

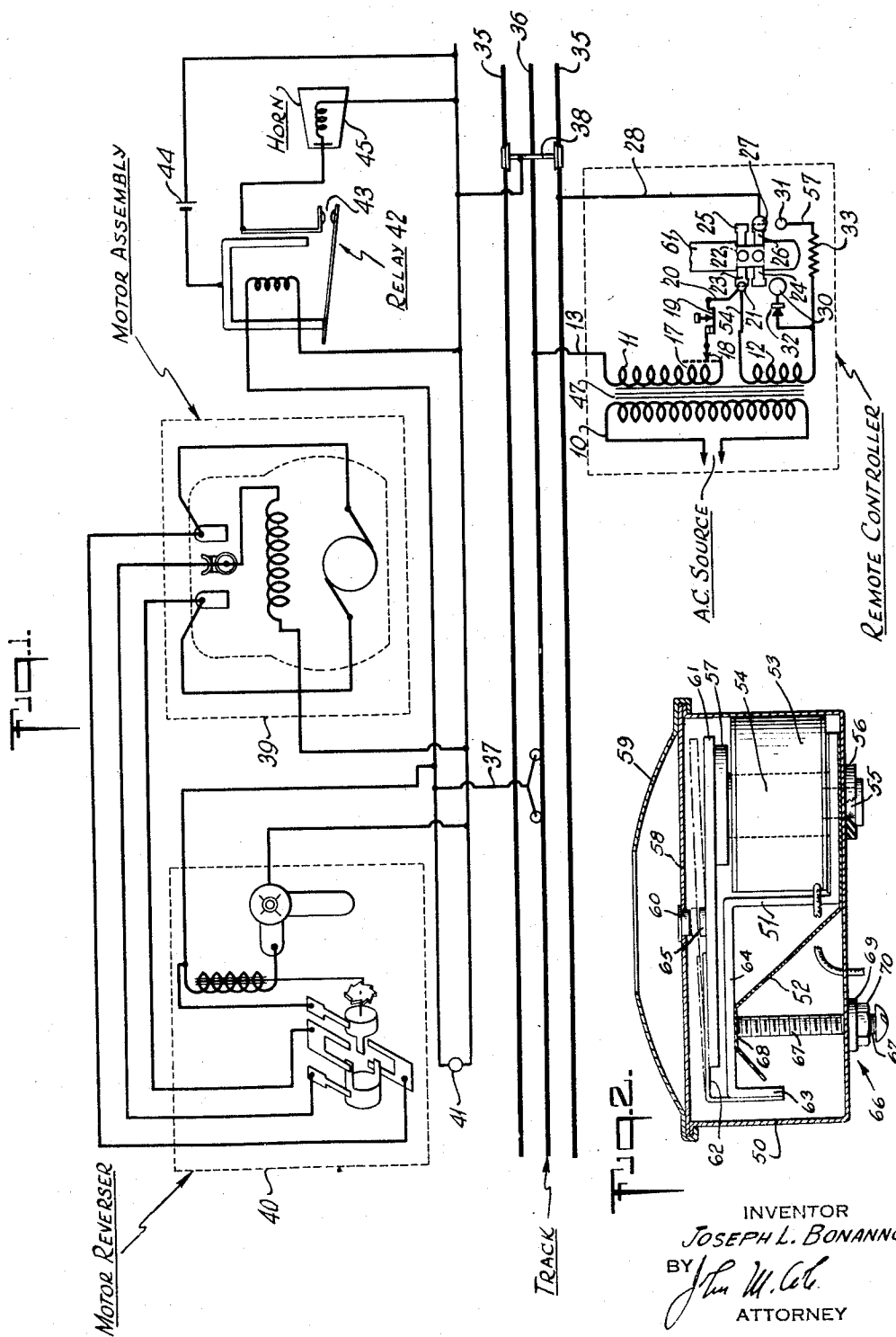
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TOY RAILROAD SYSTEMS

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TOY RAILROAD SYSTEMS

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The present invention relates to toy railroad systems and is more particularly directed toward a toy railroad system employing train-carried, relay-controlled, magnetically-operated, tuned-frequency sound producing devices for emitting at selected intervals, a noise or sound simulating the horn on the usual diesel locomotive used on regular railroads, and is a continuation of my copending application for Toy Railroad Systems, Serial No. 157,545.

The usual steam type locomotive, on regular railroads, uses a steam siren or whistle while diesel type equipment employs a horn. These horns have a characteristic tone property with a rather constant frequency and audible signal that a diesel locomotive is in operation. Where toy railroad locomotives are of the diesel type, as contrasted with the steam type, it is desirable to equip the toy diesel locomotive with a sound device simulating the horn of the regular diesel locomotive, and it is manifestly obvious that the siren type noise maker producing the shrill whistle, is not acceptable as a substitute on a toy that should produce a "toot-like" sound.

In prior art whistle controllers for toy railroads, it was customary to use a series motor driving a siren. The pitch of the note of the siren was determined by the dimensions of the resonating chambers and was independent of the speed or variations of the speed of the motor and it was unaffected by the pulsation of alternating current supplied through the rectifier. If one were to energize a vibratory horn from an A.C. voltage supply, with superposed direct current, the result would be entirely satisfactory for the motor of the prior art shrill whistle, but the noise produced in such an arrangement if connected to a diesel "toot-like" horn, would be entirely unsatisfactory.

This is true since the whistle sound is obtained from tuned pipes and a motor driven blower. The tuned pipes convert the mechanical energy of the air blast into acoustic energy. All trace of the pulsating character of the energy supplied having been eliminated and the sound pitch being determined solely by the length of the pipes. Fluctuations in voltage supply to the tracks have comparatively little effect upon the sound emitted from the whistle because of the saturation characteristics of the motor driven blower. There further would be no difference in a siren whistle whether the track current is direct current or alternating current while a horn like sound producing device could not properly be operated by alternating current obtained from the power source normally available through a transformer. The reason for this was found to reside in that the 60 cycle current available from the house circuit imposed a 60 cycle noise on the horn. When one attempted to control the horn circuit by a relay, sensitive to interposed direct current in the same way that was done with the blower type whistle, there was difficulty, for the interposing of the direct current on the alternating current induced harmonics of variable frequency and this noise further modified the output of the horn.

It was not until the alternating current in the circuit operating the horn was discarded and an entirely separate

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direct current source was used, that it was possible to produce a suitable audible signal from the toy locomotive on the toy railroad track which would satisfy the desire for a diesel type horn.

In order to simulate the diesel horn of the regular locomotive, it is desirable to operate the horn at a frequency of 200 to 300 cycles, and at such frequencies, the alternating operated horn would produce an unpleasant note because of the 120 cycle modulation from the power supply, and the 60 cycle component induced by the rectifier used in such circuits.

According to the present invention, it was found that when the horn circuit was made entirely independent of the power circuit, that no alternating current would flow through the coil of the horn and when the horn was thus energized solely by direct current, a satisfactory signal could be had on a toy locomotive. The horn used in the present invention is one which has been carefully tuned to the desired frequency and is energized by dry cell battery carried by the locomotive and the current introduced into the local circuit for the horn, at will, by the medium of a train carried relay.

In this manner, it is possible to obtain satisfactory tone of properties of the horn irrespective of the variations in voltage supplied to the track for propulsion purposes.

The accompanying drawings show, for purposes of illustrating the present invention, one embodiment in which the invention may take form, it being understood that the drawings are illustrative of the invention rather than limiting the same.

In the accompanying drawings:

Fig. 1 is a wiring diagram showing a suitable circuit arrangement; and

Fig. 2 is a transverse sectional view through the horn.

In the wiring diagram of Fig. 1 the primary of a transformer is indicated at 10. The main secondary coil is indicated at 11 and a supplemental secondary coil at 12. One end of the secondary coil 11 is connected to a lead 13. A portion 17 of the secondary coil 11 is exposed and adapted to cooperate with a movable contact 18 so that variable voltages may be taken off the secondary coil 11. The movable contact 18 is connected through a bi-metallic, thermostatically operated circuit breaker 19 and wire 20 to contact 21. The contact 21 is normally engaged by a movable switch contact 22 having spring tips, indicated at 23, 24, 25 and 26, the latter bearing on a large fixed contact or button 27 connected to a lead 28.

One end of the supplemental coil 12 is connected with the contact 21, while the other end is connected to contacts 30 and 31 through half-wave rectifier 32 and resistor 33. The contact 30 is a wide contact and it is adapted to be engaged by the tip 24 of the movable switch contact 22 before the tip 23 leaves the contact 21, so that the rectifier 32 may be brought into the circuit without opening the circuit. The upper spring tip 25 of the contact 22 engages the contact 27 before the tip 26 leaves it and then the tip 26 on further movement is brought against the contact 31 so that the resistor is brought into circuit. The structural arrangement of the parts just described is shown in my Patent No. 2,316,551 or the parts may be made as shown in my application Serial No. 120,269 filed October 8, 1949. Instead of a switching arrangement in which the circuit to the track is not opened during the introduction of the direct current component, one can employ a quick acting snap switch to insert the rectifier into the circuit or disconnect it.

The transformer leads 13 and 28 may be connected to the usual wheel bearing rails 35 and third rail 36. Current may be collected off these rails by the usual contact 37 and truck 38. The train load may include a locomotive having a motor 39, a motor reverser 40, a

lamp load 41, and relay coil 42 adapted to close the circuit at 43 through a dry cell 44 and a buzzer type horn 45 with operating coil 53. The relay is normally open an non-responsive to alternating current voltages within the output range of the transformer, but is responsive to the superposed direct current voltage, when the rectifier is in circuit. Such relays are shown in my Patent No. 2,285,560.

The horn is therefore in a local direct current circuit with unchanging characteristics except for the changes due to deterioration of the dry cell, preferably a size D cell.

Mounted inside of a casing 50 is a deformable magnetizable frame 51, grounded to the locomotive body, insulated from the casing 50 by means of insulation 52. Affixed to the frame 51 is a coil 53 surrounding iron core 54. This core is rigidly mounted by means of a rivet 55 extending through the casing 50 and insulation 52 and the rivet head is separated from the casing 50 by a washer 56.

At the upper extremity of core 54, is a circular pole piece 57 whose diameter is greater than the core 54, but less than the diameter of the coil 53. A diaphragm 58 extends across the top of the casing and is held in place by means of an apertured cover 59. This diaphragm 58 carries a first contact 60, which opens the circuit at the armature, at a point substantially central of its area.

Suspended between the diaphragm 58 and the pole piece 57 is an armature or clapper 61, a portion of which is disposed opposite the pole piece 57. Armature 61 is welded or otherwise suitably mounted to a L-shaped resilient spring 62. One leg of the spring is welded, or by other suitable means rigidly fastened, to a downwardly projecting lug 63 of the extending portion 64 of frame 51 and the other leg is affixed to armature 61. On the surface of armature 61, disposed opposite to the diaphragm 58, is a second contact 65 positioned so as to engage the diaphragm mounted first contact 60 when the armature vibrates.

In order to pre-tune the horn to a nominal frequency of about 280 cycles so that the horn will emit a sustained note as long as the relay circuit is closed, a tuning means 66 is provided.

The tuning means 66 include a threaded screw 67 extending through a suitable opening in casing 50, the inner extremity 68 of which contacts the lower surface of extending portion 64 of frame 51. Insulation 52 serves to insulate the screw extremity 67 from the frame work 51 and the frame work supported unit.

A washer 69 is welded to the outside of casing 50 and a lock nut 70 is provided to cooperate therewith, so that when the proper adjustment of screw 67 has been obtained, the screw 67 may be locked in position. Referring to Fig. 2, it is seen that as the extremity 68 of screw 67 is withdrawn or extended inwardly, the pivotal point about which the spring unit comprising spring 63 and armature 61 vibrates, will be accordingly lowered or raised. A corresponding increase or decrease will therefore occur in the space between the pole piece 57 and the portion of armature 61 disposed above it. By the hereinbefore described adjustment of the screw 67, which controls the space through which armature 61 must travel before engaging the pole piece 57, the frequency of the unit may be pre-tuned.

So far as operating the horn is concerned, any form of relay insensitive to the propulsion circuit but sensitive to a superposed circuit may be used. The horn tune however, is unaffected by the propulsion circuit voltage of frequency for any current of harmonic frequency which happens to be present.

I have described what I believe to be the best embodi-

ments of my invention. I do not wish, however, to be confined to the embodiments shown, but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. In a toy railroad car, a sound producing device including a coil having an iron core therein, an armature juxtaposed to said coil for attraction thereby, adjustable resilient mounting means for said armature, and circuit breaking means connected in series with said coil and operated by said armature, said circuit breaking means including a diaphragm, a first contact mounted on said diaphragm and a second contact mounted on said armature, said second contact being juxtaposed to said first contact, said resilient mounting means including a deformable framework affixed to said coil, a casing enclosing the above-mentioned elements, insulation separating the framework from the casing, a portion of said framework extending laterally in a direction away from said coil parallel to but not in contact with said armature, a downwardly depending lug on the outer extremity of said extending portion, an L-shaped resilient spring one leg of which is mounted to said downwardly projecting lug, the other leg of said spring extending parallel to but not in contact with, the extending portion of said framework, said armature being mounted to said last mentioned leg of said spring and adjustable positioning means adapted to exert pressure on the extending portion of the deformable framework whereby the position of the armature relative to the iron core of the coil is controlled.

2. Apparatus as in claim 1, wherein said adjustable mounting means includes a screw threadedly extending through the casing of the sound producing device, a washer, a lock nut adapted to secure the screw in position after adjustment and insulation separating the inner extremity of said screw from the extending portion of said deformable framework.

3. In a toy railroad car, a sound producing device including a coil having an iron core therein, an armature juxtaposed to said coil for attraction thereby, adjustable resilient mounting means for said armature, and circuit breaking means connected in series with said coil and operated by said armature, said circuit breaking means including a diaphragm, a first contact mounted on said diaphragm and a second contact mounted on said armature, said second contact being juxtaposed to said first contact, said resilient mounting means including a deformable framework fixed to said coil, a casing enclosing the above-mentioned elements, insulation separating the framework from the casing, a portion of said framework extending laterally in a direction away from said coil substantially parallel to but not in contact with said armature, spring means mounted on the framework and extending parallel to, but not in contact with, the extending portion of said framework, said armature being fastened to said spring means and adjustable positioning means adapted to exert pressure on the extending portion of the deformable framework whereby the position of the armature relative to the iron core of the coil is controlled.

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