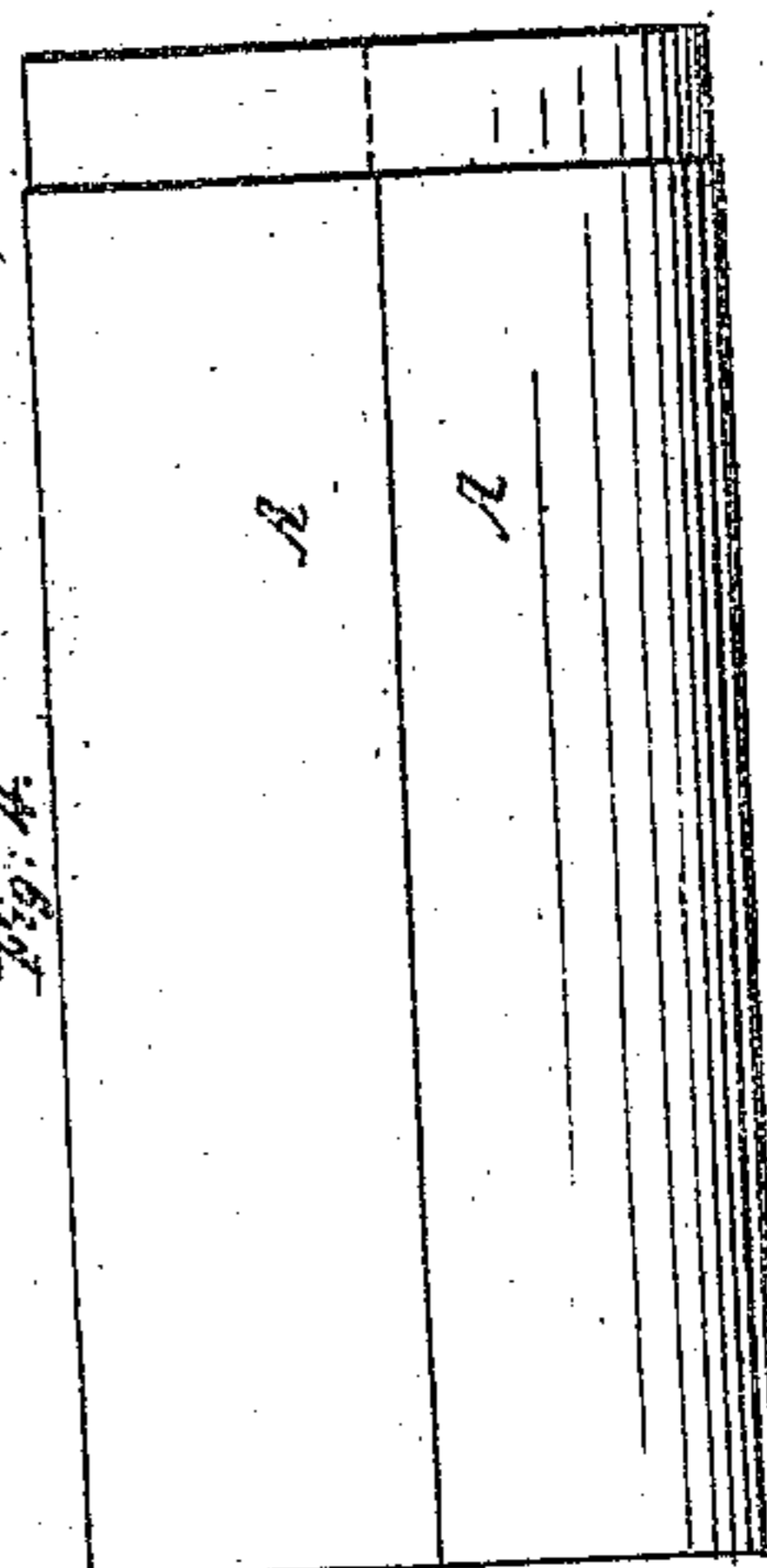
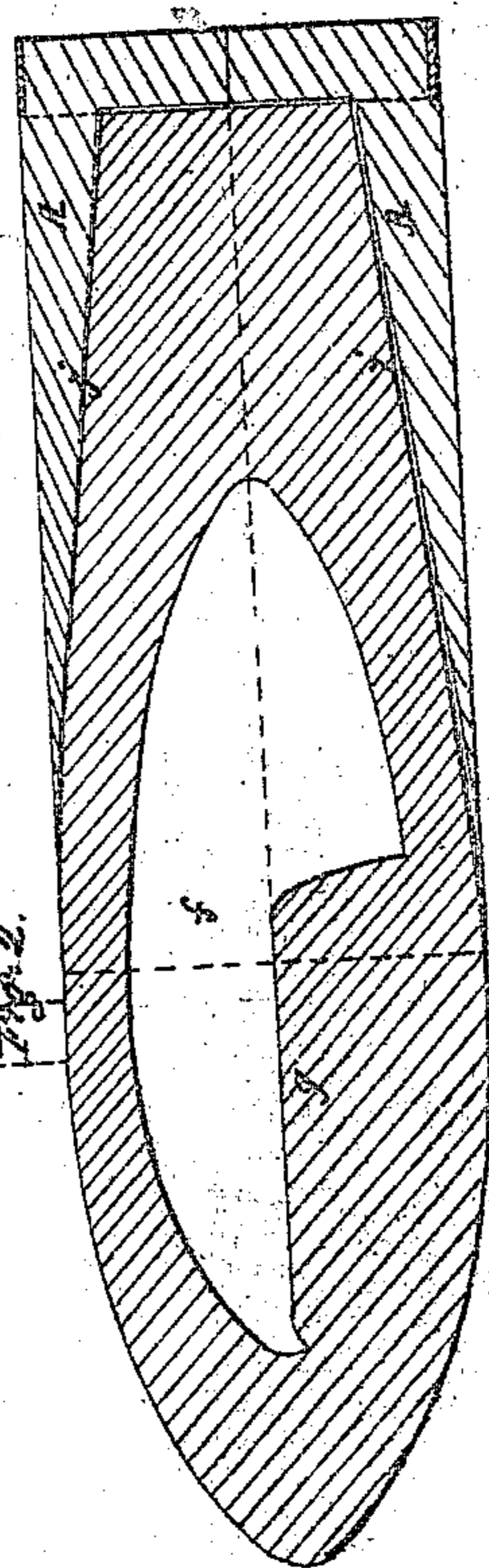
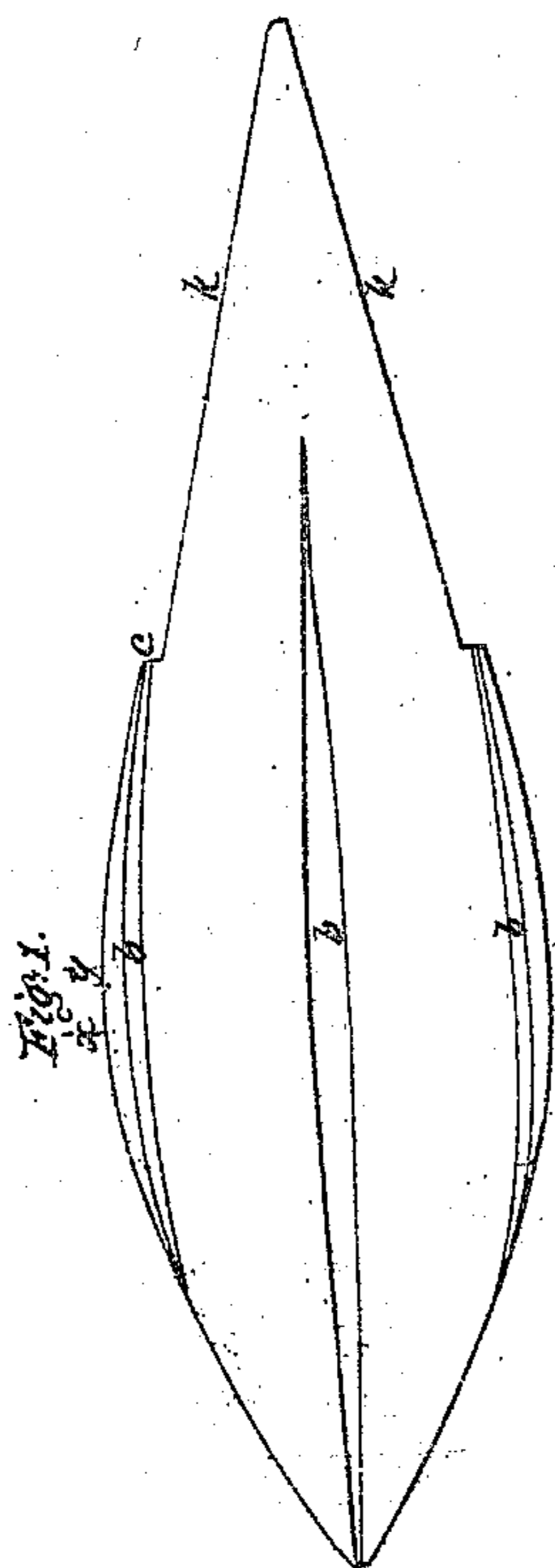
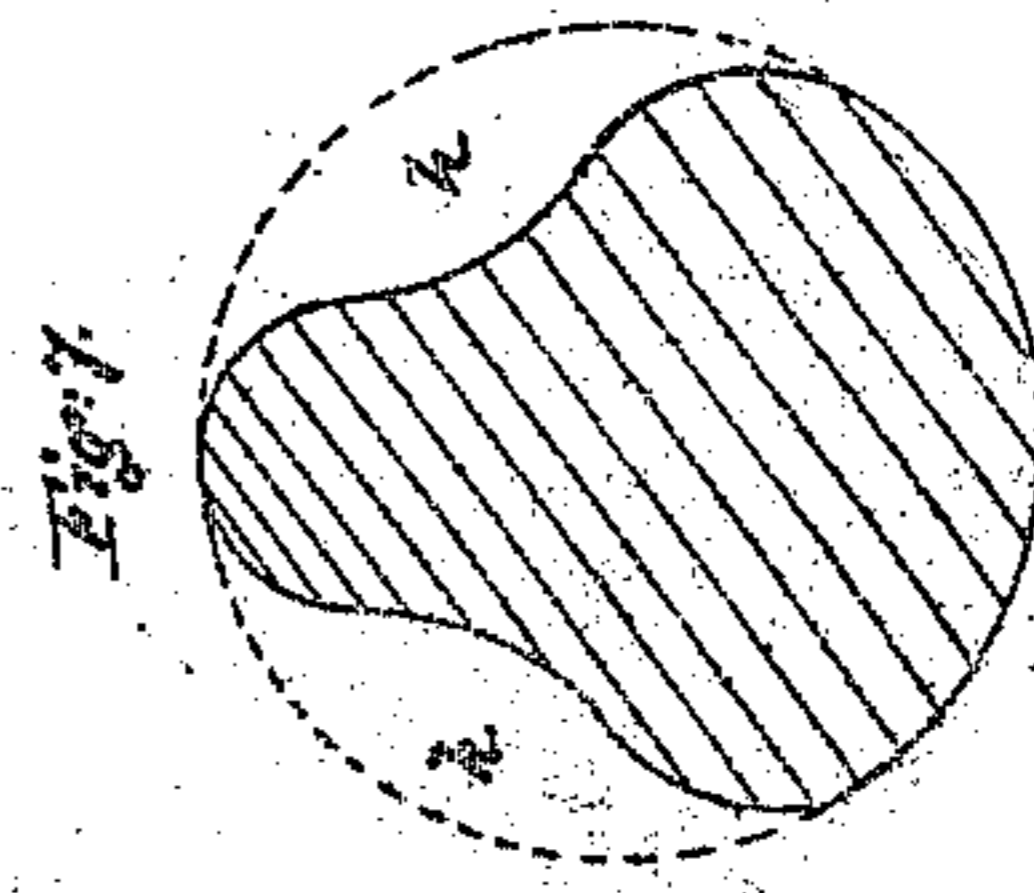
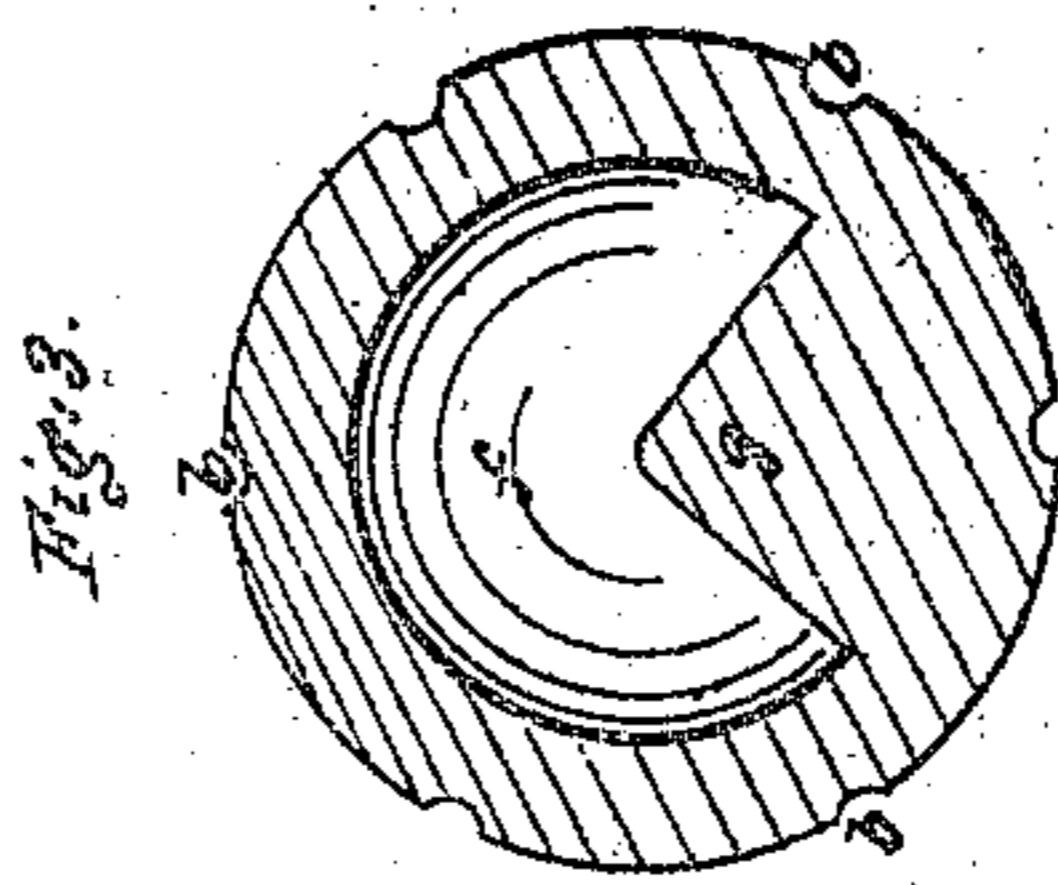
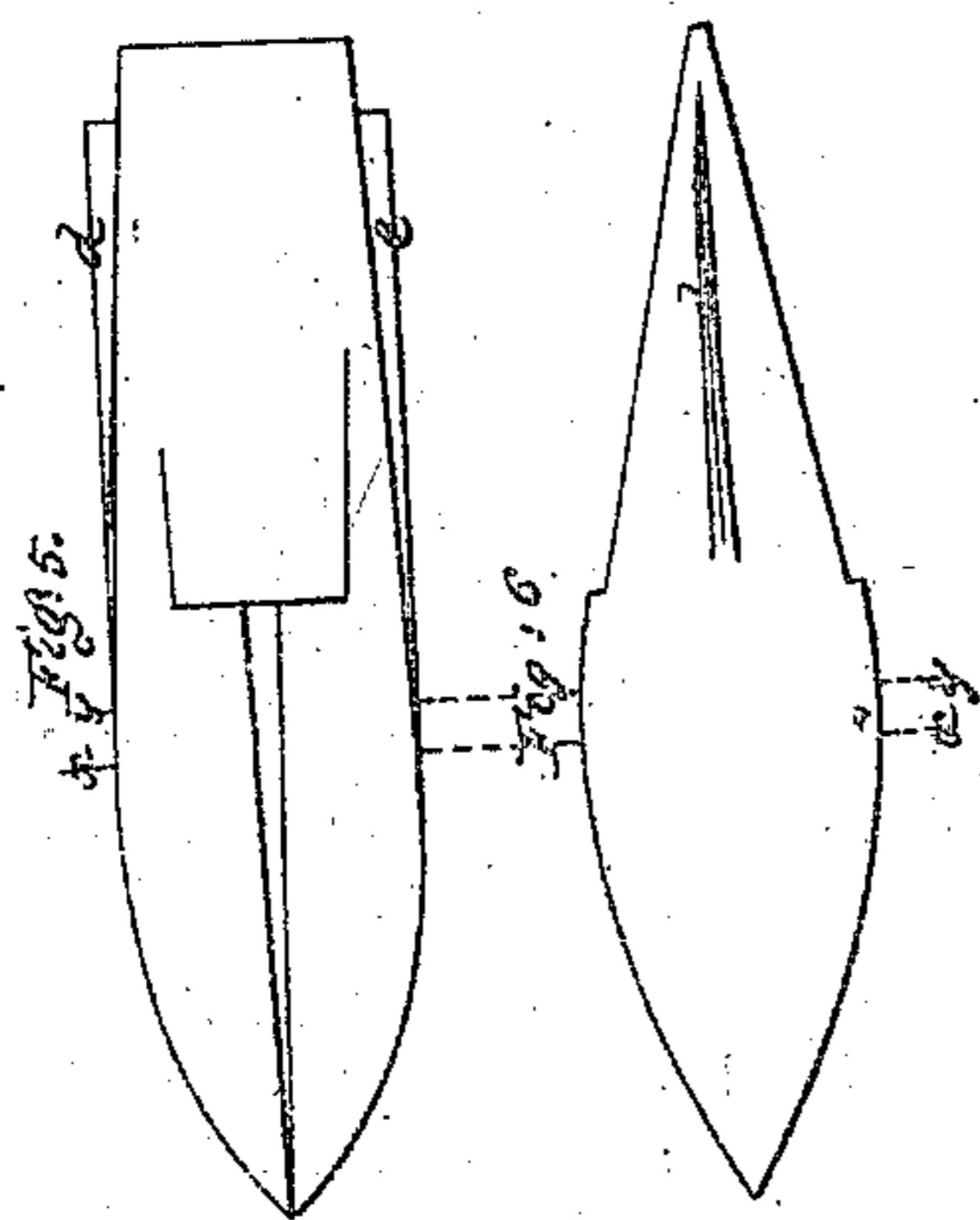


*J.F. Cleu.*  
*Projectile.*

*Patented Nov. 15. 1864*

*N<sup>o</sup> 45021.*



*Witnesses*  
*Henry T. Brown.*  
*John B. Reed*

*Inventor.*  
*John F. Cleu*

# UNITED STATES PATENT OFFICE.

JOHN F. CLEU, OF NEW YORK, N. Y.

## IMPROVEMENT IN PROJECTILES FOR FIRE-ARMS.

Specification forming part of Letters Patent No. 45,021, dated November 15, 1864; antedated November 6, 1864.

*To all whom it may concern:*

Be it known that I, JOHN F. CLEU, of the city, county, and State of New York, have invented a new and useful Improvement in Elongated Projectiles for Ordnance and Fire-Arms; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a horizontal longitudinal view of an explosive projectile constructed according to my invention. Fig. 2 is a central longitudinal vertical section of the same with the sabot applied. Fig. 3 is a transverse section of the same. Fig. 4 is a side view of the sabot. Fig. 5 is a side view of a projectile, illustrating a slight modification of my invention. Fig. 6 is a horizontal longitudinal view of the same. Fig. 7 is a transverse section of another modification of the projectile.

Similar letters of reference indicate like parts.

The object of this invention is to increase the length of range and accuracy of projectiles.

It consists, first, in the reduction of the caliber of an elongated projectile toward the rear end in a flattened form, which, in combination with a pointed front end, gives it a form substantially like that of a fish.

It consists, secondly, in so ballasting or distributing the weight of an elongated projectile as to keep a certain side of it always the lowest in its flight, thereby preventing its rotation, and tending to keep its longitudinal center in line with or tangential to the trajectory.

The projectile represented in Figs. 1, 2, and 3 is of cylindrical form for a short portion of its length between the lines  $x y$ . (Shown in Figs. 1 and 2.) In front of this cylindrical portion it is of nearly semi-spheroidal form, slightly flattened at its sides, so that its vertical is greater than its horizontal diameter, and terminating nearly in a point, as shown at  $a$ , and in rear of the said cylinder portion it is tapered to the rear end, the taper being slight vertically, as shown at  $j j$  in Fig. 2, but greater horizontally, as shown at  $k k$  in Fig. 1, the sides being nearly flat and resembling somewhat the tail of a fish, making the general form of the projectile substantially that of a fish, by which

form the formation of a vacuum behind it and the resistance to its flight is greatly reduced; but more especially when projected through water from a gun arranged below the surface. The projectile is also represented with longitudinal grooves  $b b$ , which have the effect of preventing it from turning. This projectile is to be fitted with a sabot,  $A$ , which fits the bore of the gun, and is hollowed out in such a manner as to fit the taper exterior of the rear portion of the projectile. It is made with shoulders  $c c$ , as shown in Fig. 1, to serve as bearings for portions of the sabot and enable the force evolved by the explosion of the charge of the gun to be more directly transmitted to it by the sabot.

The projectile represented in Figs. 5 and 6 is like that represented in Figs. 1, 2, and 3, except that it is furnished with fins  $d e$  on its upper and lower sides, substantially like the dorsal and ventral fins of a fish, which tend to prevent its rotation and steady it in its flight.

Both of the above-described projectiles have their weight so distributed that their center of gravity, while in motion, coincides or is in the same plane with its center of pressure—that is to say, its center of gravity is in a plane midway between the lines  $x y$ , which where comes the center of pressure against the air or other resisting medium through which it is projected.

The system of ballasting as applied to a hollow projectile is illustrated in Figs. 2 and 3, in which the internal cavity,  $f$ , is represented as having an inward protuberance,  $g$ , from the lower side, which brings a greater portion of the weight below than above the longitudinal center of the mass and always keeps that side the lowest in the flight of the projectile, thereby keeping the flattened rear portion of the projectile always upright, and preventing it from rotating in its flight. This system of ballasting, as well as the distribution of weight which keeps the center of gravity in the plane of the center of pressure, tends to keep the longitudinal center of the projectile in line with or tangential to the trajectory. Both of these features are applicable to other forms of elongated projectile than that represented. In a solid projectile I effect the ballasting by the hollowing out of the upper parts of the sides of the projectile, as shown at  $h h$  in the transverse section, Fig. 7, which is taken at the greatest

diameter of the shot or between the lines  $x y$ . The lower part of the circumference of the projectile fits the lower part of the bore of the gun, which is represented by a dotted circle, and the upper part bears against the upper part of the bore.

Projectiles with the several improvements herein specified may be used in guns of smooth bore, or with straight rifle-grooves.

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

1. The reduction of the size of an elongated

projectile toward the rear end in a more or less flattened form, substantially as and for the purpose herein specified.

2. So ballasting or distributing the weight of an elongated projectile as to keep a certain side of it always the lowest, substantially as herein described with reference to Figs. 2, 3, and 7, for the purpose herein set forth.

JOHN F. CLEU.

Witnesses:

HENRY MORRIS,  
GEO. W. REED.