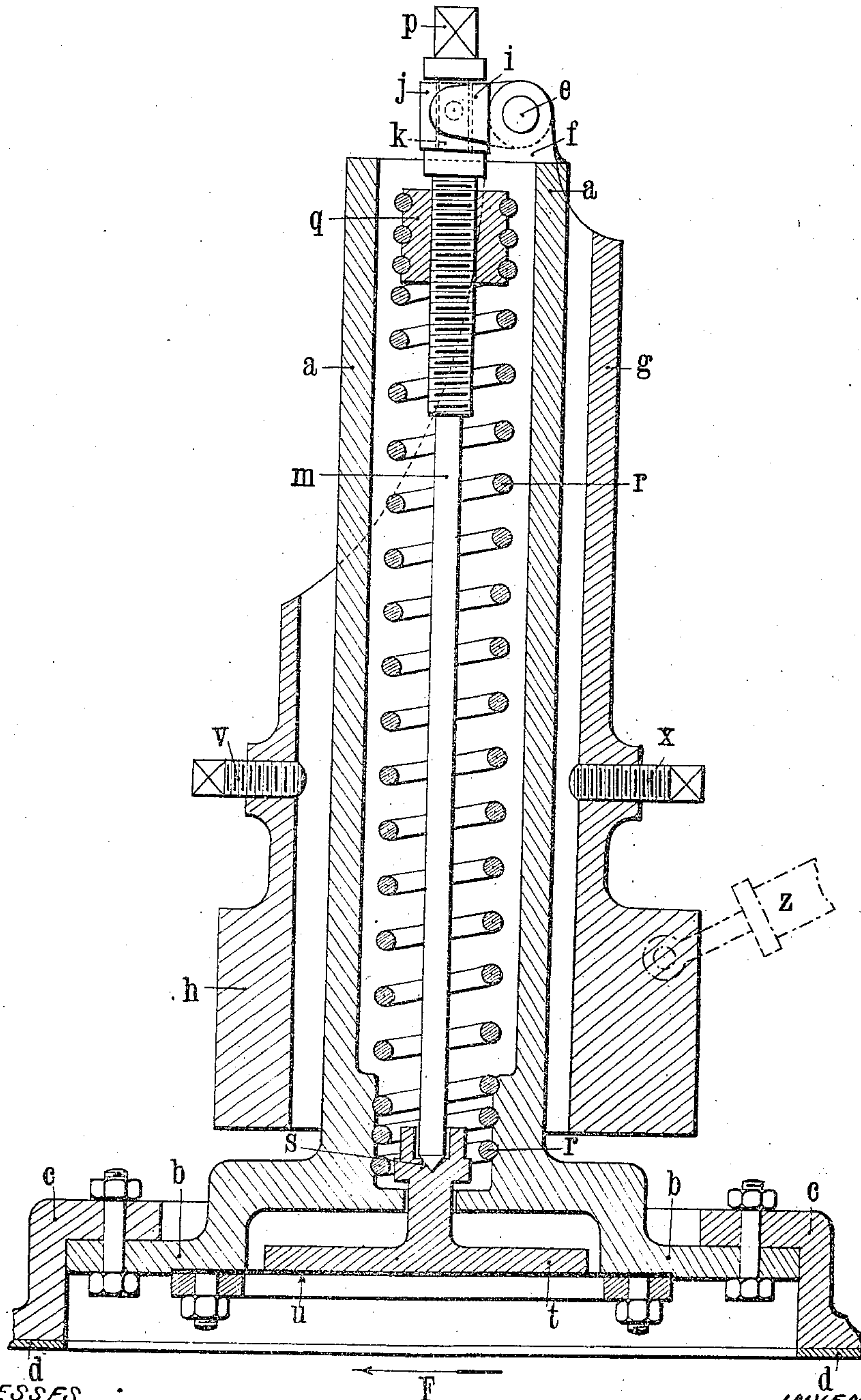


A. E. JONES.
IMMERSION REGULATOR, PARTICULARLY ADAPTED FOR TORPEDOES.
APPLICATION FILED NOV. 1, 1907.

899,304.

Patented Sept. 22, 1908.



WITNESSES :

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UNITED STATES PATENT OFFICE.

ALBERT EDWARD JONES, OF FIUME, AUSTRIA-HUNGARY, ASSIGNOR TO WHITEHEAD & COMPANY, OF FIUME, AUSTRIA-HUNGARY, A CORPORATION.

IMMERSION-REGULATOR PARTICULARLY ADAPTED FOR TORPEDOES.

No. 899,304.

Specification of Letters Patent.

Patented Sept. 22, 1908.

Application filed November 1, 1907. Serial No. 400,196.

To all whom it may concern:

Be it known that I, ALBERT EDWARD JONES, a subject of the King of Great Britain, residing at Fiume, Austria-Hungary, engineer, have invented certain new and useful Improvements in and Relating to Immersion-Regulators Particularly Adapted for Torpedoes, of which the following is a specification.

This invention has for its object improvements in immersion regulators, more particularly for self-propelled torpedoes, in which the combined action of a hydrostatic piston and a pendulum is employed.

The invention relates particularly to diminishing certain resistances at the joints, and providing a device the operation of which is assured under all operative conditions.

A constructional form of the device is illustrated in axial vertical section in the accompanying drawing.

The body of the apparatus is constituted by a hollow column *a* fixed by the intermediary of its foot *b* and of a sole plate *c* to the body *d* of the torpedo. The column *a* is provided at its upper part with two lugs *f*, the center *e* of which forms the pivot for a pendulum constituted by a tubular body *g* presenting a mass *h* at its lower part. This pendulum is provided at its upper part with a small fork-shaped arm *i* embracing a sleeve *j* serving as support for a rod *m* terminating at its upper part in a square *p* adapted for the reception of a key.

The rod *m* is screw-threaded and a nut *q* to which the upper part of a spring *r* is fixed moves along this screw-thread; the lower part of this spring is rigidly connected to the foot of the column *a*. The lower pin-shaped extremity of the rod *m* rests in a recess *s* in the hydrostatic piston *t* which is lined in the usual manner by a flexible diaphragm or membrane *u* fixed to the foot *b* of the column. The angular movements of the pendulum may be regulated by means of two screw-stops *v* *x* which are preferably arranged as closely as possible to the center of gravity of the whole constituted by the pendulum and the other parts of the apparatus.

The mass *h* of the pendulum is connected by the usual transmission means, a portion of which is shown at *z*, to the devices to be controlled.

The operation is as follows:—In the first place the tension of the spring *r* is regulated in such a manner as to balance it with the hydrostatic pressure acting upon the diaphragm *u* at the depth of immersion which has been assigned to the torpedo. This regulation is effected by displacing the nut *q* upon the rod *m* by rotation of this rod by means of a key engaging upon the square *p*. When the torpedo moves at this depth of immersion, the system is in equilibrium and the pendulum acts in the known manner for each inclination of the torpedo, point raised or point depressed, in such a manner as to correct this inclination and continuously maintain the torpedo in a path parallel with the surface of the water. If the torpedo descends, the hydrostatic pressure becoming preponderant acts beneath the diaphragm *u*, lifts the rod *m*, which movement is transmitted by the intermediary of the sleeve *j* and of the lever *i* to the pendulum *h*, the action of which becomes felt in the usual manner. If, on the contrary, the torpedo rises above its immersion point, it is the spring *r* which becomes preponderant, which results in depressing the diaphragm *u* and at the same time the rod *m* and in acting upon the pendulum in the inverse direction.

One of the advantages resulting from the fact that the stops *v* and *x* are arranged in proximity to the center of gravity of the movable parts is as follows:—If the pendulum lags, for example, as a result of an acceleration of the torpedo, which may be assumed to move in the direction indicated by the arrow *F*, it bears against the stop *v*. If this stop were not situated in proximity to the center of gravity of the movable parts, it will be understood that one of the masses situated on one side or the other of this stop would be preponderant, and would exert a certain pressure or braking action upon the pivot *e*, which would constitute a resistance opposing the rectifying action of the hydrostatic piston. As the masses are substantially equal on each side of the stop *v*, they balance each other, since this stop is in proximity to the center of gravity, this braking action disappears, and does not impede the operation of the hydrostatic piston.

Having now particularly described and ascertained the nature of my said invention

and in what manner the same is to be performed, I declare that what I claim is:—

1. In an immersion regulator, the combination of a hollow column forming a support 5 fixed to the sole plate of the apparatus, a tubular pendulum surrounding said column and pivoted to the upper part thereof, a rod connected to the pendulum and resting on the diaphragm, a spring controlling the action of the pendulum, and means for regulating the tension of said spring. 10

2. In an immersion regulator, the combination of a hydrostatic piston furnished with a diaphragm, a hollow column, a tubular pendulum pivotally mounted on the upper 15 part of the support by means of a fork-shaped arm, a rod connected to the pendulum and resting on the diaphragm, said rod being screw-threaded at its upper part, a spring rigidly connected to the foot of the column, and a nut movable along the screw-thread of the rod, said nut being fixed to the upper part of the spring for regulating the tension thereof. 20

3. In an immersion regulator, the combination of a hydrostatic piston furnished with a diaphragm, a hollow support, a tubular pendulum pivoted to the upper part of the support and connected to a screw-threaded 30 rod resting on the diaphragm, stops passing through the center of gravity of the pendulum, a spring attached to the foot of the column, and a nut movable on the screw-threaded portion of the rod and attached to the upper part of the spring for the adjustment of the apparatus for any depth of immersion. 35

4. In an immersion regulator for self-propelled torpedoes, the combination, with a hydrostatic piston, of a column forming the support of the apparatus, a tubular pendulum surrounding said column and pivoted to the upper part thereof, means for connecting the pendulum to the hydrostatic piston, and a 45 spring controlling the action of the pendulum.

5. In an immersion regulator, the combination of a hollow column forming a support fixed to the sole plate of the apparatus, a tubular pendulum surrounding said column and 50 pivoted to the upper part thereof, a rod connected to the pendulum and resting on the

diaphragm, a spring controlling the action of the pendulum, and means for regulating the tension of said spring.

6. In an immersion regulator, the combination of a hydrostatic piston furnished with a diaphragm, a hollow column, a tubular pendulum pivoted to the upper part of the column, a rod connected to the pendulum and resting on the diaphragm, said rod being 60 screw-threaded at its upper part, a spring rigidly connected to the foot of the column, and a nut movable along the screw-thread of the rod, said nut being fixed to the upper part of the spring for regulating the tension thereof. 65

7. In an immersion regulator, the combination with a hydrostatic piston, of a hollow column forming a support, a spring-controlled tubular pendulum surrounding the column, 70 means for connecting the pendulum to the piston, and stops provided on the pendulum for limiting the amplitude of its oscillations.

8. In an immersion regulator, the combination with a hydrostatic piston, of a hollow 75 column forming a support, a spring-controlled tubular pendulum connected to the piston, said pendulum being provided with stops passing close to its center of gravity for diminishing the braking effects of the pendulum on its pivot. 80

9. In an immersion regulator, the combination of a hydrostatic piston furnished with a diaphragm, a screw-threaded rod resting thereon, a hollow support, a tubular pendulum pivoted to the upper part of the support 85 and connected to the rod resting on the diaphragm, stops passing through the center of gravity of the pendulum, a spring attached to the foot of the column, and a nut movable on the screw-threaded portion of the rod and attached to the upper part of the spring for the adjustment of the apparatus for any depth of immersion. 90

In testimony whereof I have hereunto 95 placed my hand and seal: at Birmingham England this ninth day of October 1907.

ALBERT EDWARD JONES [L. S.]

In the presence of—

ARTHUR WRIGHT, Jr.,

HOWARD JOHN ASHBY.