

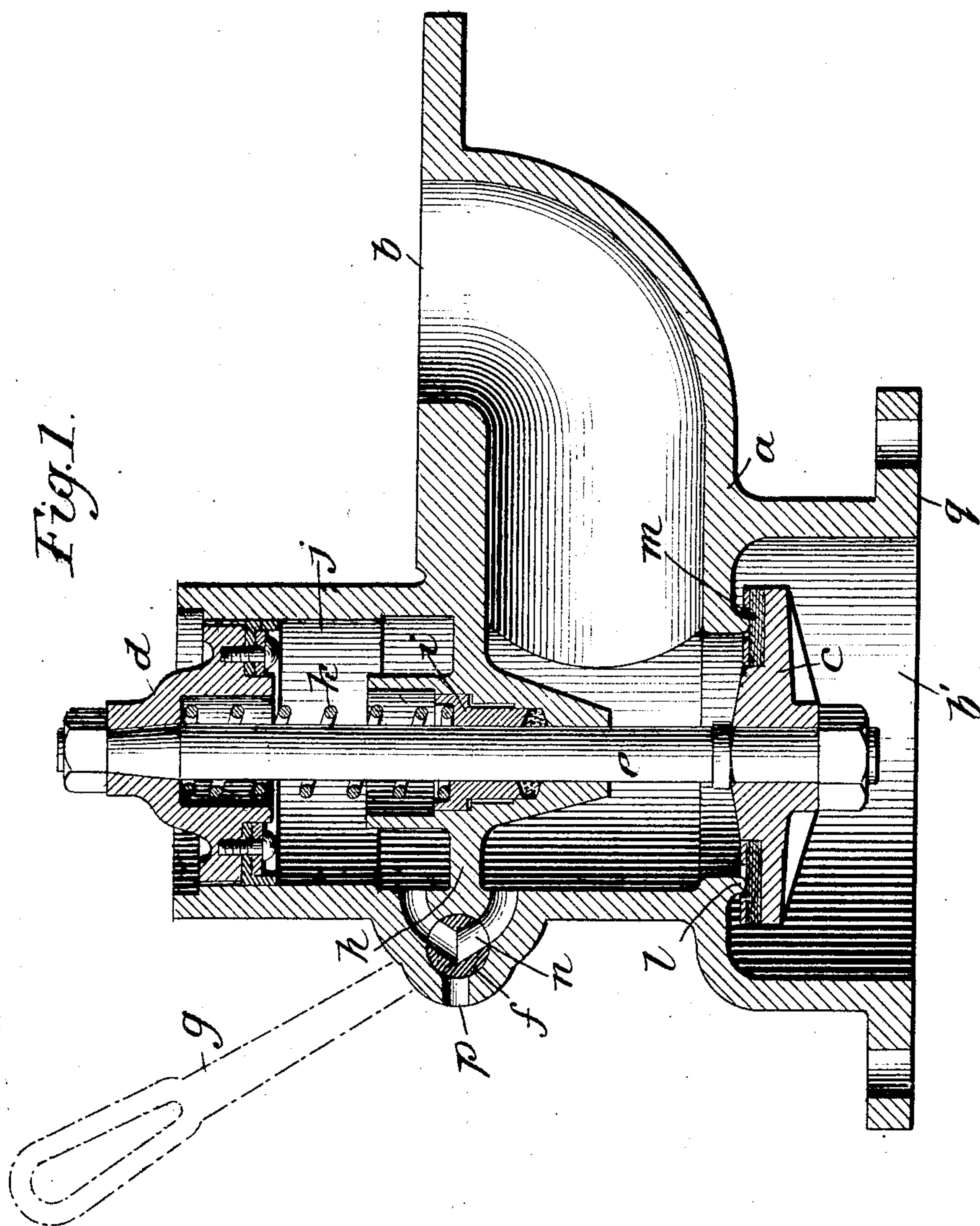
No. 822,500.

PATENTED JUNE 5, 1906.

J. BARRAJA-FRAUENFELDER.  
TORPEDO EXPULSION VALVE.

APPLICATION FILED JUNE 26, 1905.

2 SHEETS—SHEET 1.



*Witnesses:*

*O. W. Edlin.*  
*R. C. Cant.*

*Inventor:*

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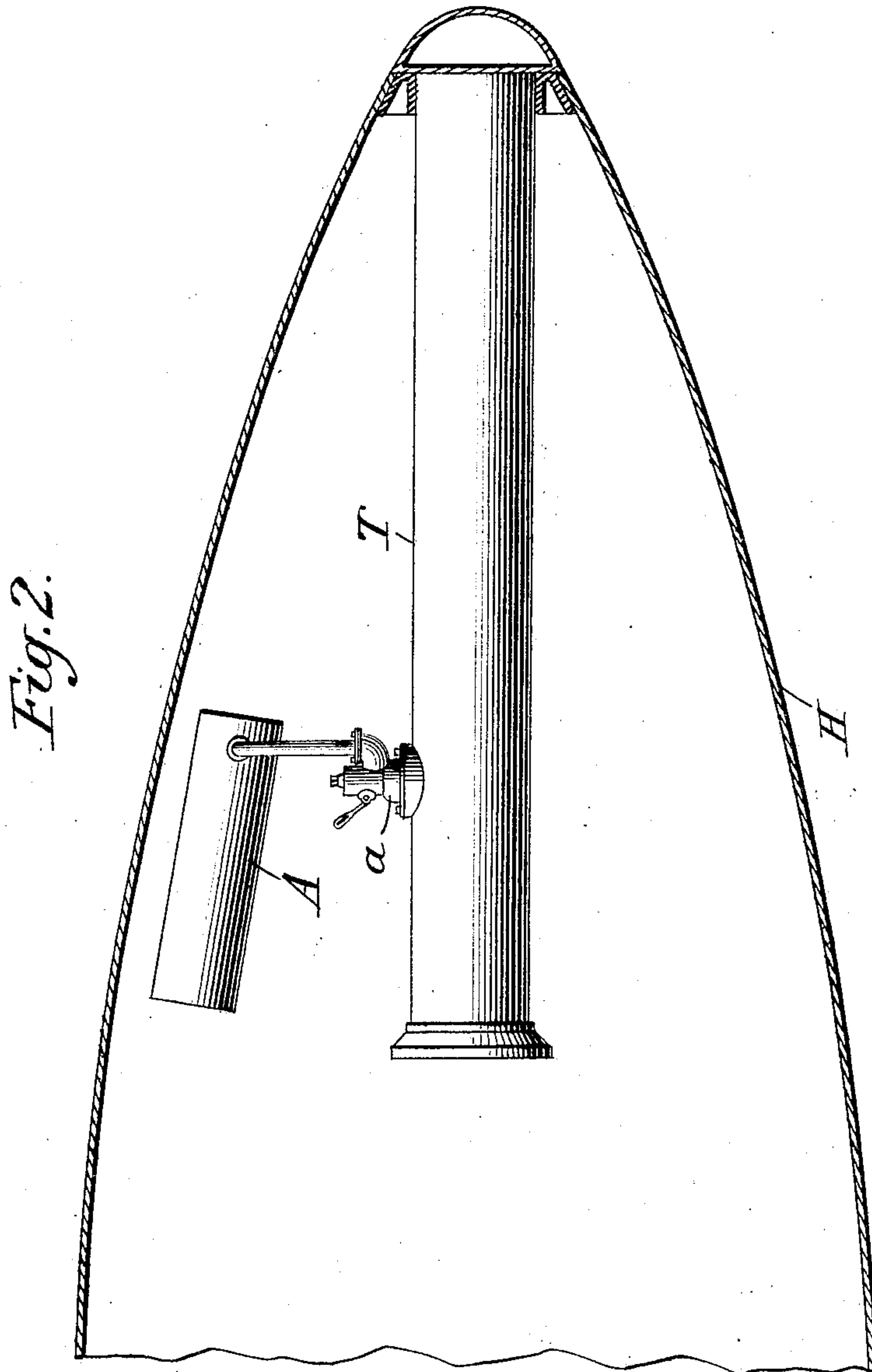
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R. C. Grant.

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# UNITED STATES PATENT OFFICE.

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ASSIGNOR TO ELECTRIC BOAT COMPANY, OF BAYONNE, NEW  
JERSEY, A CORPORATION OF NEW JERSEY.

## TORPEDO-EXPULSION VALVE.

No. 822,500.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed June 26, 1905. Serial No. 267,030.

*To all whom it may concern:*

Be it known that I, JOSEPH BARRAJA-FRAUENFELDER, a subject of the King of Italy, residing at Quincy, county of Norfolk, State of Massachusetts, have invented certain new and useful Improvements in Torpedo-Expulsion Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to mechanism for discharging torpedoes from subsurface expulsion-tubes, and has for its object to provide a simple and efficient valve mechanism to admit air under pressure to the tube for discharging the torpedo therefrom and subsequently to close the air-outlet against the entrance of the water which flows into the tube immediately after the discharge of the torpedo to prevent the water entering the casing of the firing-valve.

In the accompanying drawings, Figure 1 is a sectional elevation of the improved firing mechanism embodying the invention. Fig. 2 is a sectional elevation of the forward end of a submarine boat, showing the firing mechanism applied between the compressed-air tank and the torpedo-expulsion tube.

Referring to Fig. 2 of the drawings, II indicates the hull of a submarine or submergible boat of the ordinary type, which is provided with a torpedo-expulsion tube T, located in the bow thereof, which tube is adapted to receive and expel automobile-torpedoes in the direction in which the bow of the boat is pointed. The necessary force for expelling the torpedo from the tube is supplied by air under pressure from a storage-tank A, which is connected to the tube near the rear end thereof, and the admission of air to the expulsion-tube is controlled by valve mechanism located in the connection between the tank A and the tube T.

The object of the present invention is to provide a simple and compact valve mechanism which not only serves to admit the compressed air to the tube for expelling the torpedo, but also prevents the water which rushes into the tube after the torpedo has been expelled from entering the valve-casing. This valve mechanism is illustrated in detail in Fig. 1, in which *a* indicates the valve-cas-

ing, which is provided with an inlet *b*, connected with the piping leading to the storage-tank or other source of compressed air, and a discharge *b'*, which is in direct communication with the expulsion-tube T to which the valve-casing is secured by a suitable coupling-flange *g*. Mounted in the casing *a* is a reciprocating valve *c*, which opens toward the expulsion-tube T and closes against the pressure of the air from the tank A upon a seat *l*, said valve being provided upon its seating-face with suitable packing *m*, which engages the seat *l* to form a water-tight fit. The valve *c* is provided with a stem *e*, which passes through a web *h*, which divides the cylindrical portion of the casing *a* into two parts, the upper part constituting a cylinder *j*, in which is located a piston *d*, secured to the upper end of said valve-stem. Within said web there is formed a stuffing-box *i*, which prevents the air escaping past the piston-rod into the cylinder. Surrounding the valve-stem *e* and confined between the stuffing-box *i* and the piston *d* is a coiled spring *k*, which normally tends to seat the valve *c*. The upper end of the cylinder *j* is open, so that the rear of the piston *d* is in direct communication with the atmosphere. The valve-casing *a* is provided with a by-pass passage *n*, which connects the cylinder *j* with the inlet end of the casing. Opening laterally into said by-pass is a small port *p*, communicating with the atmosphere. Located in the by-pass is a controlling-valve *f*, preferably in the form of a turning-plug operated by means of a suitable handle *q*, the passage through said plug being adapted to connect the cylinder *j* alternately with the inlet side of the valve-casing and with the atmosphere by way of port *p*.

The operation of the apparatus as above described is substantially as follows: After the torpedo has been placed in the expulsion-tube T and the cap at the outboard end of the tube T has been opened water enters the tube and surrounds the torpedo. Air under pressure is then admitted from the tank A and enters the valve-casing *a*, where it reacts against the outwardly-opening valve *c*, and also enters the cylinder *j* by way of the by-pass *n*, and the piston *d* being of larger area than the exposed portion of the valve *c* the latter is retained on its seat, and no air is ad-



mitted to the expulsion-tube. When it is desired to expel the torpedo, the handle *g* is moved downward until connection is established between the cylinder *j* and the port *p* through the plug-cock *f*. When this occurs, the cylinder *j* is cut off from the air-pressure in the lower portion of the valve-casing, and the air under pressure in the cylinder escapes to the atmosphere through the port *p*, and the pressure being relieved from the cylinder *j* piston *d* no longer counterbalances the air-pressure on the upper side of valve *c*, and said valve is forced from its seat, thereby admitting the compressed air contained in the storage-tank to the expulsion-tube behind the torpedo, which is driven from the tube. As soon as the torpedo has been discharged and the air exhausted from the tank the spring causes the valve to close, and the handle *g* is returned to its former position to re-establish connection between the cylinder *j* and the inlet of the valve-casing and to close the port *p*, which connects the cylinder to the atmosphere. The air-pressure entering the cylinder *j* immediately acts upon piston *d* and draws the valve *c* firmly to its seat. When the pressure of air from the tank *A* is cut off, the spring *k* also serves to hold the valve to its seat.

It is to be noted that the above-described apparatus constitutes a simple and efficient form of stop and check valve, by means of which the firing operation may be accurately controlled after the compressed air has been turned on from the tank *A*, and which also serves to prevent the access of water into the valve-casing after the torpedo has been expelled, both of which operations are dependent upon the manipulation of the simple two-way cock *f*.

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

1. Firing mechanism for expulsion-tubes, comprising a combined stop and check valve

between the source of compression and the tube adapted to be opened by compressed air, and means controlled by the air-pressure to close said valve.

2. Firing mechanism for expulsion-tubes, comprising a combined stop and check valve between the source of compression and the tube adapted to be opened by compressed air, opening toward said tube, and means controlled by the air-pressure to close said valve.

3. Firing mechanism for expulsion-tubes, comprising a combined stop and check valve between the source of compression and the tube, a cylinder, a valve adapted to connect said cylinder alternately with the air-pressure and with the atmosphere, and a piston in said cylinder connected to said stop and check valve.

4. Firing mechanism for expulsion-tubes, comprising a valve-casing located between the source of compressed air and the tube, a valve in said casing opening toward said tube, a cylinder on said casing, a piston in said cylinder connected to the stem of said valve, and a valve adapted to connect said cylinder alternately with the air-pressure and with the atmosphere.

5. Firing mechanism for expulsion-tubes, comprising a valve-casing located between the source of compressed air and the tube, a valve in said casing opening toward said tube, a cylinder on said casing, a piston in said cylinder connected to the stem of said valve on one side and open to the atmosphere on the other side, a spring normally tending to seat the valve, and a valve adapted to connect said cylinder alternately with the air-pressure and with the atmosphere.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH BARRAJA-FRAUENFELDER.

Witnesses:

F. L. BRAKE,

W. D. FESLER.