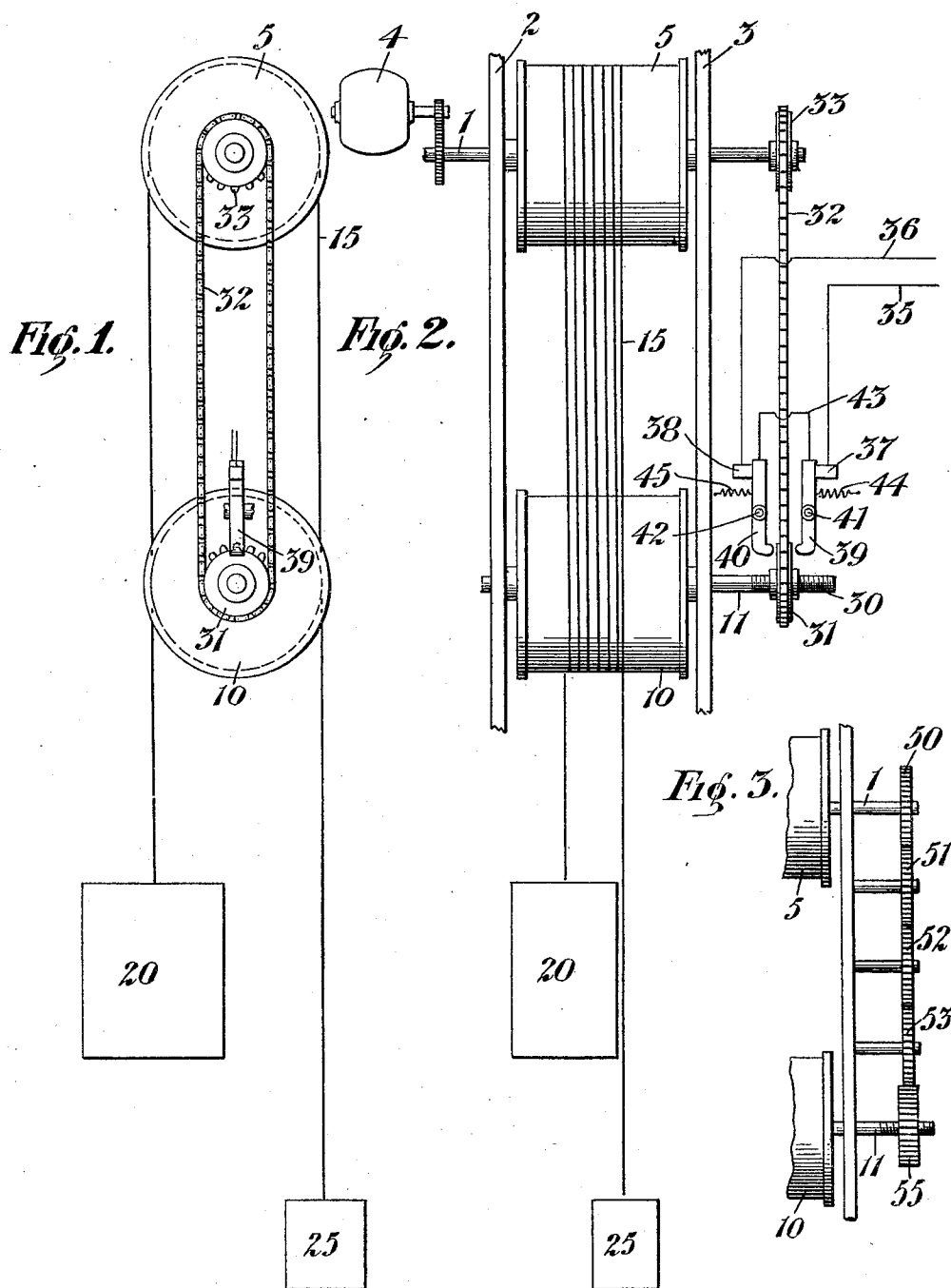


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 AUTOMATIC CONTROLLER FOR ELECTRIC ELEVATORS.
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AUTOMATIC CONTROLLER FOR ELECTRIC ELEVATORS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM McDONALD, a citizen of the United States, and a resident of Unionport, county of New York, State of New York, have invented certain new and useful improvements in Automatic Controllers for Electric Elevators, of which the following is a specification.

In the operation of electrically driven elevators, as now commonly constructed, it sometimes happens that the elevator car or the counterweight becomes wedged in its guideways so that the hoisting rope is held against movement and the motor driven sheave is caused to grind beneath the several turns of the rope until the current is shut off from the motor. At such times the wear and strain between the driving sheave and the rope is extremely objectionable and it sometimes endangers the strength of the machine. In such accidental stopping of the car or the counterweight, the operator is apt to become confused and forget to cut off the current by the use of the hand controller in the car.

The object of the present invention is to provide means for automatically cutting off the current from the motor in the event of the accidental wedging of the car or the counterweight in the elevator shaft. This result is accomplished by providing a normally closed auxiliary switch in the motor controlling circuit and a device for automatically opening said switch for interrupting the circuit, said switch operating device being arranged to be actuated by the retardation of the idler sheave over which the driving rope passes.

In the preferred embodiment of the present invention, the shaft of the idler sheave has threaded upon it a switch operating member driven through suitable mechanism at the same speed as the shaft of the motor driven sheave, and two normally closed switch arms are arranged upon opposite sides of said switch actuating member. The driving ropes extending around the motor driven sheave and the idler sheave in a common manner have the car and counterweight secured to them in any suitable way. The idler sheave is driven as usual from the driving sheave through the driving rope, and so long as the car and counterweight operate properly in the elevator shaft, the automatic switch actuating member will rotate in unison with the shaft of the idler

sheave so that it will not advance in either direction upon said shaft. In the event however, of the car or counterweight becoming wedged in its guides, the driving rope will be held against movement and the idler sheave will consequently stop; the motor driven sheave continuing to run under the action of the motor and grinding under the driving rope and the motor driven shaft through the gearing continuing to rotate the switch actuating member to cause it to travel to one side or the other upon the threaded idler shaft until it is moved into engagement with one of the switch arms to open the motor controlling circuit and thereby automatically stop the motor.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings and afterward point out the novelty more particularly in the annexed claims.

In said drawings: Figure 1 is a diagrammatic side elevation of an elevator system embodying my invention, Fig. 2 is a front elevation of the same, and Fig. 3 is a detail view showing a slight modification.

1 is a motor driven shaft suitably journaled in the proper supports as indicated at 2 and 3. This shaft is designed to be driven by a motor in any suitable manner, the motor being indicated at 4 in the drawing. Secured upon the shaft 1 between the supports 2 and 3 is the usual driving sheave of a traction elevator system.

10 is an idler sheave secured upon an idler shaft 11 which is journaled in the supports 2 and 3 in proper relation to the driving sheave 5.

15 is the driving rope or cable which passes around the driving sheave 5 and idler sheave 10 for a proper number of turns to provide the required frictional hold between the drum 5 and the driving rope.

20 indicates an elevator car and 25 indicates a counterweight, the members 20 and 25 being designed to travel in the usual elevator shaft upon proper guides.

The idler shaft 11 is provided with a threaded portion 30 upon which is threaded a switch actuating member in the form of a sprocket wheel 31. This sprocket wheel 31 is driven by a sprocket chain 32 extending around it and operated by a driving sprocket wheel 33 secured to the motor driven shaft 1 above referred to.

35—36 indicate the motor controlling cir-

cuit leading to the controller (not shown) upon the car and to the main controller of the motor shown at 4. The circuit wires 35 and 36 lead from switch terminals 37 and 38 with which coöperate the switch arms 39 and 40 pivoted as indicated at 41 and 42 and electrically connected by a wire indicated at 43. These switch arms are both held normally in closed position by springs indicated at 44 and 45. The free ends of the switch arms 39 and 40 are arranged upon opposite sides of the switch actuating member 31 above referred to so that the movement of said member 31 in either direction upon the idler shaft 11 will cause it to engage one of the switch arms for breaking the motor circuit.

In Fig. 3 of the drawings, I have shown in detail a modified form of the mechanism involving the same principles as in the preferred form above described, but illustrating a different driving connection between the motor driven shaft and the automatic switch actuating device upon the idler shaft. In this form of the mechanism, the motor shaft 1 carries a gear 50 and the switch actuating member is in the form of a wide-faced gear 55 threaded upon the idler shaft 11 in the same manner as the sprocket wheel 31 is threaded upon said shaft. The gear 50 operates through the train of gears 51, 52, 53 for driving the switch actuating member 55 in the same direction and at the same speed as the idler sheave 10 so that while the elevator is operating normally the member 55 will not advance in either direction upon the shaft 11, but the moment the shaft 11 is retarded, the member 55 will advance upon said shaft for actuating one of the normally closed switches above referred to.

It is thought that the operation of the automatic controller will be clear from the following observations. During the normal operation of an elevator equipped with my improved controller, it will be understood that the idler sheave 10 is driven by the driving rope or cable 15 from the driving sheave 5 and will operate at the same speed as the switch actuating member 31 (or 55) driven from the motor shaft 1. In the event that the elevator car or the counterweight becomes wedged or jammed in its guideways, the driving rope 15 will immediately be arrested with the result that the idler sheave 10 and idler shaft 11 will stop. Assuming that the operator fails to throw off the current from the motor by the controller on the car, the motor will continue to operate which will cause the driving sheave 5 to grind under the driving rope 15 which is held against motion. At the same time the switch actuating member 31 (or 55) will be driven at normal speed through the mechanism connecting it with the motor shaft 1 and its continued rotation will cause it to

advance in one direction or the other upon the idler shaft 11 until one of the auxiliary switch arms 39 or 40 will be engaged and moved into open position for breaking the circuit to the driving motor. In this manner the motor and driving sheave will be automatically stopped in the event of the accidental wedging of the car or counterweight and the wear and strain upon the machine will be reduced to a minimum.

What I claim is:

1. In a traction elevator, the combination of a driving sheave, an idler sheave, a traction rope passing around said sheaves, and an elevator car supported by said rope, with means actuated by a difference in speed between the driving and idler sheaves for shutting off the driving power.

2. In a traction elevator, the combination of a driving sheave, an idler sheave, a traction rope passing around said sheaves, and an elevator car supported by said rope, with power mechanism for said driving sheave having a normally inactive controller, and means actuated by a difference in speed between the driving and idler sheaves for operating said controller.

3. In an electric traction elevator, the combination of a motor operated driving sheave, an idler sheave, and a traction rope passing around said sheaves, with a motor controlling circuit having a normally closed switch, and means actuated by a difference in speed between the driving and idler sheaves for opening said switch.

4. In an electric traction elevator, the combination of a motor operated driving sheave, an idler sheave, a traction rope passing around said sheaves, and an elevator car supported by said rope, with a motor controlling circuit having a normally closed switch, and means actuated by a difference in speed between the driving and idler sheaves for opening said switch.

5. In a traction elevator, the combination of a power operated driving sheave, an idler sheave, a traction rope passing around said sheaves, and an elevator car supported by said rope, with power mechanism including a normally inactive controller, a threaded shaft operated by said idler sheave, a controller actuating member threaded upon said shaft, and means for normally rotating said actuating member at the same speed as said driving sheave, whereby said controller will be operated when the speed of the idler sheave falls below the speed of the driving sheave.

6. In a traction elevator, the combination of a power operated driving sheave, an idler sheave, a traction rope passing around said sheaves, and an elevator car supported by said rope, with power mechanism including two normally inactive controller arms, a threaded shaft operated at the same speed

as said idler sheave, a controller actuating member threaded upon said shaft between said controller arms, and means for normally rotating said actuating member at the same speed as said driving sheave, whereby one of said controller arms will be operated when the speed of the idler sheave falls below the speed of the driving sheave.

7. In a traction elevator, the combination of a power driven shaft and a driving sheave fixed upon it, an idler shaft and an idler sheave fixed upon it, a traction rope passing around said sheaves, and an elevator car supported by said rope, with power mechanism including a normally inactive controller, a controller actuating member threaded upon said idler shaft, and means for normally rotating said actuating member at the same speed as said power shaft, whereby said controller will be operated when the speed of said idler shaft falls below the speed of said power shaft.

8. In an electric traction elevator, the combination of a motor driven shaft and a driving sheave fixed upon it, an idler shaft and an idler sheave fixed upon it, a traction rope passing around said sheaves, an elevator car supported by said rope, a motor controlling circuit including a normally closed switch, a switch actuating member threaded upon said idler shaft, and means for rotating said switch actuating member at the same speed as said motor driven shaft, whereby said switch will be opened when the speed of said idler shaft falls below the speed of said motor driven shaft.

9. In an electric traction elevator, the combination of a motor driven shaft and a driving sheave fixed upon it, an idler shaft and an idler sheave fixed upon it, a traction rope

passing around said sheaves, an elevator car supported by said rope, a motor controlling circuit including two normally closed controlling switches, a switch actuating member threaded upon said idler shaft between said controlling switches, and means for rotating said switch actuating member at the same speed as said motor driven shaft.

10. In an electric traction elevator, the combination of a motor driven shaft and a driving sheave fixed upon it, an idler shaft and an idler sheave fixed upon it, a traction rope passing around said sheaves, an elevator car supported by said rope, a motor controlling circuit including a normally closed switch, a switch actuating member threaded upon said idler shaft, and driving mechanism between said driving shaft and said switch actuating member for rotating said member at the same speed as said driving shaft.

11. In an electric traction elevator, the combination of a motor driven shaft and a driving sheave fixed upon it, an idler shaft and an idler sheave fixed upon it, a traction rope passing around said sheaves, an elevator car supported by said rope, a motor controlling circuit including a normally closed switch, a switch actuating member in the form of a sprocket wheel threaded upon said idler shaft, a driving sprocket fixed upon said driving shaft, and a sprocket chain operating upon said driving sprocket and said switch actuating sprocket for operating the latter at the same speed as the former.

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