Oct. 7, 1930. G. BONTE 1,777,825

ELECTRICALLY OPERATED TRACK SWITCH

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Fig.1

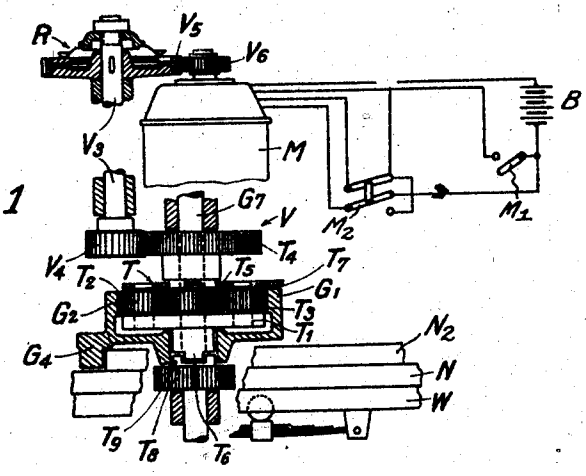

Fig.2

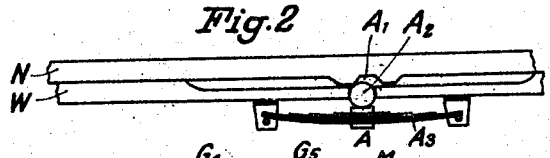

Fig.3

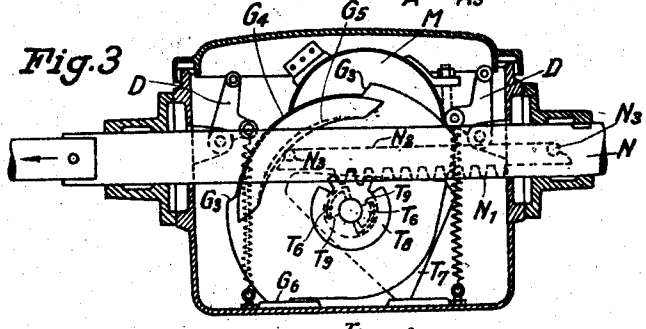

Fig.7

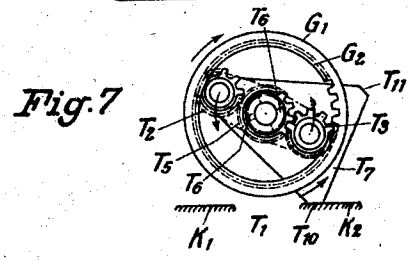

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Fig.4

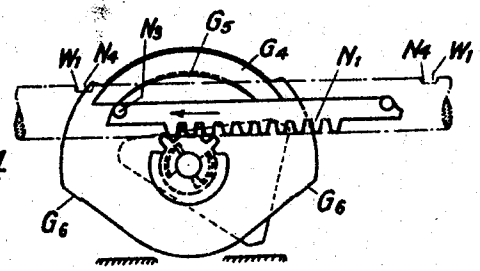


Fig.8

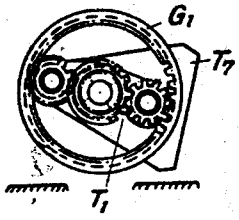


Fig.5

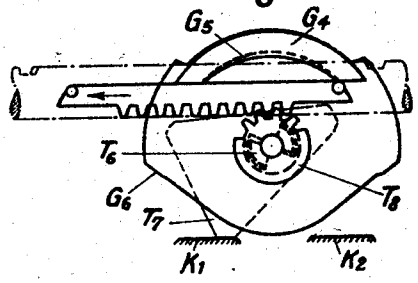


Fig.6

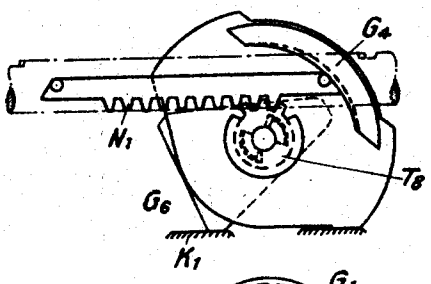


Fig.9

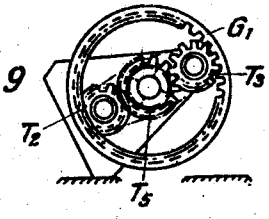
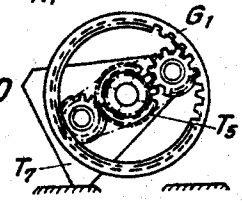


Fig.10



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Patented Oct. 7, 1930 1,777,825

UNITED STATES PATENT OFFICE

GEORG BONTE, OF BERLIN-SIEMENSSTADT, GERMANY, ASSIGNOR TO VEREINIGTE EISENBAHN-SIGNALWERKE GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG, OF BERLIN-SIEMENSSTADT, GERMANY, A CORPORATION OF GERMANY

ELECTRICALLY-OPERATED TRACK SWITCH

Application filed December 1, 1928, Serial No. 323,067, and in Germany April 16, 1928.

My invention relates to improvements in electrically operated track switches.

It is well known, that it is necessary to secure or lock the tongues or points of track switches in the end position, which is generally effected by latches. By my invention it is possible to incorporate the lock for the switch tongues in the operating gear. Such a construction has amongst others the special advantage, that a large portion of the movable members located outside the drive box in the known switch drives is eliminated or protected against the effects of the weather or mechanical injury from outside by stones or the like located between the rails.

According to my invention the arrangement is such, that for operating the switch tongues an intermediate member is placed between the reversible motor and the switch operating rod, which on the one hand transmits the power of the motor to the operating rod and effects its motion and on the other hand, after the setting motion has been completed, brings about the motion of the locking members, located inside the drive box, by a relative motion of the individual parts of the intermediate member.

The idea underlying my invention may be reduced to practice in various ways, for instance by using as relatively movable intermediate member a transverse beam, which normally would move both rods attached to its ends, one of which is connected with the switch tongues and the other with the locking members.

As soon as the rod coupled to the switch tongues encounters a resistance, i. e. in the end position of the switch tongue or point, the other rod only is moved by the connecting beam and the switch tongue locked thereby. It is also possible to use a differential gear, such as an epicyclic gear or sun and planet wheel, as relatively movable intermediate member.

An embodiment of my invention employing an epicyclic gear is illustrated in the drawings affixed hereto and forming part of my specification.

In the drawings

Fig. 1, shows the switch operating gear diagrammatically in sectional plan, and

Figs. 2 to 10 the construction and mode of operation of the epicyclic gear or sun and planet wheel.

Referring to Fig. 1 of the drawings, M is the motor which through a countergearing V and the epicyclic gear T drives the motor rod N. The motor is of the reversible type and supplied with current from the source B. M_1 represents the electric main operating switch, and M_2 the motor reversing switch, reversing in well known manner the connections with the field pole windings of the motor. These electric switches are here merely diagrammatically indicated without their connection with the rail switch mechanism, since those features are well known in the art, and are not involved in the particular features of the present invention. The countergearing V consists of a pinion V_6, a sliding coupling R with the sliding gear wheel V_5, the shaft V_3 and the gear wheel V_4, which meshes with the outer gear wheel T_4.

The construction and mode of operation of the epicyclic gear will be understood with reference to the Figures 2 to 10. The epicyclic gear T, comprising the planet wheels T_2, T_3, and their supporting arm T_1, rotates freely upon the shaft G_7. The gear wheel T_5 is by its hub rigidly coupled with the outer wheel T_4. The planet wheels T_2 and T_3 journaled on the rocker T_1 mesh on the one hand with the teeth of the gear wheel T_5, and on the other hand with the teeth of the internally toothed rim G_2 provided within the casing G_1. The hub of the rocker T_1 upon which runs the planet housing G_1 terminates in coupling claws T_6, which engage the claw recesses T_9 of the gear wheel T_8 with a little angular play. This gear wheel T_8 meshes with the rack N_1 of the slide bar N. On the studs of the planet wheels T_2 is also mounted the stop member T_7, the two lower edges T_{10} or T_{11} of which are adapted to come in contact with the abutments K_1 or K_2 respectively. On the planet housing G_1 is mounted the control cam G_3 for the switch levers D and the locking mem-

ber G_4 with the cam faces G_5 and the limit stops G_6. The locking member G_4 slides upon the slide face N_2 of the motor rod N. For the protection of the edges of the slide face against excessive wear steel bolts N_3 are inserted into them.

The motor rod N driven by the motor M is in known manner detachably coupled with the switch rod W by the switch trailing coupling A, as shown in Fig. 2 of the drawings. According to the position of the operating gear in relation to the track switches the switch tongues may be connected with one or the other end of the switch rod. The trailing of the switch takes place in known manner by the switch rod W being moved towards the motor rod N by the car wheel flanges when the points are thrown over, whereby owing to the resistance of the motor rod N, which is held in the end position by the locking members G_4, the roller A_2 is lifted out of the notch A_1 of the motor rod N, the spring A_3 being deflected thereby.

The switch levers D controlled by parts of the gearing effect in known manner, as by suitably operating electric switch M_2, the changing over of the pole windings, as well as of the safety groundings and the control current contacts, not here shown.

The mode of operation of the described mechanism is as follows:

Figures 3 to 10 illustrate different phases during the rotation of the planet or epicyclic gear. The operating and locking process is substantially as follows:

The motor drives through a countergearing V with planet or epicyclic gear T and driving wheel T_8 the motor slide or rod N and through the switch trailing coupling A the switch rod or slide W and the tongues or points connected with it.

The switch rod W moves parallel to the motor rod N and possesses like the former at two places corresponding notches W_1 and N_4. Only when the switch rod and the motor rod agree in their positions, the switch levers D controlled by the rim G_3 of the casing are able to engage the notches and to effect the known switch movements. The notches become operative as controlling means only when the switch or point is forced open or breakdowns have occurred in it.

Special control rods may be provided for supervising the tongues, and the notches of these rods must correspond with the notches of the other slides or rods, as otherwise they would signal a breakdown in the switch.

Fig. 3 of the drawing illustrates the inoperative state of the gearing in one end position of the switch. The switch rod is locked to the motor rod N by the locking member G_4 through the switch trailing coupling. Figs. 7, 8, 9 and 10 illustrate the positions of the planet gear of the Figs. 3 to 6.

When throwing the switch into the other position the motor commences first to drive the housing G_1, because the planet wheels T_2 and T_3 transmit their motion originating from the gear wheel T_5 to the toothed rim G_2 of the housing. The rocker T_1 serving as support for the planet wheels is stationary, because the rocker contacts with its claws T_6 with the abutment faces T_9 of the driving wheel T_8, which is in gear with the rack N_1 of the motor slide rod N, which is prevented from moving towards the left-hand side by the locking member G_4. When the housing or casing G_1 starts turning, the opening of the lock commences. The motor slide deviates from the inoperative position in the direction of the arrow by the height of the inclined cam face G_5 of the locking member G_4, propelled by the driving wheel T_8 entrained by the rocker. The lock is undone when the locking member G_4 has come in contact with the rack N_1, as shown in Fig. 4. At this stage the motor slide or rod N is uncovered at N_3. At the forcing coupling the roller A_2 has reached the center of the notch, from the eccentric position shown in Fig. 2. Now commences the motion of the motor rod and the switch rod coupled with it, because the planet wheels T_2 and T_3 are forced to roll upon the toothed rim G_2, so that the rocker T_1 is obliged to move in the direction of the arrow. The driving wheel T_8 turns with the rocker and moves through the rack N_1 the motor slide with the coupled switch slide. The switch commences to move. The locking member G_7 then slides upon the rack.

Fig. 5 of the drawing illustrates the state, when the switch is thrown over. The switch slide W has reached its end position. The locking commences, after the stopping member T_7 has encountered the face K_1 and has thus come to rest. The driving wheel T_5 continues to revolve and drives through the planet wheels T_2 and T_3 the casing or housing G_1. The locking member G_4 then forces the motor rod in the direction of the arrow by means of inclined cam face G_5 until the stop G_6 encounters the face K_1, as illustrated in Fig. 6 of the drawings. The driving wheel T_8 is then carried around by the rack N_1 across the play provided at T_6. Together with the driving wheel T_8 the motor slide N is moved so far, that the roller A_2 is fork-jointed to the forcing coupling, as illustrated in Fig. 2 for the end position of the switch drive according to Fig. 3, for instance, so that the switch rod stands under the pressure originating from the forcing coupling A.

When trailing the switch the power originating from the switch tongue is transmitted to the switch slide W through the switch rod. Since the motor slide N is held stationary by the locking member G_4, the trailing power becomes operative in the trailing coupling. The roller A_2 is forced out of the

notch A_1, deflecting the spring A_3, the motor slide N is displaced in relation to the switch slide W and the switch levers D are forced out of the notches of the rod N, whereby the electric circuit to the control magnets in the signal box is interrupted and indicates the disturbance.

In order to couple the drive again with the switch, the switch lever is thrown over, the motor drives the motor slide, the abutment of which encounters the roller A_2 and forces it into the notch A_1. In this way the switch slide is coupled with the motor slide, i. e. the switch or point is coupled with the drive.

In the event of breakdowns in the drive, it is possible to throw the switch by hand.

Various modifications and changes may be made without departing from the spirit and the scope of the invention.

I claim as my invention:—

1. An electrically operated track switch mechanism, comprising in combination an electric motor, an operating rod for transmitting the motor power to the switch tongues, and a planet gear interposed between said motor and said operating rod, one wheel of said gear having means for throwing the switch tongue over during one part of its motion and for locking the switch during another part of its motion, the outer member of said planetary gear having a locking rim, said operating rod having an abutment member located in the path of said locking rim and permitting said rim and the abutment member to serve as mutual abutments.

2. An electrically operated track switch mechanism, comprising in combination an electric motor, an operating rod for transmitting the motor power to the switch tongues, and a planet gear interposed between said motor and said operating rod, one wheel of said gear having means for throwing the switch tongue over during one part of its motion and for locking the switch during another part of its motion, the outer member of said planetary gear having a locking rim, said operating rod having an abutment member located in the path of said locking rim and permitting said rim and the abutment member to serve as mutual abutments, said locking rim having a suitably shaped cam surface to press the switch tongue through said operating rod tightly against the pertaining rail.

3. An electrically operated track switch mechanism, comprising in combination an electric motor, an operating rod for transmitting the motor power to the switch tongues, and a planet gear interposed between said motor and said operating rod, one wheel of said gear having means for throwing the switch tongue over during one part of its motion and for locking the switch during another part of its motion, the outer member of said planetary gear having a locking rim, said operating rod having an abutment member located in the path of said locking rim and permitting said rim and the abutment member to serve as mutual abutments, and an elastic element interposed between the drive and the switch tongue and adapted to be compressed by the momentum of the motor after the switch point has come in contact with its pertaining rail.

4. An electrically operated track switch mechanism, comprising in combination an electric motor, an operating rod for transmitting the motor power to the switch tongues, and a planet gear interposed between said motor and said operating rod, one wheel of said gear having means for throwing the switch tongue over during one part of its motion and for locking the switch during another part of its motion, the outer member of said planetary gear having a locking rim, said operating rod having an abutment member located in the path of said locking rim and permitting said rim and the abutment member to serve as mutual abutments, said locking rim having a suitably shaped cam surface to press the switch tongue through said operating rod tightly against the pertaining rail, and an elastic element interposed between the drive and the switch tongue and adapted to be compressed by the momentum of the motor after the switch point has come in contact with its pertaining rail.

In testimony whereof I affix my signature.

GEORG BONTE.