

No. 656,292.

Patented Aug. 21, 1900.

P. C. F. HOFFMANN.
ELECTRICALLY OPERATED SUBMARINE TORPEDO.

(Application filed Apr. 30, 1898.)

(No Model.)

Fig. 1.

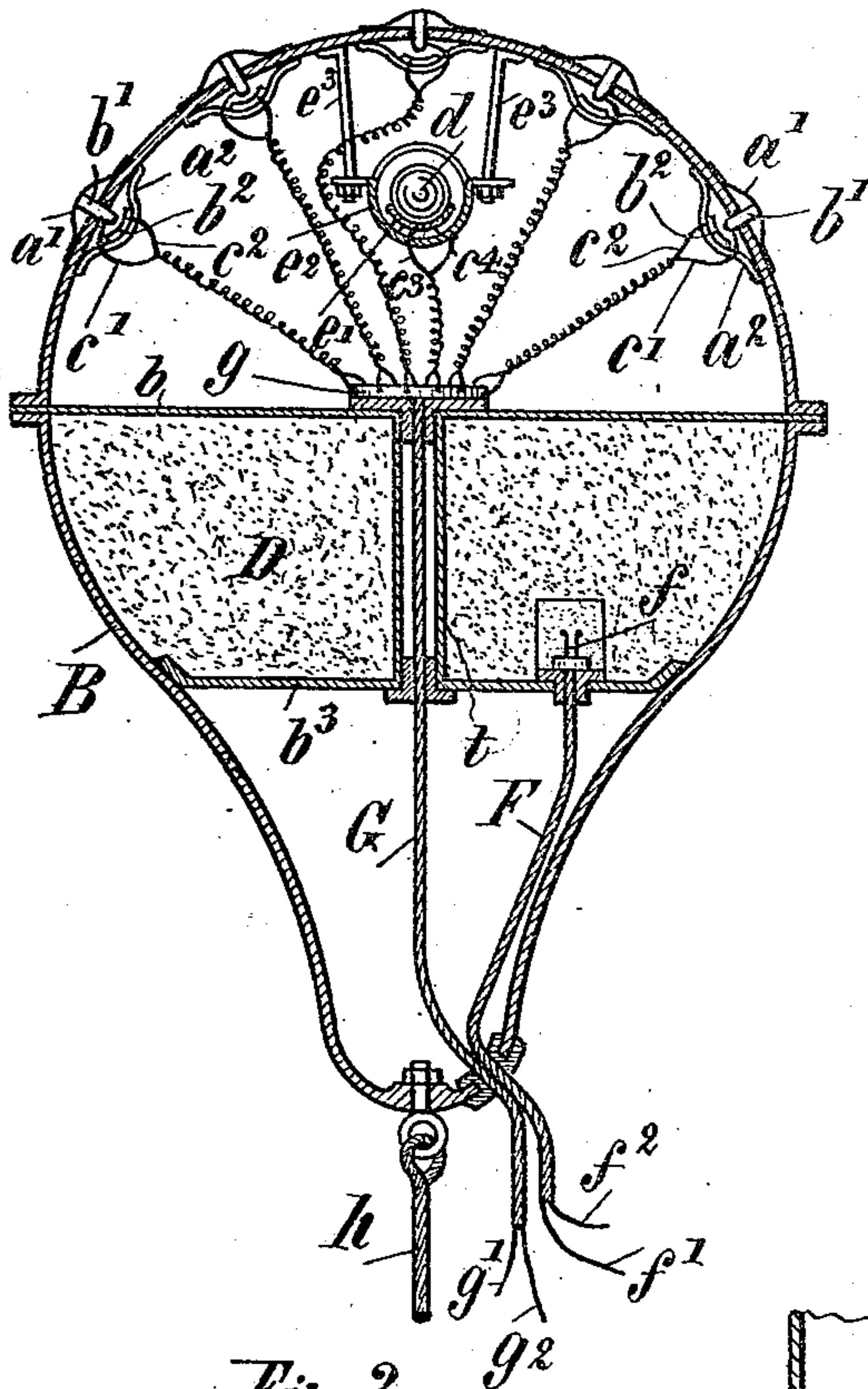


Fig. 2.

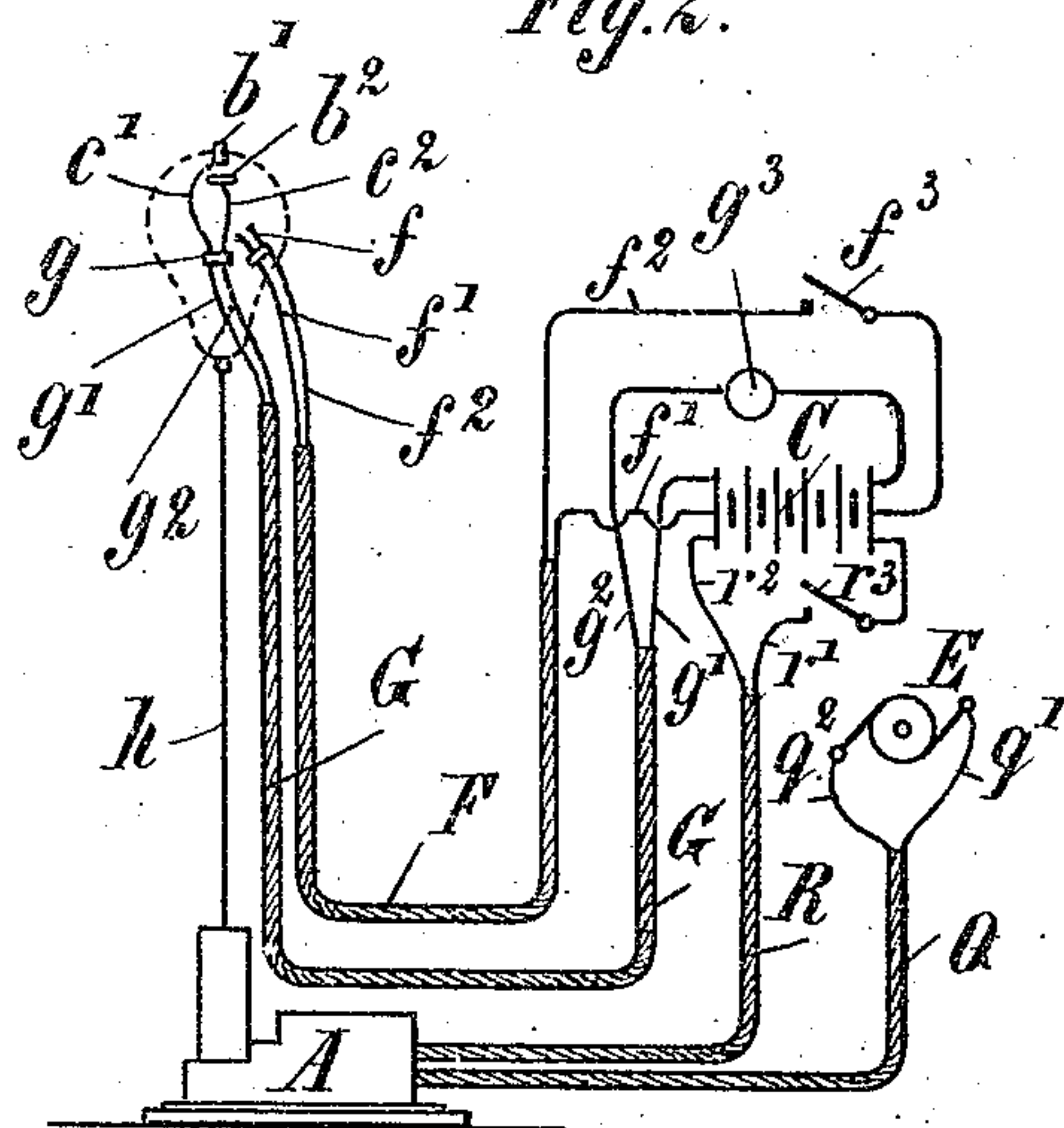


Fig. 3.

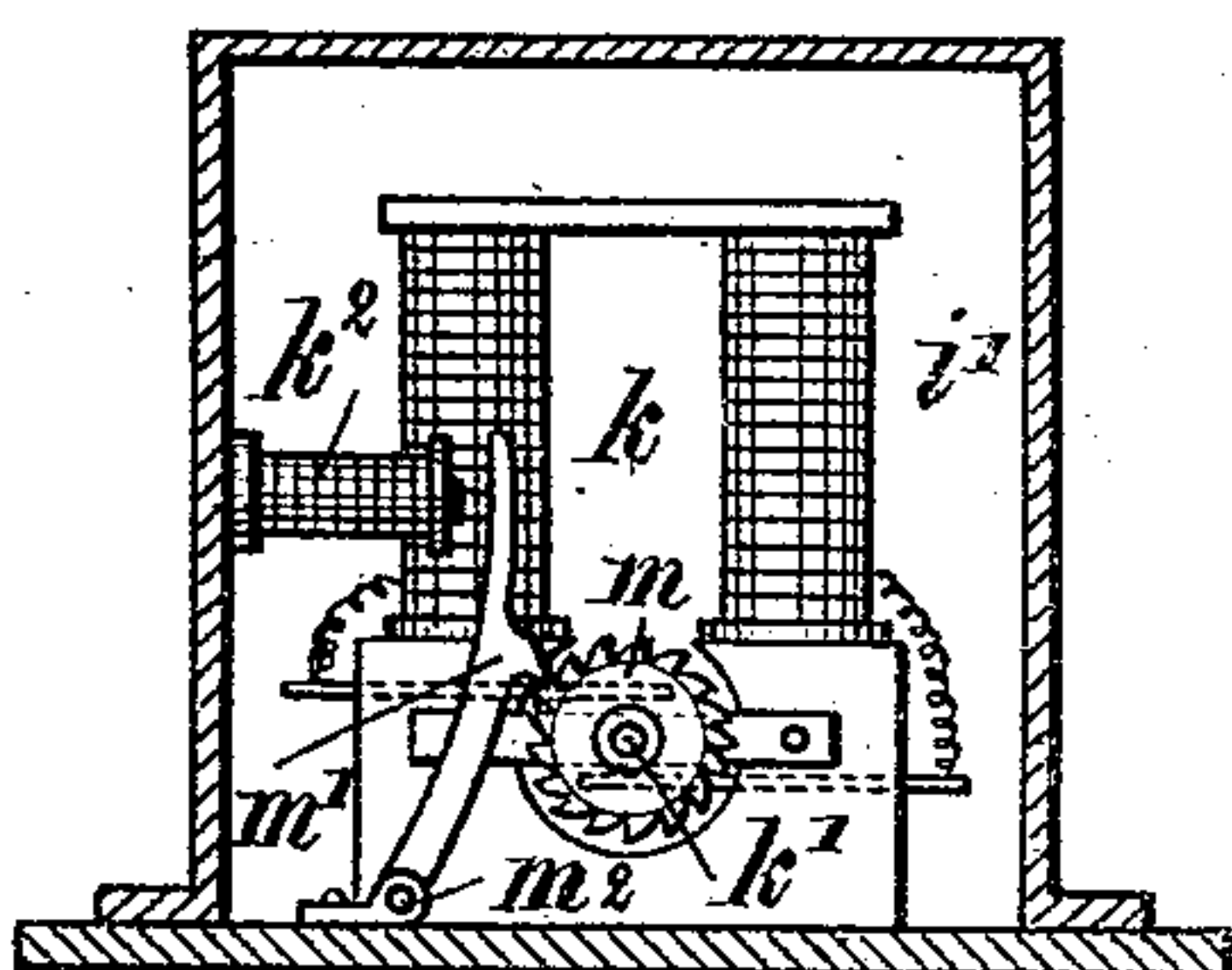
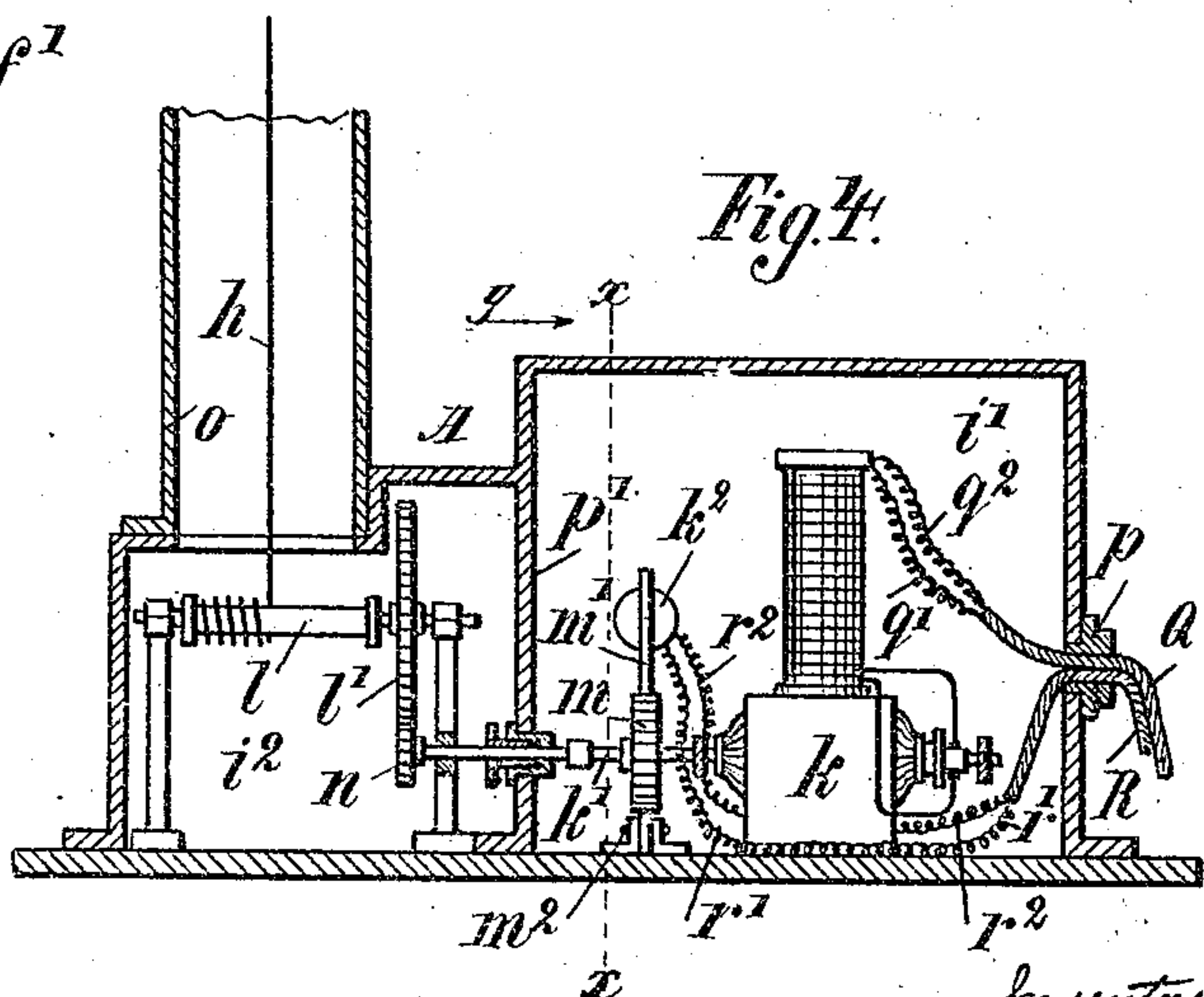


Fig. 4.



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ELECTRICALLY-OPERATED SUBMARINE TORPEDO.

SPECIFICATION forming part of Letters Patent No. 656,292, dated August 21, 1900.

Application filed April 30, 1898. Serial No. 679,327. (No model.)

To all whom it may concern:

Be it known that I, PETER CHRISTIAN FRIEDRICH HOFFMANN, a subject of the King of Prussia, German Emperor, residing at Kiel, in the Province of Schleswig-Holstein and Kingdom of Prussia, in the German Empire, have invented a new and useful Improvement in Electrically-Operated Submarine Torpedoes, of which the following is a specification.

This invention has relation to submarine mines for the protection of rivers, harbors, bays, and the like against the entrance of hostile vessels in case of war, and my said invention relates more particularly to that type of mine or more properly torpedo known as "floating torpedoes," the objects of my invention being the following: First, the combination, with a torpedo, of electrical appliances operated by contact of a vessel with such torpedo and organized to indicate such contact at a distant station, which may be a floating or a shore station; second, the combination, with a torpedo and contact signaling appliances, of electrical appliances at the distant station for exploding the torpedo; third, the provision of means whereby the position of the torpedo below the surface of the water may be controlled by the operator at the distant station; fourth, the provision of means whereby the operator at the distant station will be apprised of a displacement of the mine or torpedo should an attempt be made to drag the same from its anchorage, and, fifth, a construction of torpedo, such as to insure the transmission of the contact-signal, whatever may be the direction of travel of a hostile craft across the torpedo; but that my invention may be fully understood I will now describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of a submarine floating torpedo embodying a part of my invention. Fig. 2 is a diagrammatic view of the electric circuits. Fig. 3 is a longitudinal vertical section of the submarine power and anchoring chambers, and Fig. 4 is a vertical cross-section taken on line $x-x$ of Fig. 3 looking in the direction of arrow y .

The torpedo consists of a suitable casing B, which is preferably pear-shaped, or substantially so, and divided into upper, lower, and

intermediate compartments by two partitions b b^3 , the intermediate compartment D constituting the charge-chamber and containing the explosive, the weights being so distributed as to cause the torpedo to float head upward. A tube t , arranged axially of chamber D, serves as a passage for a cable G, made up of two wires g' and g^2 . Within the charge-chamber D is located an electric spark-igniter f , of well-known construction, whose terminals are connected with two conductors f' f^2 , made into a cable F', which latter and the cable G are carried out of the torpedo at its lower or smaller end through a suitable aperture, so as to preclude the entrance of water into the lower compartment. In the upper end of the tube t is seated a connecting-disk g , and the semispherical head of the torpedo is studded with a number of contacts b' , working in openings in said head and covered water-tight externally by flexible diaphragms a' . Within the head of the torpedo are arranged contacts b^2 , one for and opposite the inner end of each of the aforesaid contacts b' , said contacts b^2 being supported from cups a^2 , conductors c' c^2 being connected with the aforesaid contacts b' b^2 , respectively, and with the connecting-disk g . A cup e^2 of a conductive material is supported axially within the upper chamber by rods e^3 , secured to the head of the shell B, and within said cup and concentric therewith is arranged a shallow cupped or dished contact e' for a conductive gravity-contact, as a ball d of a suitable conductive metal. To the contacts e' and e^2 and to the connecting-disk g are secured conductors c^3 c^4 , and the arrangement of the connecting-disk is such as to connect all the conductors c' and the conductor c^3 with the conductor g' of cable G and all the conductors c^2 and the conductor c^4 with the conductor g^2 of said cable G.

Wherever a torpedo such as described is located I provide means for anchoring and for positioning the same, the anchorage A consisting of a water-tight power-chamber i' and an anchoring-chamber i^2 , both embedded in the bed of the waterway. The anchoring-chamber has a trunk o extending vertically therefrom sufficiently above the bed of the waterway to prevent sand, mud, or stones from being washed into said chamber, in

which is mounted a winding-drum l , on which is wound the anchor chain or cable h , attached to the lower end of the torpedo. The shaft of the drum carries a gear-wheel i , meshing with a pinion n on the shaft k' of an electric motor k , of any desired or well-known construction, said shaft k' passing fluid-tight from the power-chamber i' into the anchoring-chamber i'' through a suitable stuffing-box. The shaft k' carries a ratchet-wheel m , engaged by a gravity-pawl m' , pivoted at m^2 within the power-chamber, and has an extension projecting in front of and constituting the armature of an electromagnet k^2 within said chamber i'' , the pawl locking the ratchet-wheel m and shaft k' against rotation in one direction, which would cause the anchor chain or cable h to wind off the drum l . To the poles of the electromagnet k^2 are connected the conductors r' and r^2 , united into a cable R, and to the poles of the electric motor k —i. e., its electromagnet—are connected the wires q' and q^2 , united into a cable Q, both of which cables R and Q are led out of the power-chamber i' in such a manner as to keep out water and solid matter.

The cables F, G, R, and Q constitute the main lines of a torpedo-station, which may be a shore or a floating station and which is equipped with two electric generators or sources of supply of electricity, one of which is preferably a battery C and the other a dynamo E. The conductors q' and q^2 of cables Q for the electric motor k are connected with the opposite poles of the aforesaid dynamo E. The conductors f' f^2 of cable F for the igniter f are respectively connected with the opposite poles of the battery C, a circuit-maker f^3 being included in their circuit. The conductors r' and r^2 of cable R for the electromagnet k^2 are likewise respectively connected with the opposite poles of battery C, a circuit-maker r^3 being included in their circuit, and, finally, the conductors g' and g^2 of cable G are respectively connected with the opposite poles of said battery C, an alarm-bell g^3 or other suitable alarm or indicator being included in their circuit, all of which is clearly shown in Fig. 2. If the operator at the torpedo-station desires to cause the torpedo to rise to a higher level or to the surface of the water, he closes the circuit at r^3 , thereby energizing the electromagnet k^2 , which attracts its armature-pawl m' , and the latter moving out of engagement with the ratchet-wheel m releases the power-shaft k' , the torpedo being then free to rise to any desired height above the bed of the waterway. Should the operator, on the contrary, desire to lower the torpedo, he sends current from dynamo E to the electric motor, causing the shaft k' , and consequently the winding-drum l geared thereto, to revolve, so as to wind up the anchor chain or cable h , and thereby draw the torpedo down, said shaft k' being free to revolve in the direction of winding, but locked by the pawl m' against

motion in an opposite direction. When the torpedo is in the desired position, the circuits, including the electromagnet k^2 or the electric motor k , as the case may be, are interrupted. The closure of the electromagnet-circuit demagnetizes the latter, causing the armature-pawl m' to drop back into engagement with ratchet-wheel m and lock-shaft k' and drum l against rotation, this being, of course, also the case when the dynamo-circuit is interrupted. Should a hostile craft depress any one or more of the contacts b' , the circuit through the conductors g' g^2 will be closed, the alarm g^3 will be set in operation, and the operator then closes the firing-circuit at f^3 through conductors f' f^2 , thereby producing a spark at f , which ignites the charge in chamber D. Should an attempt be made to grapple the torpedo, either by its anchor chain or cable h or by one of the cables F or G for the purpose of breaking said connections, said torpedo will assume a position at such an angle to the vertical as to cause the gravity-contact d to roll partly out of its shallow cup e' into contact with the inclosing contact e^2 , and thereby close the circuit through c^3 c^4 g' g^2 and the alarm-bell g^3 , apprising the operator at the torpedo-station that the torpedo is being tampered with, and he can then explode the same.

The appliances for controlling submarine floating torpedoes described are very simple and provide practically every possible means for insuring the object aimed at in this particular mode of warfare.

Obviously a torpedo may, with the appliances described, be held out of reach of a vessel, and as the latter approaches the anchorage the torpedo may be released and allowed to rise into contact with such vessel and then exploded.

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

1. The combination with a torpedo, electric metallic contacts studding its surface, a chamber containing the explosive charge of signal-circuits closed by the contacts on the surface of the torpedo, an igniter in the chamber containing the charge and its electric circuit, an electric-motor circuit and a driven mechanism, a magnetically-operated detent for said mechanism, the signal, firing and detent operated circuits in parallel and independent of the motor-circuit.

2. In a torpedo, a shell divided into three chambers, the central chamber containing an explosive charge and an electric igniter in said charge, a set of metallic contacts arranged to project from said shell and be moved toward the interior thereof, a second set of contacts within the shell, a pair of terminals insulated from one another within the shell, a gravity-contact on one of said terminals arranged to close circuit between them, said contacts and terminals connected in parallel

and adapted to close circuit through a pair of wires to a distant signal, substantially as set forth.

3. The combination with a floating torpedo, 5 of concentric contacts e' e^2 arranged axially therein near its head, a gravity or ball contact d in the inner shallower contact e' , and an electric circuit including the said contacts; of an alarm-bell at a station distant from the 10 anchorage of the torpedo, included in the circuits of the aforementioned contacts, for the purpose set forth.

4. The combination with a floating torpedo, 15 of concentric contacts e' e^2 arranged axially therein near its head, a gravity or ball contact d in the inner shallower contact e' and an electric circuit including said contacts; of an alarm-bell at a station distant from the anchorage of the torpedo included in the cir- 20 cuit of the aforementioned contacts and an electrical firing-circuit controllable from said station, for the purpose set forth.

5. In a torpedo, a shell divided into three superposed chambers, the central chamber containing the explosive charge, an electric 25 igniter therein and a conductive cable connected with said igniter, a second cable passing through the charge-chamber, a set of contacts projecting beyond the surface of the torpedo and a second set of contacts within the 30 upper chamber of the torpedo, each of the first set of contacts arranged to be moved into the shell and contact with one of the second set of contacts, a pair of concentric cups insulated from one another, a ball in the inner 35 cup adapted to close circuit between them when displaced, the contacts arranged in parallel to and closing circuit through the second cable, substantially as set forth.

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