

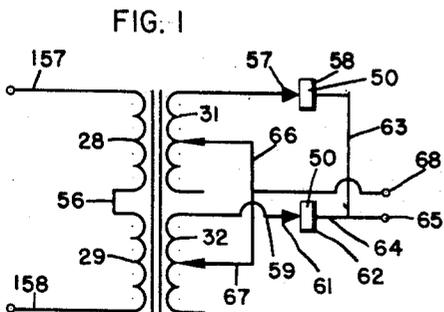
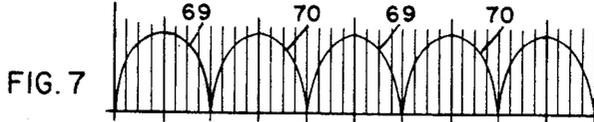
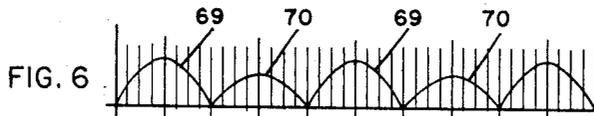
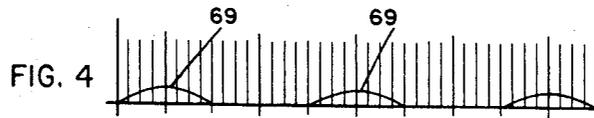
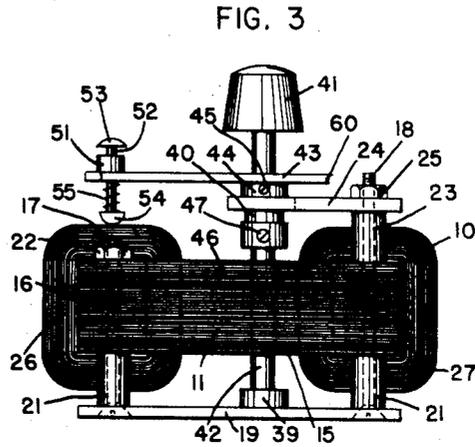
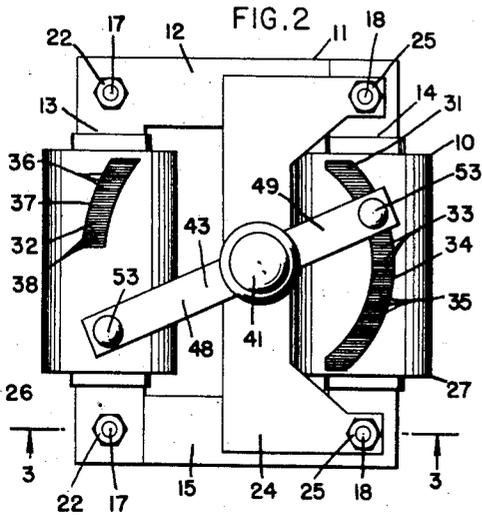
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POWER SUPPLY

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POWER SUPPLY

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The herein disclosed invention relates to power supplies and particularly to a power supply for use in operating miniature electric trains and small direct current electric motors.

An object of the invention resides in providing a power supply in which pulses of current are used in the starting of the motor and in which direct current is used for the propulsion of the motor after the same has been started.

Another object of the invention resides in providing a power supply utilizing a transformer having two windings, and in utilizing a full wave rectifier in association therewith and in causing one section of the rectifier to become operative before the other.

Another object of the invention resides in utilizing switch means including two movable switch arms and two groups of contacts, one group of contacts being connected to certain of the turns of one of the said windings and the other group to certain of the turns of the other winding, said contacts being arranged so that the contacts of one group are engaged by its switch arm before the contacts of the other group are engaged by its switch arm.

A feature of the invention resides in forming the contacts by baring portions of the outermost layer of turns of each of said windings.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings:

Fig. 1 is a wiring diagram of a power supply illustrating an embodiment of the invention.

Fig. 2 is a plan view of the transformer used with the invention.

Fig. 3 is an elevational view of the transformer shown in Fig. 2.

Figs. 4, 5, 6 and 7 are diagrammatic views showing the performance of the power supply.

The transformer used with the invention is shown in detail in Figs. 2 and 3 and is indicated by the reference numeral 10. This transformer utilizes a core 11 which is rectangular in form and has four legs 12, 13, 14 and 15. This core is constructed in the customary manner by means of laminations 16 which are stacked as usual and secured together by means of bolts 17 and 18. The bolts 17 and 18 pass through a base 19 and the core 11 is held in position above said base by means of sleeves 21 encircling said bolts and engaging the said base and core. The bolts 17 have nuts 22 screwed on the same and which clamp the laminations together at the locality of the legs 12, 13 and 15. The bolts 18 have other sleeves 23 encircling the same and extend through a plate 24 overlying the core 11. Nuts 25 screwed on the ends of the bolts 18 hold the portions of the core at the legs 12, 14 and 15 in position and also hold the plate 24 rigidly supported above said core.

Mounted on the legs 13 and 14 of core 11 are two coils 26 and 27. These coils include primary windings 28 and 29 and secondary windings 31 and 32. The

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secondary windings 31 and 32 are disposed outermost of the windings 28 and 29 and the outermost turns 33 of the winding 31 are bared along an arcuate path 34 to form a plurality of contacts indicated by the reference numeral 35. In a similar manner the outermost turns 36 of the winding 32 are bared along an arcuate path 37 to form a second group of contacts 38. It will be noted that the extent of the path 37 is considerably shorter than the extent of the path 34 of the contacts 35 for a purpose to be presently described.

Attached to the base 19 and to the plate 24 are bearings 39 and 40 which rotatably support a shaft 42. This shaft has attached to it a lever 43 which has formed on it a boss 44 resting on the plate 24. A set screw 45 screwed into the boss 44 holds the lever 43 in position on said shaft. A collar 46 also mounted on the shaft 42 engages the under side of the bearing 40. The collar 46 has mounted in it a set screw 47 which similarly holds the collar attached to said shaft. By means of this construction the lever 43 is held from longitudinal movement. A knob 41 on the end of the shaft 42 serves to rotate the same.

The lever 43 has two arms 48 and 49 which extend outwardly in opposite directions. Attached to the ends of these arms are bosses 51 which slidably receive shanks 52. These shanks have heads 53 at the upper ends of the same which limit their downward movement and contacts 54 at the lower ends of the same and which are adapted to engage the contacts 33 and 38 of the windings 31 and 32. Compression coil springs 55 encircle the shanks 52 and are mounted between the under sides of the arms 48 and 49 and the contacts 54 and urge the contacts 54 into engagement with the contacts 33 and 38. The contacts 54 and the contacts 35 and 38 form a switch means indicated in its entirety by the reference numeral 60.

The transformer 10 is connected as follows: Primaries 28 and 29 are connected together by means of a conductor 56 and to two conductors 157 and 158 which are connected to a suitable source of alternating current. One end of the secondary 31 is connected to one element 57 of a dry disc rectifier 58. The corresponding end of the other secondary winding 32 is connected by means of a conductor 59 with one element 61 of a dry disc rectifier 62. The other elements 50 of the rectifiers 58 and 62 are connected by means of conductors 63 and 64 to an output terminal 65. The two contacts 54 of the switch means 60 are connected by means of conductors 66 and 67 to another output terminal 68.

The operation of the invention is as follows: When the lever 43 is moved so that the contact 54 on switch arm 49 just engages any of the first turns of the winding 31, current flows through the secondary winding 31 only and not through the secondary winding 32. Pulses 69 are then produced as shown in Fig. 4. These pulses are of low voltage due to the fact that only a few of the turns of the winding 31 are engaged and said pulses are spaced due to the fact that only half waved rectification is procured, the winding 32 not being in the circuit. As the lever 43 is advanced, the voltage of the pulses increases as shown in Fig. 5, still with half waved rectification. As such time the pulses give an on-and-off flow of current to the motor being started which serves to give intermittent starting pulses to the motor and producing positive starting of the motor. Were a direct current applied, only one impulse would be received, and if this impulse was not effective in starting the motor the motor would simply fail to operate. However, where a series of impulses are given, the motor is always caused to start. If the first impulse is insufficient one of the succeeding pulses usually produces the desired result. As soon as the motor starts, the contacts 54 on the switch arm 48

are moved to engage the contacts 38. Pulses 70 are then produced which are 180 degrees out of phase with the pulses 69 and full waved rectification commences. At first these pulses are of less amplitude as shown in Fig. 6. When the contacts 54 reach their extreme clockwise position as viewed in Fig. 2, all of the turns of both windings are connected in the circuit and complete full waved rectification is procured as disclosed in Fig. 7. This current serves as direct current for operating the motor and the motor now continues to operate in the customary manner.

The advantages of the invention are manifest. The power supply when the switch means is first actuated produces impulses which procure positive starting of the motor. The change from half wave rectification to full wave rectification is automatically procured by simply continuing to rotate the switch knob. The change from half wave to full wave rectification is gradual. The construction can be fabricated at a nominal expense and permits of using a transformer of merely sufficient capacity to operate a motor after the same has been started. The invention combines easy starting with high running efficiency.

Changes in the specific form of the invention, as herein described, may be made within the scope of what is claimed without departing from the spirit of the invention.

Having described the invention, what is claimed as new and desired to be protected by Letters Patent is:

1. A power supply comprising a transformer including a core having first and secondary windings thereon, a first group of contacts connected to certain of the turns of said first winding, a second group of contacts connected to certain of the turns of the second winding, a rectifier connected to a certain end of each of said windings, said rectifiers being further connected to a common terminal, switch means including first and second switch arms movable in unison and connected to another common terminal, the first switch arm being adapted to successively make contact with said first group of contacts and the second switch arm with the second group of contacts to increase the voltage at said terminals as the switch arms are moved in one direction, the contacts of the first winding being arranged to be engaged by the first switch arm before the contacts of the second winding become engaged with the second switch arm.

2. A power supply comprising a transformer including a core having first and secondary windings thereon, some of the outermost turns of said first winding being bared to form a first group of contacts, some of the outermost turns of said second winding being bared to form a second group of contacts, a rectifier connected to a certain end of each of said windings, said rectifiers being further connected to a common terminal, switch means including first and second switch arms movable in unison and connected to another common terminal, the first switch arm being adapted to successively make contact with said first group of contacts and the second switch arm with the second group of contacts to increase the voltage at said terminal as the switch arms are moved in one direction, the contacts of the first winding being arranged

to be engaged by the first switch arm before the contacts of the second winding become engaged with the second switch arm.

3. A power supply comprising a transformer including a core having spaced facing legs, a first secondary winding wound on one of said legs, a second secondary winding wound on the other of said legs, a group of contacts connected to certain of the turns of one of said windings, another group of contacts connected to certain of the turns of the other winding, a rectifier connected to a certain end of each of said windings, said rectifiers being further connected to a common terminal, switch means including first and second switch arms pivoted about an axis disposed intermediate said legs and movable in unison and connected to another common terminal, the first switch arm being adapted to successively make contact with said first group of contacts and the second switch arm with the second group of contacts to increase the voltage of said terminals as the switch arms are rotated in one direction, the contacts of the first winding being arranged to be engaged by the first switch arm before the contacts of the second winding become engaged with the second switch arm.

4. A power supply comprising a transformer including a core having spaced facing legs, a first secondary winding wound on one of said legs, a second secondary winding wound on the other of said legs, some of the outermost turns of said first winding being bared to form a first group of contacts, some of the outermost turns of said second windings being beared to form a second group of contacts, said contacts being substantially in the same plane, a switch lever having two arms extending in opposite directions one being engageable with the first group of contacts and the other being engageable with the second group of contacts, said second group of contacts being disposed so as to be engaged by the first switch arm before the second group of contacts become engaged with the second switch arm.

5. In a power supply comprising a transformer including two windings each producing the same maximum voltage, separate rectifiers connected to said windings each winding having a number of taps, and simultaneously movable contactors movable into contact with said taps, said taps being disposed so that the contacts of one winding are engaged by the complemental contactor prior to the engagement of the other contacts with their complemental contactor to produce half wave rectification, said contacts being disposed so that when the second named contacts are first engaged the voltage in the winding to which they are connected is less than the voltage in the first named winding to produce full wave rectification with different voltages for alternate pulses.

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