-case.

For many centuries past rockets have been employed for carrying shells as well as shot against an enemy. Those shells have been charged with gunpowder, or with gunpowder and projectiles, or with incendiary or "carcass" composition. All such explosive or inflammable contents of rocket-shells have been ignited by a fuse fixed in the base of the shell, which is then permanently fixed to the rocket-case. The fuse being thus secured inside the rocket, is inaccessible afterward, and is ignited from the burning of the rocket composition, depending entirely thereon for firing the contents of the shell, which greatly detracts from the utility of rockets for war uses, as the "time" of the fuse is arbitrary, irrespective of the distance of the object aimed at.

In the drawings, Figure I shows a side view of the exterior of the rocket; Fig. II, a longitudinal section of the same; and Fig. III is a sectional view through the letters *c c*.

A shows the tube or case. B shows a shell-head; C, the tail-piece; 1 1 1, rivets by which the latter are secured to the case. D shows the rammed composition; E, the core or fire-surface; 2, the rear aperture, and 3 a covering of paper or other material on top of the composition.

My first improvement consists in employing a ring or section of a cylinder, *a a*, secured on the inside of the case A by the rivets *b b* or otherwise, and through which case and ring I bore the tangential holes *c c*. This enables me to have the case entire, with the holes at its center of gravity, and as I by these holes bore through the composition D into the core E, (see channels *d d*,) I am able to ram the whole case with composition and employ one common core, as with ordinary plain rockets, so that I can cause the fire to flash simultaneously from each of the tangentials, (three being best,) and also from the rear orifice, 2.

My second improvement consists in the employment of and providing the rocket with an adjustable time-fuse, so arranged as to be readily graduated and cut by the gunner, the same as with common shell-fuses, according to the distance of the object aimed at, and insuring the firing of the shell quite as accurately as can be done in gun-service, and which I believe has never before been done with rocket-shells.

Into the base of the shell or head of the rocket and through the case I bore a radial hole to a proper depth, into which I place a closely-fitting fuse-plug, *f*, provided at its outer end with a projecting threaded shoulder to se-

cure it by a corresponding screw-thread in the head. The outer end of this plug is slotted for a turn-screw, by which it is removed for cutting the fuse, which is made slightly conical, and closely fitting a corresponding bore through the plug *f*. The shape of the fuse is to prevent it being thrown out by centrifugal force. *e* shows an inner plug and fuse secured longitudinally through the base of the shell, similar to the usual rocket-fuse, except that I close both ends of the plug, whereas usually both ends are left open. Into this plug *e*, I place for long-range rockets a fuse of known time, and close the upper end by a screw-cap, to prevent the fuse from driving into the shell from the force of the gas at the burning end. Through the sides of this cap, and at the extreme end of the fuse, I bore several small holes for communicating fire to the contents of the shell. The time of this fuse being always known to the gunner, he adds to it the time of the radial fuse, which he withdraws and cuts accordingly, the fuse *e* being inaccessible to him. As this fuse must be ignited before the rocket leaves the stand, and quite independent of the rocket composition, it follows that there should be two distinct and simultaneous ignitions for this improved rocket. This I effect as follows: *h* shows a quick-match, covered with inflammable paper as far as *i*, where it branches in two parts or stems, one of which is inserted in one of the tangential apertures, and the other end into or over the adjustable fuse *f*. At *g* a groove or channel is shown cut into and around the rocket-case near its upper end. A slight string taking into this groove binds the match upon the fuse *f* until it is fired. If the head of the rocket is designed as a bursting shell, whether to contain a charge of gunpowder alone or gunpowder and bullets, such charge is introduced by removing the screw *k* until the charge is complete and the screw replaced. In this case the shell should not be perforated, as is shown in the drawings at *m m m*, which are designed to illustrate my third improvement, which consists of the employment of the herein-described fuse to set fire externally to a shell charged with carcass composition. In this case the shell is perforated in various places, (see *m m m*,) and is rammed solid with inflammable composition, as at *n*. I then bore through this composition by one of the apertures *m* to one or more of the perforations in the screw-cap of the fuse-plug *e*. (See channel *o*.) I then prime all the recesses formed by the holes *m*. Now, I take a cap of proper material, (netted or woven or paper,) fitting the shell, which cap I saturate with quick-burning composition and place it on the shell, as seen at *p*, partly cut away. This hood-match I protect by a cap of fine wire, *r*, with meshes as large as possible, and the two hoods I secure to the shell by a fine wire, *j*, wound around the groove *g*. This wire hood should be covered by oiled paper, to preserve it for storing.

It will be seen that I can dispense with the inner fuse, *e*, and use the radial or outer fuse only for igniting the contents of the shell; but for general use the combination of the two fuses, as described, is preferable.

What I claim, and desire to secure by Letters Patent, is—

1. The construction of a rocket-case with the ring *a*, combined with the apertures *c c* and core E, by means of the channels *d* or their equivalent, substantially as described.

2. The radial adjustable fuse *f*, arranged, as described, for igniting the contents of the shell directly or through the agency of the inner fuse, as described.

3. The hood-match *p* and its protector *r*, secured and ignited as described.

4. The partially-guarded match *h*, with its branches, for simultaneously igniting the rocket and shell-fuse, as described.

J. BURROWS HYDE.

Witnesses:

C. C. HYDE,

THOS. J. JONES.