Nov. 30, 1943. J. L. BONANNO 2,335,382

TRANSFORMER

Filed March 4, 1941

Fig. 1.

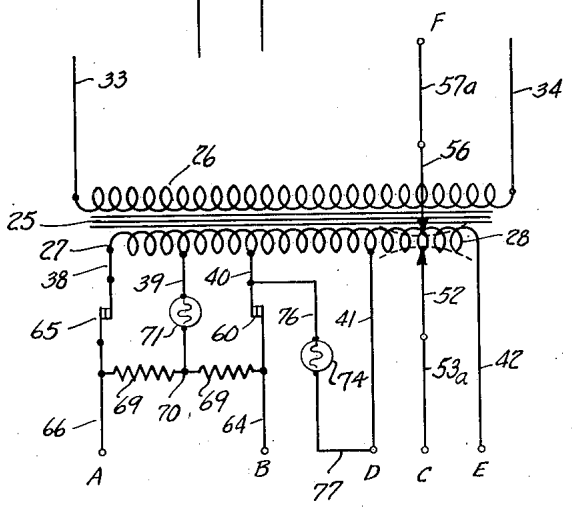


Fig. 2.

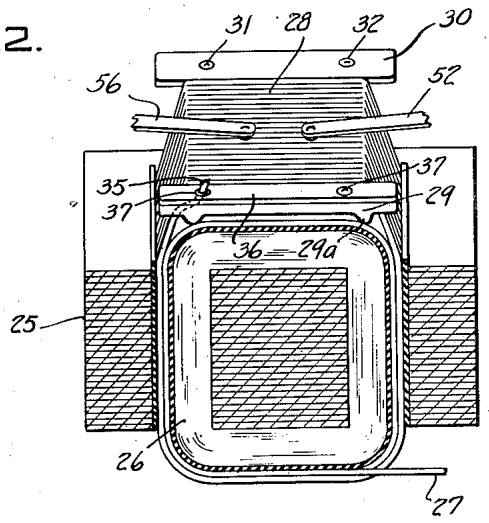
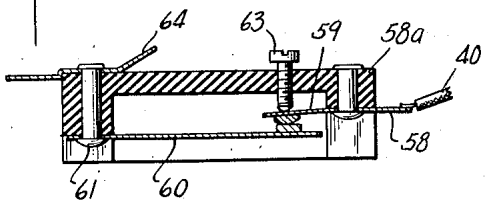


Fig. 3.



INVENTOR
JOSEPH L. BONANNO
BY
Irvin Silverman
ATTORNEY

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2,335,382

TRANSFORMER

Joseph L. Bonanno, Maplewood, N. J., assignor to The Lionel Corporation, New York, N. Y., a corporation of New York

Application March 4, 1941, Serial No. 381,658

2 Claims. (Cl. 177—311)

The present invention relates to transformers, and is more particularly directed toward transformers suitable for operating toy trains and having a plurality of output circuits.

In the operation of toy trains it is desirable to have separate sources of variable voltages for operating different trains. For example, a voltage range of 6 to 16 volts and another voltage range of 14 to 24 volts. It is also desirable to have other fixed voltages for operating accessories where variable voltage supply is not desired.

In toy train operation where two separately controlled load circuits are employed there is the possibility of a short circuit or overload appearing in either of these output circuits, and the present invention contemplates the provision in the transformer of a single indicating or signalling means responsive to short circuit in either of the load circuits. This signalling means operates when the overload circuit breaker acts to open the circuit which has been overloaded and does not affect the operation of the other load circuit.

The accompanying drawing shows, for purposes of illustrating the present invention, one of the many embodiments in which the invention may take form, it being understood that the drawing is illustrative of the invention rather than limiting the same.

In this drawing:

Figure 1 is a wiring diagram;

Figure 2 is a fragmentary view illustrating the transformer core and coil assembly; and

Figure 3 illustrates a form of circuit breaker employed.

The transformer has a laminated core 25 of usual construction, a primary winding 26 about the core and a secondary winding 27 about the primary winding. The coil was wound about a form of rectangular cross section so that each layer has flat faces and rounded corners. The outer layer 28 of the secondary winding passes about an insulating plate 29. This insulating plate has longitudinal ribs 29*a*, which engage the rounded corners and prevent slippage sidewise, and an enlarged rear end 30 thicker than the portion which receives the winding and carries two rivets 31 and 32 to which the leads 33 and 34 of the primary winding 26 are soldered. One end 35 of the secondary winding is soldered to a brass plate 36 secured to the insulating plate 29 by rivets indicated at 37, 37. The secondary winding has taps, indicated in Figure 1 at 38, 39, 40, 41 and 42.

The secondary tap 40 is connected, as shown in Figure 3, to a soldering lug 58 secured to an insulator 58*a*. The soldering lug 58 carries a spring contact 59 above a bi-metallic thermostat 60 also secured to the insulator 58*a* by a rivet 61. The contact 59 is adjustable by means of a screw 63 to control the amount of current which thermostat 60 can carry before it opens the circuit. The rivet 61 is connected by a wire 64 with a terminal indicated at B in Figure 1.

The secondary lead 38 is connected through a similar thermal circuit breaker 65 and through a lead 66 to the terminal A, as indicated in Figure 1. The rivets 61, 61 on the two thermal circuit breakers are connected to a resistor 69. When the thermal circuit breakers are closed this resistor is across the leads 38 and 40 and is subject to the voltage developed in this part of the coil. The midpoint 70 of the resistor 69 is connected through a lamp 71 with the tap 39 midway of the coil between the leads 38 and 40. When the two circuit breakers are closed no current flows through the lamp 71.

In addition to the fixed taps above discussed the transformer is provided with two movable current collectors 52 and 56 adapted to sweep over the exposed portion 28 of the secondary winding and these contacts are connected through wiring indicated at 53*a* and 57*a*, respectively, with terminals marked C and F in Figure 1.

The circuit above described may be conveniently embodied in a toy transformer, such as shown in detail in application, Serial No. 361,766, filed October 18, 1940, by Joseph L. Bonanno and Anthony Ehret, and in this case the terminals here marked A, B, C, D, E and F may be in the form of binding posts readily accessible for the connection of wiring.

The transformer above described makes it possible to provide constant voltages between binding posts such as A—B, B—D, D—E, etc., and it is possible to obtain variable voltages when terminals C and F are used. These variable voltages generally include either the terminal A or the terminal B. Should a short circuit appear in either of the circuits being fed through leads A or B the corresponding circuit breaker will open and the lamp 71 be lighted. This does not open the circuit for the other loads being supplied from the transformer. Leads 76 and 77 interconnect tap 40 and terminal D with a pilot lamp 74 to indicate that power is being applied to the transformer.

It is obvious that the invention may be embodied in many forms and constructions within

the scope of the claims and I wish it to be understood that the particular form shown is but one of the many forms. Various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

1. A transformer having a secondary winding adapted to provide a maximum output potential, leads connected to the end of the coil, one lead including an overload circuit breaker, a second lead connected to an intermediate coil of the secondary and including an overload circuit breaker, a high resistance interconnecting the two leads having the circuit breakers to be supplied by current flowing through both circuit breakers, and a signal connected between the midpoint of the resistance and the midpoint of the secondary winding between the leads having the circuit breakers, whereby on opening of either circuit breaker a voltage is impressed on the signal.

2. A transformer having a secondary winding provided with two fixed taps having a predetermined potential difference and two other taps whereby a circuit may be supplied from one fixed tap and one of the other taps and a second circuit from the other fixed tap and the remaining other tap, an overload circuit breaker connected in series with each fixed tap, a high resistance connected between the output sides of the circuit breakers so that a predetermined voltage is impressed on said resistance when the circuit breakers are closed, and a signal connected between an intermediate point of the resistance and an intermediate coil of the transformer secondary between the fixed taps, and responsive to current flow when either circuit breaker is open.

JOSEPH L. BONANNO.