

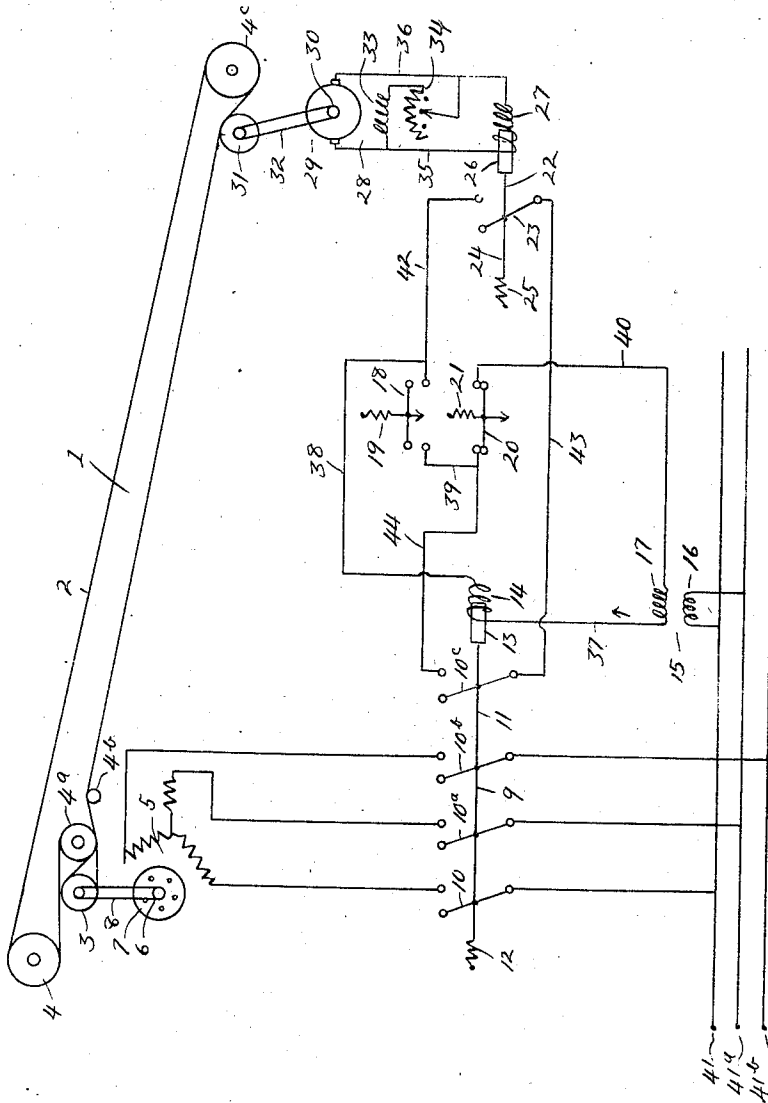
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CONTROL SYSTEM FOR ENDLESS BELT CONVEYERS

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CONTROL SYSTEM FOR ENDLESS-BELT CONVEYERS.

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This invention relates to a method for controlling the operation of a conveyer, and is more particularly concerned with the endless belt type of conveyer which is used for transporting bulk materials to be loaded in freight cars, boats, etc. In a conveyer of this type it often happens that the belt may be so over-loaded as to put it under excessive strain which will cause a slowing of the belt and is apt to cause a breakage unless the driving means is quickly stopped.

One of the objects of my invention is to provide a means for controlling the operation of the conveyer which will automatically stop the motor or other driving means under abnormal conditions, such as the over-loading, excessive slippage or breaking of the belt. Another object is to provide adjustable means for stopping the operation of the conveyer when the belt speed falls a certain percentage below the normal speed of the conveyer.

In the drawing:—

The figure is a diagrammatic representation of an endless belt conveyer and the system for controlling the operation of the same.

1 is an endless belt conveyer comprising the endless belt 2, driven by the pulley 3. 4, 4^a, 4^b, and 4^c are other pulleys operated by the belt. 5 is an electric motor having the pulley 6 mounted upon the armature 7 and connected to the pulley 3 by means of a driving belt 8. 9 is a switch comprising the contactors 10, 10^a, 10^b, and 10^c, which are operated by the rod 11 at one end of which is the spring 12 adapted to normally open the contactors and at the other end of which is a core 13 adapted to be operated by a solenoid 14.

15 represents a transformer comprising the primary coil 16 which is connected to a source of current and the secondary 17. 18 is a manually operable start switch normally held open by the spring 19. 20 is a manually operable stop switch normally held closed by the spring 21. 22 is another switch comprising the contactor 23 operated by the rod 24. 25 is a spring fastened to one end of the rod 24 adapted to normally hold open the contactor 23. At the other end of the rod 24 is a core 26 which is adapted to be operated by the solenoid 27 to close the contactor 23. 28 is a generator comprising the armature 29 having mounted thereon the pulley 30. The generator is driven by

the conveyer belt 2, and any suitable connection may be used for accomplishing this result but the drive is diagrammatically represented in the drawing by the pulley 30 on the generator, a pulley 31 driven by the friction of the belt 2 and the belt 32 connecting the pulleys 30 and 31. The generator is provided with a shunt field 33 connected in series with an adjustable rheostat 34 for varying the voltage delivered by the generator. The generator is connected to the solenoid 27 by means of the conductors 35 and 36.

The operation of the conveyer is as follows:—For starting the conveyer, the switch 18 is manually closed which completes the following electric circuit; current supplied from the transformer secondary 17 flows through conductor 37, the solenoid 14, conductor 38, switch 18, conductor 39, switch 20, and conductor 40, thus completing the circuit. This circuit energizes the solenoid 14 which operates the switch 9 closing the contactors 10, 10^a, 10^b and 10^c.

The switch 9 now being closed, current is supplied from the lines 41, 41^a, 41^b and operates the motor 5 which drives the generator 28 and sends a current through the solenoid 27. As soon as the conveyer reaches a predetermined speed the voltage from the generator is sufficient to operate the magnetic switch 22 which closes the contactor 23 and provides an additional circuit through the solenoid 14 shunting around the manually operable switch 18 and if this switch is now released current will still flow through the solenoid 14. This circuit is as follows: the current from the transformer secondary 17, flows through the solenoid 14, conductor 38, conductor 42, contactor 23, conductor 43, contactor 10^c, conductor 44, switch 20 and conductor 40, completing the circuit. Thus it will be seen that as long as the conveyer drives the generator at a speed sufficient to energize the solenoid 27, the motor will be continuously operated. If it is desired to stop the motor at any time, this can be accomplished by opening the switch 20 which will break the circuit through the solenoid 14 and open the switch 9, thus stopping the motor.

If the generator is driven at less than a predetermined speed, as for instance when the conveyer is over-loaded the voltage generated by the generator 28 will be insufficient to energize the solenoid 27 and the contactor

23 will be opened by means of the spring 25. This will automatically open the circuit through the solenoid 14 which will in turn open the switch 9 and stop the motor.

5 The speed of the generator will be proportional to the speed of the conveyer belt and any condition which slows up the conveyer belt will also slow up the generator and will correspondingly reduce the voltage generated. 10 The voltage generated at any given speed may be adjusted by means of the adjustable rheostat 34 which regulates the current flowing through the shunt field. Thus is it possible to so adjust the generator that 15 it will automatically operate the switch 22 at a predetermined belt speed.

What I claim as my invention is:—

1. The combination with an endless belt conveyer and means for driving the same, of 20 means for producing a voltage dependent upon the speed of said conveyer belt, and means controlled by said voltage for stopping said driving means.

2. The combination with a conveyer and 25 means for driving the same, of a generator driven by said conveyer, and means for controlling said driving means dependent upon the voltage produced by said generator.

3. The combination with a conveyer, of a 30 motor for driving said conveyer, a generator driven by said conveyer, and means for automatically stopping said motor controlled by the voltage produced by said generator.

4. The combination with an endless belt 35 conveyer, of a motor for driving said conveyer, a generator driven by said conveyer, adjustable means for regulating the voltage generated, and means for automatically stopping said motor controlled by the voltage 40 produced by said generator.

5. The combination with an endless belt conveyer, of a motor for driving said conveyer, a generator driven by said conveyer, said generator having a shunt field in series 45 with a rheostat for regulating the voltage

generated, and means for automatically stopping said motor controlled by the voltage produced by said generator.

6. The combination with an endless belt conveyer, of a motor for driving said conveyer, a switch for stopping said motor, a relay for operating said switch, a generator driven by said conveyer, and a magnetic switch controlled by the voltage of said generator, said magnetic switch being adapted 55 to operate said relay for stopping said motor.

7. The combination with an endless belt conveyer, of a motor for driving said conveyer, a generator driven by said conveyer, 60 means for manually starting and stopping said motor, and means for automatically stopping said motor controlled by the voltage produced by said generator.

8. The combination with an endless belt 65 conveyer, of a motor for driving said conveyer, a magnetic switch for stopping said motor, a manually operable switch for closing said magnetic switch, a manually operable switch for opening said magnetic switch, 70 and an automatically operated switch for opening said magnetic switch, said automatic switch being controlled by the speed of said conveyer belt.

9. The combination with an endless belt 75 conveyer, of a motor for driving said conveyer, a magnetically operated switch for stopping said motor, a generator driven by said conveyer, adjustable means for regulating the voltage generated, a manually operated switch for closing said magnetically 80 operated switch, a second manually operable switch for opening said magnetically operated switch, and an automatically operated switch for opening said magnetically operated switch, said automatically operated switch being controlled by the voltage produced by said generator. 85

In testimony whereof I affix my signature.

CHARLES RICHARD FISHER.