

(No Model.)

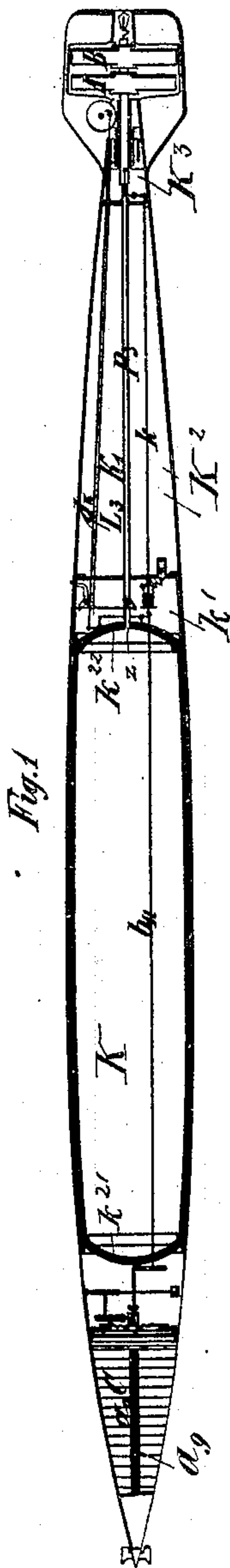
4 Sheets—Sheet 1.

ADOLF GRAF VON BUONACCORSI DI PISTOJA.

AUTOMATIC SINKING VALVE FOR SUBMARINE TORPEDOES.

No. 413,115.

Patented Oct. 15, 1889.



Witnesses:

Will. E. Rouzee.
J. Thomson Cross

Inventor

Adolf Graf von Buonaccorsi di Pistoja

by

Henry O. M.
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(No Model.)

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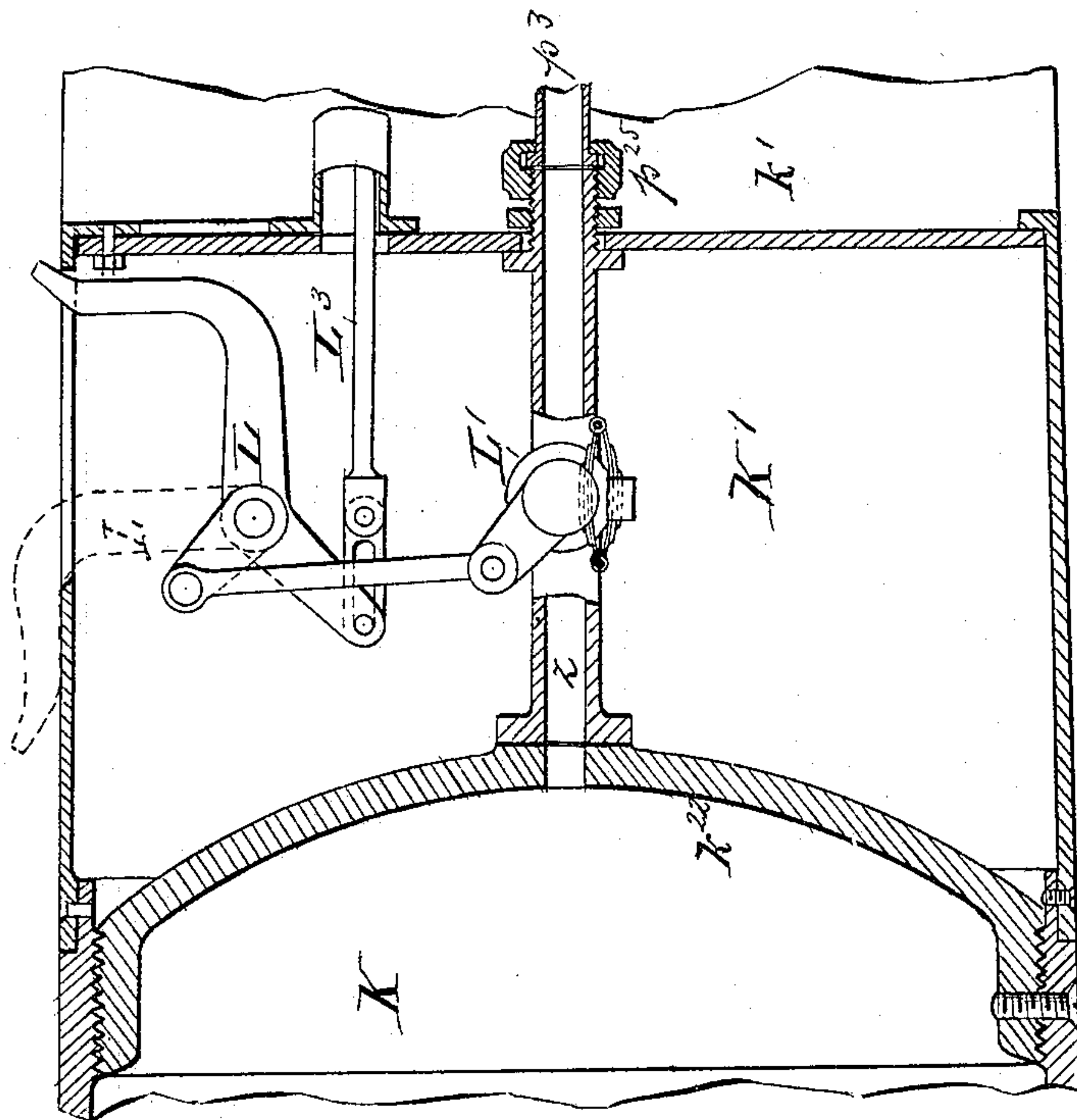
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Fig. 2.



Witnesses:

J. Thomson Cross
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Adolf Graf von Buonaccorsi di Pistoja
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(No Model.)

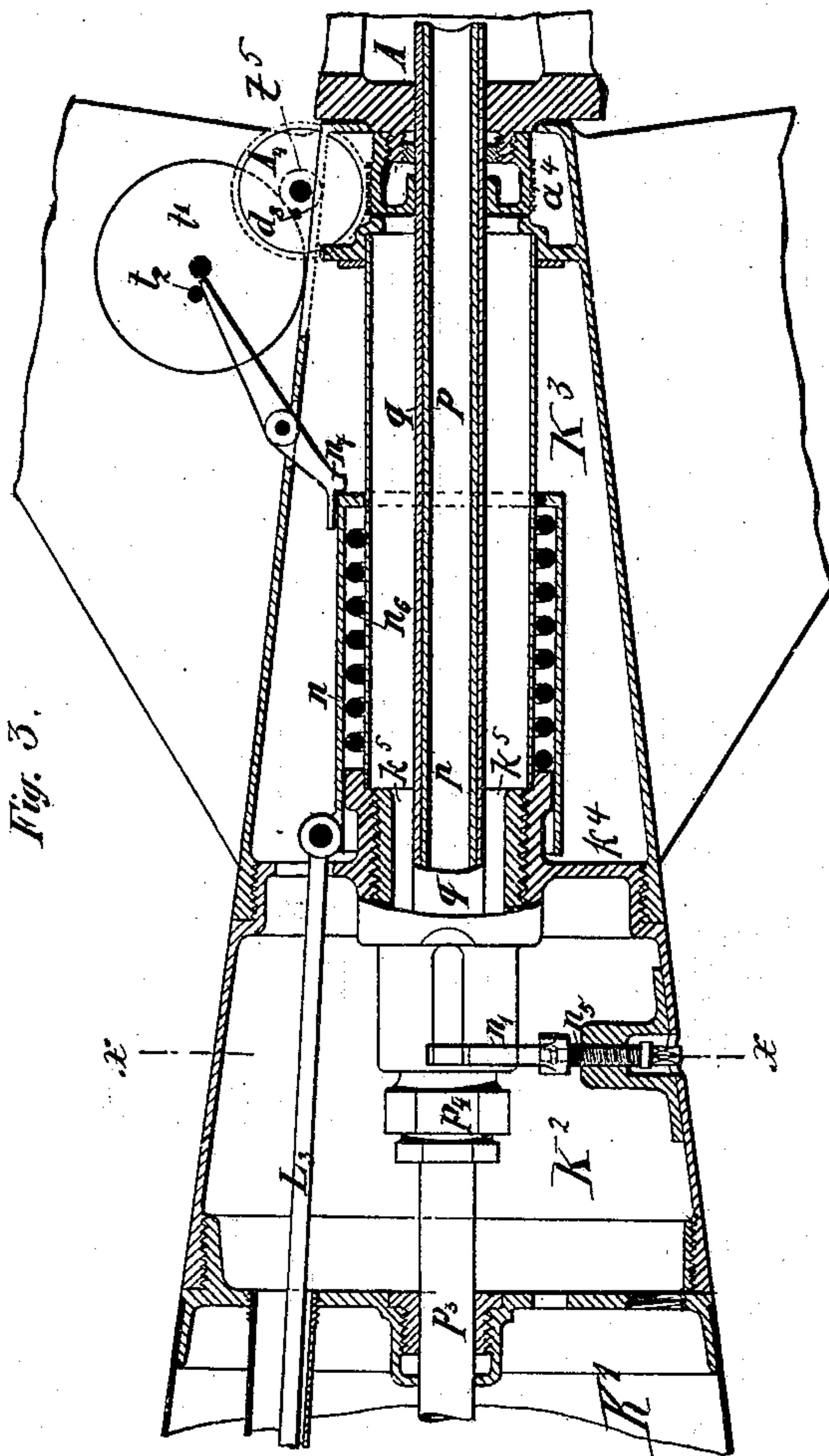
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Witnesses:

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(No Model.)
ADOLF GRAF VON BUONACCORSI DI PISTOJA. 4 Sheets—Sheet 4.

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Mill. E. Rouzee,
Thomson Cross

Inventor
Adolf Graf von Buonacorsi di Pistaja
Henry Mth
att'y

UNITED STATES PATENT OFFICE.

ADOLF GRAF VON BUONACCORSI DI PISTOJA, OF VIENNA, AUSTRIA-HUNGARY.

AUTOMATIC SINKING-VALVE FOR SUBMARINE TORPEDOES.

SPECIFICATION forming part of Letters Patent No. 413,115, dated October 15, 1889.

Application filed November 15, 1888. Serial No. 290,969. (No model.) Patented in Germany February 24, 1888, No. 49,123; in France February 24, 1888, No. 188,945; in Belgium March 12, 1888, No. 81,003; in England March 20, 1888, No. 4,297; in Italy March 31, 1888, XXII, 23,135, XLV, 431; in Portugal May 17, 1888, No. 1,244; in Norway May 28, 1888, No. 934; in Austria-Hungary June 26, 1888, No. 8,093, and No. 21,102, and in Spain June 30, 1888, No. 8,035.

To all whom it may concern:

Be it known that I, ADOLF GRAF VON BUONACCORSI DI PISTOJA, a subject of the Emperor of Austria-Hungary, residing at Vienna, in the Province of Lower Austria, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Self-Propelling Torpedoes, (for which I have obtained Letters Patent in Austria-Hungary, No. 8,093 and No. 21,102, dated June 26, 1888; in Germany, No. 49,123, dated February 24, 1888; in France, No. 188,945, dated February 24, 1888; in Belgium, No. 81,003, dated March 12, 1888; in Italy, Vol. XXII, No. 23,135, and Vol. XLV, No. 431, dated March 31, 1888; in Spain, No. 8,035, dated June 30, 1888; in Portugal, No. 1,244, dated May 17, 1888; in England, No. 4,297, dated March 20, 1888, and in Norway, No. 934, dated May 28, 1888;) 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Referring to the drawings, Figure 1 is a longitudinal axial and more or less schematic view of a torpedo embodying my invention. Fig. 2 is a vertical axial section of the chamber immediately in rear of the compressed-air chamber, showing the mechanism that controls the admission-valve. Fig. 3 is a like view of the two stern-chambers immediately in rear of the ballast or sinking chamber. Fig. 4 is a horizontal section of the chamber immediately in rear of the ballast-chamber, containing the mechanism for operating the sinking-valves. Fig. 5 is a section on line *xx* of Fig. 4. Fig. 6 is a vertical axial section of the rear end of the torpedo, showing the rudders and propellers. Fig. 7 is a like view, on an enlarged scale, a portion of the propellers and the vertical rudder being broken away. Figs. 8 and 9 are sections of the propeller and immersing-rudder shaft and its bearing and the compressed air-distributing pipe, showing the

ports thereof through which the air is admitted to the propellers.

The invention relates to self-propelling, offensive or fish torpedoes, and has for its object to provide means for automatically sinking the torpedo should it miss its mark.

In my application for Letters Patent of the United States, filed November 15, 1888, Serial No. 290,966, I have described a novel means for propelling a torpedo of the class referred to, in which the compressed air is caused to act directly upon the propeller-blades, the propeller operating on the principle of the Barker reaction wheel, whereby I am enabled to dispense with the usual piston cylinder and connections and other mechanism employed—for instance, in the Whitehead and other torpedoes—so that I am enabled to use a plurality of sinking-valves instead of one, as is the case in the Whitehead torpedo, thereby expediting the sinking of the torpedo in case it misses its mark.

To these ends the invention consists in novel means for automatically operating the sinking-valves and in a time mechanism for controlling the said means, substantially as hereinafter fully described, and as pointed out in the claims.

In the choice of the outlines of the improved torpedo it is the aim to preserve that form which presents the least resistance to its motion through the water and has the least tendency to the formation of eddies, and at the same time to give to the compressed-air chamber a perfectly symmetrical form and to locate the same as near the bow or head of the torpedo as possible, thereby reducing the labor and cost of the construction of the air-chamber and facilitating the distribution of the weight of the entire structure and its contained mechanism, so that the persistence of the torpedo in its course through the water, which depends chiefly upon a perfect equilibration or distribution of weight, is materially increased.

In order that this part of my invention may be thoroughly understood, it will be nec-

essary to briefly describe the propelling mechanism and the air-distribution. The motive fluid, preferably air, is compressed to form seventy to ninety atmospheres within a cylindrical reservoir or chamber K, having dome-shaped heads or ends $k^{21} k^{22}$, Fig. 1. To the head k^{22} is connected the distributing-pipe z , and to said pipe is pivotally connected a pipe p^3 , by means of a suitable coupling p^{25} , as shown and described in my application for patent hereinbefore referred to, so that said pipe p^3 may be revolved, for purposes hereinafter described. To the pipe p^3 is coupled a pipe p , and said pipes z , p^3 , and p constitute the distributing-pipe for the compressed air, the pipe p also serving as a support or bearing for the tubular propeller-shaft q , mounted and movable endwise on said pipe. On the tubular shaft q are loosely mounted two screw-propellers A and B, Figs. 6 and 7, said propellers having their blades curved in reverse directions, the blades of the propeller A being, for instance, segments of a right-hand screw-thread, while those of the propeller B are segments of a left-hand screw-thread. In the hub of each propeller is formed an axial chamber A' B', respectively, that have the form of a truncated cone in longitudinal section, said chambers tapering rearwardly, and through which the hollow shaft q extends. The compressed air is admitted to the chambers A' B' through ports $p' p^2$ and $q' q^2$, formed, respectively, in the pipes p and q , the ports p' and q' and p^2 and q^2 registering with each other. The object in pivotally connecting the pipe p^3 to the pipe z is to permit of its being revolved within pipe q , so as to adjust the area of the distributing-ports, and thereby the speed of the propellers.

It will be seen by an inspection of Figs. 8 and 9 that by a partial rotation of the head p^4 of pipe p (shown in dotted lines and in full lines in Figs. 3 and 4) in the direction of arrow 1, the ports q' in pipe q will cease to register, the air being cut off from the propeller-chamber B', while the ports q^2 will still fully register with the ports p^2 , thus applying the full motive power to the propeller A. A partial rotation of the pipe p in a reverse direction, or that of arrow 2, will produce a reverse result. The chambers A' B' perform here the function of auxiliary reservoirs, and jointly with the admission-ports and the moment of inertia of the revolving propellers regulate the speed of the torpedo, the air passing out through passages A² B², formed, respectively, in the blades of the propellers A and B, the operation of which is based upon the principles of the Barker reaction-wheel, as fully described in my application hereinbefore referred to.

In order to permit of the adjustment of the ports referred to after the torpedo is completed, I provide a suitable slot p^5 , formed in

the torpedo-shell, Fig. 4, for the introduction of a key or wrench.

Any suitable means may be provided for admitting the compressed air to and cutting it off from the distributing-pipes $z p^3 p$. I preferably employ, but do not claim herein, the means described and shown and claimed in an application for patent filed November 15, 1888, Serial No. 290,968, and in said application I have shown and described means for automatically cutting off the supply of compressed air to said distributing-pipe, said means being combined with a time mechanism controlled by the propeller A, and consisting, essentially, of a valve-operating lever L, connected by a rod L³ with a spring-actuated sleeve or cylinder n , encompassing the supply-pipe and propeller-shaft and mounted and sliding on a boss formed on the partition k^4 , to which is screwed the tubular bearing k^5 for the shaft q and pipe p , to the outer end of which bearing is screwed one-half of the coupling-head p^4 for the pipes $p^3 p$. (See Fig. 4.) The sleeve n is held in its normal position by a stop-lever n^7 , whose outer end lies in the path of a pin t^2 , projecting from the timing and registering gear-wheel t' , that meshes with a pinion t^5 on the arbor of the worm-wheel A⁴, which latter meshes with a worm-thread a^4 on the hub of the propeller A, as shown in Fig. 3.

The mechanism for operating the sinking-valve is controlled by the sleeve n ; hence it is timed to operate synchronously with the cut-off mechanism.

V V are the sinking-valves, having their seats formed in the partition or rear head K²¹ of the sinking or ballast chamber k' , astern of the chamber containing the mechanism for operating the admission-valve. These sinking-valves are in communication with the outer water through the opening p^6 in the shell of the torpedo, and which opens into the sinking-chamber, whereby the latter is always filled with water. This outside water communication, however, may be made through the opening p^5 , as shown in Fig. 4. The valves V V are held to their seats by means of springs v^{10} , and are connected with the spring-actuated sleeve n by means of tubular rods v' and rods v , which latter have a slight independent motion within the tubular rods v' , so that during the first portion of the rearward movement of the sleeve n the rods v' will move independently of the rods v , and then with said rods to fully move the valves V off their seats, which latter corresponds to the closure of the cut-off valves, so that both the cut-off valves and the sinking-valves will operate simultaneously. This is desirable—in fact, necessary—in order that the course of the torpedo may be arrested and the torpedo simultaneously sunk, for if the sinking-valves were to operate after the cut-off valve the torpedo would necessarily travel a distance corre-

sponding with the interval between the operation of said valves, while if the cut-off valve were to operate sooner than the sinking-valves the torpedo would be liable to drift or rise to the surface.

The object of the simultaneous operation of the valves is to afford a means for locating the torpedo and finding it again, and to prevent its destruction by an enemy should it miss its mark.

Inasmuch as it is not desired to sink the torpedo except when actually used for offensive purposes, it is necessary for torpedo practice to provide means for maintaining the valves on their seats, and this is effected by disconnecting the valve-operating rods *v* from the actuating-tube *n*, in the following manner: The connecting-rods *v v'* are guided in rings *n²*, formed at the end of arms of a shifting-fork *n'*, pivotally connected with a screw *n⁵*, that works in a boss *n⁵⁵*, secured to the torpedo-shell, said screw being provided with a squared head projecting into the enlarged bore of the boss, and so as to be accessible from the outside. By rotating the screw in the proper direction the rods *v v'* are lifted, being hooked to the valve-heads, their hooked ends *n³* being thus lifted out of the eyes *n⁴* secured to said heads, thereby disconnecting the valves from their operating-rods. It will of course be understood that the ambient water has free access to the chamber containing the sinking-valve-operating mechanism through suitable ports in the shell of said chamber.

Having described my invention, what I claim is—

1. In a torpedo, the combination, with the motor and an immersing or sinking valve located in one of the heads or partitions of the sinking-chamber and communicating with the outside water, of an automatically-movable valve-operating device connected to said sinking-valve, a locking device or detent engaging said valve-operating device and holding it in position against the action of its operating power, and a trip mechanism, substantially such as described, operated from the motor and engaging said locking device or detent to trip the same, whereby to permit the automatically-movable valve-operating device to operate, substantially as described.

2. In a torpedo, the combination, with the motor for the same and a sinking-valve, of a timed valve-shifting mechanism comprising a spring-actuated valve-rod, a locking-lever to lock the rod against the stress of its spring and hold the valve to its seat, and a tripping mechanism operated by the motor to trip the locking-lever and release the spring, substantially as and for the purposes specified.

3. In a torpedo, the combination, with the motor for the same and a sinking or immersing valve located in one of the heads or partitions of the sinking-chamber and communicating with the outside water, of a rod provided with a hook at one end hooked to said

valve, and an automatically-movable valve-operating device controlled from the motor for pulling said rod to operate said valve, substantially as described.

4. In a torpedo, the combination, with the motor for the same and a sinking or immersing valve, of a rod provided with a hook at one end hooked to said valve, an automatically-movable valve-operating device, and a screw inserted through the shell of the torpedo for raising the hooked end of said rod out of connection with said valve, substantially as described.

5. In a torpedo, the combination, with the sinking or immersed valves provided with eyes, of rods having hooked ends engaging said eyes, a fork which supports the hooked ends of said rods, and a screw inserted through a socket in the shell of the torpedo, the upper end of said screw being pivoted in said fork, substantially as described.

6. In a torpedo, the combination, with the motor for the same, a stop mechanism for said motor and controlled by the same, and a sinking-valve, of rods connected to said valve and to said stop mechanism, substantially such as described, and adapted to be pulled by said mechanism, substantially as described.

7. In a torpedo, the combination, with the motor for the same and a sinking-valve, of a spring-actuated device connected to open said valve, a detent for keeping said device set, and a trip mechanism operated by the motor to release said detent, substantially as and for the purposes described.

8. In a torpedo, the combination, with the motor for the same and a sinking-valve, of a spring-actuated sleeve, a rod which connects said valve and sleeve, a detent which holds said sleeve against the action of its spring, and a disk operated from said motor and provided with a pin for tripping said detent, substantially as described.

9. In a torpedo, the combination, with a motor for the same, a supply-pipe for said motor, and a cut-off valve for said supply-pipe, of a sinking-valve, a spring-actuated sleeve, a detent which holds said sleeve against the action of its spring, a trip mechanism operated by said motor for releasing said detent, a rod connecting said sleeve and cut-off valve, and a rod connecting said sleeve and sinking-valve, substantially as described.

10. In a torpedo, the combination, with the motor for the same, a supply-pipe for said motor, and a cut-off valve for said supply-pipe, of a sinking-valve, a spring-actuated device connected to close said cut-off valve, a detent for keeping said device set, a trip mechanism operated by said motor for releasing said detent, and a partly-extensible rod connected to said sinking-valve and to said spring-actuated device, substantially as described.

11. In a torpedo, the combination, with the motor for the same, a supply-pipe for said motor, and a cut-off valve for said supply-

pipe, of a sinking-valve, a spring-actuated sleeve, a detent for holding said sleeve against the action of its spring, a trip mechanism operated by said motor for releasing said detent, a rod connected to said sleeve and to said cut-off valve, and a partly-extensible rod connected to said sleeve and to said sinking-valve, substantially as described.

10 12. In a torpedo, the combination, with the motor for the same, a supply-pipe for said motor, and a cut-off valve for said supply-pipe, of a sinking-valve, a spring-actuated sleeve, means operated by the motor for hold-

ing and releasing said sleeve, a rod connecting said sleeve and cut-off valve, a rod connected to said sinking-valve, and a rod connected to said sleeve and telescoping in the rod connected with the sinking-valve, substantially as described.

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

ADOLF GRAF VON BUONACCORSI DI PISTOJA.

Witnesses:

OTTO SCHIFFER,
OTTO MAASS.