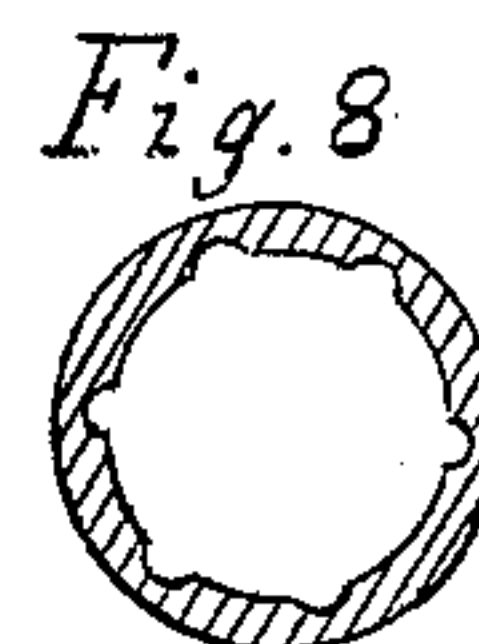
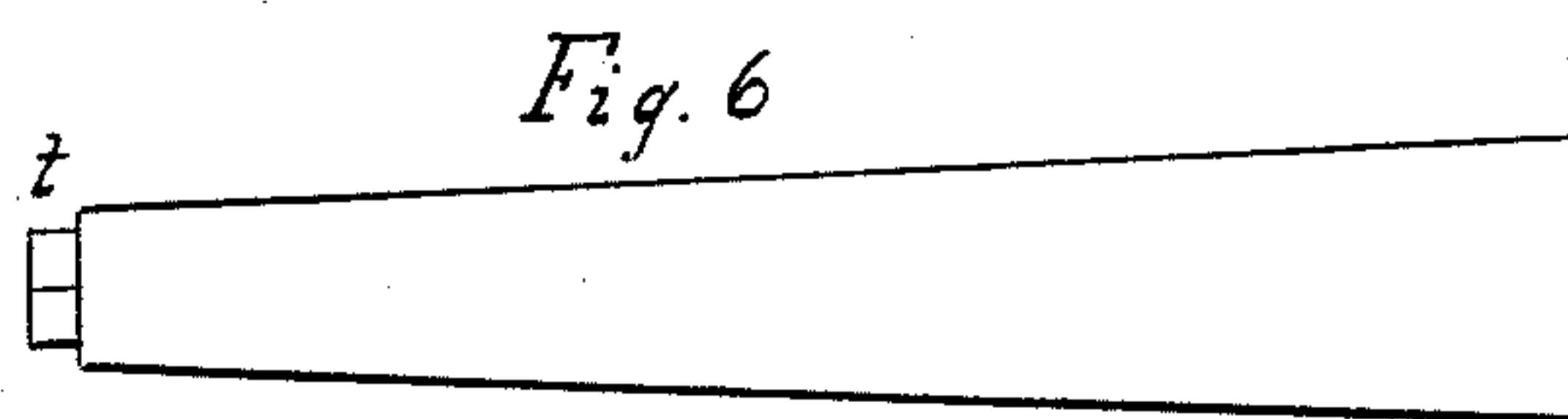
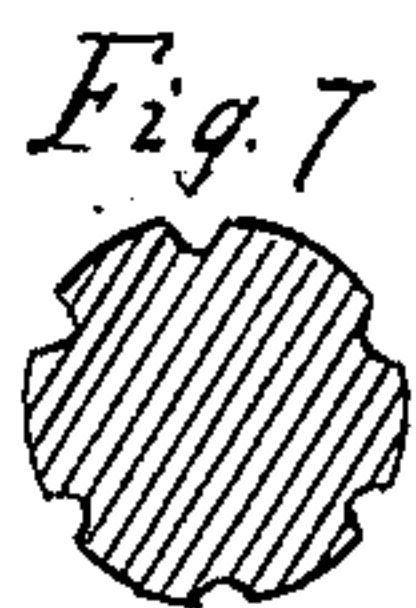
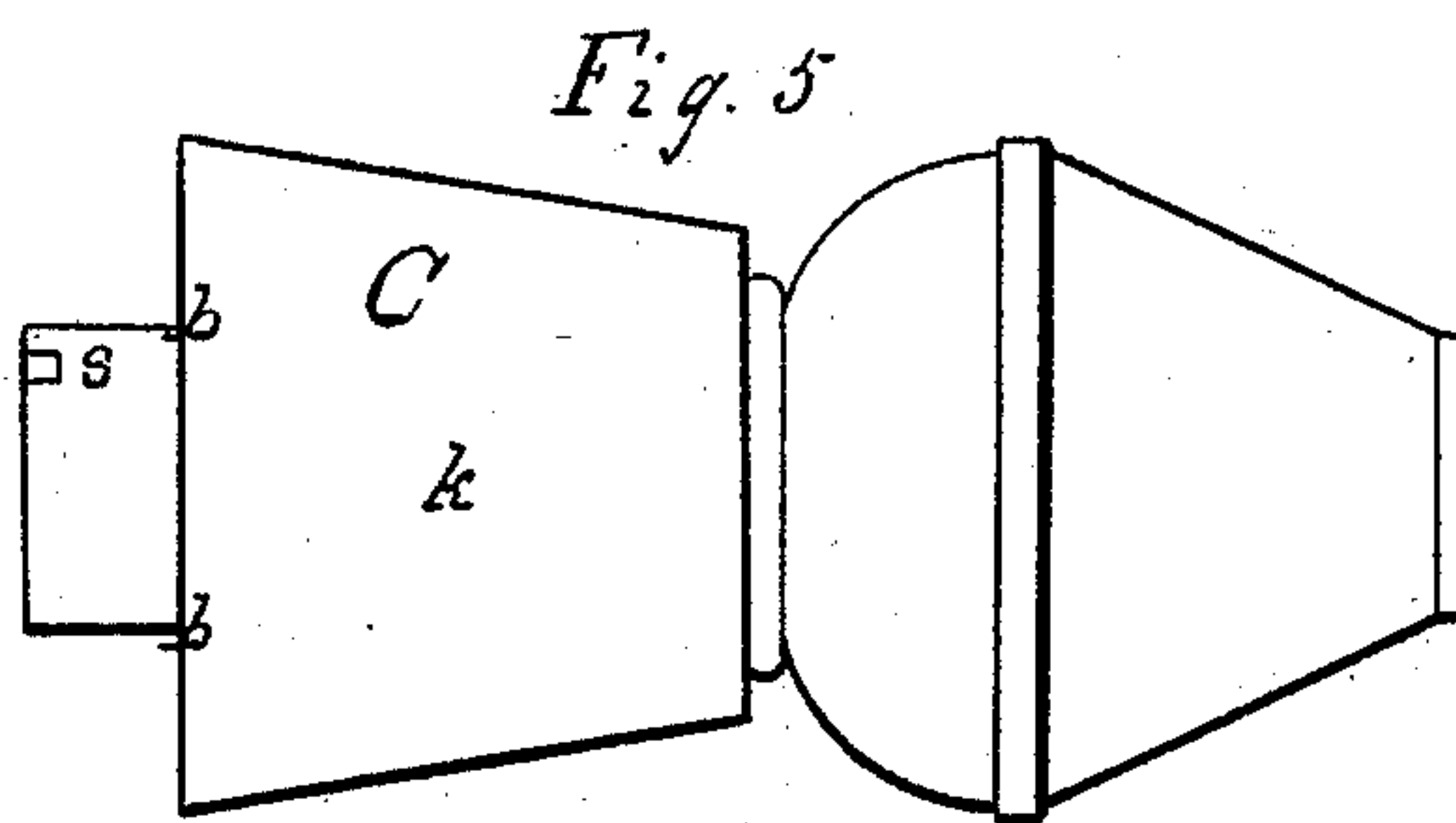
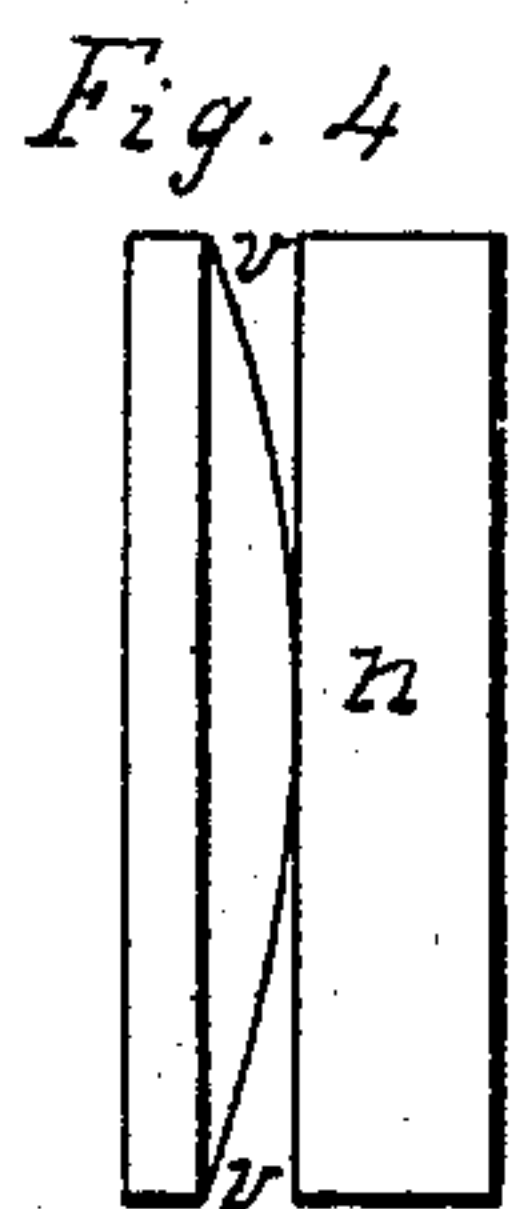
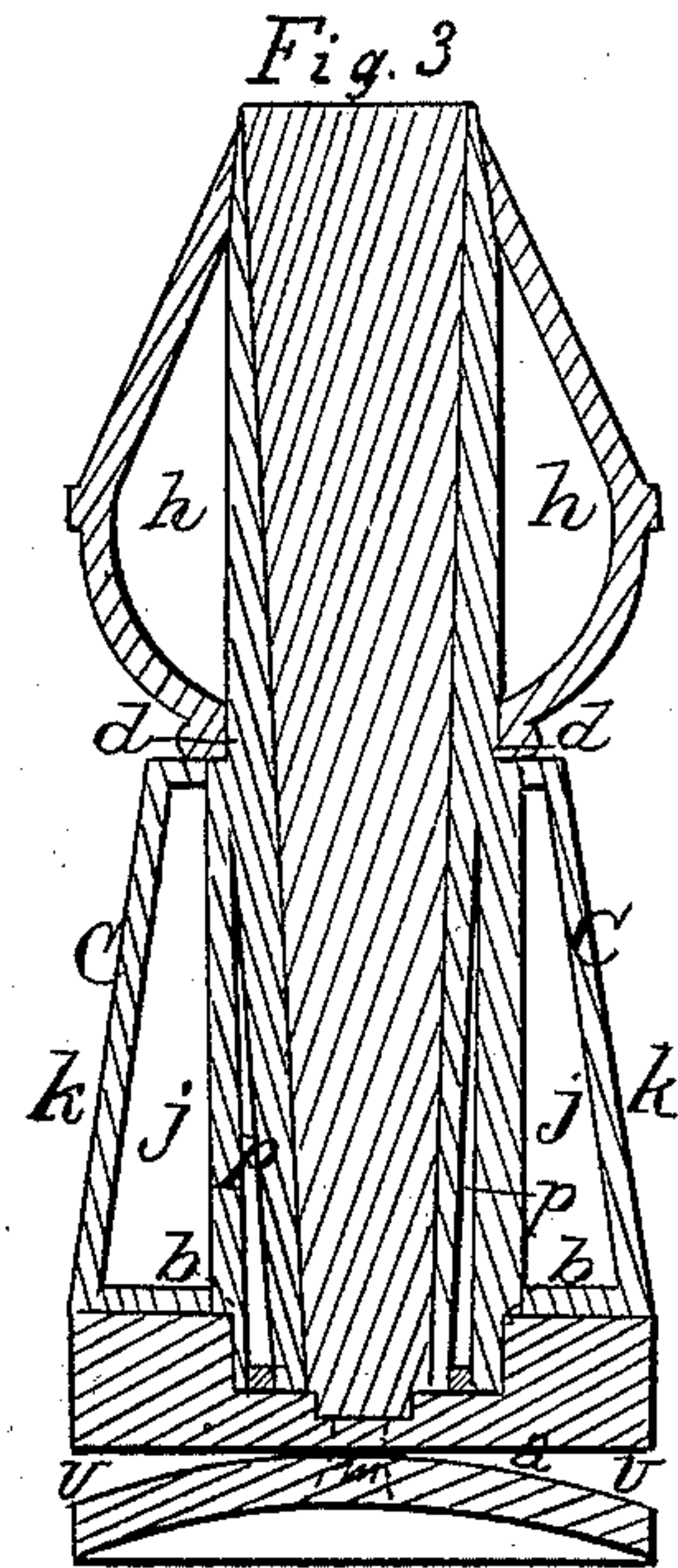
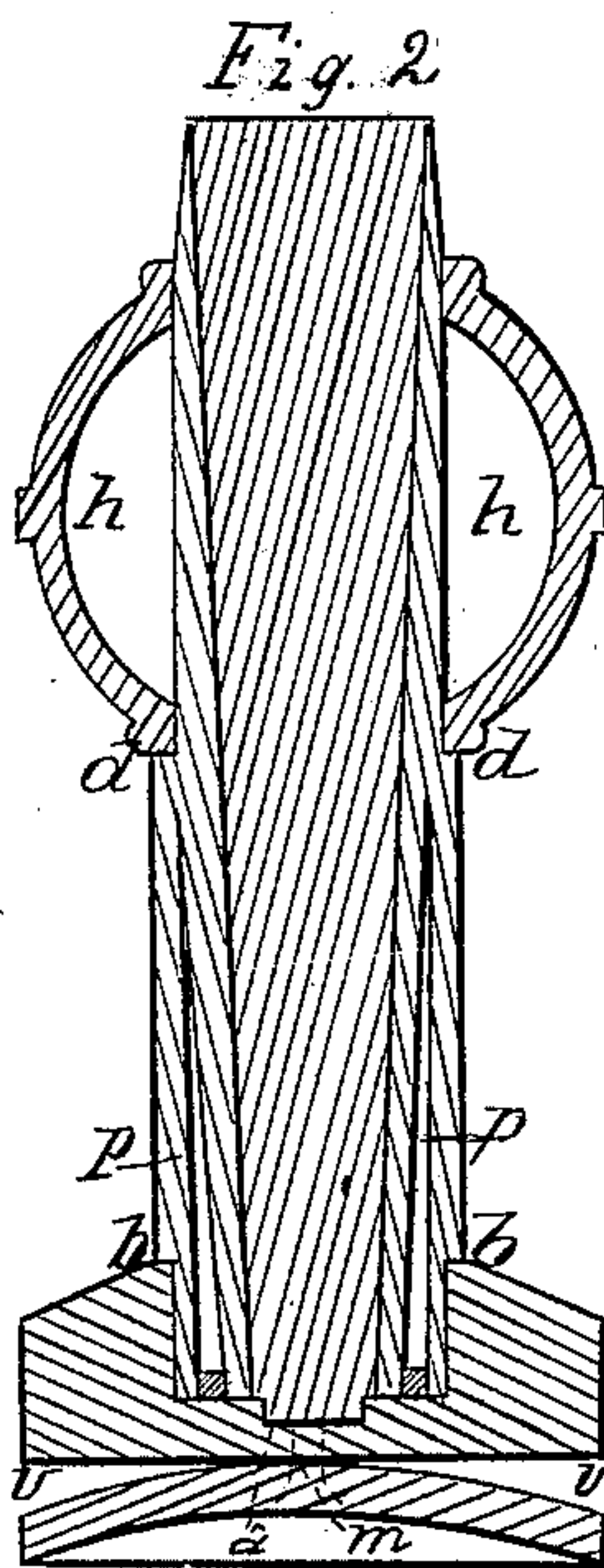
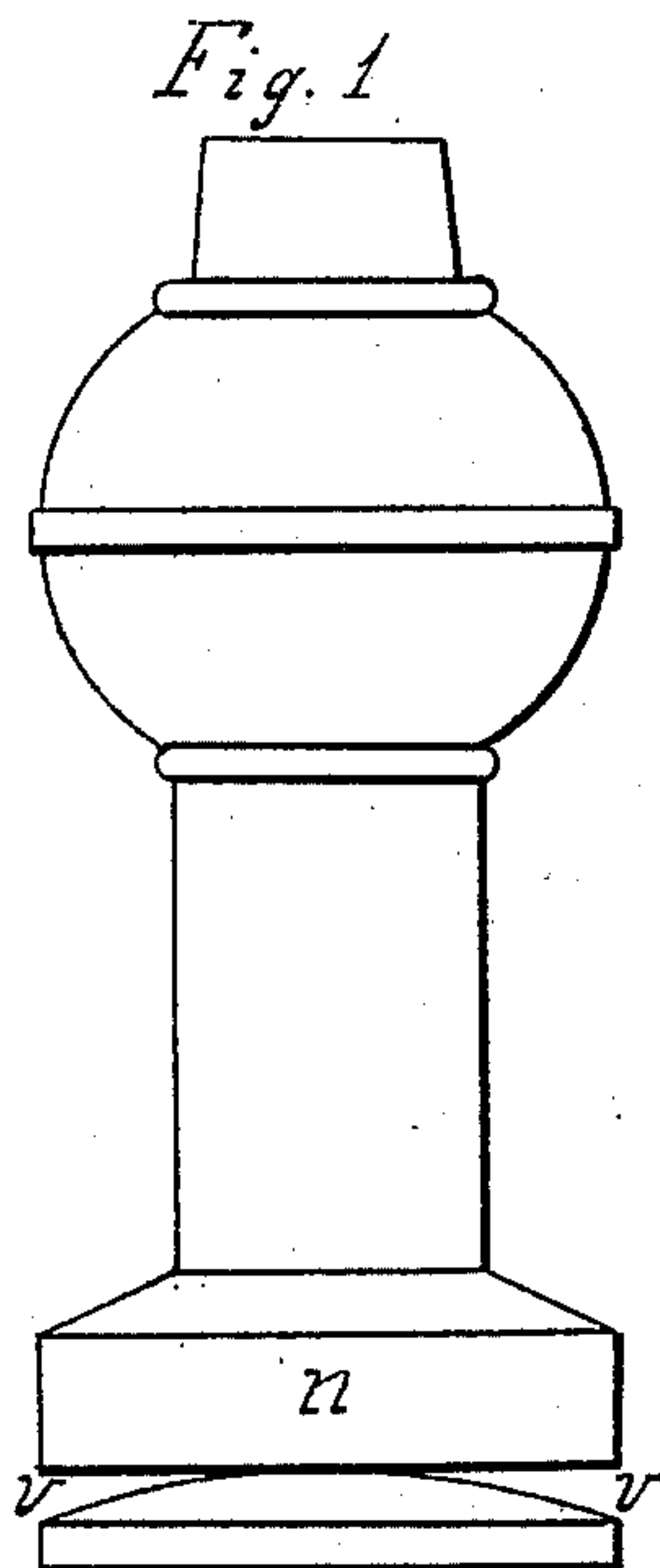


C. ARICK.  
Projectile.

No. 39,369.

Patented July 28, 1863.



Witnesses

David Rowland  
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Clifford Arick



# UNITED STATES PATENT OFFICE.

CLIFFORD ARICK, OF ST. CLAIRSVILLE, OHIO.

## IMPROVEMENT IN COMPOUND SUB-CALIBER PROJECTILES.

Specification forming part of Letters Patent No. 39,369, dated July 28, 1863.

*To all whom it may concern:*

Be it known that I, CLIFFORD ARICK, of St. Clairsville, in the county of Belmont and State of Ohio, have invented a new and Improved Projectile for Ordnance; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and the letters of reference marked thereon.

My invention relates to that class of projectiles for ordnance technically denominated "sub-caliber shot;" and it consists, first, in an arrangement of means whereby the bearings, or the bearings and casing, used for projecting from a gun a sub-caliber shot, are to be completely released therefrom during its flight without impeding materially its velocity or disturbing its direction, and at the same time, at a given range, insuring that the bearings, or the bearings and casing, or such parts thereof as may be desirable, shall pursue the same line of flight of the preceding shot to the same "bull's-eye" as an effective following shot; second, in so constructing and loading the bearings, or the bearings and casing, used for projecting from a gun a sub-caliber shot, with explosive, incendiary, or other destructive material, that the same shall be effective as a following shot, as hereinafter more fully indicated and explained; third, in so constructing the casing and bearings used for projecting a sub-caliber shot from a gun as to secure by air-passages from their front facings every possible relief against atmospheric pressure by the admission of air-currents from the front to the rear thereof, in the manner hereinafter more fully described; fourth, in so adjusting the relative weight of the sub-caliber shot and its bearings, or its casing and bearings, and the atmospheric causes acting thereon, impeding their flight, that at a given range, under a given projectile force, they may be so influenced that while their separation is insured they will be maintained in the same line of flight to the same bull's-eye, and yet not be so widely separated as to impair or defeat their united effect, either as against bodies in motion or bodies at rest; fifth, in so arranging the bearings, or bearings and casing, used for projecting from a gun a sub-caliber shot as to insure that the sabot or rear bearing thereof shall be thrown from the socket

by the action of an air-current or air-currents introduced from the forward facings thereof, as hereinafter more fully described.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawings, making a part hereof, wherein—

Figure 1 is a side elevation of my invention. Figs. 2 and 3 are longitudinal sections of the same. Figs. 4, 5, and 6 represent the parts of my improved projectile as they are supposed to be situated during their flight, wherein Fig. 6 represents a "sub-caliber bolt" after it is released from its bearings. Fig. 5 represents its loaded casing and bearings acting as a following shot, while Fig. 4 represents the released sabot and expanding disk, which have been thrown off by the action of the atmosphere, as will be more fully hereinafter described. Figs. 7 and 8 represent transverse sections of a corrugated casing for a sub-caliber shot, and a grooved periphery of the projectile itself, wherein Fig. 7 represents a section of the latter, and Fig. 8 represents a section of the former. The casing may also be corrugated externally, so as to aid the action of the internal currents in throwing off the sabot by an external one acting on its outer exposure, as well also, if desirable, to give greater relief to the following shot against atmospheric pressure.

To construct the sub-caliber shot which I design using with my invention, I take an elongated bolt, made of steel or other suitable material, of the form best adapted to the work for which it is intended. If a penetration of iron armor is the object, the face of the shot must be of such form—square or concave—and of such diameter as will produce, under the action of an adequate force, such opening as is desired therein. A square face is deemed best in all cases. It will then be elongated and formed in other respects so as to insure sufficient strength and weight of metal and perfection of flight, as to contribute in the highest degree to the desired end. A square-faced elongated tapering shot is deemed best. In other words, the shot or bolt is to be constructed mechanically on the same principle as any



other tool, having reference to the use to be made of it and the manner of that use. That the shot or bolt thus constructed may the more freely make its exit from its bearings, whether it be cylindrical, square, hexagonal, or of other form transversely, or of uniform size, or at a taper longitudinally, I make and construct a corrugated casing with internal or external air-passages, either or both, as may be desirable. I also groove the outer surface of the shot, if necessary, for the same purpose. These internal air-passages I regard as important, because the atmospheric conditions existing externally in the immediate vicinity of a flying shot cannot be relied on, under any circumstances, as safely to throw the sabot from its socket as the internal pressure secured thereby. The grooves in the periphery of the shot may be so constructed, in connection with these corrugations and with reference to this pressure, as to facilitate the spiral motion of the departing shot. By these air-passages through the following shot it is manifest its line of motion may be preserved and its range enhanced and regulated. The form of the shot represented in the drawings as probably best adapted to these conditions is one with a regular taper from its front to its rear, as represented by Fig. 6, and it is provided at its rear end with a projection, as shown at *t*, which is designed to meet a corresponding opening in the sabot, to be truly centered in its place, and made of such angular form as to prevent its turning on its axes, and yet at the same time to offer as little resistance by friction to the exit of the shot as possible.

To construct the casing I propose to use as a bearing for a sub-caliber shot, and as and for a following shot, I take a metal tube of uniform external diameter, made of sufficient strength and suitable material, and of such an internal form as will suit it to the reception of the proposed sub-caliber shot cast or turned down so as neatly to fit the same, and of the same length of the shot, excluding its rear projection, *t*; or the shot may be so made as to its length as to allow of a slight projection at its front end. To relieve the shot of friction, a slight increase of size may be given this receptacle, commencing near the front end of it and ending near its rear, so as to have a close fit of the shot only at the extremities of the tube, and within the socket for the reception of its rear projection, *t*.

Having thus provided a receptacle for the shot, I turn down the forward end of the tube so as to admit a forward bearing to slip over it, of the caliber of the gun from which it is to be fired, less a proper windage, and so that the same will come to a suitable shoulder, as shown at *d* in Figs. 2 and 3. If a tube is used with external corrugations or air-passages along its periphery, it would be necessary to use heavier material in the construction of the tube than desirable. To obviate this corresponding corrugations may be introduced through the internal opening in the bearing.

This, however, may not be necessary, and no representation thereof is made in the drawings. I turn down the rear end of the tube on its external surface so as to form a suitable bearing and shoulder for the reception of the sabot, as shown at *b* in Figs. 2, 3, and 5. The sabot is provided with a socket adapted to this bearing, and also within the same and at its precise center an angular socket for the reception of the projection *t* at the rear end of the shot, as shown at *a*.

The sabot and expanding disk to be used with my improved projectile are constructed of suitable material, in accordance with any of the approved forms in general use. I have represented in the drawings an arrangement constructed in two parts, wherein the part marked *n* is made of sufficient strength of material to withstand the explosive force of the charge in the gun, and of such form as to apply to and properly fit the other parts of my arrangement. It operates also as a rear bearing for the shot and its casings, and is of the same caliber of the gun, less a suitable windage.

The expanding disk is constructed separately of suitable material, and afterward securely fastened and combined with the sabot by means of a through-and-through rivet, as shown at *m*. In the space *v* between the sabot and the convex surface of the expanding disk suitable lubricating packing is introduced, so that when the action of the powder on its concave surface is exerted so as to force it up against the sabot the rifle motion will be imparted to all the parts of the projectile, a most perfect closing of the windage, with no injury to the gun, and a lubrication which will most perfectly counteract friction.

The forward bearing introduced on the tube is made of any suitable material, and of any desired form, and of sufficient strength to prevent its breaking down in the gun, and is intended to continue with and constitute a part of the following shot. To render it effective for that purpose, it has provided within it a chamber, *h*, for the reception of incendiary, explosive, or other destructive material.

When the receptacle for the sub-caliber shot is formed at a taper, as represented in the drawings, it will leave an unnecessary weight of metal at the rear end of the tube. To obviate this, and at the same time add greater efficiency to the following shot, I construct a conical chamber therein, as indicated at *p* in Figs. 2 and 3, for the reception of an additional charge of incendiary, explosive, or other destructive material. The location of this chamber being within the diameter of the face of the preceding shot is deemed especially important to the following shot.

If desirable, I construct a hollow cone, *C*, designed to slip over the tube intervening the bearings, and with it I form an additional chamber for the reception of destructive material, as shown at *j* in Fig. 3. This is designed merely as a supplemental chamber, and may



be used or not, as found efficient. It may be constructed of glass or other suitable material.

Some suitable arrangement or fastening must be made so as to prevent the sabot from turning on its axis. An opening, as shown at s, in the rear of the tube, into which a strong rivet within the socket of the sabot is loosely fitted, will be sufficient. Some analogous means must be provided for the front bearing, and also, when used, for the cone C, as well also to retain the cone on the tube after the sabot is thrown off, as a part of the following shot. I have arranged these chambers in a conical form, with their apices toward the forward end of the shot, in the belief that this is the most favorable condition for their efficiency and action. It is obvious, however, that they may be of any desired form, and that they may be subdivided indefinitely. It is alike obvious that the supplemental chamber C may be constructed in rigid combination with said tube, and of any desired form and size within the caliber of the gun.

The chambers *j* and *p* are provided with a suitable plug or screw to close their rear ends after the same are charged; or they may be constructed with closed ends and be filled and plugged from any other point.

The relative weight of the sub-caliber shot and the following shot, to be used in combination, as herein indicated, the atmospheric causes influencing their flight and their initial velocity are to be so considered, adjusted, and regulated with reference to a given range as to insure the best practicable result, without producing too wide a divergence by their modified velocity, or in the time of their arrival at the object to be destroyed, so as not only to insure a proper and separate action of the two shots, but the best combined action, as against bodies in motion or bodies at rest. This may be done by increasing or diminishing their relative weight, or by the use of additional air-passages through the bearings of the following shot, so as more nearly to equalize the atmospheric pressure on the face of both shots, not, however, by any change of the weight or form of the sub-caliber shot, as we have supposed it already to be the best in these respects for its intended work.

It is obvious that for incendiary or explosive purposes many of these conditions are applicable to fixed bearings attached to any sub-caliber bolt or shot, or that they may be made in rigid combination with it, so that while the bearings may be broken, either by concussion or by the crushing effect at or within the object, they will, nevertheless, with their contents, not be thrown off, but will in their broken and crushed state be carried forward by their own momentum and follow the course of the penetrating shot, depositing their particles and their contents within or beyond its target, and this, too, without in any way interfering with the efficiency of the shot for penetrating purposes. There can be no doubt, however, that the highest results can be attained in the

use of a combined sub-caliber and a following shot.

This projectile is intended to be fired from any of the rifled guns in common use, and involves no modification thereof. It is adapted to the bore of any gun by increasing or diminishing the diameter of its bearings.

Having once determined the dimensions of the sub-caliber shot to be used for the best practical effects, those fired from rifle-guns of the largest caliber will certainly insure the most satisfactory results.

The object of my invention is to secure, by combining with a sub-caliber shot, all the reliefs attainable in order to produce the highest penetrating effects, a suitable explosive force, increased velocity, diminished weight, diminished atmospheric pressure, and diminished penetrating resistance all contributing to that end, and at the same time insure that from the same gun with the same charge, at a given range, and in the use of the essential bearings thereto project an effective following shot, going to the same bull's-eye, whereby may be penetrated the sides of ships of war, iron clad or otherwise, and at the same time fire, by the means indicated, the opening made therein, or to explode within it, or to deposit beyond the same and between decks a self-igniting explosive or other destructive material for the destruction of such ships and their crews.

The further object of my said invention is to secure similar results in the use of the same means against iron-clad or otherwise-constructed land defences.

To operate my invention the parts of it are constructed substantially in the manner described, and may, for convenience of transportation or greater security, be kept separate until at the scene of their use, when they may be put together, secured, and charged as indicated, and thus rendered ready for service. For its effective operation the philosophical considerations before indicated are relied on to insure results, being projected at a high velocity, separated by atmospheric action, and finally, by a proper adjustment of parts in view of these considerations, insuring the indicated action.

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

1. Loading with incendiary, explosive, or other destructive material the bearings, or the casing and bearings, used for projecting from a gun a sub-caliber shot.

2. So arranging the bearings used for projecting a sub-caliber shot or bolt from a gun that on its flight the shot and its bearings, or its bearings and casing, shall be separated by atmospheric and other causes in such manner that the sub-caliber shot shall act as a preceding penetrating tool, and its bearings and casing, or either or all of them, as may be the most desirable, shall act in conjunction with it as an effective following shot.



3. A casing for a sub-caliber bolt or shot with its bearings arranged with suitable chambers for the reception of explosive, incendiary, or other destructive material, to be operated in any manner as and for a following shot.

4. A corrugated and grooved casing, or with otherwise-perforated bearings for a sub-caliber shot, or a grooved shot, whereby the atmosphere is admitted from its front to its rear, in the manner and for the purpose described.

5. A supplemental chamber made of glass or other suitable material, and adapted to the bearings and casing for a sub-caliber shot, and as an auxiliary chamber for the reception of destructive material to increase the efficiency of a following shot, substantially as and for the purpose set forth.

6. A sub-caliber shot, in combination with an incendiary shell acting as its bearings, or its

casing and bearings, and whether detachable or not, substantially as described.

7. The introduction of air-passages through the bearings, or the bearings and casing, of a sub-caliber shot, for regulating the flight of a following shot, substantially as described.

8. A combined sub-caliber shot and following shot, with their accompanying chambers for the reception of destructives, with its constructed and resulting openings for the admission of air from its front facings to its rear, constructed and operating substantially as and for the purposes set forth.

June, 1863.

CLIFFORD ARICK.

Attest:

DANL. ROULAND,  
R. LEECH.