

- [54] **CIRCUIT FOR CONTROLLING THE
DURATION OF AN INTERVAL
BETWEEN SOUND SIGNALS**
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317/141**

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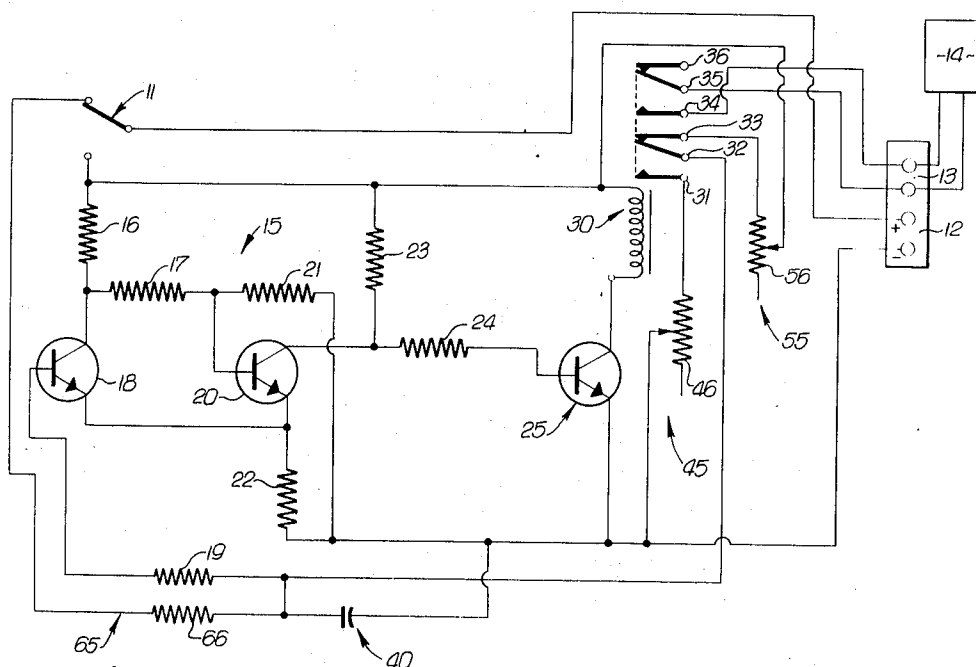
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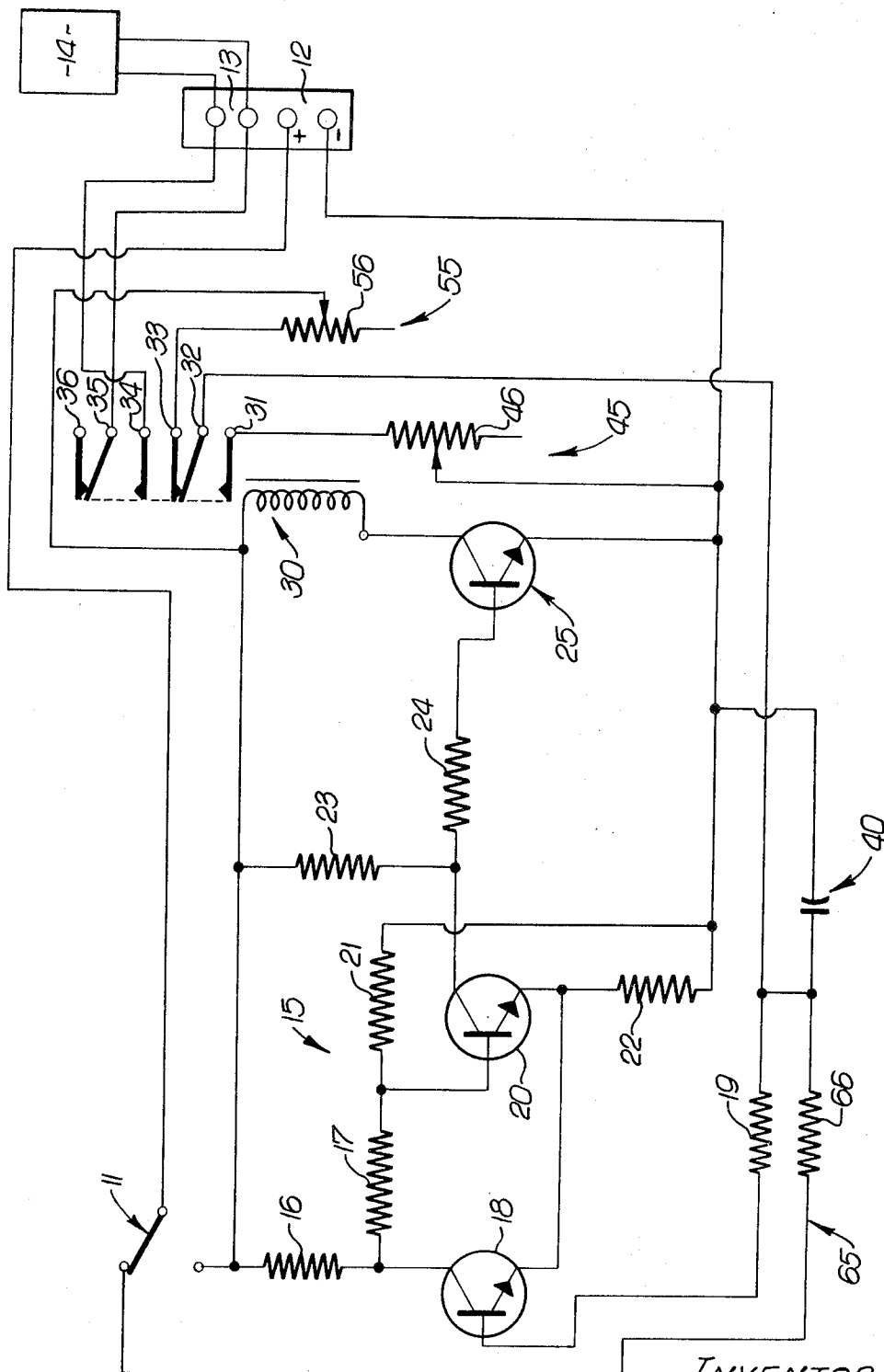
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[57] **ABSTRACT**

A circuit for controlling the duration of, and interval between, successive signals for operating, for example, a fog horn and in which the duration and interval may be manually preselected in accordance with prevailing weather conditions and navigation rules.

3 Claims, 1 Drawing Figure





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CIRCUIT FOR CONTROLLING THE DURATION OF AN INTERVAL BETWEEN SOUND SIGNALS

BACKGROUND OF THE INVENTION

This invention is concerned with nautical safety problems, particularly where a vessel is encountering low visibility conditions, such as in a fog. Various governmental authorities require that marine vessels be equipped with a sound producing device commonly referred to as a "fog horn." While manually operated horns have been used in the past, and are still in use particularly on small craft with no source of electric power, most larger vessels are equipped with a fog horn that is electrically operated. The power source is a common 12 volt battery providing direct current.

Navigational rules provide that in a low visibility condition the operator of the craft must provide a sound to warn craft in the vicinity of its presence. Such sound is generally a continuous series of successive signals, each signal having a prescribed duration. For example, the United States Coast Guard publication "Rules of the Road, International-Inland" (Publication CG-169) states that a motor vessel should emit a sound signal of from 4 to 6 seconds duration repeated at intervals of no more than 1 minute.

It is readily apparent that in fog conditions, the operator of the craft is fully occupied with attempts to maintain visibility and in maneuvering the craft as required. The operation of a fog horn which is manually controlled (regardless of how it is powered) obviously precludes the operator from giving his full attention to the other requirements for safely operating the vessel. This distraction thus compromises the safety benefits otherwise obtainable from use of the fog horn.

The need for an automatically operating fog signal device is known, although no such devices are presently known to be commercially available. Two mechanically operated devices are found in the nineteenth century prior art and described in U.S. Pat. Nos. 194,937 and 336,401. However, such devices are mechanically complex and complicated which would involve substantial manufacturing and maintenance costs. The reliability of such devices are also dubious and the devices are cumbersome and of appreciable weight. Such devices are also subject to salt-water corrosion. Generally, then, these prior art devices fail to satisfy the need for an automatically operating fog signal device.

SUMMARY OF THE INVENTION

Accordingly, it is one object of this invention to provide a circuit for automatic control of a sound emitting device, for use on marine vessels or the like. Another object is to provide a circuit that will control the duration of the sound signal and the interval between successive signals. Still another object is to provide a circuit such as that last described in which the signal duration and interval may be manually varied in accordance with different weather conditions and the signals prescribed therefor by the nautical rules. The circuit of this invention permits the manufacture and use of a sound-emitting device that is inexpensive to make, reliable in operation, maintenance-free, resistant to salt-water corrosion, compact, and relatively light in weight.

In one embodiment of the invention, there is provided input terminals for connection to a source of direct current potential, output terminals for connection to a sound emitting device or other load, and switch means for cyclically connecting and disconnecting the source of power and sound emitting device including a trigger circuit, a transistor switch, a relay controlled by the transistor switch, a discharge circuit for a timing capacitor including a variable resistance for adjusting the duration of a horn signal and a charging circuit for the timing capacitor including a second variable resistance for adjusting the interval between horn signals, the charging circuit being cyclically connected through the relay. The circuit includes means to maintain the timing capacitor fully charged when the on-off switch is in the off position so that the signal will be emitted immediately after the switch is turned to the on position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exemplary embodiment of a circuit for automatic control of a sound emitting device constructed in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, there is shown a circuit for automatic control of a sound emitting device, such as a fog horn which may be used on a nautical vessel to warn other craft in the vicinity of its presence during conditions of low visibility or other adverse weather conditions. Generally, the circuit includes an on-off switch 11, a trigger circuit indicated generally at 15, a transistor switch indicated at 25, a relay indicated generally at 30, a timing capacitor indicated at 40, a discharge circuit indicated generally at 45 and a charging circuit indicated generally at 55, and a circuit 65 for maintaining the timing capacitor 40 fully charged when the on-off switch is in the off position.

More specifically, the on-off switch 11 is manually controlled and may be positioned in the cockpit of a marine craft in a convenient position to the operator of the craft. The circuit includes an input terminal 12 which may be connected to a 12 volt direct current potential such as is commonly provided in a powered vessel. While other sources of potential may be used in the present invention, the preferred embodiment will be described in connection with such 12 volt direct current source. Output terminals 13 are provided for connection to a load such as a sound emitting device indicated at 14.

The trigger circuit may be a Schmitt trigger including the voltage dividing resistors 16, 17, transistor 18, the base of which is connected through the resistor 19 to the capacitor 40 and to the relay 30. The trigger circuit includes a second transistor 20 having its base connected between the resistor 17 and a resistor 21 and its emitter connected through a resistor 22 to ground. The collector voltage is divided between resistors 23, 24 and is connected to the transistor switch 25.

Transistor 25 is connected between ground and the relay 30. Relay 30 is a double-pole, single-throw relay including a first set of contacts 31, 32 and a second set of contacts 32 and 33; contacts 31, 32 when closed, being connected to the discharge circuit 45. Contacts

32, 33, when closed, are connected to the charging circuit 55. The first set of contacts on the throw 34, 35, are connected to the output terminal 13 and thus to the sound emitting device 14. The second set of contacts 35, 36, when closed, do not activate the horn 14.

The on-off switch 11 is a single-pole, single throw type switch which is connected such that when in the off position, as shown in the figure, all circuits other than circuit 65 are disconnected and circuit 65 includes the resistor 66 in series with the timing capacitor 40 which limits the current to a few microamperes for reasons to be explained more fully hereinafter.

In operation, assume that the on-off switch is in the on position and the system is operating. At one point in the cycle, the trigger circuit 15 will sense the voltage across the timing capacitor 40 and will turn on transistor switch 25 when the voltage across capacitor 40 has reached a preselected value, for example, 7.6 volts. When switch 25 turns on, relay 30 will be actuated closing contacts 31, 32 so as to energize the discharge circuit 45. Simultaneously, contacts 34 and 35 will be made so as to turn on the horn 14. The discharge circuit potentiometer 46 is manually preset so as to select the duration of each signal emitted by the horn. Appropriate calibration and visual indication may be provided to assist the operator in this regard. When contacts 31, 32 are closed, the capacitor 40 is connected to ground through the potentiometer 46 so that it immediately begins to discharge. The rate of discharge of capacitor 40 is of course dependent upon the aforementioned setting of potentiometer 46. When the voltage across the capacitor 40 drops below a preselected value, for example, 4.7 volts, it will be sensed by the trigger circuit 15 so as to reverse the state of transistors 18, 20, thereby turning off switching transistor 25 controlling relay 30 so as to close contacts 32, 33 of the first set of contacts and to open the contacts 34, 35 of the other set. Closing of contacts 32, 33 connects the charging circuit 55 so that the capacitor 40 is charged from the positive buss of the circuit through the potentiometer 56 at a preselected rate. This rate is also manually determined through a calibrated knob and controls the interval between successive signals emitted from the horn. When the capacitor 40 has charged so that the voltage across it reaches 7.6 volts, the trigger circuit will again be operated and the entire cycle will be repeated.

It will thus be seen that by manually setting the potentiometers 46, 56 both the duration of each signal emitted by the device may be controlled as well as the interval between successive signals in accordance with the requirements of navigational rules and prevailing weather conditions. No further time or attention of the operator is required other than to trip the on-off switch and to set the knobs which control the potentiometers all of which requires only a brief instance and thus does not interfere with lookout and navigation duties of the operator.

Another feature of the instant invention is the provision of a single-pole, single-throw switch 11 and the circuit 65 which connects the charging capacitor 40 when the switch is in the off position such that such capacitor is constantly maintained at or above the preselected voltage required to operate the trigger circuit 15 to turn on the transistor switch 25 to as to actuate the

relay and sound the horn. Through this provision, the horn or sound emitting device will begin to blow immediately upon turning the device on avoiding the potentially dangerous prolonged delay which would occur if the device was not used for long periods of time such that the capacitor voltage would be drained almost completely which would require an appreciable time to charge the capacitor.

Obviously, many modifications and variations of the present invention are possible in light of the above teaching and the invention may be practiced otherwise than as specifically described in the preferred embodiment.

I claim:

1. A fog horn for automatically emitting successive sound signals and in which the duration and interval of such signals may be manually preselected in accordance with prevailing weather conditions and navigation rules comprising:

- a. a sound emitting device;
- b. a source of direct current electric power;
- c. a timing capacitor;
- d. a double-pole, single-throw relay;
- e. a trigger circuit connected in series between said source of direct current and said timing capacitor to provide a conductive path when said capacitor is charged to a preselected value;
- f. a switching transistor connected between said trigger circuit and said relay to connect a first set of contacts of said relay with said source of direct current when said trigger circuit and switching transistor are made conductive, said first set of contacts of said relay providing connection between said source and said sound emitting device when made, said switching transistor connecting a second set of contacts of said relay with said source of direct current when said trigger circuit is non-conductive;
- g. a variable resistance connected in series between said relay and said timing capacitor for discharging said capacitor when said first set of contacts of said relay is made so as to control the "on" of connection between said direct current source and sound emitting device; and
- h. a second variable resistance connected in series between relay and said timing capacitor for charging said capacitor when said second set of contacts of said relay are made, said second set of contacts of said relay providing no conductive path between said sound emitting device and said direct current source to provide an "off" period of connection between said sound emitting device and source, said "off" period being controlled by said variable resistance and said timing capacitor, whereby the duration of said "on" and "off" period may be varied.

2. The fog horn of claim 1 wherein said source of direct current electric power is a battery.

3. The fog horn of claim 1 additionally including a manual on-off switch of the single-pole, single-throw type, connected in series between said battery and said trigger circuit and providing a conductive path therebetween when said switch is in the "on" position and providing a conductive path to a resistance in series with said timing capacitor when said switch is in the "off" position.