May 14, 1957 W. R. SMITH 2,792,409

VIBRATORY IMPULSED CIRCUITS WITH BOOSTER

Filed Jan. 25, 1954 3 Sheets-Sheet 1

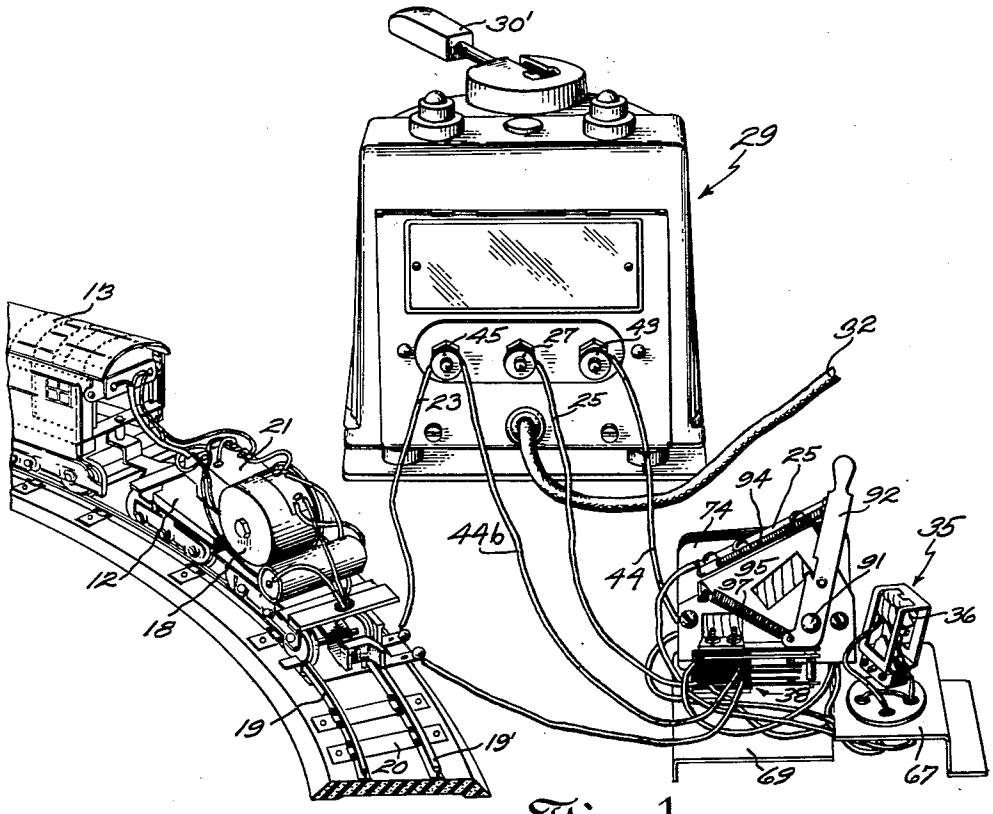


Fig. 1

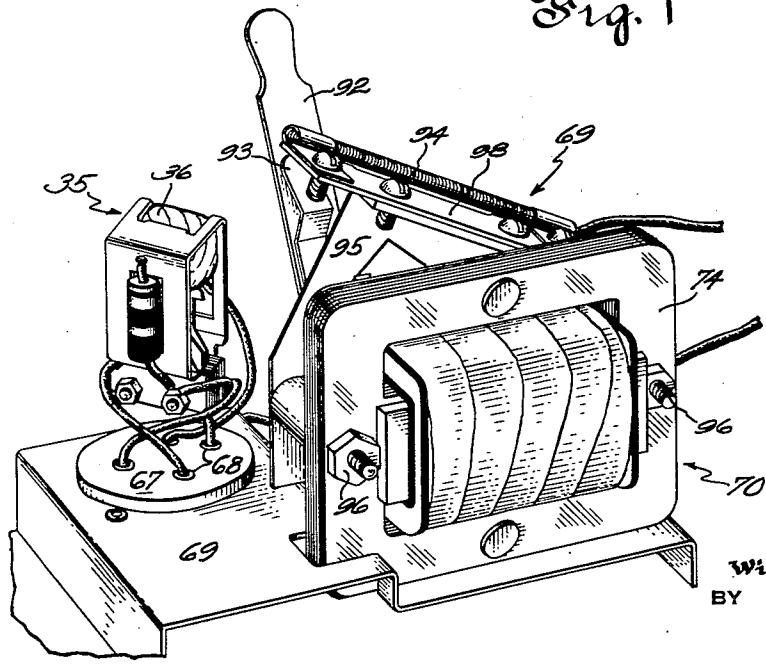


Fig. 2

INVENTOR
William R. Smith,
BY
ATTORNEY

May 14, 1957 W. R. SMITH 2,792,409

VIBRATORY IMPULSED CIRCUITS WITH BOOSTER

Filed Jan. 25, 1954 3 Sheets-Sheet 2

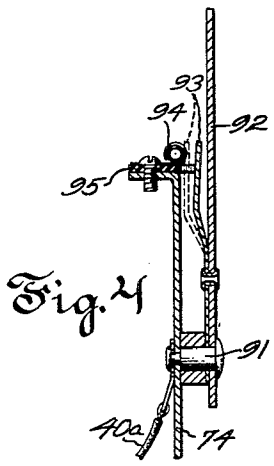


Fig. 4

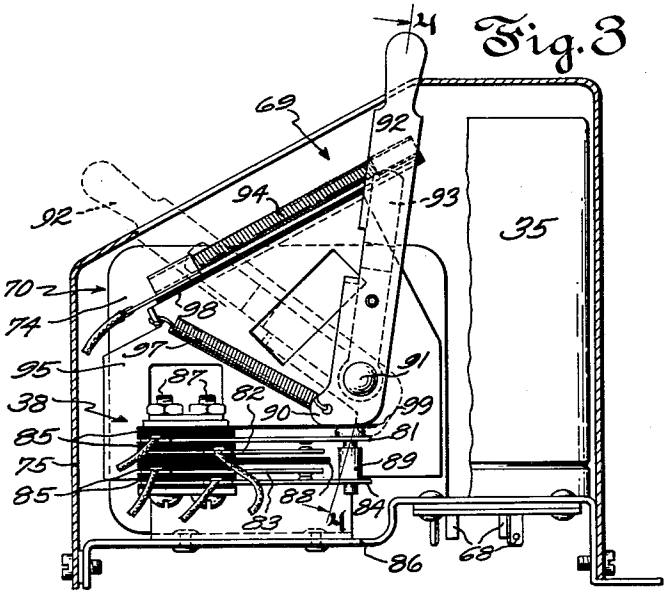


Fig. 3

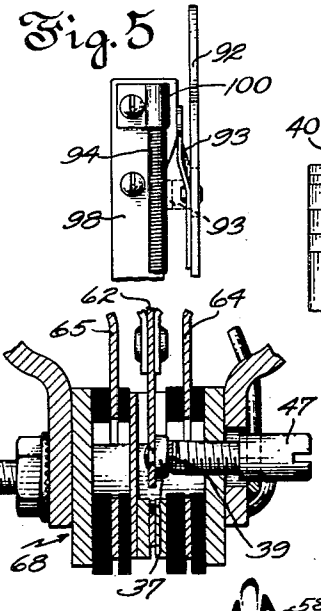


Fig. 5

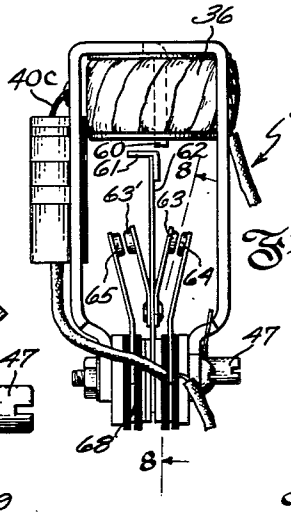


Fig. 6

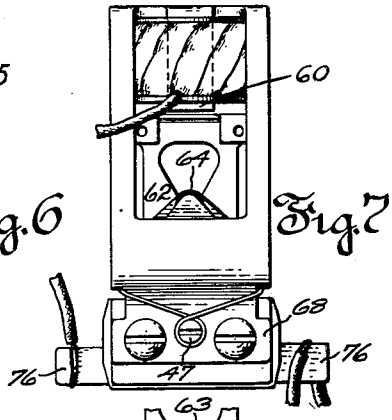


Fig. 7

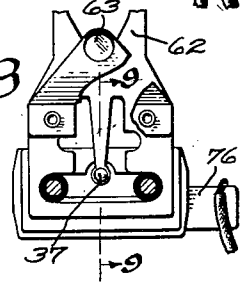


Fig. 8

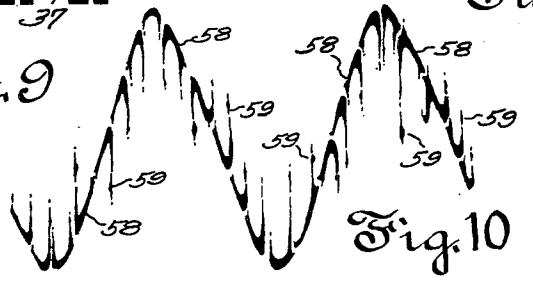


Fig. 9

Fig. 10

INVENTOR
William R. Smith,
BY
ATTORNEY

May 14, 1957 W. R. SMITH 2,792,409

VIBRATORY IMPULSED CIRCUITS WITH BOOSTER

Filed Jan. 25, 1954 3 Sheets-Sheet 3

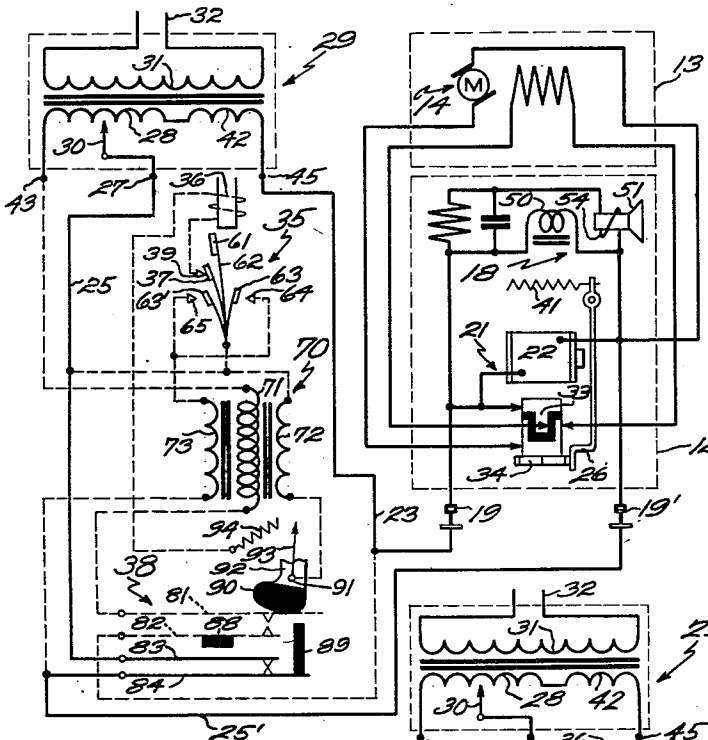


Fig. 11

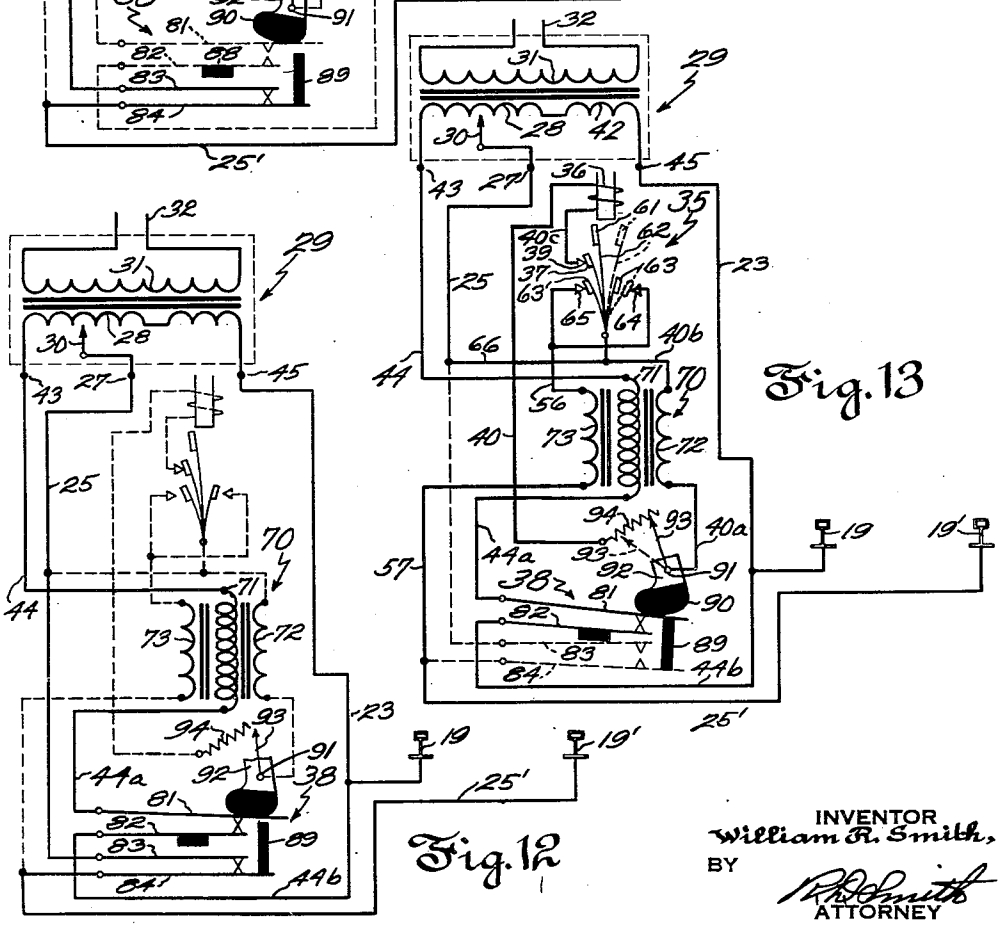


Fig. 13

Fig. 12

INVENTOR
William R. Smith,
BY
ATTORNEY

United States Patent Office

2,792,409

Patented May 14, 1957

2,792,409

VIBRATORY IMPULSED CIRCUITS WITH BOOSTER

William R. Smith, Philadelphia, Pa., assignor to The A. C. Gilbert Company, New Haven, Conn., a corporation of Maryland

Application January 25, 1954, Serial No. 405,956

10 Claims. (Cl. 104—150)

This invention relates to improvements in the generation and selective transmission of vibrator conditioned electric current wave forms capable of causing on desired occasions an output of sound from a signaling device that is constantly present but normally silent in a system of circuits subject to such wave forms. The invention solves troublesome problems that have been encountered heretofore in generating a satisfactory whistling noise on a toy train without interference with or by the running of the train. The invention is of particular value where the propulsion motor of the train and the train carried sound generating device derive their electrical energization from a common source of alternating current such as an ordinary sixty cycle, variable, toy transformer. Electrical systems of this type are disclosed in copending patent applications, Serial No. 362,082 filed June 16, 1953 and Serial No. 251,426 filed October 15, 1951.

It is an aim of the present improvements to provide an electrical system for miniature electric railways, and for toys of other kinds which incorporate a sound producer in addition to a work performing motor or some equivalent translative load, wherein wave form modifying vibrations of a reed in a vibratory electromagnetic circuit interrupter can be made to produce a satisfactorily loud emission of whistle imitating sound and also provide an amply powered supply of train running current to the track from a common source of alternating current. In the present improvements neither of these demands interfere with nor detract from the full satisfaction of the other.

Another object is to start and stop the generation of a sustained, somewhat throaty, whistle imitating sound by a modulated supply to and withdrawal from the sound producing device of variable current intensities thereby to imitate more realistically the progressive rise and fall of sound and corresponding changes in tone that characterize the sound emitted by steam or air whistles as contrasted with the more abrupt, staccato and penetrating sound of horns and the like.

A further object is to accomplish the foregoing in a system of electrical apparatus wherein a satisfactorily loud steam "whistle" sound can be started and stopped at will by means of a single current switching control handle and irrespective of whether or not the track is being supplied simultaneously with sufficiently strong current to impel the train.

A still further object is, in a system of the kind concerned, to reduce the requirement for initial and maintained fine accuracy in the setting and spacing of contact positions in the electromagnetic circuit interrupter.

These and other objects of the invention will become apparent in greater particular from the following description of an illustrated hook-up of electrical devices in a system of circuits affording the above mentioned advantages, which description has reference to the appended drawings wherein:

Fig. 1 shows an assembly of toy electric railway control apparatus electrically connected in a system incorporating the invention.

Fig. 2 is a perspective enlarged view of the side of the whistle sounding control unit opposite to that shown in Fig. 1 with electrical connections omitted.

Fig. 3 is a side elevation of the control unit drawn on a larger scale than in Fig. 1 showing a canister housing for the vibrator and an overall casing for the unit broken away.

Fig. 4 is a fragmentary view taken in section on the plane 4—4 in Fig. 3 looking in the direction of the arrows.

Fig. 5 is a fragmentary plan view of the variable resistor shown in Figs. 3 and 4.

Figs. 6 and 7 are respective edgewise and broadside elevational views of the vibratory circuit interrupter of Figs. 1 and 2 provided with circuit terminal bars to serve as binding posts.

Fig. 8 is a fragmentary view taken on the planes 8—8 in Fig. 6 looking in the direction of the arrows.

Fig. 9 is a view taken in section on the plane 9—9 in Fig. 8, looking in the direction of the arrow, and enlarged.

Fig. 10 is an oscillogram of a wave form to which an ordinary 60 cycle current is converted by the vibratory circuit interrupter of Figs. 6, 7, 8 and 9 for producing a satisfactory whistle sound without interference with the train either in stopped or running condition thereof.

Figs. 11, 12 and 13 are system diagrams explaining the present invention, all representing the same hook-up of electric circuits but differentiating by full and by broken lines between what circuit sections are live and what circuits are dead in different states of operation of the system.

A toy train in Fig. 1 is represented by rolling stock comprising a locomotive 13 hauling a sound car 12. The locomotive carries and is driven by a reversible propulsion motor universal for alternating or direct current, not visible in Fig. 1 but designated 14 in the circuit system of Figs. 11, 12 and 13.

The sound car carries a whistle imitating sound producing device 18 (see Figs. 1 and 11) hereinafter referred to as the sounder. Details of a suitable construction for this sounder are shown in Fig. 4 of the aforesaid copending application, Serial No. 251,426. It is preferably of the electromagnetic loudspeaker type in which a magnetic field structure provides an air gap for a voice coil 54 connected to a sound emitting diaphragm 51. The field may use a permanent magnet but preferably shall have an energizing coil 50.

The train 12, 13 is shown as standing or traveling on a course of electrically conductive, relatively insulated, toy track rails 19 and 19' supported by and insulated from sleepers 20 as usual. Electrical connections shown in Fig. 11 indicate that the propulsion motor 14 derives its energizing alternating current through the track rails 19 and 19'. The current may be collected in conventional manner by relatively insulated traction wheels on respectively opposite sides of the sound car insulated from the body and chassis thereof. The motor will operate for all train propelling purposes on 60 cycle plain alternating current at voltages between 7½ volts and 16 volts. This in relation to the sounder 18 is sub-signalling frequency. The motor will also operate correspondingly on the same fundamental current wave when such wave is interrupted inductively at frequencies which are high multiples of 60 cycles but not of necessity in excess of 720 cycles. This in relation to the sounder 18 is signalling frequency.

Motor 14 is controlled as to starting, stopping and reversal of the direction of train running by an electromagnetic relay or step switch 21 which may be carried by the locomotive 13 but in Fig. 1 is shown to be carried by the sound car 12 as is conventional in toy trains powered by alternating current. Details of such a relay are disclosed in fuller particular in U. S. Patent No. 2,292,565. Each

time current is purposely cut off from the track by turning controller handle 30' far enough in voltage decreasing direction, the magnetic armature of stepping pawl 26 for the current commutating drum 33 is pulled back a step by spring 41 ready to engage a new tooth of the ratchet wheel 34 that is actuated thereby so that when current is next supplied to the track, a forward stroke of the stepping pawl is caused by solenoid 22 which advances the drum rotatively a fraction of a turn. Repetition of cut-off and restoration of current to the track causes switching of the circuit connections of the reversible universal A. C. or D. C. motor 14 by relay 21 in such sequence that at first the motor will run in forward direction, next the motor will stop, next the motor will run in reverse direction and next the motor will stop— this cycle being completed by two sustained breaks alternating with two remakes of the track circuit caused by reciprocative swinging of the manual controller 30' of the source transformer 29, the sequence repeating indefinitely in the order of steps named.

Transformer 29 is a variable toy transformer having a base binding post 45 that forms one terminal of its secondary winding 28, 42. It serves as the single and common source of variable electrical power both for running the train and sounding the whistle and is therefore termed a controller. It may be constructed and operate like the controller disclosed in copending applications Serial No. 227,897 filed May 23, 1951, now U. S. Patent 2,661,461 granted December 1, 1953, or Serial No. 271,458, filed February 14, 1952.

Transformer 29 is capable of delivering, say, 15 volts at its high potential binding post 43 which forms an opposite terminal of its secondary winding 28, 42. The intermediate binding post 27 of controller 29 is in electrical connection with a swingable, current tap or take-off arm 30 and will deliver, say, 7½ to 15 volts depending on the angular position of arm 30 along the train running portion 28 of the secondary winding as it wipes conductively along this portion when swung by controller handle 30'. The primary winding 31 of the transformer derives electric power preferably at 60 cycles through an attachment cord 32 from any ordinary source. The controller may be stationed at the track side of the toy railroad or remotely from the track as desired. It serves to govern the speed and direction of running of the toy train at will.

In the electrical system of the present improvements the sounder 18 is caused to operate by the circuit conditioning effect of an electromagnetic vibratory circuit interrupter briefly herein referred to as the vibrator 35. The vibrator incorporates reed motivated, make-and-break contacts that operate on general principles set forth in the copending patent application, Serial No. 251,426, aforesaid, to break up a fundamental 60 cycle alternating current wave, delivered by the power source 29, into higher frequency pulsations or peaks of potential that serve to vibrate diaphragm 51 of the sound producing device 18 at an audible range of frequency. This converts the fundamental 60 cycle wave form into the peak interruptions appearing in the oscillogram of Fig. 10. Vibratory circuit interrupters capable of operating to this effect are disclosed in many United States patents including Patent Numbers 2,541,450 and 2,659,184. A somewhat different construction of vibrator will now be described.

Referring more particularly to Figs. 6 to 9, the free tip of vibratory reed 62 is provided with a magnetically attractable armature 61 and the reed is resiliently biased so that such armature is normally slightly toward the left of the axis of the magnetic core 60 of its driving coil 36 so as normally to make circuit between a reed carried reed driving contact 37 and a stationed, reed driving contact 39 on the inner end of contact adjusting screw 47 that is constantly in electrical series with driving coil 36 through lead 40c. In some well known kinds of

vibratory circuit interrupters an operative equivalent of driving contact 37 is carried at a point in the length of the reed intermediate contacts 63, 63' and the armature 61, the driving contact 39 being correspondingly located as indicated in Fig. 11. While Figs. 1, 2 and 3 show the base 67 of the vibrator equipped with mounting prongs 68, an alternative provision for mounting the base is shown in the conductive extension bars 76 (see Fig. 7) that serve as binding posts to which lead wires may be soldered. Circuit interrupting contacts 64 and 65 are resiliently stationed at opposite sides of the reed and both are normally separated respectively from contacts 63 and 63' carried by reed 62 when the latter is idle or not vibrating. Vibratory contacts 63 and 63' constantly have the same polarity as the reed itself which is made of conductive metal.

The schematic diagrams of Figs. 11, 12 and 13 show the same hook-up of circuits but each diagram distinguishes by full and broken lines which of the different sections of the circuits are energized and live or de-energized and dead at a given time depending on the controlling condition of a manually actuated, whistle sounding switch designated 38 as a whole and having the single actuating handle 92.

For convenience of reference, specific sections of the interconnected circuits may be referred to as a normal train running section which alone is shown in full lines in Fig. 11, a transitional section which together with the train running section is shown by full lines in Fig. 12, and a combined train running and whistle sounding section represented by full lines in Fig. 13. By this last mentioned section there is rendered selectively controllable the speed of the train and/or the sounding of the whistle.

The whistle sounding switch 38 comprises four conductive spring leaf contacts 81, 82, 83 and 84. As shown in Fig. 3 the anchored ends of these contact leaves are fixedly sandwiched between insulative spacers 85 forming a laminated column of insulation held together and mounted on the base 86 of unit 69 by screws 87. The resilience of contact leaves 81, 82, 83 and 84 normally biases them into their relative positions shown in Figs. 3 and 11. Contacts 82 and 83 are prevented from ever touching each other by intervening insulation 88. Sufficient depression or downward flexing of the free end of contact 81 will, with lag, cause depression of contact 84 also by thrusting downward on the insulative coupling 89.

Depression or downward flexing of resilient contact leaf 81 is accomplished by the pressing action of a cam 90 pivoted at 91 and acting through a flexible strip of insulation 99 on spring contact leaf 81 in insulated relation thereto. Cam 90 is swung about its pivot 91 by the circuit switching handle 92 against the constant pull of a return spring 97 and carries a conductive arm 93 that can wipe along the bared, individually insulated convolutions of a coil of resistance wire 94 which may be open-wound about and thus supported upon a stiff cylindrical insulative core carried by an insulative bed plate 98 held by bracket 95 which is supported by studs 96 from the core frame 74 of a booster transformer 70 which in turn is supported on the base 86 of the unit 69. Insulative bed plate 98 has an offset edge 100 as best shown in Fig. 5 which separates arm 93 from conductive contact with resistance coil 94 when handle 92 is swung to its extreme position toward the right as in Figs. 1, 3 and 11. In other positions of handle 92 arm 93 wipes conductively along the resistance coil.

The introduction of booster transformer 70 in the unit 69 has proven to furnish adequate power for all the aforesaid purposes of the invention in a hook-up in which all power is derived at source from a single controller as 29. For compactness of apparatus it is preferred to mount the vibrator 35 also on the base 86 so that it is incor-

porated in a single unit 69 enclosed by a removable overall casing 75.

The booster transformer 70 has a primary winding 71 powered always at 15 volts and capable of inducing current simultaneously in two back-to-back secondary windings. Secondary winding 72 derives from primary winding 71 an induced voltage substantially equal to that impressed upon the primary winding. Secondary coil 73 derives from primary winding 71 an induced voltage equal to only substantially half of that impressed upon the primary winding. The current induced in full voltage secondary winding 72 acts through coil 36 solely to drive the reed 62 of the vibrator. The current induced in half voltage secondary winding 73 acts through a circuit traced through 64 and 65, 66, 25, 27, 30, 28, 42, 45, 23, 19, 19', 25' and 57 to augment the current derived at 7½ to 15 volts from the take-off arm 30 in the power source 29. These two secondaries of the booster transformer thus help insure that the intermittent electrical impulses delivered to the track 19, 19' by the action of the vibrator 35 shall carry enough power to sound the whistle with sufficient loudness and a desirable characteristic of tone while the train is being run at any of its possible speeds and while the train is standing still as well. They also insure that the sounding of the whistle shall have no appreciable effect upon the usual speed and performance of the train responsive to shifting of position of the controller handle 30'.

In operation the whistle sounder 18 is normally silent even though its voice coil 54, and its field coil 50 if any, are constantly energized by conventional uninterrupted 60 cycle current that is delivered to the track through the circuit section shown in full lines in Fig. 11, consisting of lead 25, closed leaf contacts 83, 84, lead 25', the track, and lead 23. This circuiting condition enables the track to be supplied selectively with train speed varying voltages ranging, say, from 7½ volts to 15 volts depending on the position of current tap 30 along the source secondary 28. The electrical value of secondary 42 in the slowest speed position of tap 30 may or need not be such as to deliver sufficient current to the track to impel the train or to release the relay armature 26 in the motor reversing switch 21 to the retractive pull of spring 41 whereby to cause motor starting, stopping or reversal by a stepping action of current switching drum 33. In any event the presence of the whistle sounding circuit shown in broken lines in Fig. 11 in no way interferes with normal control of the starting, stopping, reversing and speed of train in conventional manner by means of train controller handle 30'.

Fig. 12 shows the switch handle 92 at the start of its throw to sound the whistle. In Fig. 12 handle 92 is swung counterclockwise only sufficiently to cause contacts 81, 82 to close. This adds to the load operating or train running circuit section, that is shown energized in Fig. 11, a further energized transitional circuit section comprising lead 44, booster transformer primary 71, lead 44^a, closed leaf contacts 81, 82, lead 44^b to lead 23. This energizes the primary winding 71 of booster transformer 70 with a constant potential of 15 volts regardless of the position of the variable current tap 30 in controller 29. It will be noted that as yet in Fig. 12 the contacts 83, 84 have not been opened because of the initial space between contact leaf 81 and the top end of the insulative coupling post 89 carried by contact leaf 84.

In this transitional stage of circuit energization shown in Fig. 12 the secondary 73 of the booster transformer remains dead ended at both vibratory contacts 64, 65 so that any potential induced in secondary 73 can have no effect upon the track current nor upon the vibrator. This is because the reed 62 in vibrator 35 remains idle in the position to which it normally is biased as shown in Fig. 11 until switch handle 92 has been swung enough farther toward the left to ease the wiper arm 93 into sliding contact with resistance coil 94. Until then whatever potential is induced in the other secondary 72 of the booster transformer does not result in current supply to the driving coil 36 of the vibrator.

Fig. 13 shows the whistle sounding conditioning of the circuits wherein still further swinging of switch handle 92 counterclockwise in Fig. 13 has forced contact leaf 81 sufficiently far downward to engage and depress coupling post 89 on contact leaf 84 thereby to cause opening of contacts 83, 84 while contacts 81, 82 remain closed. This further movement of switch handle 92 swings the wiper 93 further toward the left as in Fig. 13 and into contact with the full resistance length of coil 94 through a vibrator energizing section of the circuits comprising in series the driving coil 36 of the vibrator lead 40, resistance 94, wiper 93, lead 40^a, booster transformer secondary 72, lead 40^b, reed 62, contacts 37, 39, and lead 40^c. Thereupon reed 62 begins to vibrate under the intermittent impulses delivered to it by the make and break action of its normally closed driving contacts 37, 39, as well understood in the art, at frequencies far higher than that of the current flowing through its driving coil 36.

Continued swinging of wiper 93 toward the left progressively reduces the electrical resistance of coil 36 to any desired extent down to and including zero. Such progressive reduction of resistance admits increasing strength of current from booster secondary 72 to the driving coil 36 of the vibrator and causes reed 62 to vibrate with progressively greater amplitude as it alternately makes and breaks circuit through vibratory movement of each of the automatic circuit interrupting contacts 63 and 63' with twice the frequency of the number of excursions of the reed. By this current strength modulating effect of the variable resistance 94, 93 sounder 18 is caused to emit a whistle imitating noise such as corresponds to the characteristic response of a steam whistle to the manual opening of a steam or air valve as steam pressure is built up at the whistle orifice.

The circuit interrupting action of the vibrator at contacts 64, 65 transforms the usual train running 60-cycle smooth current wave into an agitated form in which there are imposed upon the fundamental wave 58 peak potentials 59 typified by the oscillogram in Fig. 10 which generates, as is explained in copending application Serial No. 251,426, a frequency and amplitude of current pulsations in the voice coil 54 of the sounder 18 sufficient in electrical potential to cause its diaphragm or cone to emit the desired whistle immitative sound. Such frequency may extend up to or exceed 720 peak pulsations per second.

While the whistle is being sounded by the conditioning of circuits as in Fig. 13 the strength of current delivered to the track can be cut down to a train speed reducing or train stopping degree by swinging current tap 30 to the right in the controller 29. This however does not drain on the current strength delivered to the driving coil of the vibrator because the driving coil is kept forcefully energized by current supply derived from the induced potential in secondary 72 of the booster transformer through a section of the circuit involving lead 40, resistance 94, wiper 93, lead 40^a, secondary 72, lead 40^b, reed 62, driving contacts 37, 39 and lead 40^c.

While the whistle is being sounded, the starting, stopping, reversing, and speed variation of the train remain controllable by handle 30' of controller 29 just as in Fig. 11 without impairment or interruption by the sounding of the whistle because train running current reaches the track through the vibratory contacts 63, 64 and 63', 65 via the coupling lead 66 that delivers current to reed 62 from the speed modulating take-off arm 30 in the source transformer 29. The gap of the breaks in the fundamental 60 cycle alternating current wave 58 in Fig. 10 are so minute and the frequency of the inductively produced peak potentials 59 occurring at said minute breaks are so high, frequent and rapid that the current delivered to the track from source transformer 29 through

lead 66, reed vibrated contacts 63, 64 and 63, 65 as in Fig. 13 is powerful enough to operate the train propulsion motor 14 and all current consuming equipment carried by the train with substantially as good efficiency as when operated by current derived from transformer 29 merely through lead 25 and switch contacts 83, 84 as in Fig. 11.

Primary 71 of the booster transformer 70 offers enough impedance to avoid short circuiting the secondary of the source transformer 29. Secondary 73 of the booster transformer must not offer enough impedance to cut down the supply of full speed train running current to the track.

The present improvements may be incorporated in electrical circuit arrangements differing in detail from those herein chosen to illustrate the invention and without departing from the principles thereof, wherefore the appended claims are directed to and intended to cover all such variations as fall within a broad interpretation of the wording of their terms.

I claim:

1. An electrical system for operatively energizing selectively by alternating current derived from a common source at subsignalling frequency either an electrodynamic signal sounding loud speaker alone or a utilization load alone or both together without reciprocal interference, comprising in combination with parallel circuit branches containing respectively a translative load and an electrodynamic loud speaker, a variable potential source transformer giving an output of alternating current at subsignalling frequency and having a base terminal and a full voltage terminal and a variable voltage terminal, electrical connections placing both of said circuit branches in series with said base terminal and with said variable voltage terminal for modulating the strength of current supplied to said branches, a vibratory circuit interrupter having a reed impulsing electromagnet and reed driving contacts and reed operated circuit interrupting contacts adapted by opening and closing to impose peak potentials on the fundamental wave form of non signalling alternating current derived from said source transformer, a booster transformer having a primary winding connectable in electrical series with said base terminal and with said full voltage terminal and having one secondary winding connected in electrical series with both of said branch circuits and with said circuit interrupting contacts and with said variable voltage terminal, said booster transformer having another secondary winding connected in electrical series with said reed operated driving contacts and with said electromagnet, and circuit switching means operative to control the energization of said primary winding of said booster transformer by current derived from said source transformer.

2. An electrical system as defined in claim 1, together with additional circuit switching means operative to control current derived by the said reed impulsing electromagnet from the said other secondary winding of the said booster transformer.

3. An electrical system as defined in claim 2, wherein the said additional circuit switching means includes a variable resistance electrically connected to modulate the strength of current directed through the said reed impulsing electromagnet.

4. An electrical system as defined in claim 3, together with a single manually operable handle arranged mechanically to actuate both of the said circuit switching means in predetermined sequence.

5. An electrical system comprising a loud speaker silently non responsive to current pulsations of subsignalling frequency, a translative load, a utilization circuit including said speaker and load, a source of current pulsating at subsignalling frequency for normally energizing said circuit, a vibratory circuit interrupter operative when switched into said utilization circuit to produce voltage pulsations of higher than subsignalling frequency, a booster transformer electrically powered from said source and electrically connected to assist in energizing said circuit interrupter, and current switching means electrically connected alternately to exclude said interrupter and booster transformer from operation in said utilization circuit thereby to maintain said speaker silent and to render said interrupter and booster transformer operative in said utilization circuit thereby to cause said speaker to emit signalling sound.

6. An electrical system as defined in claim 5, together with a variable rheostat electrically connected to modulate the energizing of the said circuit interrupter by the said booster transformer.

7. An electrical system as defined in claim 6, together with a single manually operable handle arranged mechanically to actuate both the said current switching means and the said variable rheostat in predetermined sequence.

8. An electrical system comprising, toy track rails, toy rolling stock on said rails, an electric utilization circuit including said rails and rolling stock, a source of alternating current delivered to said circuit at subsignalling frequency, a train propulsion motor in said circuit, a sound signalling device in said circuit operative to produce sound only when energized by current impulses of signalling frequency, a vibratory circuit interrupter operative when switched into said circuit to impose peak potentials of signalling frequency on the fundamental wave form of said alternating current, a booster transformer electrically powered from said source and electrically connected to assist in energizing said interrupter, and an electric switch in stationary relation to said rails electrically connected in a first condition to exclude said vibrator and said booster transformer from said circuit and in a second condition to include said vibrator and booster transformer in said circuit, thereby to cause said device to produce signalling sound only in said second condition of said switch.

9. An electrical system as defined in claim 8, together with a variable rheostat electrically connected to modulate the energizing of the said circuit interrupter by the said booster transformer.

10. An electrical system as defined in claim 9, together with a single manually operable handle arranged mechanically to actuate both the said current switching means and the said variable rheostat in predetermined sequence.

References Cited in the file of this patent

UNITED STATES PATENTS

2,187,064	White	Jan. 16, 1940
2,292,565	Jordan	Aug. 11, 1942
2,299,671	White	Oct. 20, 1942
2,547,027	Winkler	Apr. 3, 1951
2,622,542	Bonanno	Dec. 23, 1952