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INDUCTION GENERATOR STARTING GEAR

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Fig. 1

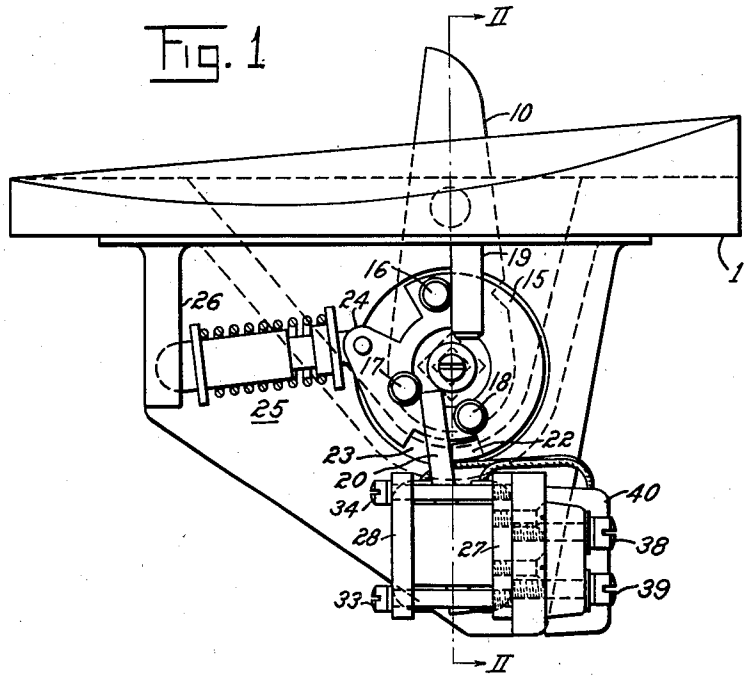


Fig. 2

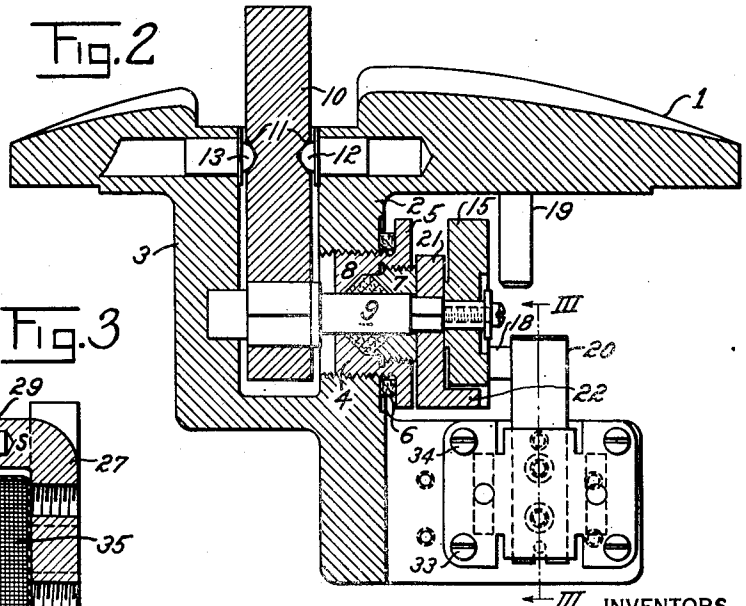
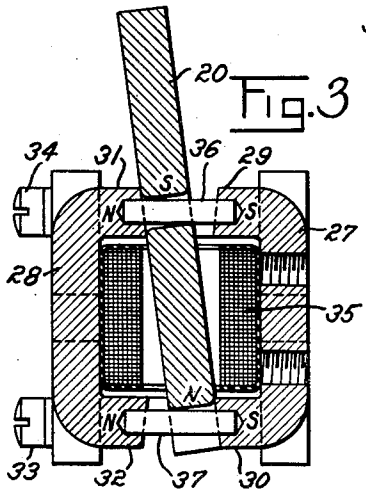


Fig. 3



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INDUCTION GENERATOR STARTING GEAR

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2 Claims. (Cl. 171—209)

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Our invention relates to electromagnetic devices and more particularly to impulse generators of general utility but particularly useful with the starting gear of electric torpedoes.

The Government of the United States has been granted a certain royalty-free license for governmental purposes with respect to the invention herein described.

In electrically propelled torpedoes a trigger switch is usually used to set up the initial starting circuits for the electric control system. For some types of torpedoes the trigger switch is called upon to carry a rather heavy current.

One specific object of our invention is the provision of a trigger mechanism for the starting gear of a torpedo of an impulse current generating type.

One of the objects of our invention is the provision of a snap-action mechanism for an electric current generator to thus provide current impulses of a sharp peak.

A more specific object of our invention is the provision of a trigger mechanism for the starting gear of a torpedo for producing a current impulse having a sharp peak and produced during the initial movements of a torpedo being fired from a firing tube.

The objects hereinbefore stated are merely illustrative of still other objects and advantages that will become more apparent from a study of the following specification and the accompanying drawing, in which:

Figure 1 is a side view of our novel trigger mechanism including an impulse generator;

Fig. 2 is a transverse sectional view on section line II—II of the subject matter shown in Fig. 1; and

Fig. 3 is a sectional view of the impulse generator taken on section line III—III of Fig. 2 but on a somewhat larger scale than the showing in Fig. 2.

We are aware that many impulse generators are known in the art but our combination of the novel trigger mechanism and novel impulse generator of novel and rugged construction provides for dependable and reliable operation of the starting gear of an electric torpedo.

In Figs. 1 and 2 the base, or supporting structure 1 may be circular or oval shaped but is designed to fit into a suitable well in the afterbody of a torpedo so as to hermetically seal off the interior of the afterbody from the sea. The base is provided with a well having parallel side-walls 2 and 3.

One side-wall, side-wall 2 as shown, is provided with a threaded opening for receiving the sleeve nut 4 having the flange 5. A suitable gasket 6 of rubber or neoprene, or some other material provides a liquid seal so that sea water that may leak past the threads will not enter the interior of the torpedo. The outer end of the sleeve nut 4 is provided with internal threads to receive a second sleeve nut 7. This sleeve nut 7 and sleeve nut 4 and the packing material 8 constitute a packing gland and one of the bearings for the shaft 9 disposed as shown in the side-walls 2 and 3.

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On the rectangular portion of the shaft disposed within the well the trigger lever 10 is secured. This lever 10 is provided with depressions 11 for receiving the spring biased buttons 12 and 13. The details for biasing the buttons into the depressions are well known and are, therefore, not shown.

The lever 10 projects sufficiently above the base 1 to be actuated counterclockwise by a dog on the firing tube of the torpedo, the angular throw being through about forty-five degrees.

At the right-hand end of shaft 9 a cam 15 is rotatably mounted. The cam 15 is provided with three pins 16, 17 and 18 projecting toward the right. Pin 16 is disposed to engage the downwardly projecting stop 19 limiting the clockwise rotation of cam 15. Pins 17 and 18 are disposed to actuate the armature 20 of the impulse generator to be described hereinafter.

A cam actuating member 21 is rigidly coupled to shaft 9 in the space between the cam 15 and the sleeve nut 7. The cam actuating member 21 is provided with a lug 22 projecting into the cut out region 23 of cam 15. The cam 15 is provided with an ear 24 having pivotal engagement with the overcenter spring mechanism 25 disposed between ear 24 and the backup bearing bracket 26.

When the lever 10 is actuated counterclockwise upon firing of the torpedo, the lug 22 carries the cam 15 along in the same direction but as soon as the spring force of the overcenter spring mechanism passes below the shaft axis, the cam is moved counterclockwise with a snap action. The pin 17 thereupon moves the armature 20 clockwise with a snap action since the lug 22 is free to move in the cut out region 23.

The impulse generator portion of our trigger mechanism comprises a pair of permanent magnets provided with the inwardly projecting lugs 29 and 30, and 31 and 32, respectively. The magnets, polarized as shown, are mounted in a nonmagnetic frame bolted together by brass bolts 33 and 34.

The armature 20 is provided with a bottom slot and a transverse hole near the middle. The armature 20 is disposed axially of the coil 35 and rests on the non-magnetic pins 36 and 37 disposed as shown between the lugs 29 and 31, and 30 and 32, respectively.

The end wires of the coil are connected to the electric terminals 38 and 39 mounted in the block 40 of insulating material. The block 40 is bolted to the magnet 27 as shown.

It will be noted that as long as the armature 20 is in the position shown in Figs. 1 and 3, the armature is magnetized as shown in Fig. 3, and there is no change of the flux threading coil 35. When the armature 20 is moved clockwise with a snap action, the flux threading coil 35 is rapidly reversed with the result that a sharp-peaked voltage impulse appears at the terminals 38 and 39. When the trigger mechanism is reset to the position shown, a second similar voltage impulse appears at the terminals. For the size of trigger mechanism used with a torpedo an impulse of one-hundred-and-seventy milliamperes may be obtained. This current impulse is obviously enough to trigger off a relay or electronic tube or some other translating device.

We have shown but one embodiment of our invention, but we are aware that others, particularly after having had the benefit of the teachings of our invention, may devise similar devices for the same general purposes. We, therefore, do not wish to be limited to the particular showing made, but wish to be limited only by the scope of the claims hereto appended.

We claim as our invention:

1. An impulse generator, in combination, a U-shaped permanent magnet having like poles at the ends of the legs, a similar magnet having like poles at the ends of the legs but of opposite polarity to the first magnet, said second magnet being so disposed with reference to the first that the ends of the legs are in alignment with each other but spaced a selected distance from each other, an armature of magnetic material disposed for angular movement between the legs of the U-shaped magnets so that said armature may, when in one position, bridge one pair of non-adjacent opposite poles or bridge the other pair of non-adjacent opposite poles, said armature having an actuating end for moving the armature from one position to the other position, a generally disc-shaped cam element having a pair of pins disposed on each side of the actuating end of the armature and being mounted for a limited angular movement so as to move said armature, an overcenter mechanism, a pivoted lever, a lost-motion coupling between the lever and cam element for moving the cam element angularly, said overcenter mechanism being coupled to the cam element to thus move the cam element with a snap action, and electromagnetic means energized by the rapid reversal of the flux in the armature caused by the snap action movement of the cam element operating said armature.

2. An impulse generator, in combination, a U-shaped permanent magnet having like poles at the ends of the legs, a similar magnet having like poles at the ends of the legs but of opposite polarity to the first magnet, said second magnet being so disposed with reference to the first that the ends of the legs are in alignment with each other but spaced a selected distance from each other, an armature of magnetic material disposed for angular movement between the legs of the U-shaped magnets so that said armature may, when in one position, bridge one pair of non-adjacent opposite poles or bridge the other pair of non-adjacent opposite poles, said armature having an actuating end for moving the armature from one position to the other position, a generally disc-shaped cam element having a pair of pins disposed on each side of the actuating end of the armature and being mounted for a limited angular movement so as to move said armature, an overcenter mechanism, a pivoted lever, a lost-motion coupling between the lever and cam element for moving the cam element angularly, said overcenter mechanism being coupled to the cam element to thus move the cam element with a snap action, and a coil disposed about the armature to thus produce a sharp-peaked current impulse upon movement of the armature by said snap action of the armature caused by the movement of the cam element.

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