T. K. NORTH.

BOMB.

APPLICATION FILED JULY 7, 1917.

1,298,377.

Patented Mar. 25, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

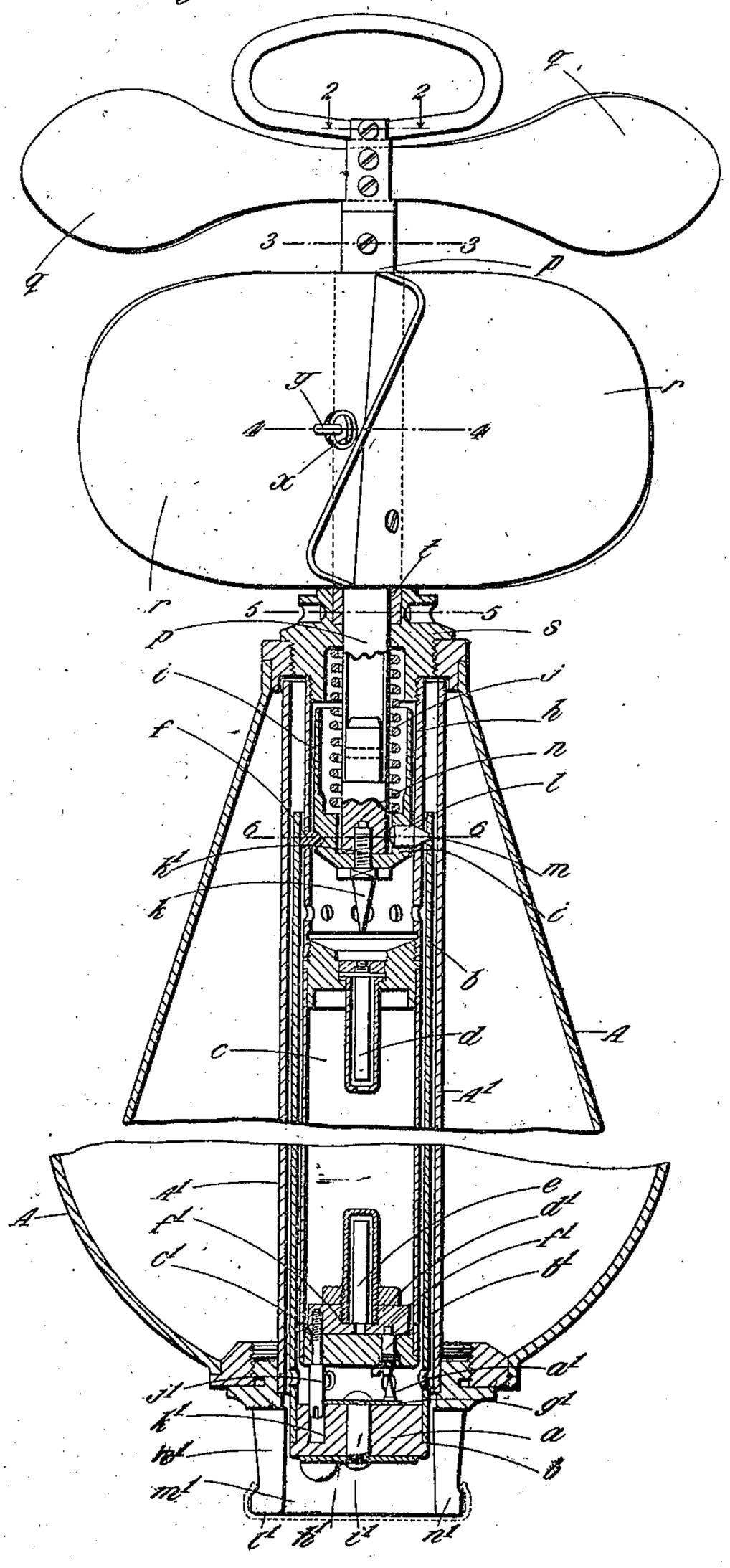


Fig. 2.

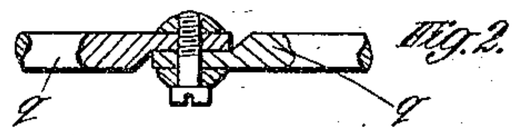


Fig. 3.

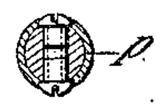


Fig. 4.

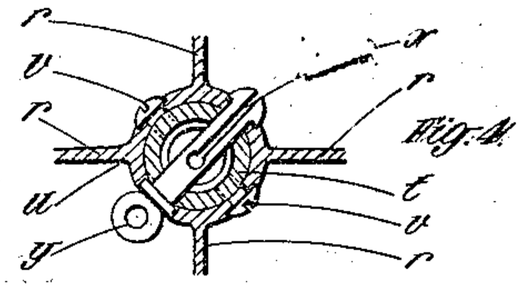


Fig. 5.

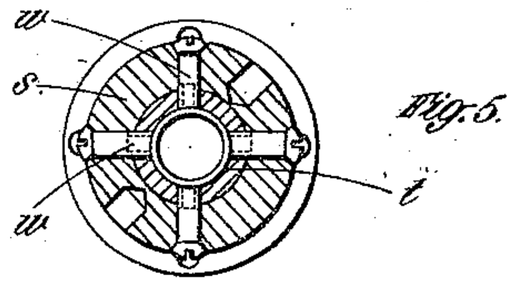


Fig. 6.

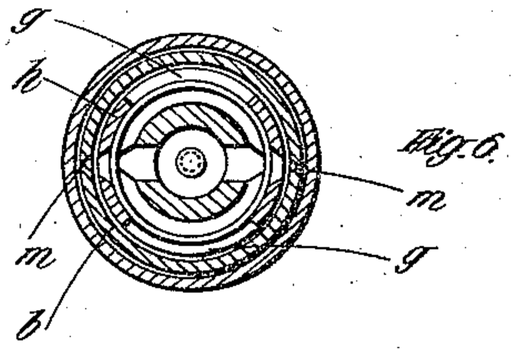


Fig. 7.

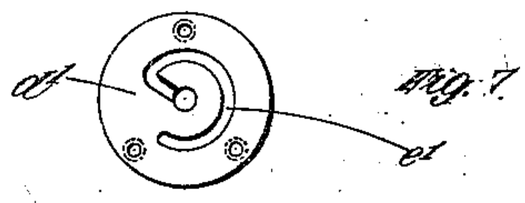


Fig. 8.

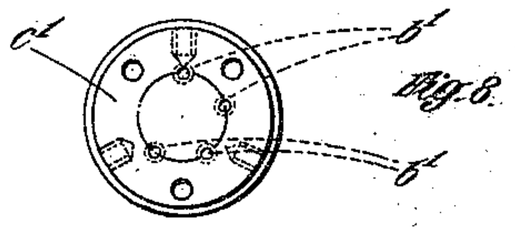
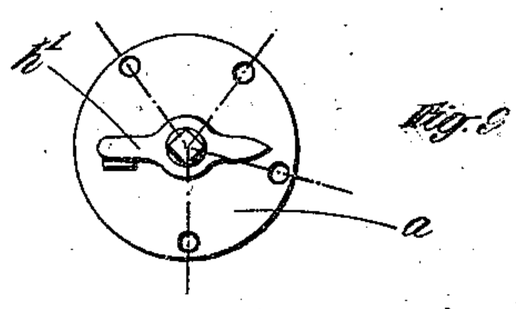


Fig. 9



Inventor:
Thomas K. North

By Fowler Steere Morrison & Edmonds
Attys

T. K. NORTH.

BOMB.

APPLICATION FILED JULY 7, 1917.

1,298,377.

Patented Mar. 25, 1919.

2 SHEETS—SHEET 2.

Fig. 1a.

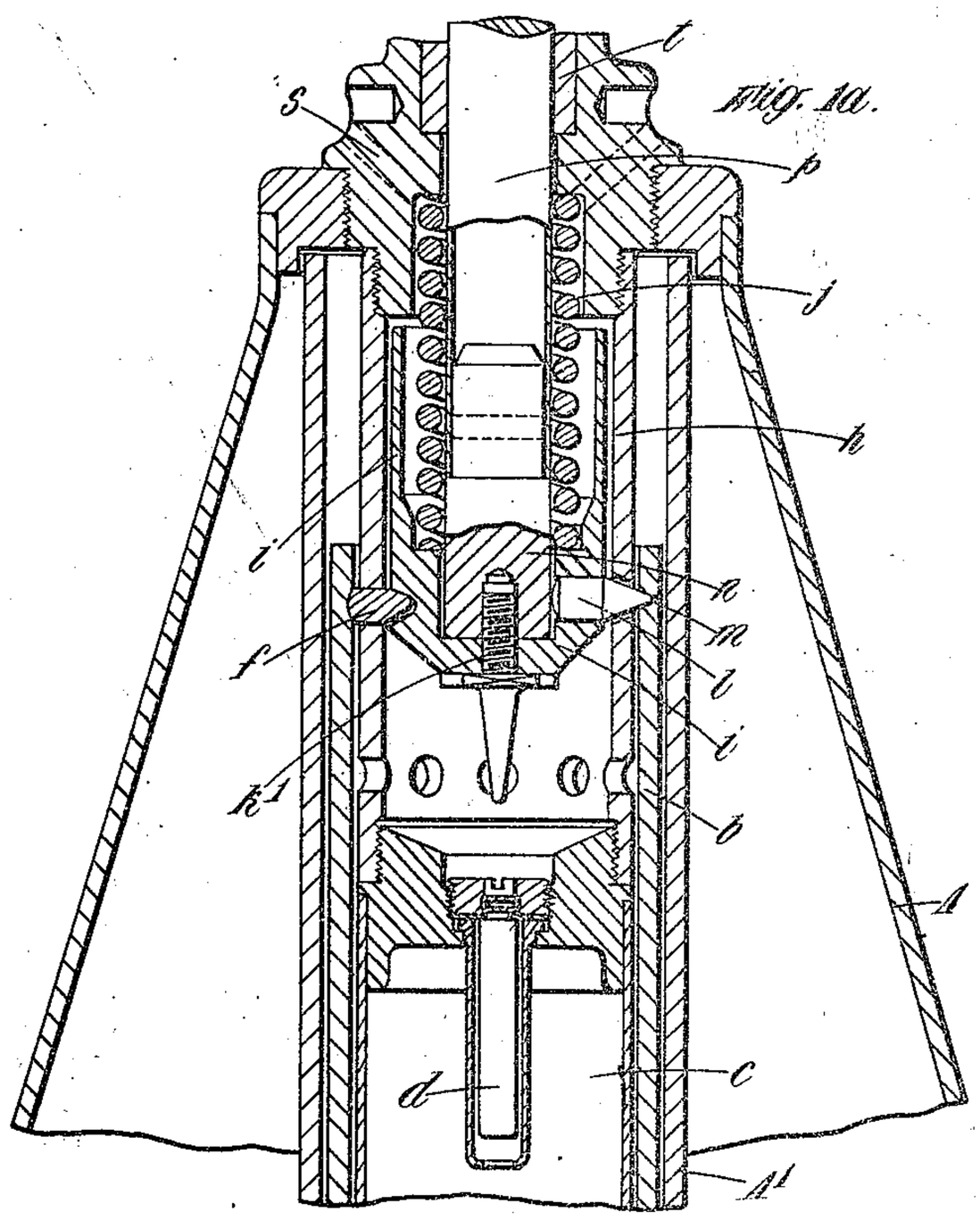
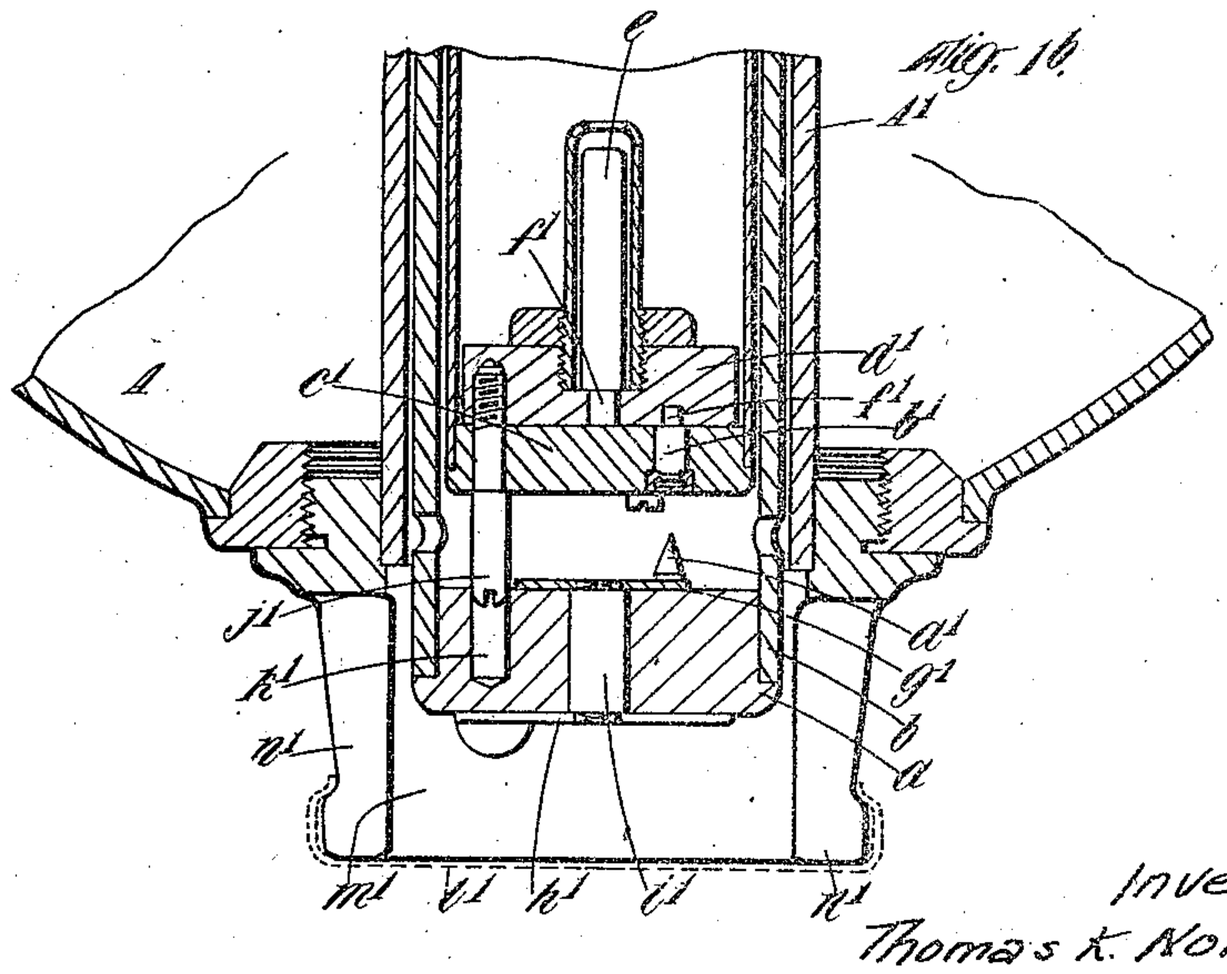


Fig. 1b.



Inventor:
Thomas K. North
By
Louis Stein Morris & Edmonds

UNITED STATES PATENT OFFICE.

THOMAS KEPPEL NORTH, OF WESTMINSTER, LONDON, ENGLAND, ASSIGNOR TO VICKERS LIMITED, OF WESTMINSTER, ENGLAND.

BOMB.

1,298,377. Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed July 7, 1917. Serial No. 179,277

To all whom it may concern:

Be it known that I, THOMAS KEPPEL NORTH, a subject of the King of Great Britain, residing at Vickers House, Broadway, Westminster, in the county of London, England, have invented certain new and useful Improvements in or Relating to Bombs, of which the following is a specification.

This invention relates to bombs which are primarily intended to be dropped from aircraft upon ships and submarines.

According to the invention the bomb is provided at its nose with a displaceable member or pellet which is so constructed and arranged with respect to impact firing mechanism and time firing mechanism that when the bomb strikes a hard body on or below the surface of the water such as a ship or a submarine the said pellet will be moved downward by its inertia and will actuate the impact firing mechanism or when the bomb strikes the surface of the water without coming into contact with a hard body the said pellet will be moved upward by the water and will actuate the time firing mechanism. The aforesaid time firing mechanism is of the fuse type and may be of such a character that it can be adjusted to give different periods of time between the ignition of the time fuse and the explosion of the bomb and can, when desired, be set to a safe position in which event the time fuse cannot be ignited.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawings, in which:—

Figure 1 is a sectional elevation of a bomb embodying both the impact firing mechanism and the time firing mechanism, part of the bomb having been broken away.

Figs. 1ª and 1ᵇ are fragmental sectional views of the impact firing mechanism and the time firing mechanism, respectively, on an enlarged scale.

Figs. 2, 3, 4, 5 and 6 are sections taken on the lines 2—2, 3—3, 4—4, 5—5 and 6—6, respectively, of Fig. 1; the segments and detents hereinafter referred to being omitted from Fig. 6, and for the sake of clearness being shown in Fig. 1 in the same plane whereas they are disposed in planes at right angles to one another as will be apparent from Fig. 6.

Figs. 7, 8 and 9 show details of the time firing mechanism.

a denotes the aforesaid pellet (shown in the form of a piston) which is disposed at a lower level than the lower end of the bomb body A and carries an inwardly extending sleeve *b* which together with the pellet is capable of longitudinal movement within a surrounding casing A′. The sleeve *b* surrounds a casing *c* which contains the primer charge and is in the example shown provided with detonators *d* and *e* for firing the said charge. Near its inner end the sleeve *b* bears against laterally arranged segments *f* or other suitably shaped members which project through holes or apertures *g* (Fig. 6) formed in a fixed cylindrical part *h* to which the said casing *c* is connected, the inner ends of the said segments being chamfered or pointed to engage with corresponding recesses in a spring controlled striker *i* forming part of the impact firing mechanism. When the piston *a* and sleeve *b* move downward by their inertia, on impact of the bomb with a solid body the sleeve *b* moves clear of the said segments *f* by pushing them inwardly; the striker *i* is thus liberated and by the action of its spring *j* forces the segments *f* outward and impels the firing pin *k* against the detonator *d* thus firing the charge in the casing *c* and exploding the bomb. The sleeve *b* is normally held in the position shown in Figs. 1 and 1ª and the striker locked in the safety condition by suitable detents or pins *l* having conical or pointed outer ends protruding through openings in the fixed cylindrical part *h* and engaging in conically shaped recesses *m* (Figs. 1, 1ª and 6) in the inner wall of the sleeve. The inner ends of the detents bear against a plug *n* secured to the lower end of a hollow spindle *p* whose upper end carries vanes *q* which revolve during the descent of the bomb through the air, the air being deflected toward them by blades *r* mounted on the body of the bomb independently of the spindle *p* and serving to keep the bomb point downward. As shown, the blades *r* are mounted on a cap *s* (Figs. 1, 1ª and 5) on the bomb through the medium of a central sleeve *t* (Figs. 1, 1ª, 4 and 5) to which a boss *u* (Fig. 4) carrying the blades *r* is secured by means of screws *v*, the said sleeve *t* being secured to the cap *s* by means of screws *w* (Fig. 5). The aforesaid plug *n*

is formed with a screw threaded hole engaging with a correspondingly screw threaded prolongation k' (Fig. 1[a]) of the firing pin k. When the vanes q are revolved during the descent of the bomb, the said plug n becomes unscrewed from the prolongation k' and at the same time rises out of the path of the detents l which are thus rendered free to move inward when the sleeve b is displaced as aforesaid. The vanes q and the spindle p are normally locked by a removable pin x (Figs. 1 and 4) which passes through the boss u and sleeve t of the deflector blades r, and through the aforesaid spindle p. The pin x is shown formed with a ring head y for the reception of a lanyard by which the pin is withdrawn during the launching of the bomb.

The piston a may carry a needle a' forming part of the time firing mechanism which needle can be set into a position opposite any one of a number of percussion caps b' (Figs. 1, 1[b] and 8) which are shown carried by a plate c' on which rests a plate d' provided with a groove e' which may be of the form indicated in Fig. 7 for the reception of a time fuse f'. The needle a' can also be set into a position in which it does not lie opposite a percussion cap b' and in this condition the time firing mechanism is in the safe position. The needle a' is preferably carried upon a pivoted plate g' at some distance from the axis of movement thereof. The said plate may be actuated to set the needle into any of its aforesaid positions, by a finger piece h' (Figs. 1, 1[b] and 9) arranged on the lower surface of the piston a and connected to the plate g' by a spindle i' passing through the piston, the said finger piece being formed at one end thereof as a pointer which can thus be set into any one of the positions indicated by dotted lines in Fig. 9 to bring the needle a' opposite any one of the percussion caps b' according to the length of time that is to ensue before the detonator e is exploded by the time fuse after the bomb strikes the surface of the water.

The piston a and its sleeve b are of substantially lower sectional density than the remainder of the bomb, that is to say the weight of the piston and sleeve per unit of surface area of the piston is less than the weight of the remainder of the bomb per unit of its cross-sectional area at the largest diameter, so that when the bomb strikes the water the piston a and sleeve b will be displaced upward relatively to the bomb by the water as aforesaid. As shown, the piston a is adapted to be guided during its upward and downward movement by means of longitudinal screw pins j' which connect the plates c', d' together and project at their free ends into corresponding recesses k' in the piston to permit of the movement.

If it is desired to render the bomb hereinbefore described capable of exploding by impact when it strikes the water a cap l' (Figs. 1 and 1[b]) is provided which can be slipped over the end of a nose piece m' surrounding the piston a as shown by dotted lines in Figs. 1 and 1[b], the said nose piece having lateral openings n'; in this case, when the bomb strikes the water, the piston a and the sleeve b instead of being moved upward by the water, move downward by inertia relatively to the bomb and effect the explosion of the bomb through the medium of the firing pin k forming part of the impact firing mechanism striking the detonator d. When the said cap l' is employed it will of course be understood that the time firing mechanism will not become operative and the explosion of the bomb will occur only by the inertia of the aforesaid pellet, upon impact of the cap with the surface of the water or a hard body such as a ship floating thereon. The use of the said cap also insures that the bomb will be exploded by the impact firing mechanism, if the bomb is dropped upon mud, soft or marshy ground, sand or other substance which might not be of a sufficiently solid nature to cause the pellet to move downward by its inertia without the cap.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a bomb, the combination of impact firing mechanism, time firing mechanism, and a displaceable member adapted to be moved downward by its inertia to actuate the impact firing mechanism or to be moved upward by contact to actuate the time firing mechanism.

2. In a bomb, the combination of impact firing mechanism, time firing mechanism, a displaceable member adapted to be moved downward by its inertia to actuate the impact firing mechanism or to be moved upward by contact to actuate the time firing mechanism, a device for locking said member in a safety condition, and means for releasing said locking device during the descent of the bomb through the air.

3. In a bomb, the combination of impact firing mechanism, time firing mechanism, a displaceable member adapted to be moved downward by its inertia to actuate the impact firing mechanism or to be moved upward by contact to actuate the time firing mechanism, a firing element carried by said member and forming part of the time firing mechanism and means for varying the position of said element.

4. In a bomb, the combination of impact firing mechanism, time firing mechanism, a displaceable member adapted to be moved downward by its inertia to actuate the impact firing mechanism or to be moved upward by contact to actuate the time firing

mechanism, a striker forming part of said impact firing mechanism, means for retaining said striker in a retracted or cocked condition, and a safety device for preventing the release of said retaining means prior to the descent of the bomb through the air.

5. In a bomb, the combination of impact firing mechanism, time firing mechanism, a displaceable member adapted to be moved downward by its inertia to actuate the impact firing mechanism or to be moved upward by contact to actuate the time firing mechanism, a spindle extending longitudinally into the striker of said impact firing mechanism, displaceable detents carried by the striker and normally retained in engagement with the displaceable member by said spindle, vanes on said spindle for causing it to revolve during the descent of the bomb through the air and means whereby its revolution removes it from its detent retaining position.

6. In a bomb, the combination of impact firing mechanism, time firing mechanism, a displaceable member adapted to be moved downward by its inertia to actuate the impact firing mechanism or to be moved upward by contact to actuate the time firing mechanism, a spindle extending longitudinally into the striker of said impact firing mechanism and having screw threads, a screw threaded portion on said striker for engaging with the screw threads on said spindle, displaceable detents carried by the striker and normally retained in engagement with the displaceable member by said spindle, and vanes on said spindle for causing it to revolve during the descent of the bomb through the air and disengage the screw threads on said spindle from the screw threaded portion of said striker to remove said spindle from its detent retaining position.

7. In a bomb, the combination of impact firing mechanism, time firing mechanism, a displaceable tubular piston-like member, a device for locking said member in a safety condition, means for releasing said locking device during the descent of the bomb through the air, and means for releasing the striker of the impact firing mechanism during downward movement of the piston-like member without preventing upward movement of said piston-like member.

8. In a bomb, the combination of impact firing mechanism, time firing mechanism, a displaceable tubular piston-like member, a casing containing the primer charge and surrounded by the tubular portion of said member, and detonators at the opposite ends of said casing one of which is adapted to be fired by the impact firing mechanism and the other by the time firing mechanism according to the direction in which said displaceable member moves.

9. In a bomb, the combination of impact firing mechanism, time firing mechanism, a displaceable member adapted to be moved downward by its inertia to actuate the impact firing mechanism or to be moved upward by contact to actuate the time firing mechanism, an open nose piece on said bomb, and a cap for closing said nose piece.

In testimony whereof I affix my signature.

THOMAS KEPPEL NORTH.