(No Model.) 2 Sheets—Sheet 1.

E. KASELOWSKY.

STEERING APPARATUS FOR TORPEDOES.

No. 591,768. Patented Oct. 12, 1897.

Fig. 1.

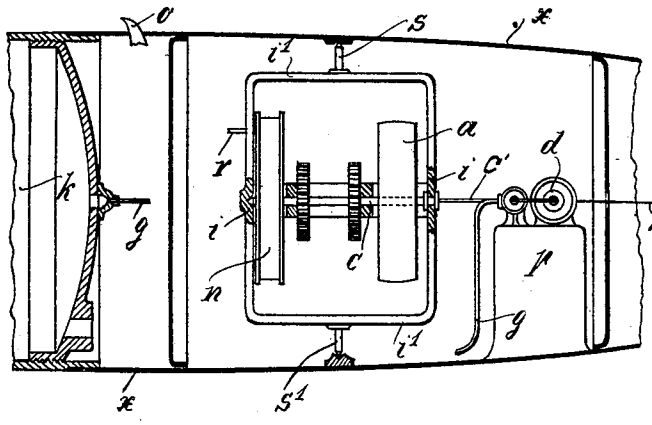


Fig. 5.

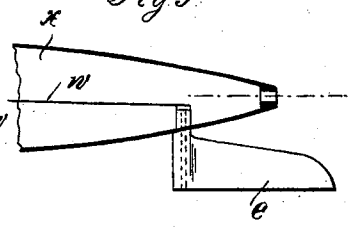


Fig. 2.

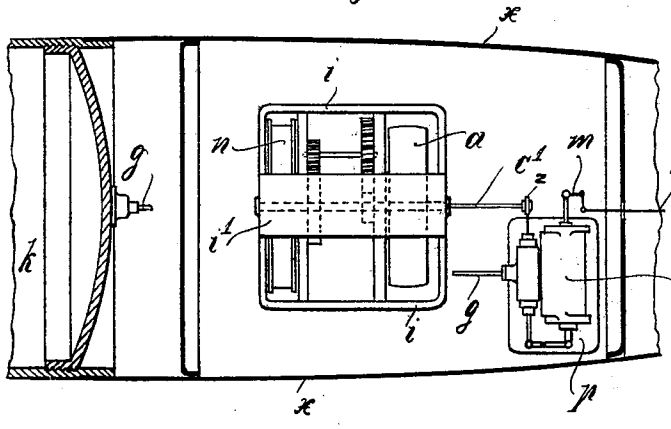
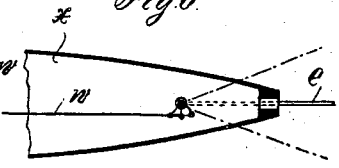


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

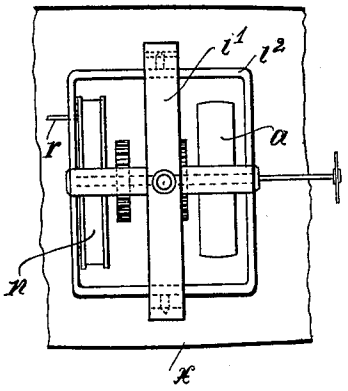
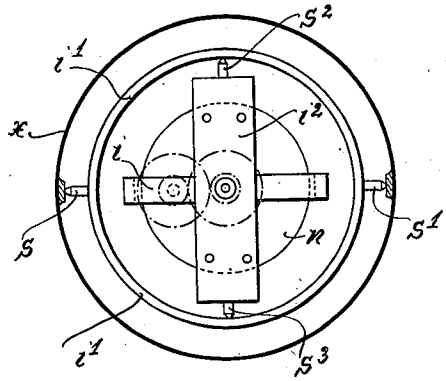


Fig. 4.



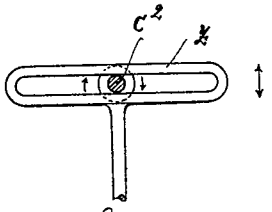


Fig. 8.

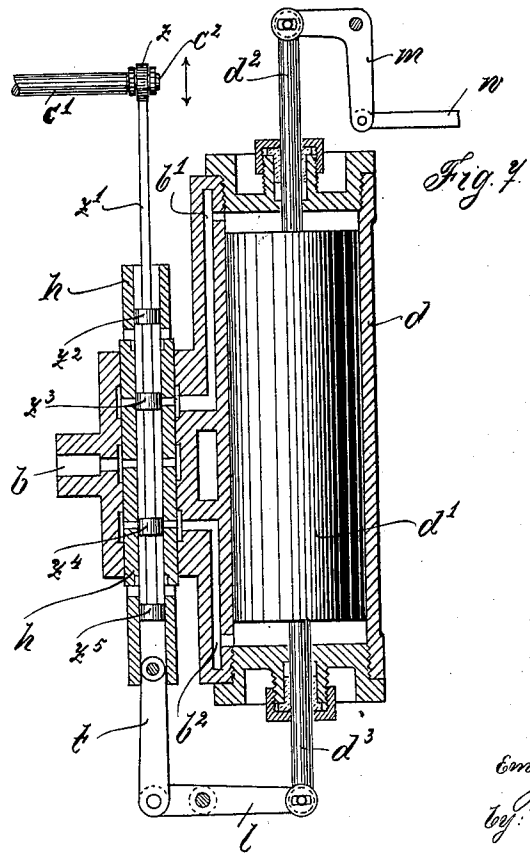


Fig. 7.

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UNITED STATES PATENT OFFICE.

EMIL KASELOWSKY, OF BERLIN, GERMANY.

STEERING APPARATUS FOR TORPEDOES.

SPECIFICATION forming part of Letters Patent No. 591,768, dated October 12, 1897.

Application filed October 3, 1896. Serial No. 607,783. (No model.) Patented in Germany October 3, 1894, No. 86,522.

To all whom it may concern:

Be it known that I, EMIL KASELOWSKY, a subject of the King of Prussia, German Emperor, and a resident of Berlin, in the Kingdom of Prussia, German Empire, have invented an Improved Steering Apparatus for Fish-Torpedoes, (for which patents have been obtained in Germany, No. 86,522, dated October 3, 1894, and in Italy application filed on July 14, 1896,) of which the following is an exact specification.

In launching a torpedo from a broadside-tube while the boat is in motion the torpedo is deviated from its correct path in consequence of the inertia existing within and imparted to it by the moving boat. The deviation is of course the stronger the greater the speed of the boat, and it is consequently in a torpedo-boat very great because of the very quick motion of such a boat.

The purpose of my present invention, therefore, is to do away with said lateral deflections of the torpedo or to cause the latter to move in a straight line, respectively, and my invention is based on the principle that a quickly-rotating wheel or disk suspended so as to allow of being inclined to any plane maintains its plane of rotation if its frame or support is inclined. I thus connect a wheel or disk of the kind stated with the rudder of the torpedo in such a manner that any lateral movement of the torpedo or any deviation of the same, respectively, results in an action of said quickly-rotating wheel or disk upon the rudder. The latter is operated from the said wheel or disk in such a way that the torpedo is deviated back into its normal path until the rudder extends again exactly in the longitudinal direction of the torpedo.

In order to make my invention more clear, I refer to the accompanying drawings, in which similar letters denote similar parts throughout the different views, and in which—

Figure 1 is a vertical section through the middle portion of a torpedo constructed according to my invention. The other portions are left away to save space. Fig. 2 is a plan of the parts shown in Fig. 1, the shell being again in section. Fig. 3 is a side view similar to the middle portion of Fig. 1, but showing a slightly-modified form of construction. Fig. 4 is a front view of said modified construction. Fig. 5 is a vertical section through the rear portion of the torpedo. Fig. 6 is a horizontal section through the rear portion of the torpedo. Fig. 7 is a longitudinal section through an air-motor of the Servi type; and Fig. 8 is a detail of said motor, which will duly be referred to in the detailed description.

The fly wheel or disk *a*, Figs. 1 and 2, is situated upon a shaft *c*, held by the frame *i*, and is connected by a set of suitable cog-wheels to a spring which is arranged within the casing *n*. This latter is also held by the frame *i*. The proportions in diameter and the arrangement of said set of cog-wheels are such that the disk *a* is quickly rotated by said spring. The spring after being strained may be set free by any desired means. The latter are preferably caused to come into action on the torpedo being launched, and I have shown as an example a movable hook or nose *o*, Fig. 1, projecting from the shell. Said hook is in any way connected with a rod *r*, that on being longitudinally displaced sets the spring free and causes it to rotate the disk *a*.

The horizontal frame *i* is rigidly connected with a vertical frame *i'*, Figs. 1 and 2, which is furnished with pivots *s s'*. The latter are retained by suitable bearings secured to the bottom and to the top of the shell *x* of the torpedo, and the frame *i'*, together with the frame *i* and all the parts held by the latter, may thus rotate or revolve on and around said pivots.

In the modified form of construction shown in Figs. 3 and 4 the frame *i'* is circular and arranged concentric with the shell *x*. The pivots *s s'* and the bearings for the same are situated at the side portions of said frame and said shell. The frame *i* is not rigidly connected with the frame *i'*, but with a frame i^2, which may move—*i. e.*, rotate—within the rotatable frame *i'*, aforementioned. s^2 s^3 are the pivots, holding the frame i^2 within the frame *i'*. The fly-disk *a* may thus revolve not only around a vertical axis, but also around a horizontal one. The rearwardly-projecting end *c'*, Figs. 2 and 7, of the shaft *c* of the fly-disk *a* is provided with a pivot c^2, Fig. 8, that

takes into a slotted guide-piece z, Figs. 7 and 8. The latter is secured to the piston-rod z' of an air-pressure motor of the Servi type. Said motor operates the rudder e, Figs. 5 and 6, by the mediation of the bell-crank lever m, Figs. 2 and 7, and the connecting-rod w in such a manner that said rudder is turned either to the right or to the left, as indicated by dotted lines in Fig. 6.

As long as the torpedo moves in a straight line the pivot c^2 of the shaft c' remains within the middle portion of the slot of the guide-piece z. If, however, the torpedo deviates from its proper course, and if, consequently, the frame $i\,i'$ is turned with regard to the shell of the torpedo by reason of the fly-disk a maintaining its plane of rotation, the shaft c', with its pivot c^2, is laterally displaced, or, more precisely, caused to describe an arc in such a way that the guide-piece z is moved in the longitudinal direction of the piston-rod z', as indicated by the arrow in Figs. 7 and 8. The piston-rod z' is provided with the piston-valves $z^2\,z^3\,z^4\,z^5$, Fig. 7, two of which $z^3\,z^4$ open and close the channels that connect the inlet-conduit b of the motor with the distributing-conduits $b'\,b^2$.

The casing d contains the piston d', and the latter is thus displaced in one or the other direction, according to the opening or closing of one or the other of the distributing-conduits $b'\,b^2$. This movement is transmitted to the rudder e by the mediation of the bell-crank lever m and the connecting-rod w, as aforedescribed. The connection of the piston d' with the bell-crank lever m is effected by the rod d^2. A similar rod d^3, secured to the other end of the piston, is connected with a hollow piston-valve h by the mediation of the double-armed lever l and the link t. Said hollow piston-valve contains the four pistons $z^2\,z^3\,z^4\,z^5$, aforementioned, and contains, further, the channels establishing the communication between the inlet-conduit b and the distributing-conduits $b'\,b^2$. The purpose of the pistons $z^2\,z^5$ is to make the pistons $z^3\,z^4$ independent of the pressure of the air or to relieve steam from said pressure, respectively. The purpose of the hollow piston-valve h and of its connection with the steering-piston d' is to interrupt the communication between the inlet-conduit b and one or the other of the distributing-conduits $b'\,b^2$ after the steering-piston d' has been displaced by the air. The pistons $z^3\,z^4$, as well as $z^2\,z^5$, regain their former or proper position only after the torpedo has regained its straight path. In doing so the relative position of the torpedo and the frame $i\,i'$ with the fly-disk a becomes again the correct one, and the piston-rod z' is thereby displaced into its medium position or position of rest, respectively.

Any change in the vertical direction of motion of the torpedo does not cause the motor to come into action, because the pivot c^2 of the shaft c' moves only along within the slot of the guide-piece z. This cannot obviously cause a longitudinal displacement of the piston-rod z'. Such a displacement, however, is necessary in order to operate the motor. The latter is arranged upon a base p, Figs. 1 and 2, and is fed with compressed air from the reservoir k by means of the pipe g.

Having thus fully described the nature of this invention, what I desire to secure by Letters Patent of the United States is—

1. In a fish-torpedo having a gyroscopic disk or wheel for operating the rudder, the combination with said disk or wheel, and its axle or shaft, and a frame carrying said axle or shaft, and adapted to turn around an axis located at right angles to the axle or shaft, of a motor for the gyroscopic disk or wheel also carried by said frame, and means for transmitting the deviations of the latter to the rudder, as set forth.

2. In a fish-torpedo having a gyroscopic disk or wheel for operating the rudder, the combination with said disk or wheel, and its horizontal axle or shaft, and the frame carrying said axle or shaft, and adapted to turn around a horizontal axis located at right angles to the axle or shaft, of a motor for the gyroscopic disk or wheel also carried by said frame; another frame carrying the latter and adapted to turn around a vertical axis, and means for transmitting the deviations of the said frame or frames to the rudder, as set forth.

3. In a fish-torpedo having a Servi motor for operating the rudder, and a gyroscopic disk or wheel for operating the valve motion of said motor, the combination with said disk or wheel, and its horizontal axle or shaft, and the frame carrying said axle or shaft and adapted to turn around a horizontal axis located at right angles to the first-named axle or shaft, of a motor for the gyroscopic disk or wheel also carried by said frame; another frame carrying the latter frame, and adapted to turn around a vertical axis; a rod extending from the first-mentioned frame in the direction of the said axle or shaft, and a vertical slotted guide-piece secured to the horizontal valve-rod of the Servi motor and taking over the free end of said first rod, substantially and for the purpose as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EMIL KASELOWSKY.

Witnesses:
HENRY HASPER,
CHARLES A. DAY.