

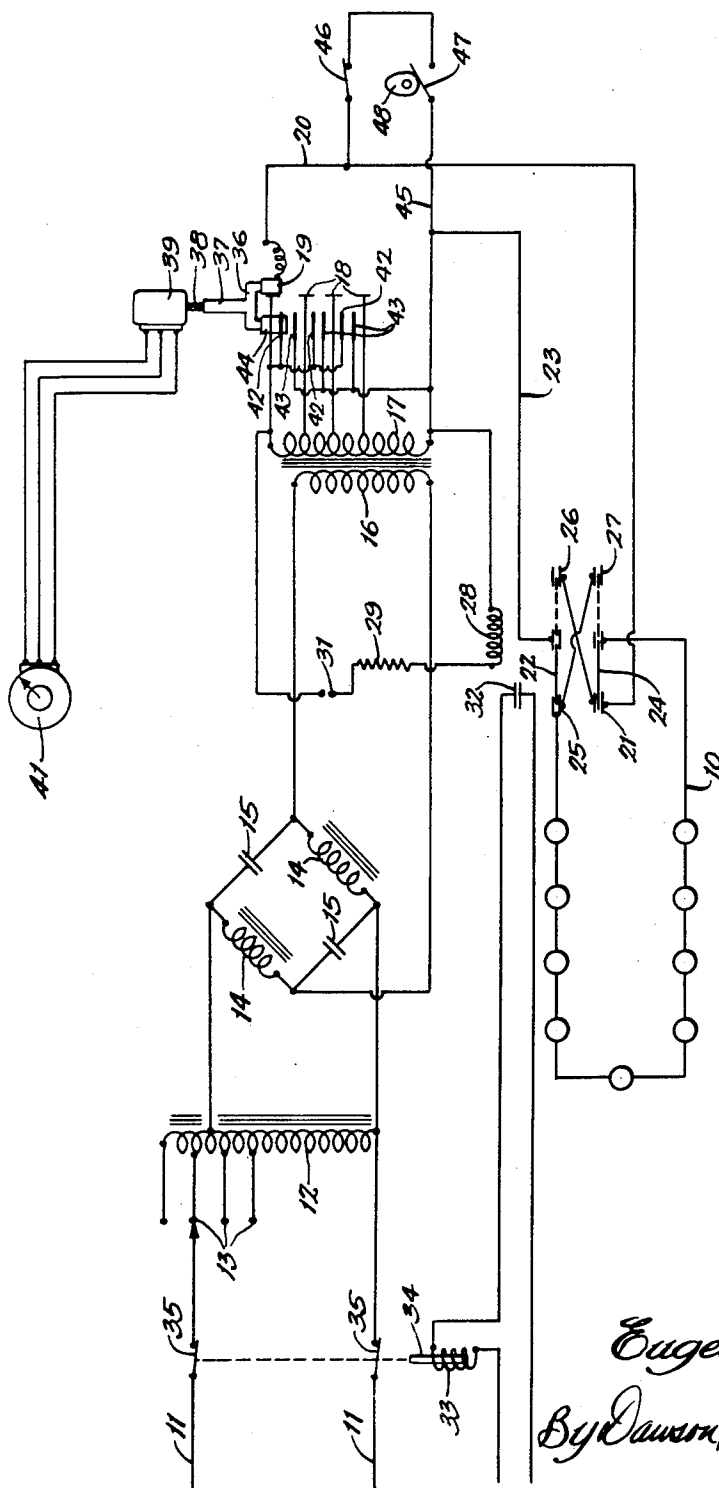
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ADJUSTABLE CONSTANT-CURRENT CONTROL SYSTEM

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ADJUSTABLE CONSTANT-CURRENT
CONTROL SYSTEMEugene H. Haug, Glencoe, Ill., assignor to La
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5 Claims. (Cl. 323—55)

1

This invention relates to electric control system and more particularly to a constant current regulating system for lighting and the like.

One of the objects of the invention is to provide an electric control system in which the value of the current supplied to the load circuit can be varied at will.

Another object of the invention is to provide an electric regulating system in which current variations may be produced without opening the circuit.

Still another object is to provide a constant current regulator connected to a load through a tapped transformer in which the transformer secondary is shorted during tap changing operations so that contacts are made and broken under minimum voltage conditions.

A still further object of the invention is to provide an electric control system in which periodic interruptions in the load circuit are produced for flashing lights and the like by periodically shorting the load circuit.

The above and other objects and advantages of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing, in which the single figure is a circuit diagram of a control system embodying the invention.

The control system shown is adapted to control a load circuit indicated at 10 including a plurality of electric lamps in series for street lighting, airport lighting and the like. Power is supplied from a supply circuit 11 which may be any convenient source of alternating current. The supply circuit is connected through an auto-transformer 12 having a series of taps 13 thereon to the opposite corners of a monocyclic square including a pair of inductive reactors 14 and a pair of condensers 15. The transformer 12 may be adjusted through the taps to compensate for any changes in the supply voltage so that the monocyclic square will always be supplied with a substantially constant potential and will convert the constant potential into a constant current. It will be understood that while a monocyclic square is shown, other types of constant potential to constant current resonant circuits might be employed. The resonant circuit is connected to the primary winding 16 of a current transformer having a secondary winding 17 provided with a series of taps 18. The taps are adapted to be successively engaged by a contactor or wiper 19 which is connected through a wire 20 to a contact 21 of a main control switch. One of the blades 22 of

2

the switch is connected through a wire 23 to one end of the transformer secondary winding 17.

The main control switch is completed by a second blade 24 connected to one side of the load circuit and by a contact 25 connected to the other side of the load circuit. At the opposite end of the switch are two contacts 26 and 27 connected respectively to the contacts 25 and 21. When the switch is in the position shown, the load circuit 10 is connected therethrough to the transformer secondary.

The switch is adapted to be operated by a coil 28 connected across the transformer secondary in series with a resistance 29 and a gap 31 forming a control circuit of the type more particularly described and claimed in my copending application, Serial No. 499,597, filed August 23, 1943, now Patent No. 2,436,803, dated March 2, 1948. The switch also includes a contact 32 which is closed when the switch moves to a position to isolate the load circuit from the transformer to complete a circuit through a coil 33 having a movable core 34 therein connected to switches 35 in the supply circuit 11. In the event the voltage in the transformer secondary or load circuit increases to a point to cause a discharge across the gap 31, the solenoid 28 will move the switch to isolate the load circuit from the transformer circuit and thereafter to open the supply circuit.

The contactor or wiper 19 may be moved in any desired manner but as shown is carried by an insulating bar 36 connected to a post 37 in which is threaded an elongated bolt 38 driven by a Selsyn motor 39. The motor 39 is connected to control motor 41 which may be located at a remote point to control the contactor.

In order to avoid interruption of the load circuit which would result in a voltage increase to operate the switch control mechanism and which would cause arcing at the taps as the contactor 19 is moved, a series of contacts 42 are provided connected to one side of the transformer secondary and a second series of contacts 43 paired with the contacts 42 are connected to the opposite side of the transformer secondary. The pairs of contacts 42 and 43 are adapted to be bridged by a contactor or wiper 44 carried by the insulating bar 36 and moved simultaneously with the contactor 19. As shown, the contact 44 is relatively elongated and is so related to the contactor 19 that it will bridge a pair of contacts 42—43 prior to the contactor 19 leaving one of the taps 18. This will directly short-circuit the transformer secondary resulting in a decrease in voltage so that when the contactor 19 leaves the tap 18 the

circuit will be broken under minimum voltage conditions and no arcing will occur. The contactor 40 will maintain the transformer secondary short-circuited by bridging one of the sets of contacts 42-43 until after the contactors 19 has engaged the next tap so that the circuit will be made without arcing and so that there will be no interruption in the load circuit.

Under many conditions it is desired to interrupt the load circuit periodically to cause flashing of the lights and for this purpose a short-circuit connection 45 is provided directly across the load circuit. The connection 45 is controlled by a normally closed manual switch 46 and a normally open switch 47 adapted to be periodically closed by a cam 48. With the switch 46 closed the cam 48 will periodically close the switch 47 to short the load circuit and interrupt supply of current to the lamps. In the event the switch 47 should stick closed, the manual switch 46 may be opened to make the load circuit again effective.

By operating the control motor 41 to move the contactors 19 and 40 the voltage supplied to the load circuit may be controlled to provide any given current flow therethrough. Since the current supplied to the transformer primary 16 is constant this provides an effective means of regulating light intensity. Due to the provision of contacts 42 and 43 and the wiper 44, the load circuit is never opened so that the automatic switching mechanism does not operate unintentionally and so that no arcing occurs during tap changes.

While one embodiment of the invention has been shown and described in detail herein it will be understood that this is illustrative only and is not intended as a definition of the scope of the invention, reference being had for that purpose to the appended claims.

What is claimed is:

1. In an electric control system, a transformer having secondary winding, a plurality of taps thereon, a load circuit permanently connected at one side to one end of the transformer secondary, means adapted to selectively connect the other side of the load circuit to any one of the taps, and automatic means operable in consonance with the tap selecting means to short circuit the transformer secondary when the selecting means is about to make a tap selection.

2. In an electric control system, a transformer having secondary winding, a plurality of taps thereon, a load circuit permanently connected at one side to one end of the transformer secondary, switching means movable into and out of contact with the taps, adapted when so moved to selectively connect the other side of the load circuit to any one of the taps, and automatic means movable with the switching means to short circuit the transformer secondary whenever the selecting means makes a selection.

3. In an electric control system, a transformer having secondary winding, a plurality of taps thereon, a load circuit permanently connected at one side to one end of the transformer secondary, switching means movable into and out of contact

with the taps, adapted when so moved to selectively connect the other side of the load circuit to any one of the taps, and automatic means movable with the switching means to short circuit the transformer secondary whenever the selecting means makes a selection, a series of contacts arranged in pairs, one contact of each pair connected to one side, the other contact to the other side of the transforming secondary, the short circuiting means including a wiper movable with the switching means and adapted simultaneously to engage both contacts of a pair immediately prior to and during the selection of a tap.

4. In an electric control system, a transformer having secondary winding, a plurality of taps thereon, a load circuit permanently connected at one side to one end of the transformer secondary, switching means movable into and out of contact with the taps, adapted when so moved to selectively connect the other side of the load circuit to any one of the taps, and automatic means movable with the switching means to short circuit the transformer secondary whenever the selecting means makes a selection, a series of contacts arranged in pairs, one contact of each pair connected to one side, the other contact to the other side of the transforming secondary, the short circuiting means including a wiper movable with the switching means and adapted simultaneously to engage both contacts of a pair immediately prior to and during the selection of a tap, each pair of short circuiting contacts being associated with one of the taps.

5. In an electric control system, a transformer having secondary winding, a plurality of taps thereon, a load circuit permanently connected at one side to one end of the transformer secondary, switching means movable into and out of contact with the taps, adapted when so moved to selectively connect the other side of the load circuit to any one of the taps, and automatic means movable with the switching means to short circuit the transformer secondary whenever the selecting means makes a selection, a series of contacts arranged in pairs, one contact of each pair connected to one side, the other contact to the other side of the transforming secondary, the short circuiting means including a wiper movable with the switching means and adapted simultaneously to engage both contacts of a pair immediately prior to and during the selection of a tap, the wiper being of such length that the contacts remain electrically connected until after the tap selection has been completed.

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