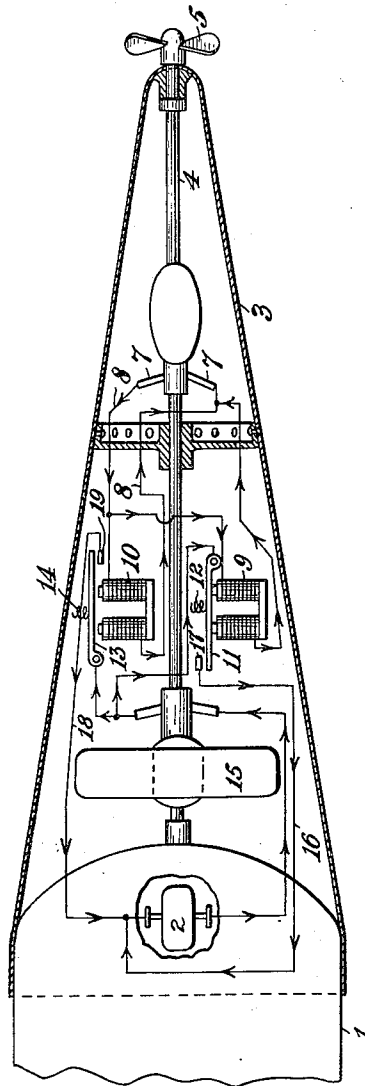


B. A. FISKE.
IGNITION SYSTEM FOR TORPEDOES.
APPLICATION FILED OCT. 5, 1920.

1,379,972.

Patented May 31, 1921.



Inventor
Bradley A. Fiske
By his Attorney
Frank L. Over

UNITED STATES PATENT OFFICE.

BRADLEY A. FISKE, OF NEW YORK, N. Y.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, BRADLEY A. FISKE, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Ignition Systems for Torpedoes, of which the following is a full, clear, and exact description.

My invention relates to various new and useful improvements in ignition systems for torpedoes.

With the development of modern systems of armoring and otherwise protecting war vessels, they are rendered much less vulnerable to direct torpedo attack, and my invention therefore relates to an ignition system by which the torpedo may be exploded beneath the vessel and thus produce the maximum damage. In effecting this result, the explosion of the torpedo obviously cannot be brought about by impact with the vessel and manifestly the target is relatively too small and the time factor too uncertain to permit of the effective use of time fuses for the purpose. I propose to utilize the magnetic mass of the attached vessel for the purpose of controlling the operation of the ignition system, so that, by adjusting the submerging mechanism so as to cause the torpedo to pass beneath the attacked vessel, the magnetic mass of the latter will so influence the ignition system as to cause it to operate and bring about the explosion. To this end, my improved ignition system utilizes a control circuit, including an armature rotating in space so as to be influenced normally only by the earth's magnetic field and driven preferably by a small propeller actuated by the passage of the torpedo through the water. The small current generated in this way in the central circuit is normally without effect, the ignition system being inoperative, but when the torpedo reaches the neighborhood of the attacked vessel, the magnetic mass of the latter will effect a sufficient change in the current in the control circuit to cause the current then generated therein to bring about the operation of the ignition system. This control of the ignition system due to a substantial change in the current thus generated, may be ef-

fecting in any suitable way. Preferably I employ a small generator, such as a shunt dynamo, also driven by the propeller which drives the armature, and capable of developing sufficient current to ignite or otherwise actuate a suitable fuse. The generator is preferably provided with two armature circuits which are normally open, their closing being determined by the current change in the control circuit. This result, I may accomplish, by employing two determining electro-magnets in the control circuit, one of which is sufficiently delicate as to be actuated by the normal current in the control circuit and thus normally breaking one of the armature circuits when the magnet-armature is attracted and the other of which is sufficiently rugged as not to be actuated by such normal current and thus normally breaking the other armature circuit when the magnet-armature remains retracted. In this way, if the effect of the magnetic mass presented by the attacked vessel, is to substantially reduce the current in the control circuit, the armature of the first magnet will be released, thus closing the corresponding armature circuit of the generator and actuating the fuse. If, on the other hand, the effect of the magnetic mass is to substantially increase the current in the control circuit, the armature of the second magnet will be attracted, and this will close the corresponding armature circuit of the generator and actuate the fuse.

With such a system as I have above outlined, a very important feature is its entire safety, since the torpedo can only be exploded after it has been discharged and is progressing at high speed through the water. There is none of the danger encountered with torpedoes which explode on impact, and which may be accidentally exploded if dropped in handling or otherwise.

Of course, it will be understood that the system may be provided with safety features to prevent premature explosion. For instance, provision may be made to prevent the magnetic mass of the vessel from which the torpedo is discharged from effecting a premature explosion, by permitting the propeller to make a number of revolutions before it commences to rotate the two armatures, and hence the torpedo will be a safe

distance away. Also, if desired, well known provision may be made to briefly delay the explosion, after the operation of the control circuit, whereby the explosion may be
5 timed to take place when the torpedo is well beneath the attacked vessel.

In order that the invention may be better understood, attention is directed to the accompanying drawing forming a part of
10 the present specification, and in which I show diagrammatically a convenient form thereof applied to the war head of a torpedo.

The war head 1 of the torpedo is provided
15 with a suitable fuse 2, adapted to be operated or ignited in any desired way by a suitable current as I shall explain, and which may be provided with well known devices to briefly delay the explosion if desired.
20

Attached to the forward end of the war head 1 is a hollow conical brass or other non-magnetic case 3, in which is mounted a shaft 4, adapted to be rotated by a small
25 propeller 5 as the torpedo is driven through the water.

The shaft 4 carries a small armature which rotates in the magnetic field of the earth and thus generates a very weak current of low voltage at the brushes 7, 7.
30 From the brushes 7, 7 leads the control circuit 8, having two branches or shunts, one including the delicate magnet 9 and the other the rugged magnet 10. The armature
35 11 of the magnet 9 is retracted by a weak spring 12, so adjusted as to permit the armature to be normally attracted by the weak current normally generated by the armature 5. The armature 13 of the magnet 10 is
40 normally retracted by a stronger spring 14, so adjusted as to resist the magnetic pull due to the normal current generated by the armature 5. Consequently, in normal operation, the armature 11 will be attracted
45 and the armature 13 will be retracted.

Mounted on the shaft 4 is the armature of a small dynamo 15 preferably of the shunt type and having a double circuit as shown, both including the fuse 2. One of
50 these circuits 16 includes a contact 17 whereby the circuit will be closed if the armature 11 is retracted, and the other circuit 18 includes a contact 19, whereby the circuit will be closed if the armature 13 is attracted.

In operation, as the torpedo progresses through the water at the proper depth to pass beneath the vessel attacked, the shaft 4 will be rotated and the armature 5 turning in the earth's magnetic field will generate a current sufficient to attract the armature 11 and thus keep open the circuit
60 16 of the dynamo 15. The current so generated will be insufficient to attract the armature 13, so that the circuit 18 will also be kept open. When the torpedo reaches

the immediate neighborhood of the attacked vessel, the magnetic mass of the latter will materially affect the field of the armature 5 and thus produce a substantial change in the current generated by the same. If the
70 effect is to weaken the field, the armature 11 will no longer be attracted, but will be withdrawn by the spring 12 and close the circuit 16 and the fuse will be actuated. If the effect is to strengthen the field, the
75 armature 13 will be attracted, the circuit 18 will be closed and the fuse will be actuated. I thus provide effective means for the operation of the control mechanism, regardless of the effect due to the magnetic mass.
80

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:

1. In an ignition system for self-propelled torpedoes, the combination of a fuse,
85 a generator operated by the motion of the torpedo through the water, an electro-magnetic mechanism influenced by variations in the magnetic field exterior to the torpedo, and means whereby an increase or decrease
90 of the magnetic field will cause the electro-magnetic mechanism to close the circuit of the generator through the fuse and thereby explode it, substantially as set forth.

2. In an ignition system for self-propelled torpedoes, the combination of a fuse,
95 an electric generator, an electro-magnetic mechanism operated by the motion of the torpedo through the water and influenced by variations in the magnetic field exterior
100 to the torpedo, and means whereby an increase or decrease in the magnetic field will cause the electro-magnetic mechanism to close the circuit of the generator through the fuse, and thereby explode it, substantially as set forth.
105

3. In an ignition system for self-propelled torpedoes, the combination of a fuse, an electric generator operated by the motion of the torpedo through the water, and means
110 for closing the circuit of the generator through the fuse actuated by increase or decrease of the magnetic field exterior to the torpedo, substantially as set forth.

4. In an ignition system for torpedoes, an
115 armature generating in a control circuit a current due to the earth's magnetic field, a control circuit including a magnet whose armature is normally attracted by the current in the control circuit, a fuse, and an ignition
120 dynamo for actuating the fuse, when the armature-circuit is closed, said armature circuit being normally open at the magnet-armature, substantially as set forth.

5. In an ignition system for torpedoes, an
125 armature generating in a control circuit a current due to the earth's magnetic field, a control circuit including two determining magnets, a fuse, an ignition dynamo for actuating the fuse, and means whereby an
130

increased current in the control circuit will
cause one determining magnet to cause the
ignition dynamo to actuate the fuse, and a
decreased current in the control circuit will
5 cause the other determining magnet to cause
the ignition dynamo to actuate the fuse,
substantially as set forth.

This specification signed and witnessed
this sixteenth day of September, 1920.

BRADLEY A. FISKE.

Witnesses:

FRANK L. DYER,
CATHARINE D. JORDAN.