Dec. 23, 1924. 1,520,131

H. JACOB

OBLONG DROP PROJECTILE

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Fig.1.

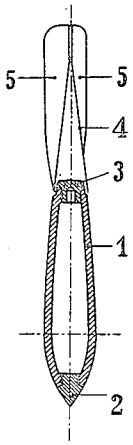


Fig.2.

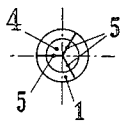


Fig.3.

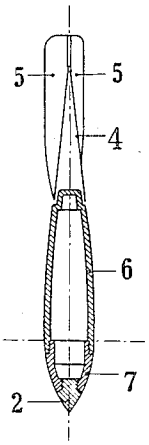


Fig.4.

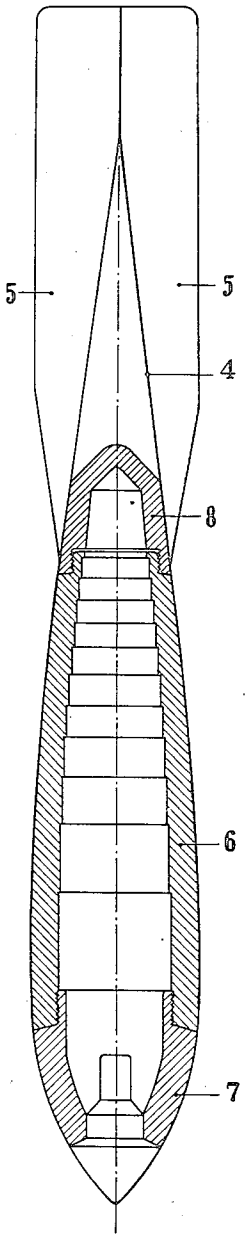


Fig.6.

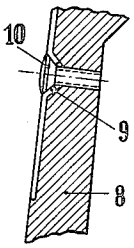
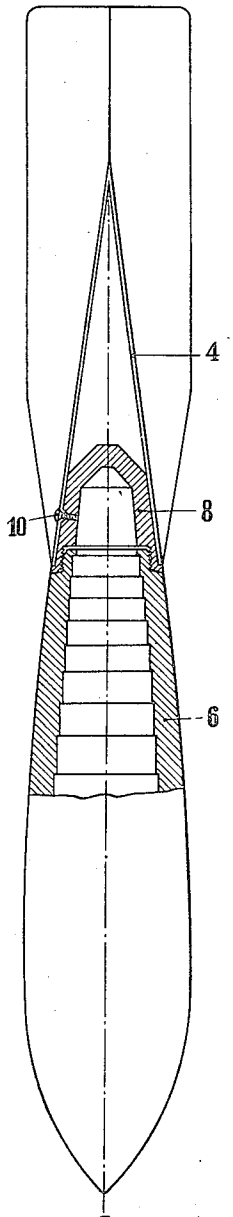


Fig.5.



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Fig. 7.

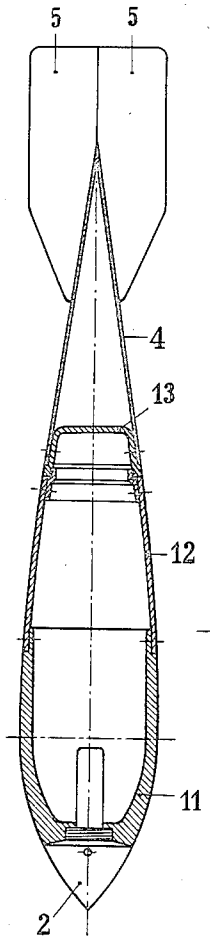


Fig. 8.

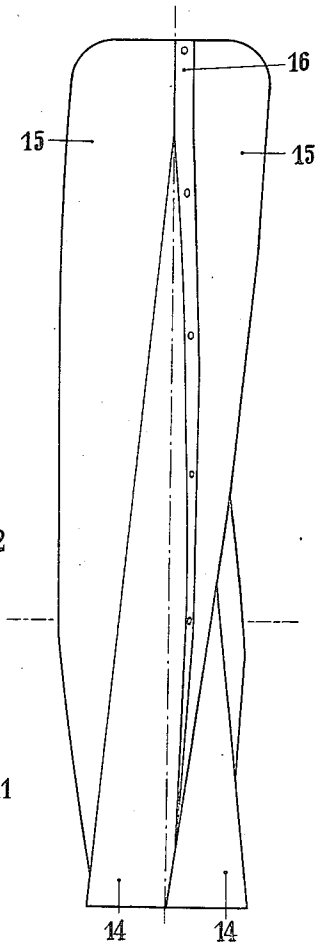


Fig. 10.

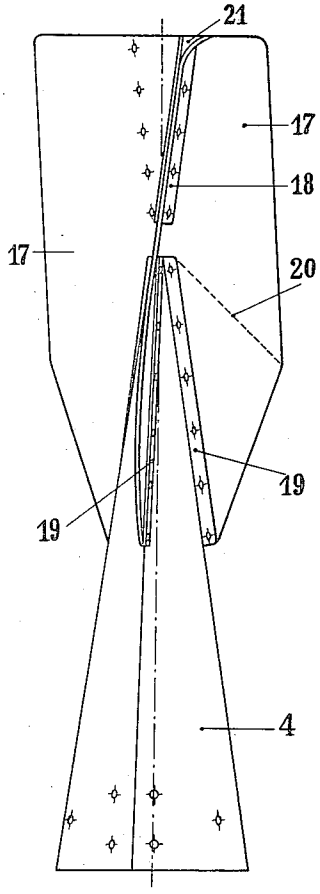


Fig. 11.

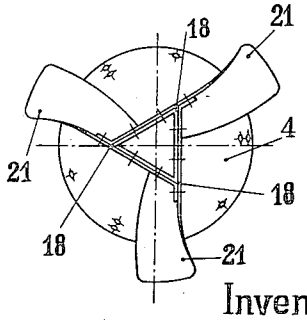
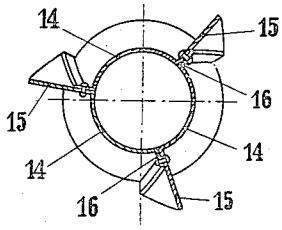


Fig. 9.



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Patented Dec. 23, 1924. 1,520,131

UNITED STATES PATENT OFFICE.

HEINRICH JACOB, OF FRIEDENAU, GERMANY, ASSIGNOR TO THE FIRM OF OPTISCHE ANSTALT C. P. GOERZ ATKIENGESELLSCHAFT, OF FRIEDENAU, NEAR BERLIN, GERMANY.

OBLONG DROP PROJECTILE.

Application filed August 30, 1921. Serial No. 496,953.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, HEINRICH JACOB, a citizen of the German Republic, and resident of Friedenau, near Berlin, Germany, have invented certain new and useful Improvements in and Relating to Oblong Drop Projectiles, of which the following is a specification.

The present invention relates to the construction of long shaped drop projectiles and has for its object to ensure stability of the projectile in its trajectory and at the same time best utilization of the material, easy production and protection of the lightly constructed steering elements against destructive influences of arising centrifugal forces.

For these purposes the projectile is given a lancet-shaped longitudinal section, the steering-tail being formed by a hollow cone-shaped sheet-metal shell. This construction allows concentration of the main part of the mass of the projectile within the body of the projectile without accumulation of dead material, while the air-resistance centre is located as far as possible back within the range of the light sheet-metal steering shell. Other features of the invention will appear from the following specification, with reference to the drawings.

Figs. 1 and 2 illustrate the principles of construction and shape of the projectile in longitudinal section and a plan view thereto.

Figs. 3 and 4 are longitudinal sections of two different constructions of the projectile.

Figs. 5 and 6 show special means for fastening the rear rudder to the explosive chamber respectively to the screw-cap of the latter.

Fig. 7 illustrates another mode of developing the explosive chamber of the projectile, particularly required for heavy mine-shells.

Figs. 8–11 illustrate two ways of connecting the hollow cone-shaped rear rudder with twisted steering-surfaces.

In all illustrated modes of construction of the projectile body, the same has apart from the steering-surfaces a lancet-shaped longitudinal section in which any protruding edge and any break in the curve of the outer demarcation lines has been avoided carefully contrary to hitherto known constructions of shells. Common to all illustrated shapes of the shell is the formation of the body proper of the bomb, of two oppositely arranged cup-shaped, viz, half barrel-shaped sections, the rear one running out into a pointed, hollow sheet metal steering-tail connected thereto. Thereby a comparatively large useful length is obtained for the entire projectile, which facilitates the flow of air considerably and whereby a very great falling velocity is obtained.

The centre of air-resistance is by these means simultaneously shifted far away from the centre of gravity of the projectile, thus producing favorable stabilizing conditions in the air during descent.

In order that the dropping projectile may develop a rotary velocity in its descent sufficient to release a centrifugal safety device for its fuse, it is necessary to impart to the steering-surfaces attached to the steering-tail a screw-shaped twist. Such steering surfaces can easily be made by constructing the hollow cone-shaped sheet-metal rear rudder of several parts, the edges of which are bent out of the cone-surfaces so that they form by themselves steering-surfaces upon the cone. The bordered edges can particularly be so shaped, that they form steering-surfaces for the projectile.

Arched steering surfaces made of thin sheet metal can only with difficulty be so constructed and connected that they are adapted to resist to the air pressure and to centrifugal forces without undergoing deformation. These difficulties can considerably be reduced by making the steering-surfaces out of sheet-metal strips, level at the rear end projecting beyond the cone-shaped steering-tail and arranged oblique to each other and the cone axis thus that their joints form the outline of a pyramid, while those of the cone surfaces of the steering tail run parallel to the axis and whereby the transition from the level part of the steering-surfaces to the edge of the joint on the steering tail is effected by a corresponding arching of such surfaces.

In the construction according to Figs. 1 and 2 of the drawings, 1 designates the

strong-walled chamber for the explosive. This explosive chamber is at its forward end provided with a fuse which on the drawing is only diagrammatically illustrated and designated with the numeral 2 and at its rear end with a cap for charging the projectile with explosives. 4 is the hollow cone-shaped rear rudder or tail and 5 are the steering-surfaces of which three are provided as illustrated. The drawing shows that the transition of the arched surface of the explosive chamber 1 to the cone-shaped surface 4 of the steering-tail is effected without any break in the outline or a shoulder, so that the air passing the body 1 during descent can flow along the wall of the tail 4 between the steering-surfaces 5 without resistance.

The projectile according to Fig. 3 differs from the one shown in Figs. 1 and 2 in that the explosive chamber is composed of two separate chambers 6, 7 each of cup shape and connected with each other in proximity of the largest diameter of the projectile.

The fuse forming the point of the projectile has again been marked 2. In this construction the cap 3 of the explosive chamber has been omitted and charging has to be effected from the point end of the projectile. The steering-tail 4 has again been fastened to the explosive chamber 6 without any break or shoulder.

According to the illustration of Fig. 4 the explosive chamber is like in Fig. 3 composed of two cup-shaped sections 6, 7 placed opposite each other with their widest opening, the cup-part 6 being however open at its bottom end and closed by a separate bottom cap 8.

This development of the rear end of the explosive chamber facilitates assembling of the steering-tail and enables inserting of a smoke-set very important for shooting practice especially for exercising purposes. The construction according to Figs. 5 and 6 corresponds to the one of Fig. 4 with the exception of a special arrangement for fitting the steering-tail 4 upon the bottom cap 8 of the explosive chamber 6, 7. The bottom cap 8 is as illustrated by the enlarged scale drawing of Fig. 6 provided with a tapered recess 9 into which material of the sheet-metal part 4 has been pressed.

According to the illustration, displacement from the recess is prevented by screws or rivets 10, but both are not indispensable for this mode of fastening.

Fig. 7 shows one way of constructing the drop projectile especially adapted for heavy mines. The explosive chamber consists in this case of a strong walled forward section 11, which again receives the fuse 2 at its point and extends to the rear into a considerably thinner sheet-metal casing 12 closed by a bottom cap 13. This bottom cap carries the thin sheet-metal steering-tail 4 with the steering-surfaces 5.

The combination of the explosive chamber of one strong walled resistible head-piece 11 and one considerably thinner part 12 corresponds to the purpose and strain of a mine shell supposed to contain as much explosive as possible and at the same time capable of entering a resisting target.

Figs. 1–7 do not show special means for connecting the steering-cone with the steering-surfaces 5. How this connection may effectively be performed has been illustrated in Figs. 8–11.

According to Figs. 8 and 9 the steering-surfaces are made in screw shape, the joints running likewise out upon the casing surface of the steering-tail in screw lines. The difficulty of shaping and retaining the shape during transport and descent has been overcome thereby, that the hollow cone-shaped steering-tail of sheet-metal is composed of several separate parts 14—according to the showing of the drawing three in number—the edges running out in screw shape and are bent out of the cone-surface. These bent out surfaces form a safe support for the steering-surfaces. According to the drawing both edges of the steering-tail sections are bent out of the cone surface and one edge is so far broadened, that it forms a steering surface in itself. The steering-surfaces formed by one edge of the sections 14 of the steering-tail are marked 15, the edges of the sections 14 contacting therewith are marked 16.

Differing from the construction according to Figs. 8 and 9, the steering-surfaces accordings to Figs. 10 and 11 are shaped substantially level. The effect of screw-surfaces is in this case obtained thereby that the sheet-metal plates forming the steering-surfaces are thus inclined toward each other in their part 17 protruding beyond the rear end of the steering-tail 4 and arranged in respect to the axis of the cone 4 that their joining edges 18 form the edges of a pyramid. (According to the drawing a three cornered pyramid.)

The edges 19 of the steering-surfaces together with the cone-surfaces of the steering-tail 4 run out parallel to the cone axis.

The transition of the level section 17 of the steering-surfaces into the edges 19 of the cone-surface of the steering-tail 4 is obtained by corresponding arching of the steering-surfaces commencing about at the line 20 and continuing gradually towards the edge 19.

The steering-surfaces with their level sections 17 act in this case mainly as screw-surfaces, while the arched surfaces between the lines 20 and 19 do not participate in the screw effect.

The steering-surfaces can be bent over at

the outer corners of the level sections 17, viz. at the point 21 in the sense of an increasing pitch of the screw-surface.

What I claim is:

1. A drop projectile comprising a strong walled explosive chamber and a hollow cone-shaped steering tail of sheet metal, these elements forming together a lancet shaped body with a substantially smooth outer surface having a pointed rear end.

2. A drop projectile comprising a strong walled explosive chamber decreasing in diameter towards both its ends and a hollow cone-shaped steering tail of sheet metal, these elements forming together a lancet shaped body with a substantially smooth outer surface having a pointed rear end.

3. A drop projectile comprising a three part strong walled explosive chamber, the two end portions of which are in the form of hollow caps and a hollow cone-shaped steering tail of sheet metal mounted on the rear cap of the explosive chamber, the explosive chamber with the steering tail forming together a lancet shaped body with a substantially smooth outer surface having a pointed rear end.

4. A drop projectile having a lancet shaped longitudinal section comprising a strong walled explosive chamber, and a hollow cone-shaped steering tail of sheet metal forming the pointed rear end of the lancet-shaped body, the steering tail being fixed to the explosive chamber by metal of the steering tail being pressed into suitable recesses within the wall of the explosive chamber.

5. A drop projectile of lancet shaped longitudinal section comprising a strong walled explosion chamber and a hollow cone-shaped steering tail forming the pointed rear end of the lancet-shaped body provided with steering surfaces consisting of sheet metal strips the joint edges of which running in screw lines on the tail surface.

6. A drop projectile of lancet shaped longitudinal section comprising a strong walled explosion chamber and a hollow cone-shaped steering tail provided with steering surfaces, the steering tail composed of several sections with screw shaped running joining edges bent out from the cone-shaped surface of the steering tail, said bent out edges forming abutments for the steering surfaces provided on the steering tail.

7. A drop projectile of lancet shaped longitudinal section comprising a strong walled explosion chamber and a hollow cone-shaped steering tail, the steering tail composed of several sections with screw shaped joining edges bent out from the cone-shaped surface of the steering tail, pairs of joining edges comprising one edge of width sufficient to make such edge itself a steering surface.

8. A drop projectile of lancet shaped longitudinal section comprising a strong walled explosion chamber and a hollow cone-shaped steering tail provided with sheet metal steering surfaces protruding over the rear end of the hollow steering-tail, the portions of the steering surfaces protruding over the end of the steering-tail being so positioned with relation to each other and connected with each other that the connected portions form a steering-tail reinforcing pyramid.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HEINRICH JACOB.

Witnesses:

HERMAN REISING,

JULES HUMBRECHT.