

(No Model.)

J. W. GRAYDON.

PERCUSSION FIRING DEVICE FOR TORPEDOES.

No. 356,067.

Patented Jan. 11, 1887.

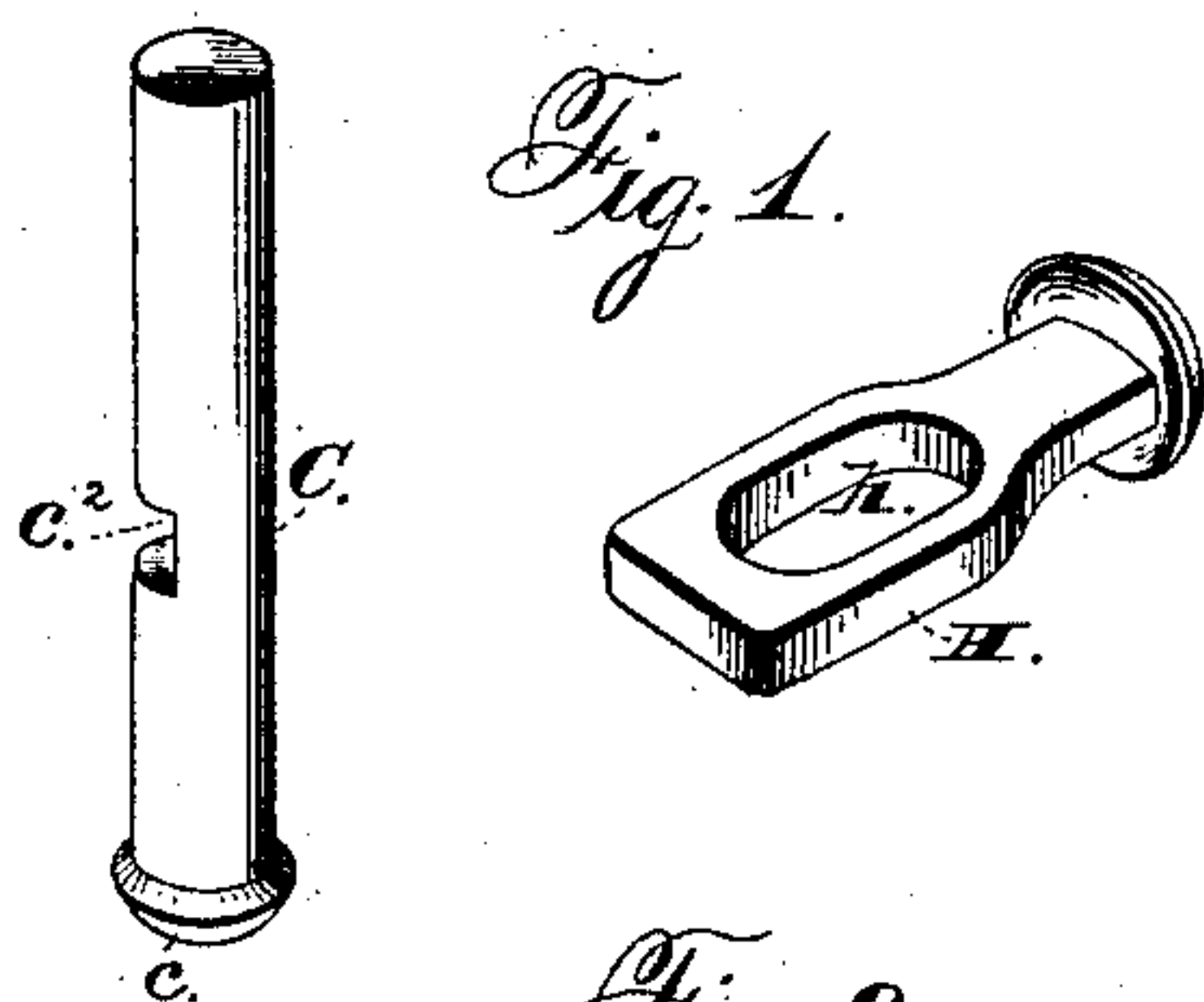


Fig. 1.

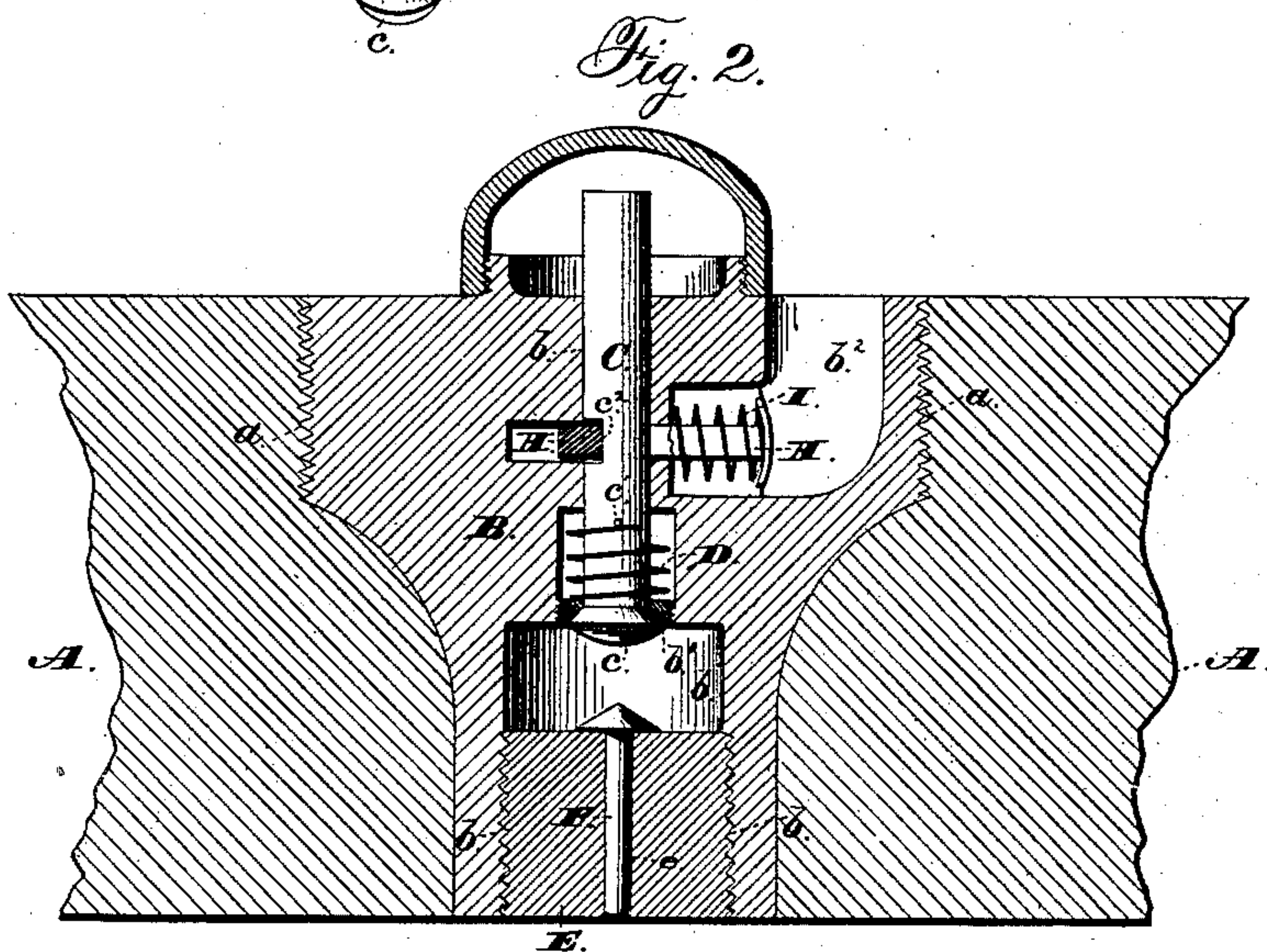


Fig. 2.

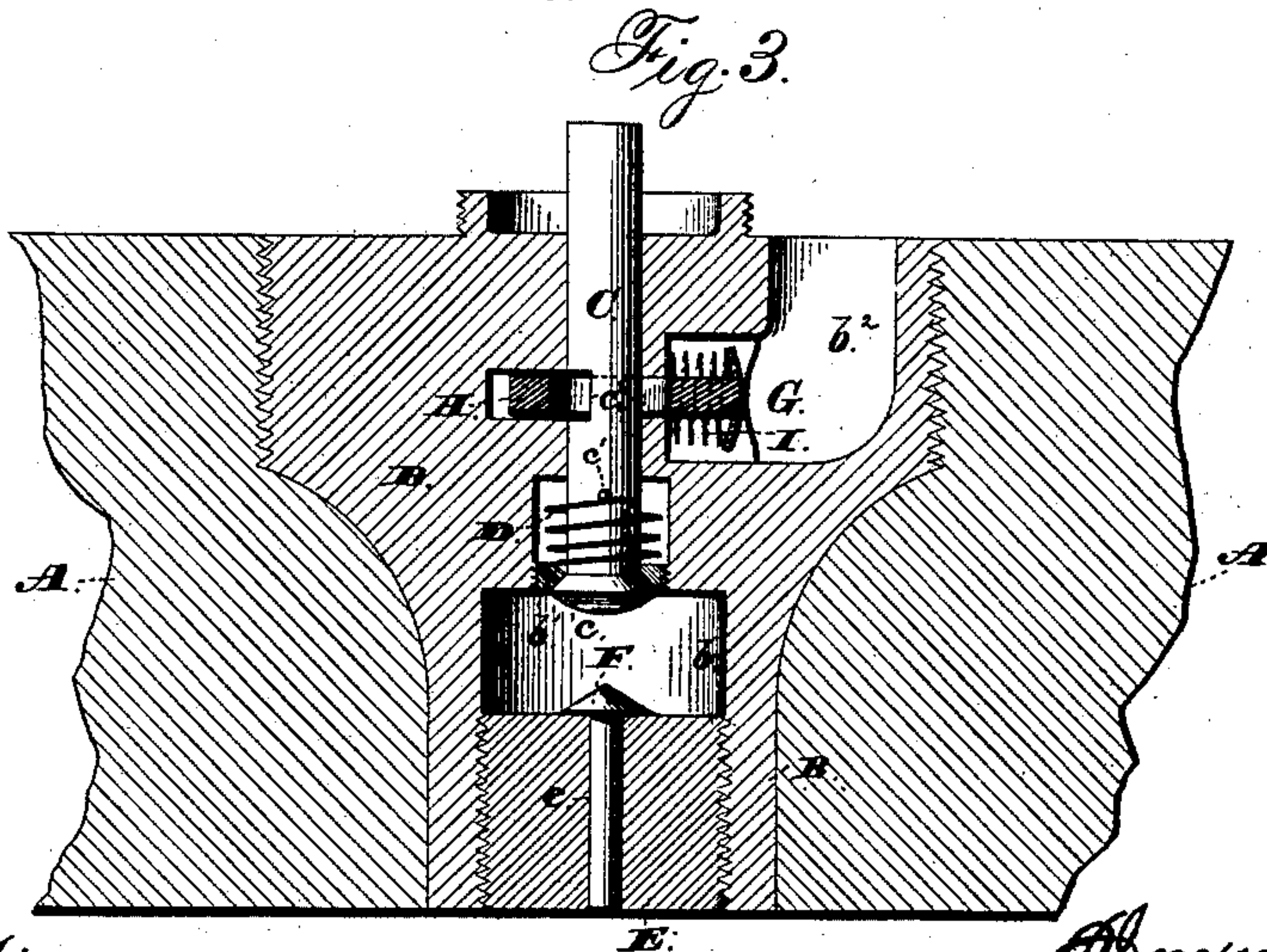


Fig. 3.

Witnesses:

Jas. E. Hutchinson.
Henry C. Hazard.

Ernest.

Jas. H. Graydon, by
 Prindle and Russell, his Attys.

UNITED STATES PATENT OFFICE.

JAMES W. GRAYDON, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR
OF ONE-HALF TO GEORGE S. PRINDLE AND PHILIP G. RUSSELL, BOTH
OF SAME PLACE.

PERCUSSION FIRING DEVICE FOR TORPEDOES.

SPECIFICATION forming part of Letters Patent No. 356,067, dated January 11, 1887.

Application filed June 2, 1883. Renewed April 7, 1886. Serial No. 198,164. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. GRAYDON, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Percussion Firing Devices for Torpedoes; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of the plunger and locking-bolt of my device separated from each other. Fig. 2 is a central longitudinal section of my device, showing said plunger locked in place; and Fig. 3 is a like view of the same with said plunger released and ready for use.

Letters of like name and kind refer to like parts in each of the figures.

The design of my invention is to prevent all liability to the accidental explosion of torpedoes which are intended for use when submerged while the same are being removed from or placed within the water; and to this end said invention consists in the construction, arrangement, and combination of elements, as hereinafter described, and specifically set forth in the claims.

The principle of my invention is the utilization of the pressure of water to hold out of engagement with the firing mechanism a locking device which otherwise will prevent the former from operating, and, while such principle is capable of application in a variety of ways, it will be sufficiently illustrated by the mechanism hereinafter described.

In the annexed drawings, A represents the shell of a torpedo, within which is provided a round interiorly-threaded opening, *a*, that receives and contains a casing, B, which in cross-section is round, and longitudinally has the general form shown in Figs. 2 and 3.

Extending axially through the casing B is an opening, *b*, the upper portion of which is considerably smaller than its lower portion, and receives and contains a plunger, C, that is closely fitted to place, while capable of a certain amount of longitudinal motion within

said opening. The lower end of said plunger is provided with a head, *c*, which operates as a stop to prevent said plunger from passing outward beyond the limit shown, and it is held in such elevated position by means of a spiral spring, D, that is preferably placed around the lower end of said plunger and compressed between a pin, *c'*, that passes radially through the latter and the lower end of an enlargement, *b'*, of the opening *b*. The lower larger portion of the axial opening *b* is threaded interiorly and receives a plug, E, which is also provided with an axial opening, *e*, that contains a firing-pin, F. Said pin F is by any suitable means adapted to explode a fulminate and fire the explosive contained within the shell A whenever forced downward, and the range of motion permitted to the plunger C is sufficient to cause its lower projecting end to impinge upon and actuate said firing-pin, as described.

Extending from the outer end of the casing B downward and then laterally to the opening *b*, at a point midway between the ends of the plunger C, is a passage, *b''*, into which water may freely enter. At the intersection of the lateral portion of said passage with the vertical portion of the same a flexible diaphragm, G, is secured, which diaphragm divides said passage and prevents the entrance of water into the inner part thereof.

Secured at one end to or upon the inner side, at the center of the diaphragm G, is a bar, H, which extends horizontally across the opening *b*, and is provided with a central longitudinal slot, *h*, that spans the plunger C and permits a certain amount of longitudinal motion to said bar.

The side of the plunger C opposite to the diaphragm G is provided with a notch, *c''*, into which the end of the bar H passes when the latter is moved to the outer limit of its motion, such engagement operating to effectually lock said plunger in longitudinal position and prevent it from being forced into engagement with the firing-pin F.

A spiral spring, I, operating to hold the bar H at the outer limit of its motion and in en-

gagement with the plunger C, completes the device, the operation of which is as follows, viz: The depth to which the torpedo is to be submerged being determined, the spring I is
 5 adjusted until the diaphragm G is capable of resisting a water-pressure slightly less than that which will exist at the depth fixed upon, after which the sinking of said torpedo to or below such depth will cause said diaphragm
 10 to be pressed inward and the locking-bar H to be released from engagement with the plunger C, while the raising of said torpedo, so as to lessen the pressure upon said diaphragm, will cause the latter and said locking-bar to be
 15 forced outward by the action of said spring I, and said plunger to be once more locked in place, such operation being automatic.

When provided with the firing mechanism described, torpedoes may be safely handled and
 20 all danger from their accidental explosion is avoided.

I contemplate using, if desired, instead of devices for locking and unlocking the firing mechanism adapted to be operated by the action
 25 of the pressure of the water at different depths, other devices which by the action of the buoyancy of the water will move the locking device to release the firing mechanism when the torpedo is submerged to a certain predetermined depth. For instance, a float could be
 30 connected by a cord, chain, or other connecting means of a certain length with the locking pin or bolt, so that when the torpedo was sunk to or below a certain depth the float would
 35 by reason of its buoyancy pull the locking-bolt out of engagement with the firing mechanism. With this arrangement, when the torpedo was raised above this point, as the float would no longer pull upon the bolt through the medium
 40 of the cord, chain, or other connecting means, said bolt would by reason of the action of its spring fly back again into engagement with the firing mechanism, so as to lock it and make the handling of the torpedo safe from the
 45 danger of accidental discharge.

As the buoyancy of a float or floating object is due to the upward pressure of the water upon it; both the means set forth above by me for actuating the latch or bolt to release the fir-
 50 ing-pin can rightly be said to be operated by the pressure of the water.

Having thus fully set forth the nature and merits of my invention, what I claim as new is—

1. In combination with a firing device for 55 torpedoes, an automatic-locking device normally locking the operative parts of the firing device in place when the torpedo is not submerged, and means, substantially as described, operated by the pressure of the water when 60 the torpedo is submerged, to cause the locking device to release the firing parts and leave them capable of action, substantially as and for the purpose described.

2. A percussion firing device for torpedoes, 65 in combination with means adapted to be actuated by the pressure of the water to release and leave capable of action the operative parts of said firing device whenever the torpedo is submerged to or below a predetermined depth; 70 and to automatically lock the parts from action when the torpedo is raised above such depth or removed from the water, substantially as and for the purpose described.

3. In combination with the firing plunger or 75 bolt of a percussion firing device for torpedoes, a latch for normally locking the same, and means, substantially as described, actuated by the pressure of the water when the torpedo has been submerged, to cause the latch to release 80 the plunger or bolt, substantially as and for the purpose described.

4. In combination with the plunger C of a percussion firing mechanism for torpedoes, provided with the notch c^2 , the spring tending to 85 hold the plunger withdrawn or in an elevated position, the latch-bolt H, the spring for the latch-bolt, and the diaphragm connected with the latch-bolt, so that when it is pressed in it will actuate the bolt against the stress of its 90 spring, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand this 2d day of June, 1883.

JAMES W. GRAYDON.

Witnesses:

HENRY C. HAZARD,
 JAS. E. HUTCHINSON.