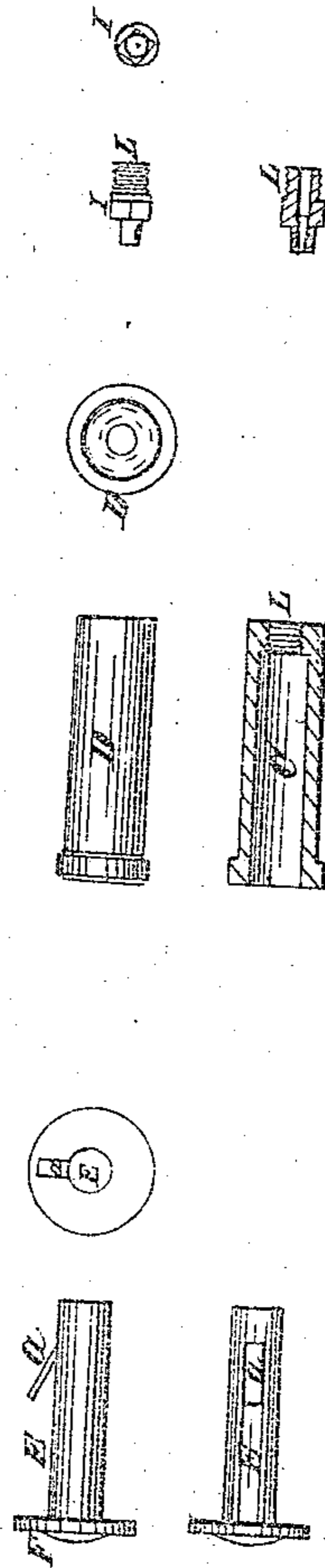
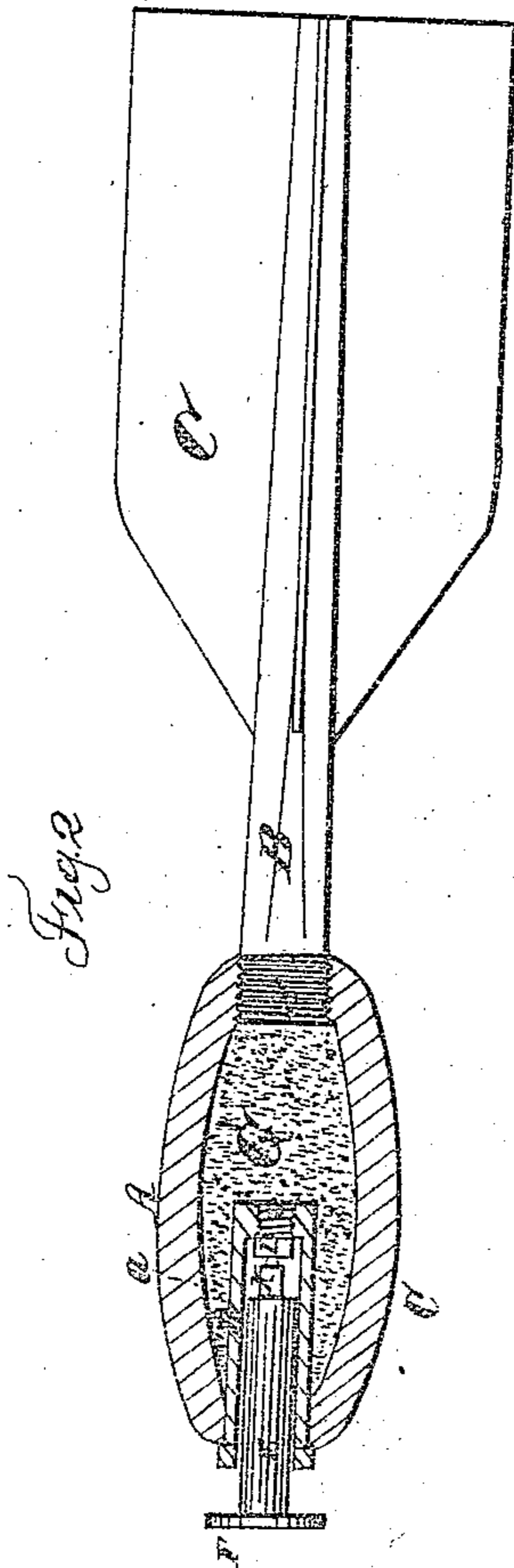
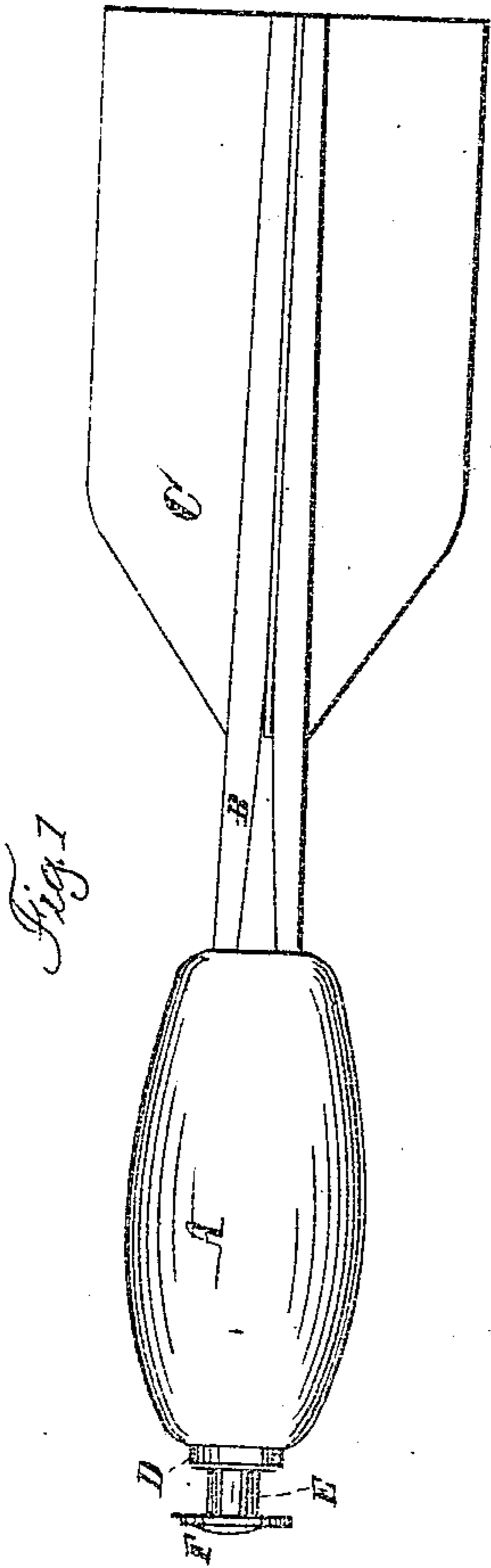
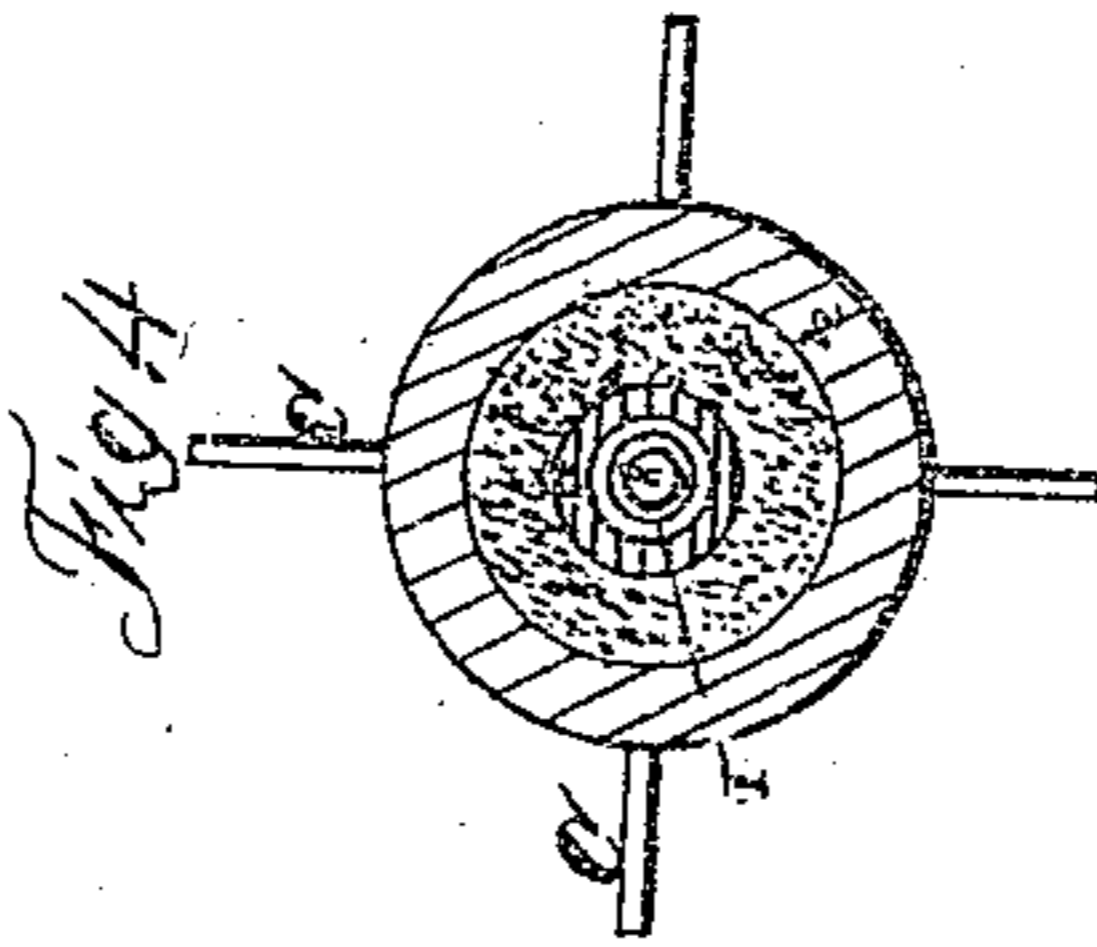
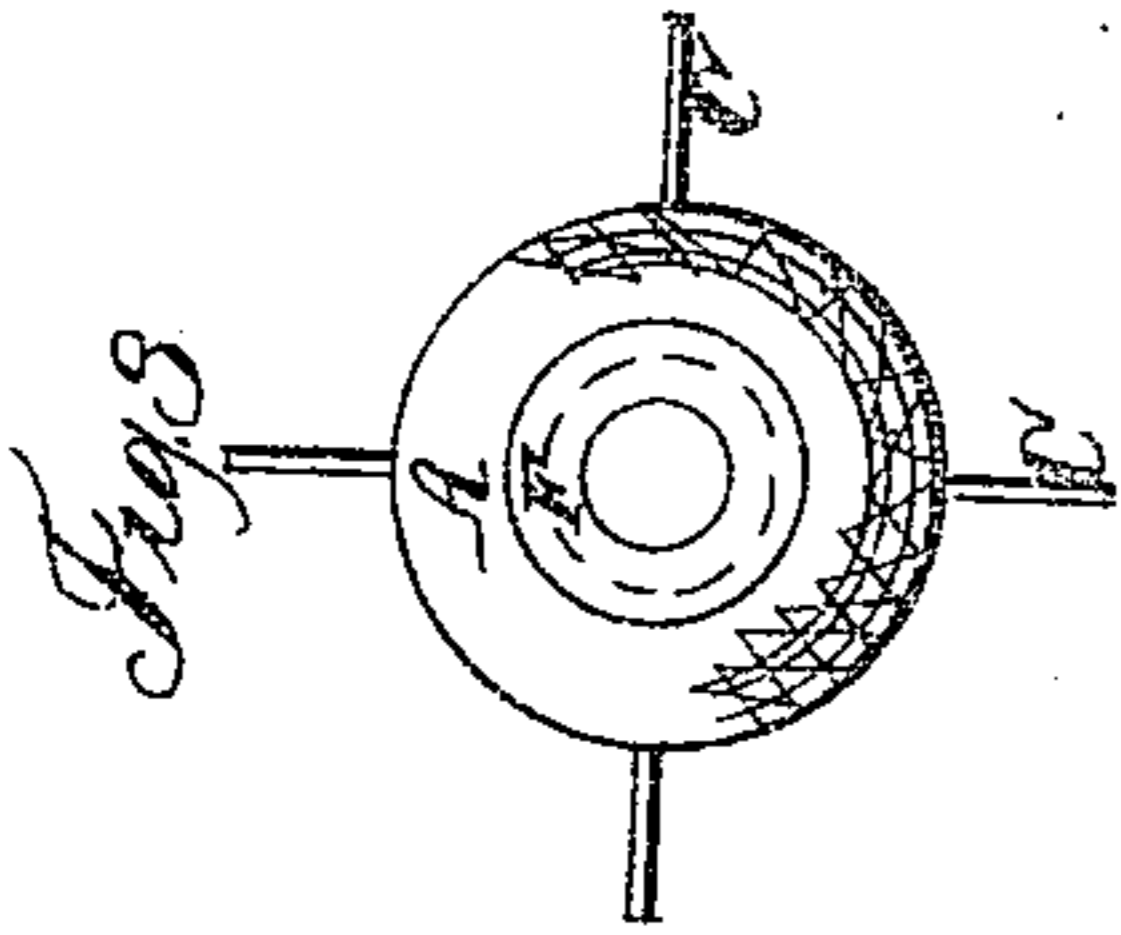


W. F. KETCHUM.  
Shell.

No. } 2,085.  
      } 33,089.

Patented Aug. 20, 1861.



Witness—

E. Needham  
J. Garhart

W. F. Ketchum

# UNITED STATES PATENT OFFICE.

WM. F. KETCHUM, OF BUFFALO, NEW YORK.

## IMPROVEMENT IN HAND-GRENADES.

Specification forming part of Letters Patent No. 33,089, dated August 20, 1861.

*To all whom it may concern:*

Be it known that I, WILLIAM F. KETCHUM, of the city of Buffalo, in the county of Erie and State of New York, have invented a new and Improved Hand-Grenade; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and the corresponding letters of reference marked thereon.

In the accompanying drawings, Figure 1 represents said grenade ready for projection. Fig. 2 represents a sectional view. Fig. 3 represents an end view. Fig. 4 represents a transverse section.

I make said grenade in a double conical oval form of cast-iron, and several different sizes and weights, from one to five pounds, and they may be made much larger. They are cast hollow, like a shell, which shell should have nearly a uniform thickness, so that the explosion will be more likely to break it into pieces of nearly the same size, and into a greater number of pieces than otherwise. It is cast with an opening or orifice at each end, about one-half of an inch in diameter. I make a piece of hollow tubing of some soft metal—lead, for instance, or lead and zinc together—which is about two inches long, one-sixth of an inch thick, made to fit into either end of said shell, which has a narrow flange on the outside, to prevent its going entirely into the opening of the shell, and on the inside of the end that is inserted in the shell there is a narrow flange extending inward, so that the hole in said hollow tube at the lower end projecting into said shell is about the size of a common musket percussion-nipple, into which flange a common percussion-nipple is screwed fast, leaving the base of said nipple flush with the lower end of said tube, with its flange resting upon the flange inside of the tube. The soft-metal tube fits closely the opening in the shell, and is thus made fast, with a nipple for a cap projecting up from the lower end of said tube, and about two inches from the outer end, which is thus made entirely secure against any accidental explosion. The cap is placed upon this nipple by means of a hollow stick or any other simple instrument, and always before the shell is charged with powder. Having thus placed the cap in place, the charge is put into the other end of the shell

and the orifice closed with any wooden stopper until it is desired to use the grenade, when the stopper or plug is removed, and another one inserted, about six or eight inches long, which has four wings of pasteboard or other material attached, which will surely cause said shell to strike upon the opposite end. I make what I call a "plunger" of iron, with a flange on the top, and a small steel spring on the side, to hold and prevent the plunger from falling out. This plunger, with the spring, fits into the hollow tube, and is long enough to reach and explode the cap on the inside the moment the outer end of the plunger with its flange or head strikes any resisting substance. This plunger is never inserted or used except at the moment it is desired to project the grenade, and until it is inserted and the grenade projected the shell, although charged and capped, is perfectly safe and secure, and cannot be exploded even by rough handling. The plunger can be inserted in an instant, and the grenade projected by hand, as may be desired. The guide may also be inserted at any convenient time prior to use, or at the instant of use, as it will require but a moment to arrange it, and if both should be arranged for use and the grenade should not be used, they may both be removed, and the grenade will then be in its former safe and secure condition. The grenade may be charged with common powder or any other explosive material upon which a common percussion-cap will take effect. The hollow tube projects inside the shell, and the end in which the cap is inserted is entirely surrounded with powder when charged.

The grenade-shell is represented by letter A, the hollow tubing by letter D, the plunger by letter E, and the guide by letter B.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

The combination of the tubing and concealed cap therein with the adjustable plunger and the adjustable winged guide arranged for a hand-grenade, substantially as and for the purpose described.

W. F. KETCHUM.

In presence of—

JOHN H. SEVART,  
WM. B. WHEELER.