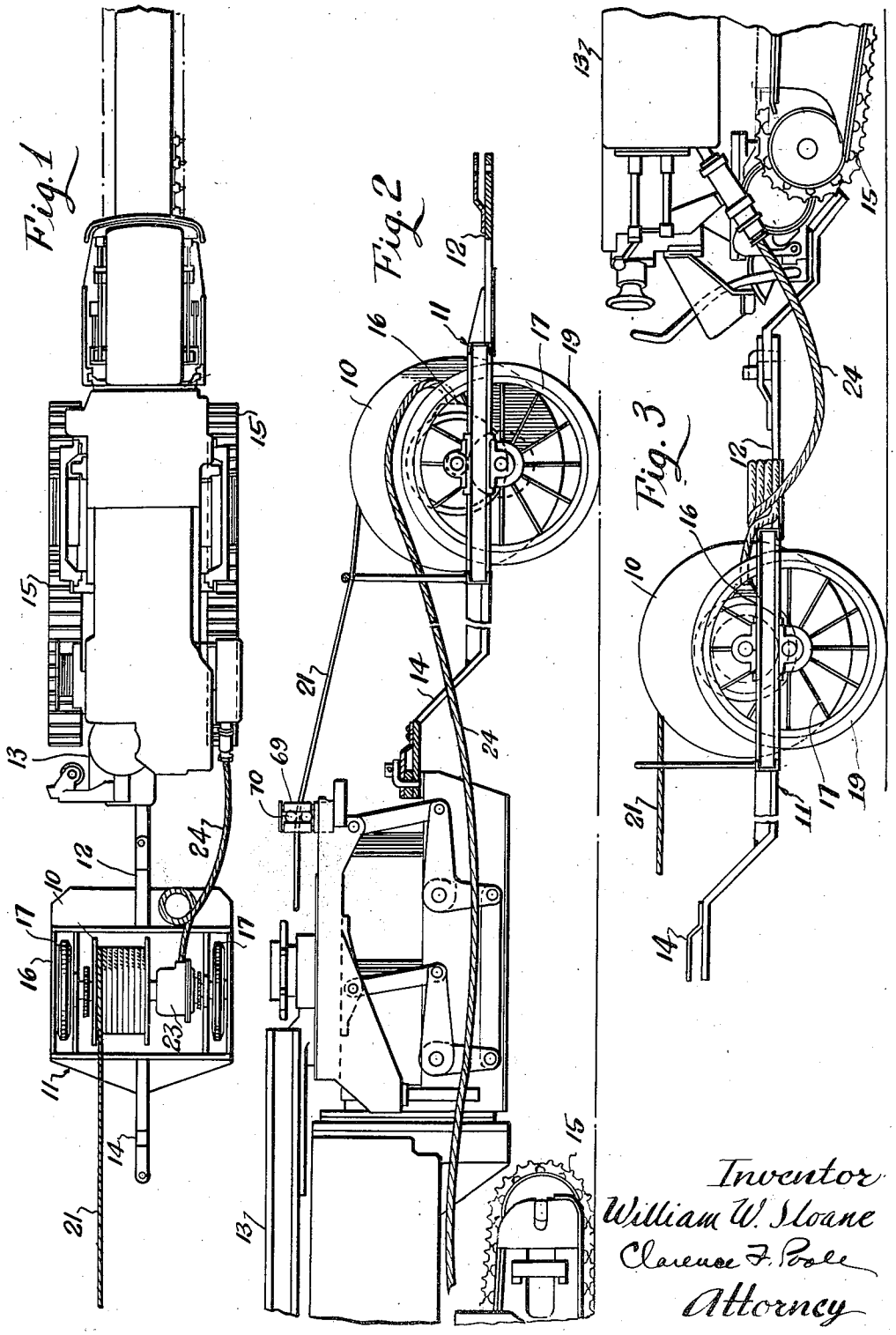
Dec. 17, 1940. W. W. SLOANE 2,225,185

MINING MACHINE

Filed Nov. 25, 1938 2 Sheets-Sheet 1



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Fig 4

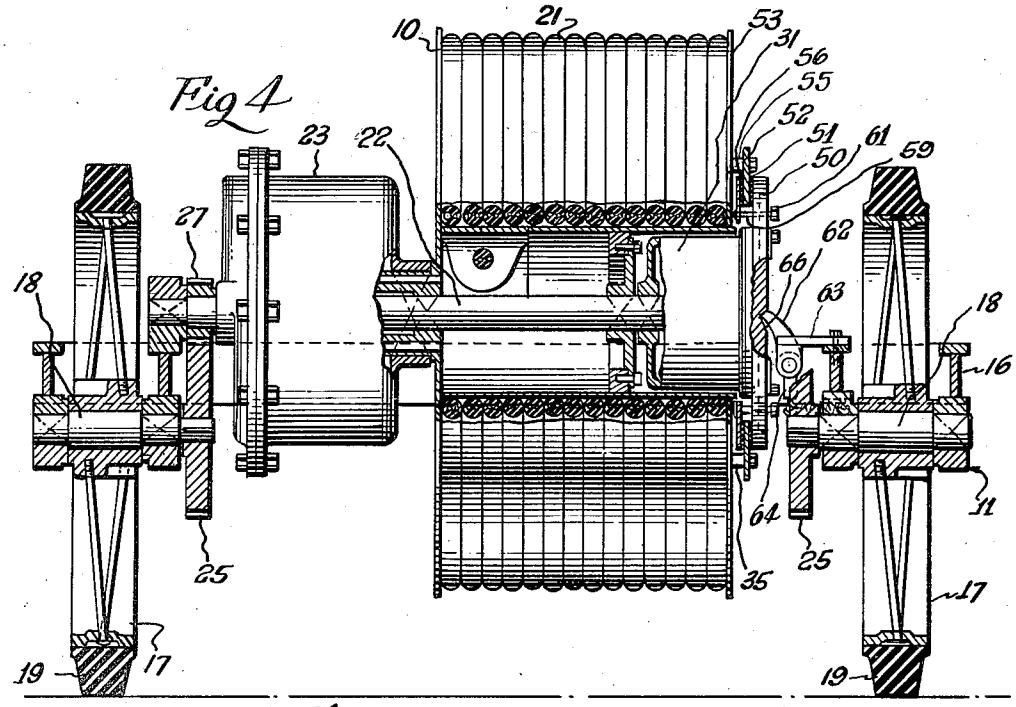


Fig. 5

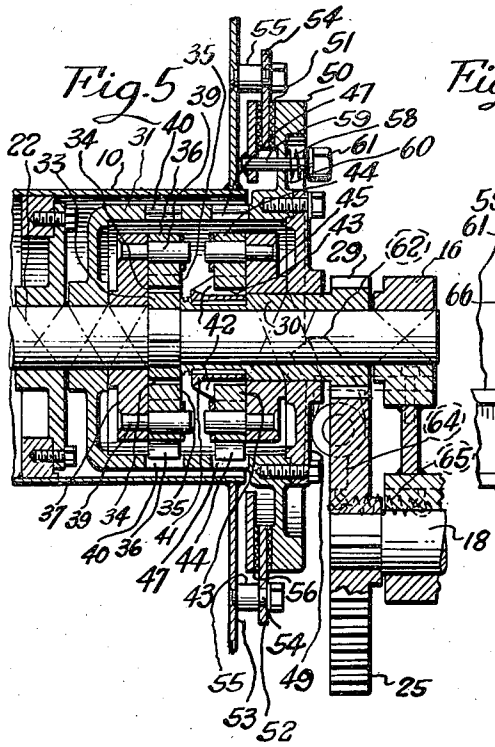
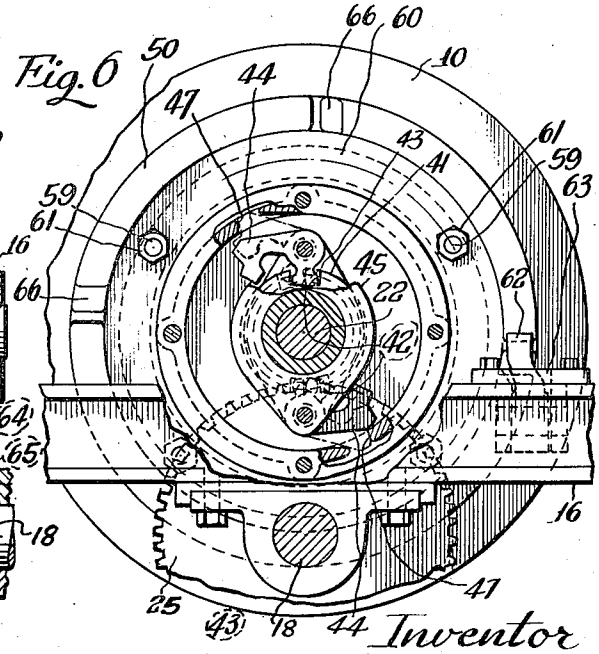


Fig. 6



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UNITED STATES PATENT OFFICE

2,225,185

MINING MACHINE

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8 Claims. (Cl. 191—12)

This invention relates to improvements in mining machines and more particularly relates to improvements in a cable reel adapted to supply power to a mining machine of the type adapted to travel directly on the ground on traction devices.

The principal object of my invention is to provide a novel, simpler and more efficient and compact form of cable reel for supplying power to a traction mounted kerf-cutting machine of the type which is adapted to travel directly on the ground, when the machine is operating remote from the source of power and traveling towards and from the source of power, which reel is arranged to travel in one direction and be connected to one end of the mining machine when the machine is moving towards the source of power and to travel in a reverse direction and be connected to the opposite end of the mining machine when the machine is moving away from the source of power.

Another object of my invention is to provide a new and improved cable reel particularly adapted to supply power to a mining machine mounted on traction devices for travel directly along the ground, which is so arranged that friction between its supporting wheels and the ground will drive the reel in a direction to wind cable thereon when the reel is traveling in one direction, and will permit free rotation of said wheels when the reel is traveling in an opposite direction.

A further object of my invention is to provide a cable reel having a novel and simplified form of differential drive between the traction wheels and reel, for driving the reel, which serves to drive the reel when the wheels are rotating in one direction only and which includes a friction drive therein to prevent breakage of the cable while being wound on the reel and serving to retard rotation of the reel when the mining machine is moving away from a source of power and cable is being payed off of the reel.

Other objects of my invention will appear from time to time as the following specification proceeds.

My invention may be more clearly understood with reference to the accompanying drawings wherein:

Figure 1 is a top plan view of a mining machine showing a cable reel constructed in accordance with my invention, coupled to the rear end thereof;

Figure 2 is an enlarged view in side elevation of the forward part of a mining machine, showing the mining machine positioned for moving away from a working place and having the cable reel coupled to the front end of the machine to wind in cable on the reel as the machine is traveling towards a source of power;

Figure 3 is a view in side elevation of the rear end of the mining machine, drawn to a somewhat smaller scale than Figure 2, showing the mining machine positioned for moving towards a working face and having the cable reel coupled to the rear end thereof for paying off cable therefrom as the machine is traveling away from a source of power;

Figure 4 is an enlarged detail end view of the reel with certain parts shown in transverse section;

Figure 5 is an enlarged partial fragmentary transverse sectional view taken through the drive end of the reel, showing certain details of the differential drive for the reel; and

Figure 6 is an enlarged detail fragmentary view of the reel in side elevation with certain parts removed and other parts broken away and shown in section.

Referring now in particular to the embodiment of my invention illustrated in the drawings, a cable reel 10 is shown as being mounted on a wheel mounted carriage 11. Said carriage, as herein shown, has a coupling tongue 12 extending from one end thereof which is adapted to be connected to the rear end of a mining machine 13 by means of a suitable coupling pin, when the machine is traveling away from a source of power, and has a coupling tongue 14 extending from the other end thereof which is adapted to be connected to the front end of the mining machine when the machine is traveling towards the source of power. Said mining machine is herein shown as being a kerf-cutting machine of the well known chain type mounted on a pair of spaced apart continuous tread traction devices 15, 15 for transportation about the mine. The details of said machine will not herein be shown or described since they are no part of my present invention.

Referring now in particular to the details of the cable reel 10 and the novel drive therefor, the carriage 11 includes a frame 16 mounted on a pair of traction wheels 17, 17 on axles 18, 18. Said wheels are secured to said axles for rotating said axles upon rotation of said wheels and said axles are journaled in said frame on opposite sides of said wheels in a suitable manner.

The wheels 17, 17 may be of any well known traction type which will obtain sufficient tractive

effort from engagement with the ground to drive the cable reel 10 and wind cable thereon, but are herein shown as being of a well known rubber tired type having solid rubber tires 19, 19 engageable with the ground.

The cable reel 10 is adapted to have an electric cable 21 wound thereon which may be connected to a source of power supply for supplying power to the mining machine as it moves towards or away from the source of power supply. Said cable reel is journaled on a transverse shaft 22, which is journaled at its ends in the frame 16 in a suitable manner (see Figure 4).

The cable 21 is connected with the mining machine through suitable current collectors (not shown), enclosed in a casing 23 mounted in the frame 16, by means of a cable 24 connected between said casing and the mining machine, in a usual manner (see Figures 1 and 3). Said current collectors are of a usual construction and are not herein shown or described since they are no portion of my present invention.

Referring now in particular to Figures 4, 5, and 6, and the drive from the traction wheels 17, 17 to the reel 10, a spur gear 25 is keyed to the inner end of each axle 18. One of said spur gears meshes with and drives a spur pinion 27 secured to the transverse shaft 22 for driving said shaft. The other of said spur gears meshes with and drives a spur pinion 29 freely mounted on said shaft and having a sleeve 30 formed integrally therewith and extending within a drive casing 31 which serves as a drive member to drive the reel.

The drive from the shaft 22 to the reel 10 includes a drive member 33 keyed on said transverse shaft within the drive casing 31. Said drive member is provided with a pair of oppositely disposed notches 34, 34 which are adapted to engage inwardly extending teeth 35, 35 of driving pawls 36, 36. Said pawls are pivotally mounted on opposite ends of a rotatable member 37 on pivotal pins 39, 39. Said rotatable member is journaled on the shaft 22 between the inner side of the drive casing 31 and the drive member 33. Said driving pawls are adapted to engage ratchet notches 40, 40 formed in and herein shown as extending through the drive casing 31. The pawls 36, 36 are so formed that their heaviest part is offset from the pins 39, 39 so they will drop into the notches 40, 40 by gravity, and the connection between the driving member 33 and the teeth of said pawls is to hold said pawls in engagement with the notches 40, 40, when said driving member is rotating in one direction, and to cause said pawls to rotate the drive casing 31. The notches 40, 40 are beveled at one side thereof so that when the shaft 22 and drive member 33 rotate in a direction to drive the reel in an unwinding direction, said pawls will slide out of and be disengaged from said notches.

The opposite wheel 17 has driving connection with the drive casing 31 in a manner similar to the drive just mentioned. This driving connection includes a drive member 41 keyed to the inner end of the sleeve 30. Said drive member is provided with a pair of oppositely disposed notches 42 adapted to be engaged by depending teeth 43, 43 of pawls 44, 44. Said pawls are pivotally mounted on opposite ends of a rotatable member 45, which is mounted on the sleeve 30 for free rotation with respect thereto, and are adapted to be engaged with oppositely disposed ratchet notches 47, 47 formed in the drive casing 41, for driving said casing in a manner similar to which the pawls 36, 36 drive said casing.

It may be seen from the foregoing that when the cable reel is connected to the mining machine and is negotiating a corner so that one wheel travels faster than the other, that one set of pawls only will rotatably drive the drive casing 31, the other pawls slipping out of the ratchet notches in said drive casing in an obvious manner. A differential drive has thus been provided between the traction wheels 17 and the drive casing 31, for driving said casing.

The drive casing 31 is secured at its outer end to an end plate 49, journaled on the sleeve 30, and is provided with a projecting annularly flanged portion 50 spaced radially from said casing and disposed outside of the reel 10. An annular friction disk 51 is mounted on the inside of the annularly flanged portion 50 and is adapted to engage an annular ring 52, secured adjacent its outer periphery to a flange 53 of the reel 10, by means of bolts 54, 54 and collars 55, 55 encircling said bolts and interposed between the outer side of the flange 53 and the inner side of the annular ring 52. The inner side of said annular ring is adapted to be engaged by an annular friction disk 56 secured to an annular ring 57. Said friction disks are held in engagement with the inner and outer sides of the annular ring 52 by means of springs 58, 58 encircling threaded pins 59, 59. Said pins are secured at their inner ends to the annular ring 57 and extend outwardly therefrom through a web 60 of the projecting flanged portion 50 of the drive casing 31. The springs 58, 58 are interposed between the outer side of the web 60 and the inner sides of nuts 61, 61, which are threaded on the ends of said threaded pins. Said springs thus yieldably engage the annular friction disk 56 with the annular ring 52 so that rotation of the drive casing 31 will cause rotation of the winding reel 10 through the friction disks 51 and 56 and the annular ring 52.

A spring actuated pawl 62 is provided to engage the outer side of the flanged portion 50 and hold the drive casing 31 from rotation when cable is being payed off the cable reel 10. Said pawl is pivotally mounted on a bracket 63 secured to the frame 16, and is provided with a depending arm 64 to which is connected a tension spring 65 for engaging said pawl with any one of a plurality of ratchet notches 66, 66 formed in the outer surface of the flanged portion 50. When cable is being payed off the reel 10, the annular friction disks 51 and 56 will tend to rotate the drive casing 31 and thus tend to drive the wheels through the pawls 36, 36 and 44, 44, but upon rotation of said casing, the pawl 61 will engage one of the ratchet notches 66 and hold said casing from rotation which will cause said cable to be payed off the reel 20 against said friction disks.

When the mining machine is moving away from the source of power supply and into the working place, the carriage 11 is connected to the rear end thereof by means of the coupling tongue 12, the free end of the cable being connected to the source of power supply and the cable reel being electrically connected to the mining machine by means of the cable 24. Movement of the mining machine towards and into the working place will cause cable to be payed off the reel 10 against the friction disks 51 and 56, in an obvious manner. Said friction disks thus prevent the paying off of cable at a

a rate faster than the speed of travel of the mining machine and also permit slippage between the driving member 31 and the reel when cable is being wound on the reel, to prevent breakage of the cable in cases where it may be caught on an obstruction.

After the cutting operation, the carriage 11 and reel 10 are usually moved to one side of the mining machine and the machine may be propelled in a reverse direction by means of its traction devices, power being conducted to the machine through the cable 24 which is of sufficient length to permit the reel to be connected to either the front or rear of the machine. The cutter bar of the mining machine being jackknifed over the top of the machine in the usual manner, as is shown in Figure 2, the carriage 11 is coupled to the front end of the machine through the coupling tongue 14. The cable 21 is then trained from the reel 10 rearwardly over the machine through a suitable spooler guide 69 detachably secured to the top side of the forward end of the machine and having a removable upper roller 70 to permit said cable to be trained therethrough, without being disconnected from the source of power. The cable 24 is of sufficient length to permit the transmission of power from the reel to the machine, and as the machine moves in a reverse direction towards the source of power, the traction of the wheels 17, 17 against the ground will rotatably drive the shaft 22 and sleeve 30 to rotate the drive casing 31 through the pawls 36 and 44 in the hereinbefore described manner and thus drive said reel through the friction disks 51 and 56. Upon the turning of a corner, one or the other set of pawls will be disengaged from the drive casing 31, depending upon which wheel is turning the fastest, to permit a uniform winding rate of the reel and to compensate for variations in speed of the two wheels upon rounding a corner.

It may thus be seen that a new and improved cable reel has been provided which is particularly adapted for supplying power to a mining machine of the type which travels directly on the ground by means of traction devices, and which is so arranged that the reel is driven solely by tractive effort of the supporting wheels against the ground. It may also be seen that the reel is driven by the wheels in a winding direction only and that a friction slip arrangement is provided in the drive to prevent injury to the cable while winding it in and to permit the cable to be payed off against friction to prevent rotation of the reel at a greater speed than the speed of travel of the machine.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, I do not wish to be construed as limiting myself to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. In a reeling mechanism for supplying electric power to a device movable towards and from a source of power supply, a carriage adapted to be pulled along the ground, said carriage including a pair of traction wheels, a reel mounted on said carriage, and a drive connection from said wheels to said reel for driving said reel from said wheels when said carriage is pulled along the ground in one direction only including a pair of coaxial driving members, an independent drive connection from each of said wheels to one of said driving members, and a drive connection from said driving members to said reel operative when said driving members are rotating in one direction only including a rotatable member, an operative connection from said rotatable member to said reel, and independent drive connections from said driving members to said rotatable drive member including a pair of pawls, each of said pawls being bodily rotatably driven in an annular path by one of said driving members, said operative connection between said rotatable member and said reel including a friction slip driving device, and interengaging means connected between said carriage and rotatable member, for holding said rotatable member from rotation in a direction other than a winding direction.

2. In a reeling mechanism for supplying electric power to a device movable towards and from a source of power supply, a carriage adapted to be pulled along the ground, said carriage including a pair of traction wheels, a reel mounted on said carriage, and a drive connection from said wheels to said reel for driving said reel from said wheels when said carriage is pulled along the ground in one direction only including a pair of coaxial driving members, an independent drive connection from each of said wheels to one of said driving members, and a drive connection from said driving members to said reel operative when said driving members are rotating in one direction only including a rotatable member, and independent drive connections from said driving members to said rotatable member including a pair of pawls, each of said pawls being bodily rotatably driven in an annular path by one of said driving members, a friction slip drive connection between said rotatable member and said reel including a friction disk rotatably driven by said driving member and having yieldable engagement with said reel, and a pawl and ratchet for holding said rotatable member from rotation when cable is being payed off said reel whereby cable must be payed off said reel against said friction disk.

3. In a reeling mechanism for supplying electric power to a device movable towards and from a source of power supply, a carriage adapted to be pulled along the ground, said carriage including a pair of traction wheels, a reel mounted on said carriage, and a drive connection from said wheels to said reel for driving said reel from said wheels when said carriage is pulled along the ground in one direction only including a pair of coaxial driving members, an independent drive connection from each of said wheels to one of said driving members, and a drive connection from said driving members to said reel operative when said driving members are rotating in one direction only including a rotatable drive casing mounted coaxial with said driving members and enclosing said driving members, an operative connection from said drive casing to said reel, and independent drive connections from said driving members to said rotatable drive casing including a pair of rotatable members mounted within said casing, a pawl pivotally mounted on each of said rotatable members, a connection between each of said driving members and each of said pawls for rotatably driving said rotatable members, and a connection from each of said pawls to the inside of said drive casing, for rotatably driving said drive casing.

4. In a reeling mechanism for supplying electric power to a device movable towards and from a source of power supply, a carriage adapted to be pulled along the ground, said carriage including a pair of traction wheels, a reel mounted on said carriage, and a drive connection from said wheels to said reel for driving said reel from said wheels when said carriage is pulled along the ground in one direction only including a pair of coaxial driving members, an independent drive connection from each of said wheels to one of said driving members, and a drive connection from said driving members to said reel operative when said driving members are rotating in one direction only including a rotatable drive casing mounted coaxial with said driving members and enclosing said driving members, independent drive connections from said driving members to said rotatable drive casing including a pair of rotatable members mounted within said casing, a pawl mounted on each of said rotatable members, a connection between each of said driving members and each of said pawls for rotatably driving said rotatable members, a connection from each of said pawls to the inside of said drive casing for rotatably driving said drive casing, and an operative connection from said drive casing to said reel including a friction disk interposed between said drive casing and said reel.

5. In a reeling mechanism for supplying electric power to a device movable towards and from a source of power supply, a carriage adapted to be pulled along the ground, said carriage including a pair of traction wheels, a reel mounted on said carriage, and a drive connection from said wheels to said reel for driving said reel from said wheels when said carriage is pulled along the ground in one direction only including a pair of coaxial driving members, an independent drive connection from each of said wheels to one of said driving members, and a drive connection from said driving members to said reel operative when said driving members are rotating in one direction only including a rotatable drive casing mounted coaxial with said driving members and enclosing said driving members, independent drive connections from said driving members to said rotatable drive casing including a pair of rotatable members mounted within said casing, a pawl pivotally mounted on each of said rotatable members, a connection between each of said driving members and each of said pawls for rotatably driving said rotatable members, and a connection from each of said pawls to said drive casing for rotatably driving said drive casing, an operative connection from said drive casing to said reel including a friction disk interposed between said drive casing and said reel, and means for holding said drive casing from rotation when said reel is being moved in a direction to pay off cable therefrom so that cable must be payed off said reel against said friction drive connection.

6. In a reeling mechanism for supplying electric power to a device movable towards and from a source of power supply, a carriage adapted to be pulled along the ground, said carriage including a pair of traction wheels, a reel mounted on said carriage, a power conductor adapted to be wound on said reel and adapted to be attached at its free end to a source of power supply, and a drive connection from said wheels to said reel for driving said reel from said wheels in a direction to wind cable thereon, when said carriage is pulled along the ground in one direction only and to permit cable to be payed off of said reel under friction when said reel is being pulled in an opposite direction including a driven member operatively connected with said reel for driving said reel, a drive member, a friction drive connection between said drive and driven members whereby said driven member may be driven by said drive member under the control of friction, means for holding said drive member from rotation when said reel is pulled in a direction away from the point of connection of said cable to the source of power supply, to permit cable to be payed off of said reel against said friction drive connection, and independent drive connections between said wheels and drive member including a shaft upon which said reel is mounted, a casing freely mounted on said shaft, a drive connection from one of said wheels to said shaft, a sleeve freely mounted on said shaft and extending within said casing, a drive connection from said other wheel to said sleeve, a ratchet connection between said shaft and said casing for driving said casing from said shaft upon rotation of said shaft in one direction, and a ratchet connection between said sleeve and said casing for driving said casing from said sleeve upon rotation of said sleeve in the same direction as said shaft.

7. In a reeling mechanism for supplying electric power to a device movable towards and from a source of power supply, a carriage adapted to be pulled along the ground, said carriage including a pair of traction wheels, a reel mounted on said carriage, a power conductor adapted to be wound on said reel and adapted to be attached at its free end to a source of power supply, and a drive connection from said wheels to said reel for driving said reel from said wheels in a direction to wind cable thereon, when said carriage is pulled along the ground in one direction only and to permit cable to be payed off of said reel under friction when said reel is being pulled in an opposite direction including a driven member operatively connected with said reel for driving said reel, a drive member, a friction drive connection between said drive and driven members whereby said driven member may be driven by said drive member under the control of friction, means for holding said drive member from rotation when said reel is pulled in a direction away from the point of connection of said cable to the source of power supply, to permit cable to be payed off of said reel against said friction drive connection, and independent drive connections between said wheels and drive member including a shaft upon which said reel is mounted, a casing freely mounted on said shaft, a drive connection from one of said wheels to said shaft, a sleeve freely mounted on said shaft and extending within said casing, a drive connection from said other wheel to said sleeve, a ratchet connection between said shaft and said casing for driving said casing from said shaft upon rotation of said shaft in one direction, and a ratchet connection between said sleeve and said casing for driving said casing from said sleeve upon rotation of said sleeve in the same direction as said shaft, each of said ratchet connections including a freely rotatable member coaxial with said shaft, a positively driven driving member, a ratchet on said rotatable member having an end adapted to positively engage said casing, when said positively driven member is rotating in one direction and a

driving connection between said positively driven member and ratchet.

8. In a reeling mechanism for supplying electric power to a device movable towards and from a source of power supply, a carriage adapted to be pulled along the ground, said carriage including a pair of traction wheels, a reel mounted on said carriage, a power conductor adapted to be wound on said reel and adapted to be attached at its free end to a source of power supply, and a drive connection from said wheels to said reel for driving said reel from said wheels in a direction to wind cable thereon, when said carriage is pulled along the ground in one direction only and to permit cable to be payed off of said reel under friction when said reel is being pulled in an opposite direction including a driven member operatively connected with said reel for driving said reel, a drive member, a friction drive connection between said drive and driven members whereby said driven member may be driven by said drive member under the control of friction, means for holding said drive member from rotation when said reel is pulled in a direction away from the point of connection of said cable to the source of power supply, to permit cable to be payed off of said reel against said friction drive connection, and independent drive connections between said wheels and drive member including a shaft upon which said reel is mounted, a casing freely mounted on said shaft, a drive connection from one of said wheels to said shaft, a sleeve freely mounted on said shaft and extending within said casing, a drive connection from said other wheel to said sleeve, a ratchet connection between said shaft and said casing for driving said casing from said shaft upon rotation of said shaft in one direction, and a ratchet connection between said sleeve and said casing for driving said casing from said sleeve upon rotation of said sleeve in the same direction as said shaft, each of said ratchet connections including a freely rotatable member coaxial with said shaft, a positively driven driving member, a pair of oppositely disposed ratchets on said rotatable member adapted to positively engage the inner periphery of said casing when said positively driven member is rotating in one direction, and a toothed driving connection between said positively driven member and said ratchets.

WILLIAM W. SLOANE.