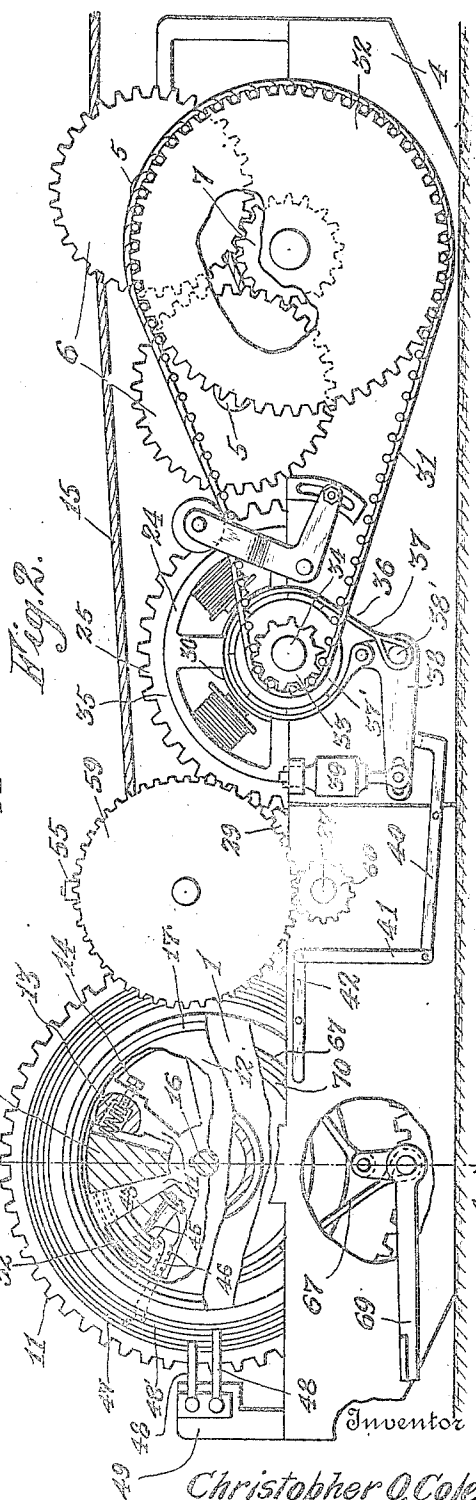
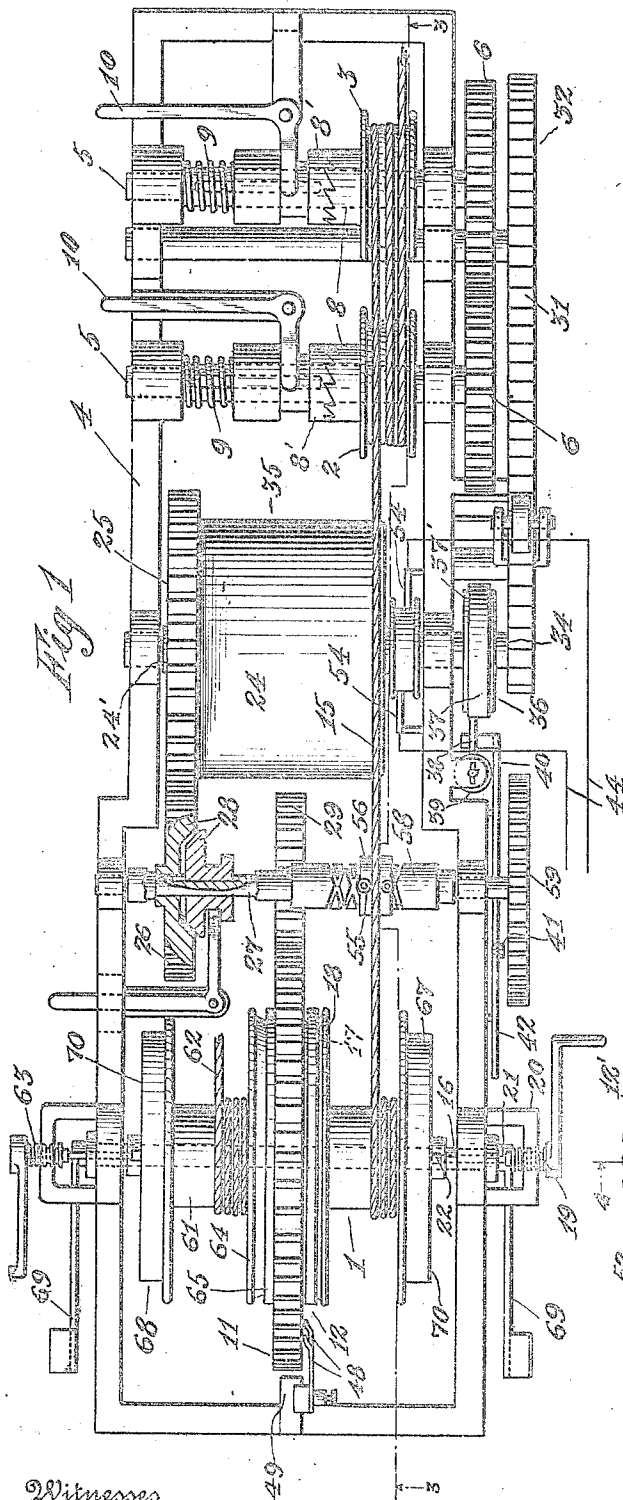


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HAULING APPARATUS.
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Patented Apr. 29, 1913.

3 SHEETS—SHEET 1.



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Fig. 5.

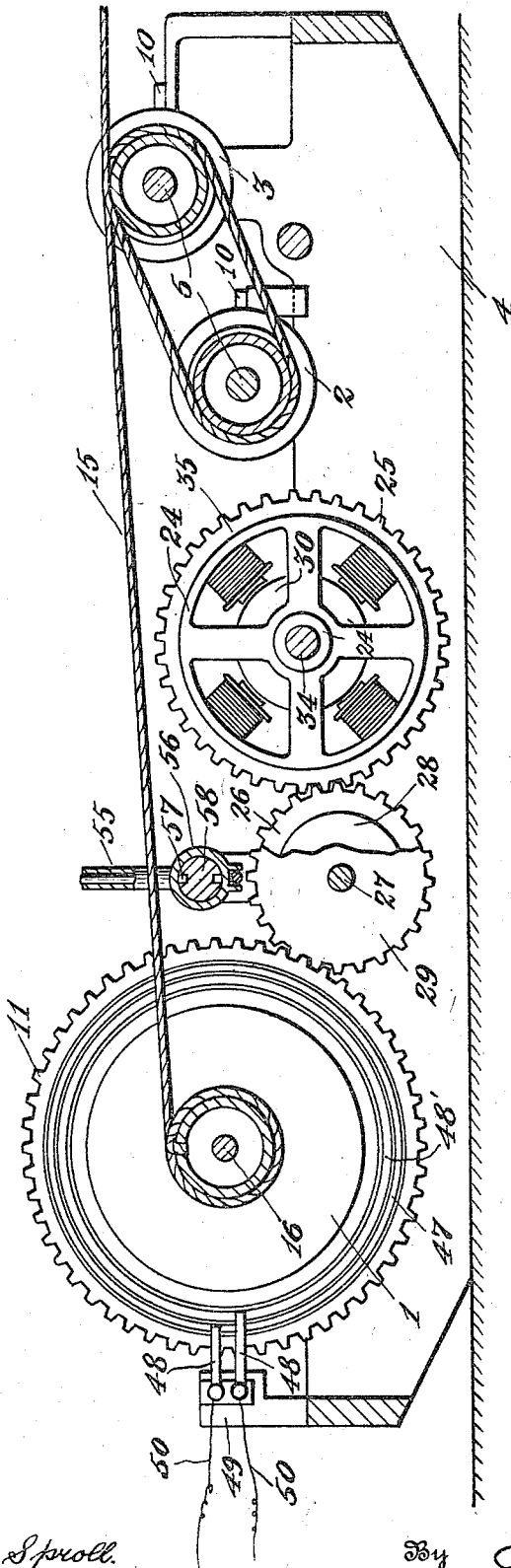
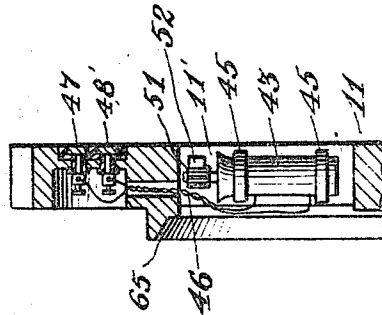


Fig. 7.



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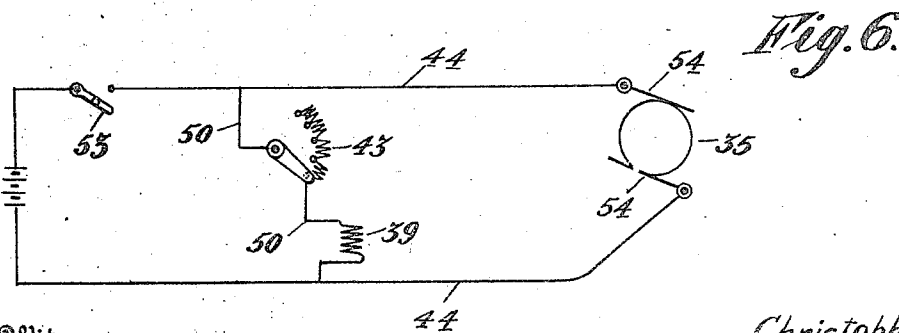
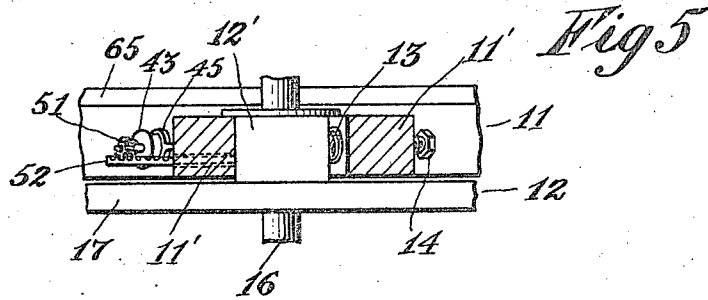
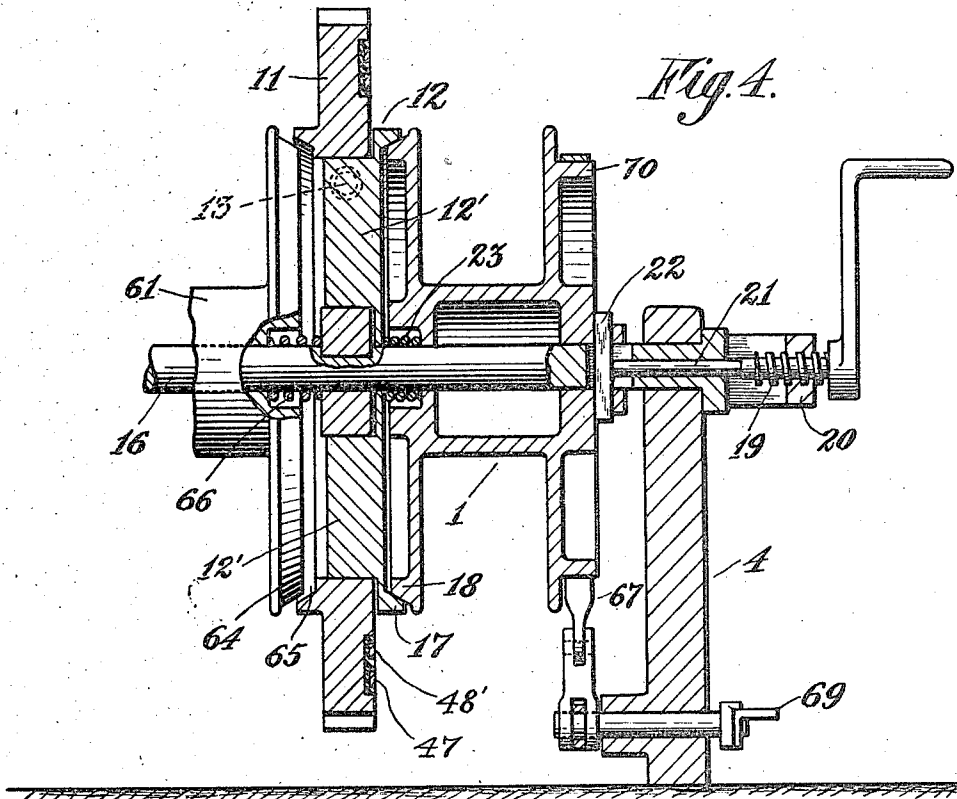
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UNITED STATES PATENT OFFICE.

CHRISTOPHER O. COLE, OF BELLINGHAM, WASHINGTON.

HAULING APPARATUS.

1,060,165.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHRISTOPHER O. COLE, a citizen of the United States of America, and a resident of the city of Bellingham, in the county of Whatcom and State of Washington, have invented certain new and useful Improvements in Hauling Apparatus, of which the following is a specification.

My invention has particular reference to apparatus of the above type and has for one of its objects the provision of means through the medium of which power for hauling is applied to the line at a plurality of points.

A further object is to provide means by which one hauling device is automatically controlled to be driven by other means than its primary driving means during hauling of the line.

A further object resides in the provision of a brake for one of the hauling device driving mechanisms controlled for operation by the load.

Other objects will be set forth as my description progresses and those features of construction, arrangements and combinations of parts, in which my invention resides, succinctly defined in my annexed claims.

Referring to the accompanying drawings illustrating my invention in such form as now preferred by me, and wherein like numerals of reference indicate like parts throughout the several views: Figure 1 is a top plan of a hauling apparatus constructed in accordance with my invention, parts being broken away. Fig. 2 is a side elevation with parts broken away. Fig. 3 is a longitudinal section taken on line 3—3 of Fig. 1. Fig. 4 is a fragmentary section taken through the winding drums and adjacent parts, on line 4—4 of Fig. 2. Fig. 5 is a fragmentary section through the interlocking relatively movable drive and driven elements provided for one of the winding drums. Fig. 6 is a diagrammatical view of the motor circuit and illustrating the connection of the controlling means for the brake mechanism, and Fig. 7 is a fragmentary section, on large scale through the drive element of the winding drum for the haul line.

Referring to the drawings by numerals of reference, 1, 2 and 3 indicate drums mounted on a frame 4, one in advance of another and connected with a suitable hauling line or cable 15 for applying power thereto. As

now considered, drum 1 winds cable 15 up, while drums 2 and 3 constitute means for hauling the cable in, the same being preferably grooved and arranged in proximity to one another so that cable 15 can be arranged to take over the same a number of times, see Figs. 1 and 3, as required to prevent slip of the cable thereon. Drums 2 and 3 are loosely mounted on respective shafts 5 which are provided on one end portion with spur gears 6 meshing with a drive pinion 7. Each of drums 2 and 3 has releasable driving connection with its shaft 5 through the medium of respective clutches 8, of the ratchet type. The shiftable clutch parts 8', which are splined to their shafts 5, are yieldingly pressed toward their related clutch parts of drums 2, 3 by springs 9, and are connected with suitable shifters 10, through the medium of which they can be moved to their inactive or disengaged positions.

Reference numerals 11 and 12 indicate drive and driven rotatable elements, the same constituting a driving connection for drum 1, and being yieldingly connected, as by a spring 13 whereby a limited relative rotary movement of one element with respect to the other is permitted. Drive element 11 is conveniently in the form of a spur wheel fixed to a shaft 16, journaled on frame 4, while element 12 comprises a disk-like body portion which is loose on shaft 16 and provided with lugs 12' having interlocking engagement with element 11, as by being received in the recesses or spaces between the spokes 11' thereof. Spring 13, is interposed between one of these lugs 12' at the rear side thereof, and the adjacent spoke 11', and has its tension regulated, as by an adjusting screw 14 having threaded engagement in said spoke.

Reference numeral 17 indicates an exterior friction clutch cone fixed to the outer face of element 12 and adapted for reception of an interior friction cone 18 provided on the adjacent end portion of drum 1, which latter is loose on shaft 16 and adapted for relative endwise movement to connect clutch parts 17 and 18. For effecting such endwise adjustment of drum 1, I have disclosed a well known type of mechanism comprising a screw 19 mounted in a nut part of bracket 20 and engaged with a thrust pin 21, slidably mounted in a longitudinal opening of shaft 16 and bearing

against a gib 22 secured to a slide collar on shaft 16 and slidably fitting in a suitable transverse slot of the shaft, as shown in Figs. 1 and 4 to be brought, by proper manipulation of screw 19, to bear against the hub of drum 1. A spring 23 returns drum 1 to open the clutch upon proper manipulation of screw 19.

Reference numeral 24 indicates the driver for drum 1, the same being provided with a gear wheel 25 meshing with a loose pinion 26, mounted on a transverse shaft 27 of frame 4 and having releasable connection with said shaft by a suitable clutch 28, preferably of the friction type. Shaft 27 is also provided with a fast pinion 29, which latter is in mesh with gear wheel 11. Reference numeral 30 indicates a second driver, this being rotatably supported and provided on its shaft 34 with a gear 33 from which power is transmitted to drums 2 and 3, by a link chain 31 to a gear 32, fixed to the shaft of pinion 7. Drivers 24 and 30, in this the preferred embodiment of my invention, constitute outer and inner elements respectively of a motor 35 of a known type, wherein the outer element, carrying the usual field magnets, and the inner element or armature are both free for rotation, the said outer element having its casing provided with the gear wheel 25 and with hub extensions 24', the latter being journaled on the armature shaft 34.

Reference numeral 37' indicates a disk, of insulating material, of a suitable brake 36 for shaft 34, the same being fixed to said shaft and encircled by a brake band 37, whose free end portions are connected with an operating lever 38, fulcrumed at 38' on frame 4. Operating lever 38 is connected with the core of a solenoid 39, through the medium of which the braking of driver 30 is under automatic control, as hereinafter more fully set forth. In conjunction with this braking mechanism I also preferably provide manually operative means, this conveniently including a lever 40, fulcrumed on frame 4 (see Fig. 2) and engaged with lever 38. Lever 40 is connected as by a link 41 with the operator's lever 42. Solenoid 39 is connected in shunt to the motor circuit lead wires 44, connected with any suitable source of electrical energy, through a rheostatic controller 43 of any well known type. Controller 43 is fixed, as by brackets 45 to one spoke 11' and connected by wires 46 with conductor rings 47 and 48' respectively mounted in suitable insulating material, as shown, in the side face of drive gear 11.

Reference numeral 48 indicates resilient fingers each engaging a respective conductor ring 47, 48'. These fingers 48 are mounted on a suitable stand 49 of frame 4 and connected by wires 50 with respective lead wires 44, and in one of these wires 50 solenoid 39

is included, as more clearly shown in Figs. 2 and 6. Controller 43 is provided on its rotary switch arm with a pinion 51 which is engaged by a rack 52 fixed to an adjacent lug 12' of driven element 12.

In operation, upon closing of the motor circuit, as by a switch 53, of any well known or desired type, a portion of the current is shunted through controller 43 and solenoid 39, thereby applying brake band 37 to cause a resistance to the rotation of armature shaft 34, while the remainder of the current passes to the motor through the usual brushes 54 and rotates the field magnets or outer element 24 around armature 30. Movement of outer motor element 24 is transmitted through gear wheel 25 and pinions 26 and 29 to gear wheel 11, which latter is connected through the intermediacy of spring 13, driven member 12 and clutch parts 17 and 18 with drum 1, as hereinbefore set forth, and drum 1 is thereby driven to wind cable 15 primarily to take up the slack therein. As the pull of the load on cable 15 overcomes the tension of spring 13, gear wheel 11 advances with respect to member 12 until the lugs 12' are in engagement with the adjacent spokes 11'. During such relative movement of gear wheel 11, rack 52 operates controller 43 to gradually include more resistance in the shunt path provided for the current and to finally open such path, thereby releasing the brake, so that the desired power can be transmitted to drums 2 and 3 as the load is picked up. Should the load jump or skid, as on a down grade, winding drum 1 will race with line 15, spinning the haul drums on their shafts, clutches 8 opening to permit of this, and thereby maintain the line taut and ready for the haul drums 2 and 3 to pick up the load again. Simultaneously with the racing of drum 1, spring 13 forces driven element 11 forwardly and thereby operates controller 43 to apply brake 36 to keep the motor armature 30 from speeding. In conjunction with drum 1, I preferably provide a line winder 55 comprising spaced vertical arms receiving therebetween line 15 and fixed to a slide 56, having a follower 57 for alternative engagement in the right and left hand grooves of a screw 58 to be thereby reciprocated lengthwise of drum 1 upon rotary movement of screw 58. Screw 58 is suitably journaled on frame 4 and provided on one end portion with a gear wheel 59 meshing with a pinion 60 on shaft 27.

Reference numeral 61 indicates a winding drum for the haul back line 62, said drum being journaled on shaft 16 and being free to be shifted lengthwise thereon by screw 63 to bring its friction cone 64 into engagement with the exterior friction cone 65 of gear wheel 11, against the action of the clutch opening spring 66. In connection

with drums 1 and 61, I provide brakes 67 and 68 respectively whereby the lines can be kept under proper tension while being "run out," these brakes preferably consisting of bands connected with foot operative levers, as 69, and engaging over annular flange extensions 70, of the drums, as clearly shown. In winding line 62, on drum 61, drums 1, 2, and 3 are released to turn on their shafts, and brake 36 applied by the manually operative lever 42 to hold motor element 30.

While I have herein disclosed a construction which will carry out the various functions assigned thereto, various changes can be made with respect to the structural parts without departing from the spirit of my invention as defined in my annexed claims. Further, while I have herein referred to the mechanism as intended for hauling, it is to be understood that my invention is equally well adaptable for hoisting.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States of America, is:

1. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a cable, comprising a hauling device, a winding device, a line of cable disposed in successional engagement with said devices, and interdependent operating means having driving connection with said devices.

2. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a cable, comprising a hauling device, a winding device, a line of cable disposed in successional engagement with said devices, and interdependent operating means having positive fixed driving connection with said devices.

3. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a cable, comprising a hauling device, a winding device, a line of cable disposed in successional engagement with said devices, and interdependent operating means having releasable driving connection with said devices.

4. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a cable, comprising a hauling device, a winding device, a line of cable disposed in consecutive engagement with said devices, and two interdependent operating means each having a releasable driving connection with a respective one of said devices for positively driving the same.

5. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a

cable, comprising a hauling device, a winding device, a line of cable disposed in successional engagement with said devices, interdependent operating means having two energized movable members, and driving means connecting each of said energized members with a respective one of said first and second named devices.

6. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a cable, comprising a hauling device, a winding device, a line of cable disposed in successional engagement with said devices, interdependent operating means having two interdependent energized rotatable members, and positive driving means fixedly connecting each of said energized members with a respective one of said first and second named devices.

7. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a cable, comprising a hauling device, a winding device, means for controlling the movements of each of said devices, interdependent operating means adapted to have their movements regulated and controlled by the movements of their respective loads, driving means positively connecting each of said operating means with a respective one of said devices, and a line of cable disposed for consecutively engaging said first and second named devices.

8. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a cable, comprising a hauling device, a winding device, automatic means for controlling the movements of each of said devices, interdependent operating means adapted to have their movements automatically regulated and controlled by the movements of their respective loads, and driving means for releasably connecting each of said first and second named devices for positively driving the same.

9. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a cable, comprising a hauling device, a winding device, automatic means for regulating and controlling the movements of each of said devices controllable by the movements of the load and the movements of the other of said devices, interdependent operating means adapted to have their movements regulated and controlled by the movements of their respective loads, and releasable driving means connecting each of said operating means with a respective one of said first and second named devices for positively driving the same.

10. In a hauling apparatus of the character described, the combination of interde-

pendent means for hauling and winding a cable, comprising a hauling device, a winding device, automatic controlling means for regulating the movements of each of said devices controllable by the movements of the load and by the movements of the other of said devices, operating means having two interdependent energized movable members adapted to have their movements regulated and controlled by the movements of their respective loads, and driving means for releasably connecting said operating means with said devices for positively driving the same.

11. In a hauling apparatus of the character described, the combination of interdependent means for hauling and winding a cable, comprising a hauling device, a winding device, automatic controlling means for regulating the movements of each of said devices controllable by the movements of the load and by the movements of the other of said devices, interdependent operating means having two interdependent energized rotatable members each adapted to have its movements regulated and controlled by the movements of its respective load and by the movements of the other of said energized rotatable members, and driving means for releasably connecting each of said energized rotatable members with a respective one of said devices for positively driving the same.

12. In apparatus of the character described, the combination of a prime mover having two interdependent energized rotatable members and two interdependent devices for hauling and for winding a cable with driving means connecting each of said rotatable members with a respective one of said devices, and a line of cable disposed in successional engagement consecutively connecting with said hauling and winding devices.

13. In apparatus of the character described, the combination of a hauling means for a cable, a means for winding the cable hauled by said first named means, an open line of cable disposed in successional engagement with said first and second named means, a positive fixed mechanical driving connection between said first named means and its operating means, a positive fixed mechanical driving connection between said second named means and its operating means, and interdependent operating means for said hauling and winding means.

14. In a hauling apparatus of the character described, the combination of a prime mover comprising two interdependent energized rotatable members, two hauling devices each having a number of annular points of contact presenting a plurality of arcs for successional connecting with and applying power to a line of cable, a releasable driving connection between one of said

devices and one of said rotatable members, a releasable driving connection between the other of said devices and the other of said rotatable members, and an open line of cable so disposed in successional engagement with said hauling devices that one of said hauling devices will store and wind said cable up consecutively with the pulling on said cable by the other both pulling simultaneously and continuously in the same direction on said line of cable while applying power thereto, said line of cable while so disposed further constituting a running structural connection between said hauling devices while receiving power therefrom.

15. In a hauling apparatus of the character described, the combination of a prime mover comprising two interdependent energized rotatable members, two hauling devices each having a number of annular points of contact presenting a plurality of arcs for successional connecting with and applying power to a line of cable, a releasable driving connection between one of said devices and one of said rotatable members, a releasable driving connection between the other of said devices and the other of said rotatable members, and an open line of cable so disposed in successional engagement with said hauling devices that one of said hauling devices will store and wind said cable up consecutively with the pulling on said cable by the other both pulling simultaneously and continuously in the same direction on said line of cable while applying power thereto, said line of cable while so disposed further constituting a running structural means for connecting between said hauling devices while receiving power therefrom, said line of cable while thus so disposed still further constituting a means for holding and regulating the rotations of said hauling devices and their respective driving energized rotatable members so that each of said energized rotatable members will be compelled to make the other of said energized rotatable members make the required rotations necessary to drive their respective hauling devices at the speeds required incident to their presenting the same amount of successional connections with said line of cable while applying power thereto.

16. In apparatus of the character described, in combination with a line, independent means connected with said line for applying power thereto at spaced points, operating means for said first means, a releasable driving connection between one of said first means and its operating means, brake means for the other of said operating means, and operating means for said brake means operatively connected with the other of said first means for operation by the load.

17. In apparatus of the character de-

scribed, spaced drums, an electric motor comprising inner and outer rotatable elements, means connecting each of said drums with a respective element of said motor to be driven thereby, a brake for one of said elements, a line engaged with both of said drums, and means controlled by the load on said line for automatically applying said brake.

18. In apparatus of the character described, a hauling drum, a drive shaft for said drum, a second drum, a line engaged with both of said drums, a releasable connection between said first drum and said shaft operated to a releasing position by operation of said second drum during hauling in of said line, a motor comprising inner and outer rotatable elements, and means connecting said shaft and said second drum each with a respective element of said motor to be driven thereby.

19. In apparatus of the character described, a hauling drum, a drive shaft for said drum, a second drum, a line engaged with both of said drums, a releasable connection between said first drum and said shaft operated to a releasing position by operation of said second drum during hauling in of said line, a motor comprising inner and outer rotatable elements, a driving connection between said shaft and the inner element of said motor, a driving connection between the outer element of said motor and said second drum, a brake for the inner element of said motor, and means controlled from said second drum for applying said brake.

20. In apparatus of the character described, spaced drums, a line engaged with said drums, an electric motor comprising inner and outer rotatable elements, means connecting each of said drums with a respective element of said motor to be driven thereby, a brake for one of said elements and electrically operated means controlled by the load on said line for automatically operating said brake.

21. In apparatus of the character described, spaced drums, an electric motor comprising inner and outer rotatable elements, means connecting each of said drums with a respective element of said motor to be driven thereby, a brake for one of said elements, a line engaged with both of said drums, electrically operative means for said brake, and controlling means for said last means controlled for operation by the load on said line.

22. In apparatus of the character described, a pair of drums, an electric motor comprising inner and outer rotatable elements, means connecting each of said drums with a respective element of said motor to be driven thereby, the connecting means between one of said elements and its drum

comprising a pair of members free for a limited movement of one with respect to the other, a brake for the other element of said motor, electrical operating means for said brake, and a switch in circuit with said last means controlled for operation by movement of one of said connection members with respect to the other.

23. In apparatus of the character described, a hauling device, a motor comprising independently movable elements, an elastic member comprising relatively movable driving and driven parts connected respectively with said device and one of the motor elements, a power operative retarding means for the other of said motor elements, means controlling power for said retarding means operative by relative movement of said driving and driven parts, and a hauling member connected with said device.

24. In apparatus of the character described, a hauling device, a motor comprising independently movable elements, a yielding driving means for said device connected with one of the motor elements, a power operative retarding means for the other of said motor elements, a hauling member connected with said device, and means controlling power for said retarding means controlled by said yielding driving means for operation by hauling movement of said member.

25. In apparatus of the character described, a hauling device, a motor comprising independently movable elements, an elastic driving means for said device connected with one of said motor elements, a retarding means for the other of said motor elements, a hauling member connected with said device, and means for applying power to said retarding means including means operative by said elastic driving means in meeting resistance to hauling movement of said member for varying the power.

26. In apparatus of the character described, a drum, a hauling member connected therewith, a rotatable driving element, a driving means between said element and drum permitting of limited independent angular movement of said element, a hauling device connected with said member, a second driving element having a connection with said device operative for releasing the latter by movement of said member by said drum, and means controllable by said angular movement of said first element for automatically retarding said second element.

27. In apparatus of the character described, a drum, a hauling member connected therewith, a motor comprising independently rotatable elements, an elastic driving connection between one of said elements and the drum permitting of independent angular movement of said last element, a hauling

device connected with said member and having a connection with said other element operative for releasing the device by movement of said member by the drum, and
5 means controllable by said angular movement of said first element for controlling the torque of said other element.

28. In apparatus of the character described, a hauling line, independent hauling
10 devices connected therewith, a motor comprising independent rotatable elements each connected with a respective one of said devices, and means for controlling the torque on one of said elements controllable by
15 torque on the other of said elements in meeting resistance to movement of said hauling line.

29. In apparatus of the character de-

scribed, a motor comprising rotatable field and armature elements, a hauling device
20 connected with the field element of said motor, a hauling member connected with said device, means for automatically retarding the armature element of said motor by
25 strain imposed on said hauling member, and a second hauling device connected with said hauling member and said armature element and movable with said first hauling device independently of the armature element.

Signed at Seattle, Washington this 25 30 day of March 1911.

CHRISTOPHER O. COLE.

Witnesses:

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