

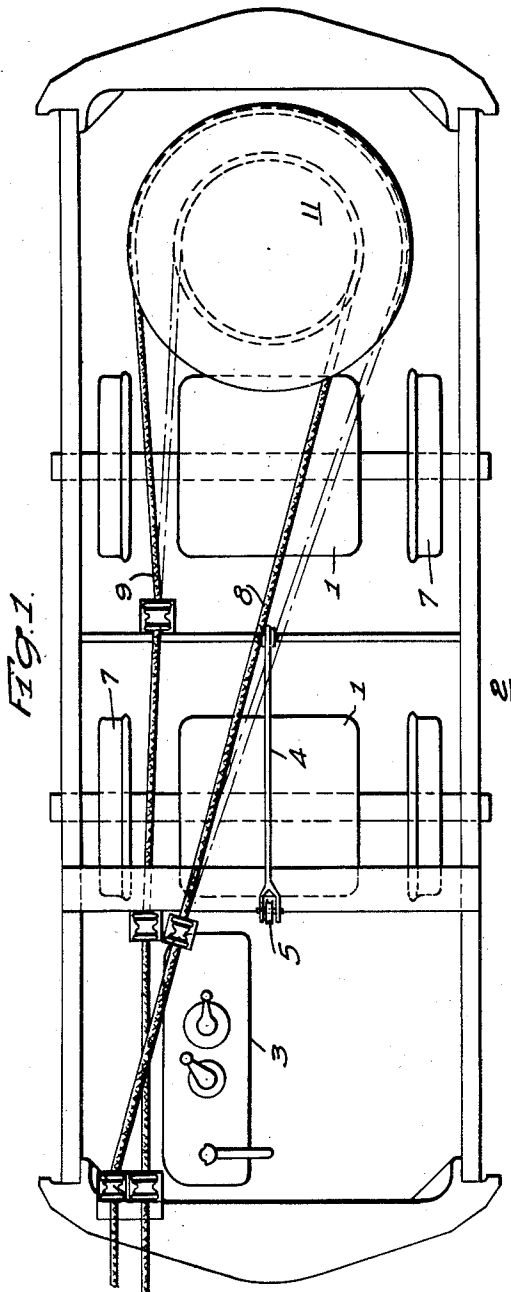
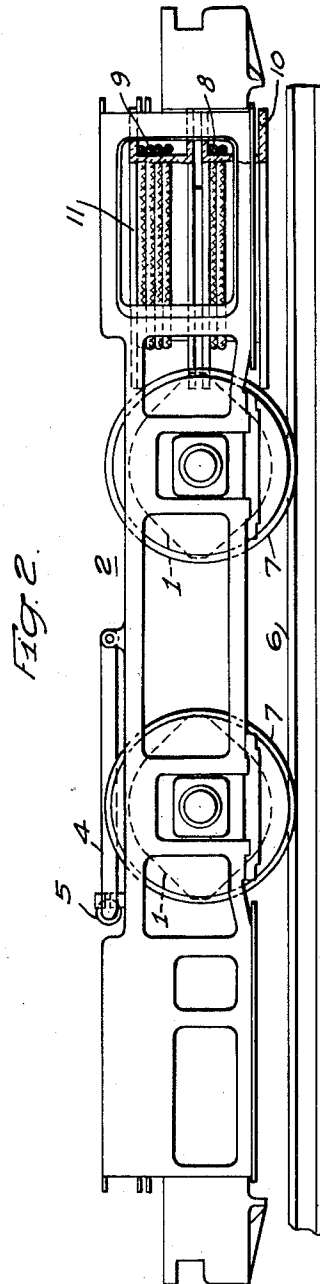
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D. E. RENSCHAW ET AL
LOCOMOTIVE GATHERING MECHANISM

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3 Sheets-Sheet 1



WITNESSES.
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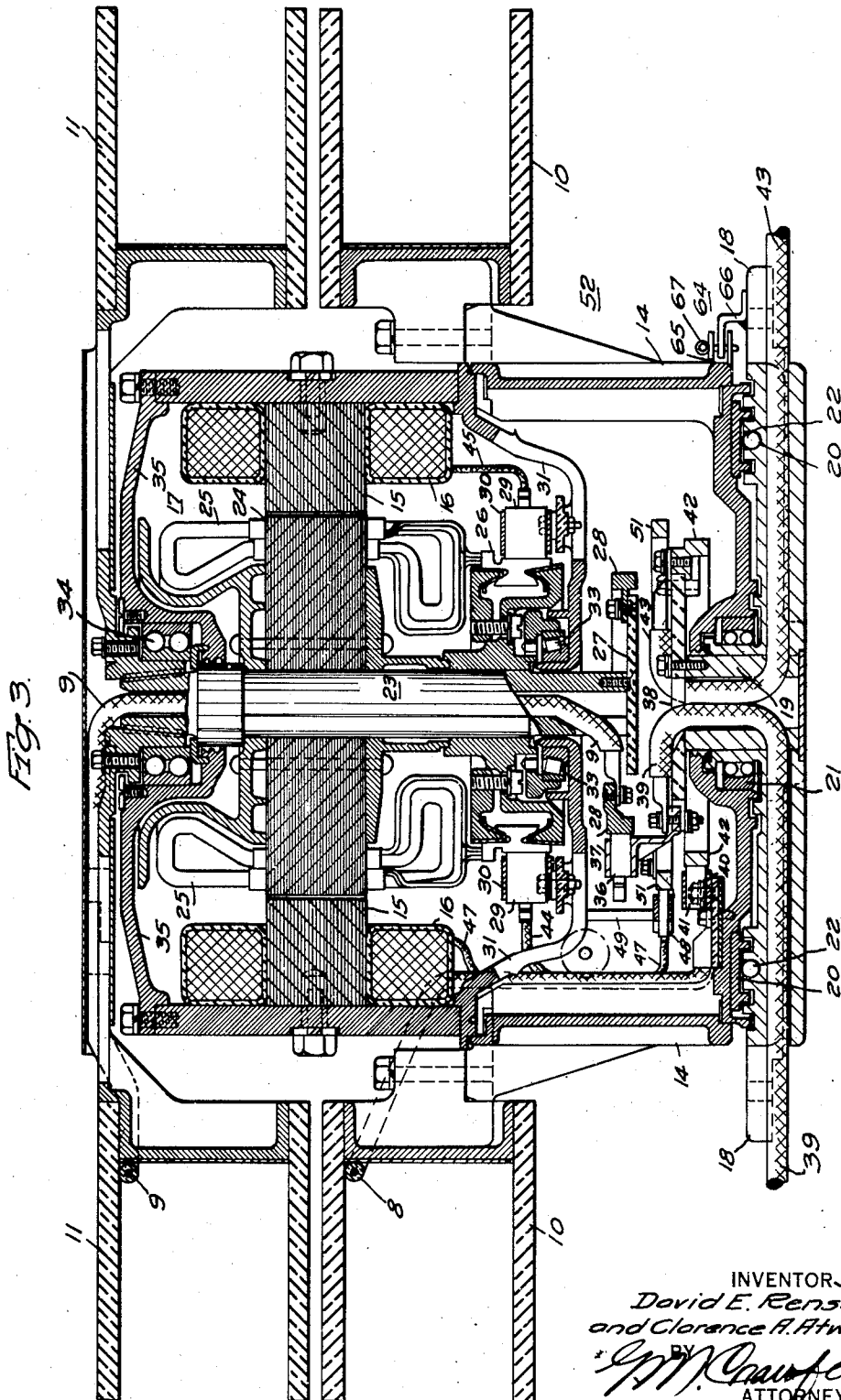
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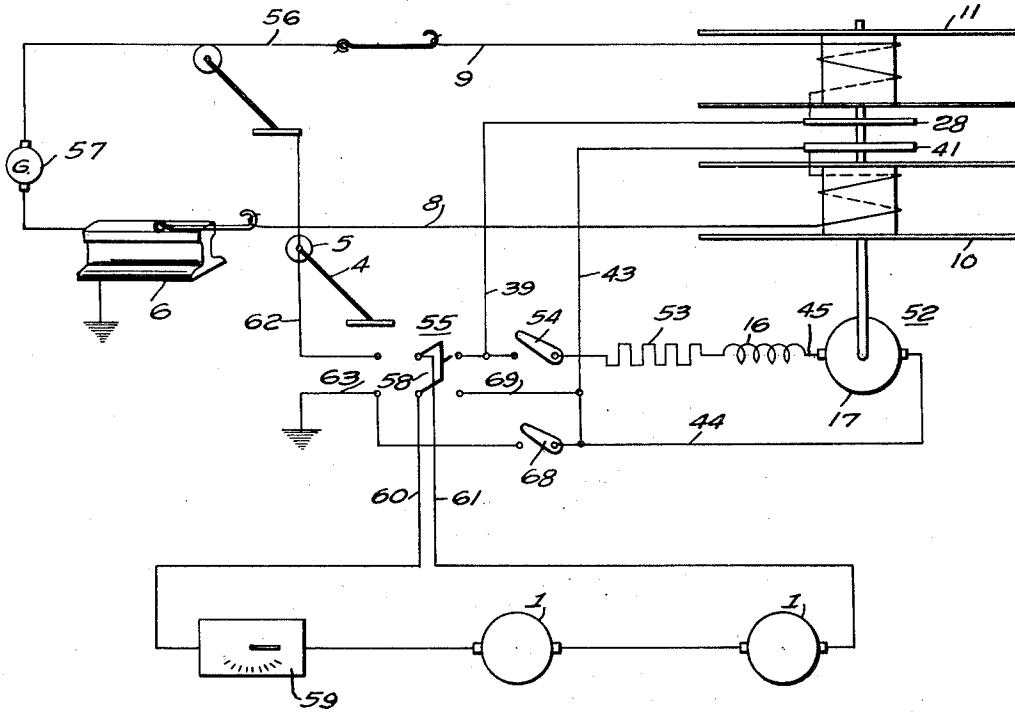
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Fig. 4.



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LOCOMOTIVE GATHERING MECHANISM

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Our invention relates generally to electric locomotives and it has particularly relation to mining locomotives provided with conductor-cable-gathering reels.

5 The object of our invention, generally stated, is the provision of a conductor-cable-gathering mechanism for mining locomotives that shall be simple and efficient in operation and readily and economically manufactured and used.

10 A more specific object of our invention is to provide for automatically maintaining predetermined tension on two conductor cables while the locomotive, to which they are supplying electric current from a power source, is moved
15 toward and away from the power source.

Other objects of our invention will, in part, be obvious and, in part, appear hereinafter.

Our invention, accordingly, is disclosed in the embodiment hereof shown in the accompanying
20 drawings, and comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in
25 the appended claims.

For a more complete understanding of the nature and scope of our invention, reference may be had to the following detailed description, taken in connection with the accompanying
30 drawings, in which

Figure 1 is a top plan view of an electric locomotive provided with an automatic cable-reeling mechanism constructed in accordance with this invention;

35 Fig. 2 is a view, in side elevation, of the locomotive shown in Fig. 1;

Fig. 3 is a vertical sectional view of the automatic cable-reeling mechanism; and

40 Fig. 4 is a diagrammatic view of the motors and control system for an electric locomotive shown in connection with the automatic reeling mechanism.

Referring now to the drawings, electric motors
45 1 of any suitable type may be employed for driving a locomotive whose frame is shown generally at 2. A controller 3, of any suitable type, is mounted on one end of the locomotive frame 2 for controlling the operation of the locomotive.

The illustrated locomotive, is particularly
50 suited for hauling cars from the interior of a mine to a point where they may be readily taken outside. Electric power for propelling a locomotive along the main entry of a mine is usually supplied from an overhead conductor,
55 and a ground return conductor for which the

track, on which the locomotive runs, is used. In this part of the mine, the ventilation is usually satisfactory and there is little danger of an explosion of accumulated gas caused by the usual sparking between the current-collecting apparatus on the locomotive and the electrical conductors.

In order to collect the current from the overhead conductor, a trolley pole 4 and a trolley wheel 5, of any suitable construction, are
65 mounted on the locomotive, as illustrated. The return connection to the track 6 is completed through the locomotive frame 2 and the drive wheels 7 in the usual manner.

When it is desired to use the locomotive for
70 hauling cars out of side entries, located along the main entry and in which a poorly bonded track may have been laid and it is undesirable to use an overhead conductor, it is necessary to use a separate circuit for supplying current for
75 propelling the locomotive rather than the circuit including the trolley wheel 5 and the ground return through the wheels 7 to the track 6. Furthermore, it is apparent that there is greater danger of an explosion of accumulated gas in
80 one of the side entries than in the main entry, since the former are usually poorly ventilated because of their limited use.

With a view to supplying electric power for operating the locomotive in side entries in which
85 it is not feasible to employ the usual current-collecting devices, two conductor cables 8 and 9 are provided which may be connected respectively to the overhead conductor and to the track at the main entry and secured at the
90 other end to a pair of cable winding reels 10 and 11. As will be observed, the cable 8 is shown by broken lines in the full reeled position and by full lines in the unreeled position while the cable 9 is shown by full lines in the full
95 reeled position and by broken lines in the unreeled position.

While the locomotive is moving into and out of a side entry, it is desirable to maintain the cables 8 and 9 at a predetermined tension in
100 order to prevent their becoming tangled with the locomotive. It is also desirable to provide for rotating the reel corresponding to each cable at a rate in accordance with the tension applied to the cable attached thereto. The importance
105 of this feature will be apparent when it is considered that one of the cables may be elongated more than the other; that they may not be attached to their respective conductors at the main entry at corresponding positions; and that
110

they may not be wound upon the winding reels at exactly the same rate.

In order to provide for independently winding and unwinding the cables 8 and 9, an explosion-proof motor having both a rotatable frame 14 and a rotatable armature 17, is utilized. The reel 10 is mounted directly on the rotatable motor frame 14, which is provided with a plurality of inwardly-extending polar projections 15 that are disposed to be energized by means of a plurality of field windings 16 in the usual manner. The reel 11 is attached directly to the rotatable armature 17 which is located, as shown, within the rotatable motor frame 14. As will be readily understood, the reels 10 and 11 will be rotated in opposite directions when electric power is applied to the field coils 16 and to the armature 17. When the locomotive is moving into the mine, the reels 10 and 11 will be rotated against the torque developed by the interaction of the current in the armature 17 and the flux produced by the field windings 16, while this same torque will cause the reels 10 and 11 to rotate in a cable-winding direction when the locomotive is moving out of the mine.

It will be noted that all of the parts that are disposed to rotate with the reel 10, and which are shown in section, are cross-hatched in a manner identical with the cross-hatching of the reel 10, while all of the parts that are disposed to rotate with the reel 11 are shown in a similar manner by means of a different cross-hatching. Furthermore, in order to simplify the drawings as much as possible only two of the field poles, each comprising a polar projection 15 and a field winding 16, have been illustrated although it is to be understood that the several field coils may be connected together in the usual manner.

The motor frame 14 is rotatably mounted on a suitable base 18 which is provided with a hollow stub shaft 19 at its center and a grooved bearing race 20 near its outside edge. A ball bearing 21 is provided around the stub shaft, for maintaining the motor frame in axial alignment therewith, while a second ball bearing 22 is provided under the lower part of the motor frame 14, in the bearing race 20, to take the thrust applied thereto while the cables 8 and 9 are being wound and unwound.

As illustrated, the armature 17, to which the upper reel 11 is attached, is provided with a hollow shaft 23, on which the customary laminated core 24 and armature conductors 25 are mounted. In addition, a commutator 26 is mounted on the shaft 23, together with an upper insulated collector ring support 27 and a collector ring 28. The customary brushes 29 for the commutator 26 are provided, as shown, and are mounted by means of suitable brush holders 30 on an inwardly-extending lower bearing housing 31. In the drawings only two brushes have been shown, although, as will be readily understood, there may be several sets of brushes utilized, which is a well known design feature of electrical apparatus of this type. The armature 17 is supported at its lower end by means of a suitable roller bearing 33 which is located within the lower bearing housing 31, and is centered at its upper end by means of a ball bearing 34 which is mounted on an upper bearing housing 35.

In order to conduct the current to the locomotive from the insulated conductor cable 9 that is wound on the upper reel 11, the cable 9 is passed through the reel 11 and down through

the hollow shaft 23 where it is connected to the collector ring 28. A stationary brush 36 and a brush holder 37, which is mounted on a lower insulated collector-ring support 38, serve to collect the current from the collector ring 28 and to conduct it to a conductor 39 which is connected to the control system of the locomotive. As shown, the collector-ring support 38 is constructed of a suitable insulating material and is supported by the stub shaft 19. The conductor cable 8 is brought from the lower reel 10 through the motor frame 14 to a brush holder 40 and brush 41 which is disposed to engage a stationary collector ring 42 that is also mounted, as shown, on the lower collector ring support 38. A second conductor 43, which is also connected to the control system of the locomotive, is connected as illustrated, to the stationary collector ring 42.

As will be more clearly set forth hereinafter, electric power for operating the reeling apparatus is obtained from the same power source as that from which the locomotive receives its power. The brush 29 on the left hand side as viewed in the drawings, is connected directly to the brush 40 by means of conductor 44, thereby making electrical connection to conductor 8. The other brush 29 shown in the drawings, is connected, by means of conductor 45 to one of the field coils 16. The other field coil, shown in the drawings, is connected by means of a conductor 47 to a brush 48, which is supported by means of a brush holder 49 that is secured to the underside of the lower bearing bracket 31. The brush 48 is disposed to engage a stationary collector ring 51, which is mounted on and insulated from the lower collector ring support 38 between the collector rings 42 and 28. A cable (not shown) is connected to the collector ring 51 and serves to make suitable connection to the control system of the locomotive.

Referring now to Fig. 4 of the drawings, the system there shown is a diagrammatic representation of an electric locomotive provided with cable gathering apparatus. For simplicity of illustration, the two winding reels 10 and 11 are shown as being connected directly to the shaft of a motor 52; however, it will be readily understood that the upper reel 11 is directly associated with the armature 17 of the motor 52 while the lower reel 10 is directly associated with the frame structure as shown in Fig. 3. In the particular system illustrated, a motor of the series connected type is used and is connected in series circuit relation with a resistor 53 and a switch 54 to the conductors 39 and 43 which are connected to the right-hand set of terminals of a transfer switch of the double-pole, double-throw type. The conductor cables 8 and 9, which are disposed to be wound on the reels 10 and 11, are respectively connected to the overhead trolley wire 56 and to the grounded track rail 6 to which power is supplied by means of a suitable generator 57.

It will be observed that the center set of terminals 58 of the transfer switch 55 is connected to the control apparatus 59 and the driving motors 1 of the locomotive by means of conductors 60 and 61. If it is desired to operate the locomotive on that portion of the track over which the trolley conductor 56 is provided, the transfer switch 54 will be thrown to the left-hand position as viewed in the drawings in which position the power for operating the locomotive will be supplied from the trolley con-

ductor 56 through the trolley wheel 5 and conductor 62 and through conductor 63 to the ground rail 6. When it is desired to operate in that portion of the mine in which no trolley conductor is provided, the conductor cables 9 and 8 are connected respectively to the trolley conductor 56 and to the ground rail 6 while the switch 55 is thrown to the right-hand position and switch 54 closed. The cables 8 and 9 will then be automatically unwound or wound up by the motor 52 as the locomotive is moved along its track. In this instance power is supplied to the motor 52 and driving motors through conductors 39 and 43 and their associated slip rings 28 and 51, respectively, and the conductor cables 8 and 9.

In the event that it is desired to use only one of the winding reels and its associated conductor cable, provision is made for locking the rotatable frame structure 14 in a stationary position. In this instance a stop or locking device 64 comprising a bifurcated member 65 secured to the motor frame 14 and a co-operating stationary member 66 which is welded to the base 18 as shown in Fig. 3, is utilized. Both of the members 65 and 66 are provided with corresponding openings disposed to receive a locking pin 67.

It is also necessary, when it is desired to only operate one of the winding reels, to provide a ground connection for the motors since for example, if the conductor cable 8 were disconnected, there would be no return circuit to the generator. Accordingly, a switch 68 is provided for connecting conductors 44 and 69 directly to ground. However, it will be understood that the locking pin 67 will be located in the position shown in the drawings and the switch 68 closed only when it is desired to operate one of the reels or when, for some other reason, it is desired to hold the lower reel 10 stationary.

It will be readily apparent that the reels 10 and 11 may be separately mounted on any suitable supports and that the motor 52 may also be mounted separately. Any suitable driving connection, such as gears or the like, may be used between the motor frame 14 and the reel 10 and between the armature 17 and the reel 11. With this modified construction, it will be noted that the cables 8 and 9 may be wound and unwound from their respective reels 10 and 11 in the manner described.

While a locomotive of the type described is particularly applicable for use in mining operations, it will be readily understood that it may also be employed in any other application in which it is desirable to obtain power for the operation of a locomotive in the manner set forth.

Since certain further changes may be made in the above construction and different embodiments of the invention may be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim as our invention:

1. The combination in an electric locomotive of two rotatable gathering reels mounted on the locomotive, two conductor cables each secured at one end to one of the reels for winding thereon and each disposed to be connected at its other end to a fixed conductor, and means comprising an electric motor for automatically and interdependently winding and unwinding said cables

in accordance with the direction in which the locomotive is moved and maintaining the tensions applied to said cables substantially equal.

2. The combination in an electric locomotive, of two independently rotatable gathering reels mounted on the locomotive, two conductor cables each secured at one end to one of the reels for winding thereon and each disposed to be connected at its other end to a fixed conductor, and automatic means directly connected to said reels for permitting them to unwind said cables when the locomotive is moved away from said fixed conductors and causing them to wind up said cables when the locomotive is moved toward said fixed conductors while maintaining interdependent tension on said cables.

3. The combination with an electric locomotive, of two rotatable gathering reels mounted on the locomotive, two conductor cables, each secured at one end to one of the reels for winding thereon and connected at the other ends to a source of electric power, and electro-dynamic means for maintaining predetermined tension on said cables while the locomotive is being moved either away from or toward said source of power.

4. The combination with an electric locomotive, of a pair of gathering reels mounted on the locomotive, a pair of conductor cables, each secured at one end to one of the reels for winding thereon and connected at the other ends to a source of electric power, and electro-dynamic means for controlling the rate at which each reel rotates in accordance with the rate at which the locomotive is moved away from the source of power and for maintaining predetermined tension on each cable when the locomotive is moved toward the source of power.

5. Reeling apparatus for gathering cables for an electric locomotive comprising, in combination, a pair of rotatable gathering reels and an electric motor for rotating said reels to maintain predetermined tension on said cables, said motor comprising an armature disposed to rotate with one of the reels and a field structure disposed to rotate with the other reel.

6. The combination with an electric locomotive, of a pair of rotatable gathering reels, a pair of conductor cables each secured at one end to one of said reels and connected at the other ends to a source of electric power, and an electric motor for rotating said reels to maintain predetermined tension on said cables while the locomotive is being moved either away from or toward said source of power, said motor comprising an armature disposed to rotate with one of the reels and a field structure disposed to rotate with the other reel.

7. Reeling apparatus for gathering cables for an electric locomotive comprising, in combination, a pair of gathering reels co-axially mounted one above the other, and an electric motor disposed within said reels and co-axially therewith for rotating said reels.

8. A cable gathering apparatus for an electric locomotive comprising, in combination, a pair of gathering reels co-axially mounted one above the other on the locomotive, and an electric motor disposed within said reels for rotating them.

9. A cable gathering mechanism for an electric locomotive comprising, in combination, two gathering reels co-axially mounted one above the other on the locomotive, and an electric motor disposed within said reels and directly connected thereto for rotating said reels in opposite directions.

10. A cable gathering mechanism for an electric locomotive comprising, in combination, two gathering reels co-axially mounted one above the other on the locomotive, an electric motor disposed within said reels and having driving connection therewith for rotating said reels, and a latch for preventing the rotation of one of said reels.
11. The combination with an electric locomotive of a pair of rotatable gathering reels co-axially mounted one above the other, a pair of conductor cables each secured at one end to one of said reels and connected at the other ends to a source of electric power, and an electric motor disposed co-axially within said reels for rotating them to maintain predetermined tension on said cables while the locomotive is being moved either toward or away from said source of power, said motor comprising an armature disposed to rotate with one of the reels and a field structure disposed to rotate with the other reel.
12. In an electric locomotive, in combination, a pair of independently rotatable gathering reels, a conductor cable individual to and secured to each reel at one end and connected at the other end to a source of electric power, an electric motor having positive driving connection with each of said reels for rotating them to maintain predetermined tension on each of said cables while the locomotive is moved away from or toward said source of power, and a resistor, said motor being connected in series circuit relation with said resistor and to the source of power.
13. In an electric locomotive, in combination,
- a plurality of circuits for obtaining current from a power source for operating said locomotive, means for connecting said locomotive to either of said circuits, one of said circuits comprising a pair of conductor cables connected at one end to the power source, a pair of independently rotatable gathering reels each individual to one of said conductor cables for winding said cables thereon, an electric motor having positive driving connection with each of said reels for rotating them to maintain predetermined tension on each of said cables while the locomotive is moved away from or toward said source of power, and a resistor, said motor being connected in series circuit relation with said resistor and to the source of power.
14. Reeling apparatus for gathering a pair of cables for an electric locomotive comprising, in combination, a base disposed to be mounted on the locomotive and provided with a stub shaft in the center thereof, a motor frame mounted on said base and disposed to rotate about said stub shaft, said motor frame being provided with a plurality of inwardly extending polar projections and a plurality of field coils for energizing said polar projections, a reel mounted on said motor frame and disposed to rotate therewith for winding one of said cables thereon, an armature located within said motor frame and disposed to rotate relative thereto, and a second reel mounted on said armature and disposed to rotate therewith for winding the other cable thereon.
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