N. D. LEVIN.

ROPE WINDING APPARATUS.

APPLICATION FILED JUNE 12, 1919.

1,378,357.

Patented May 17, 1921.

3 SHEETS—SHEET 1.

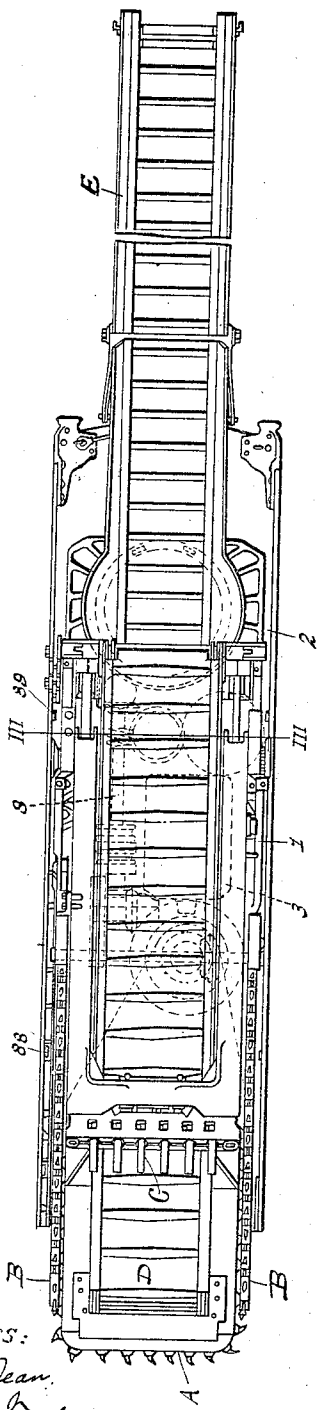

Fig. 1.

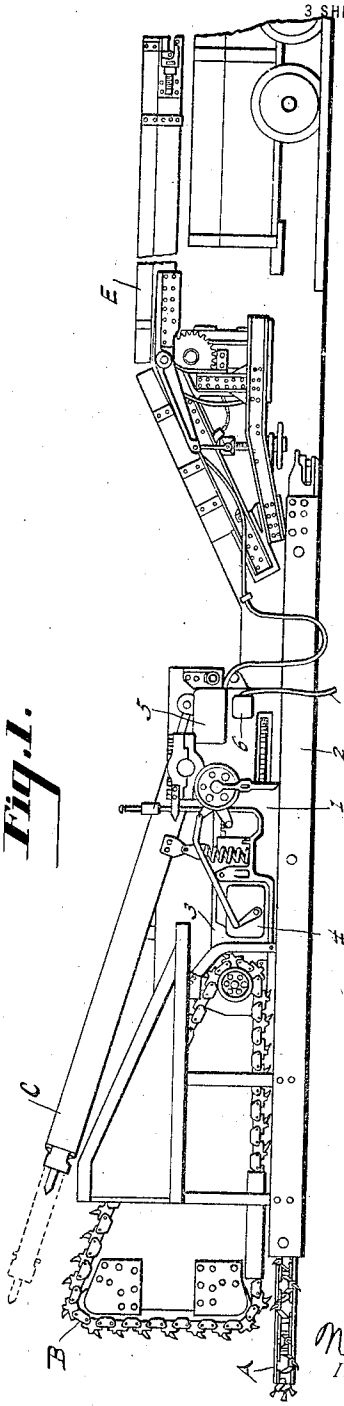

Fig. 2.

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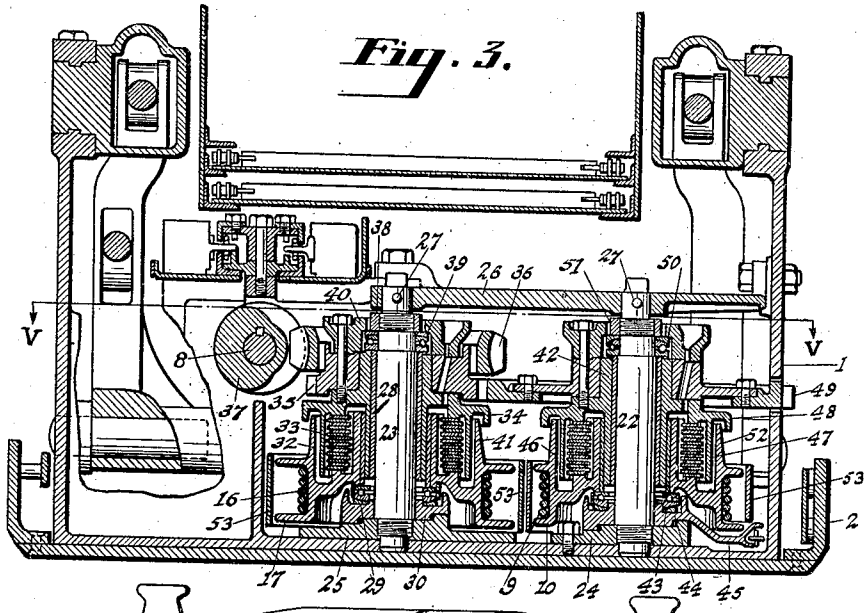
Fig. 3.



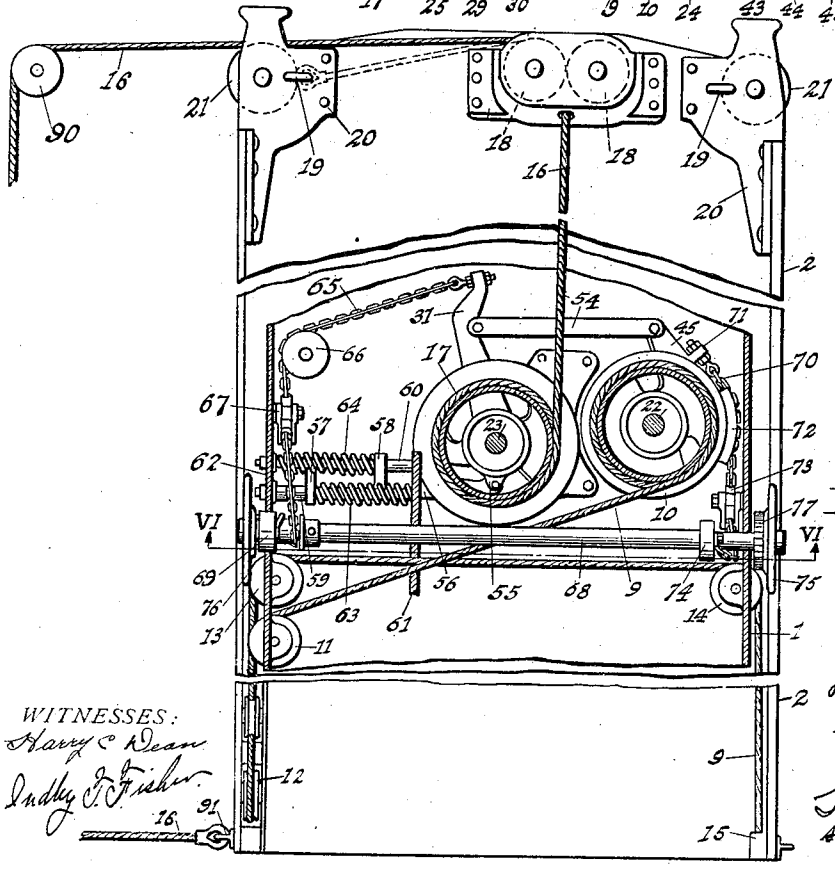


Fig. 4.

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3 SHEETS—SHEET 3.

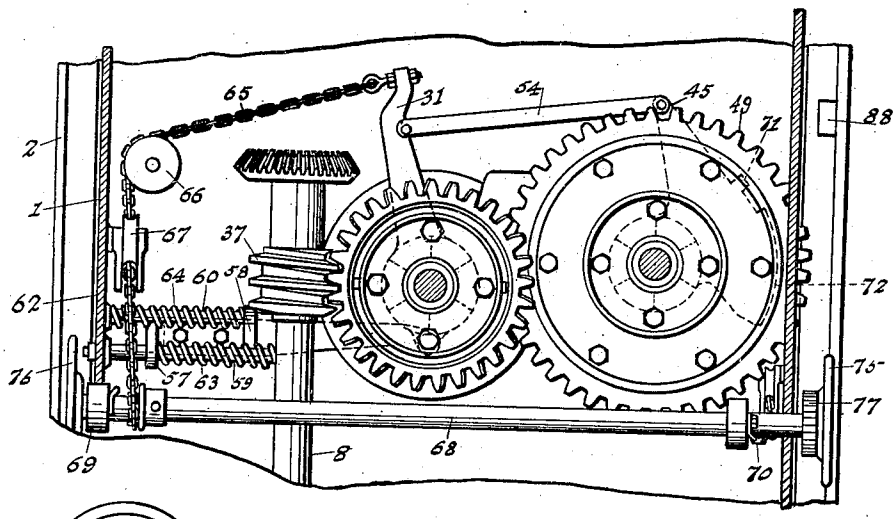

Fig. 5.

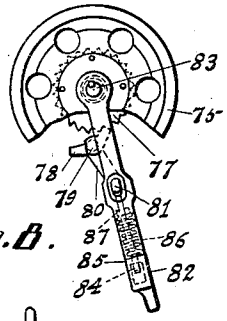

Fig. 8.

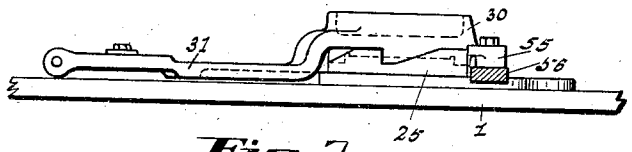

Fig. 7.

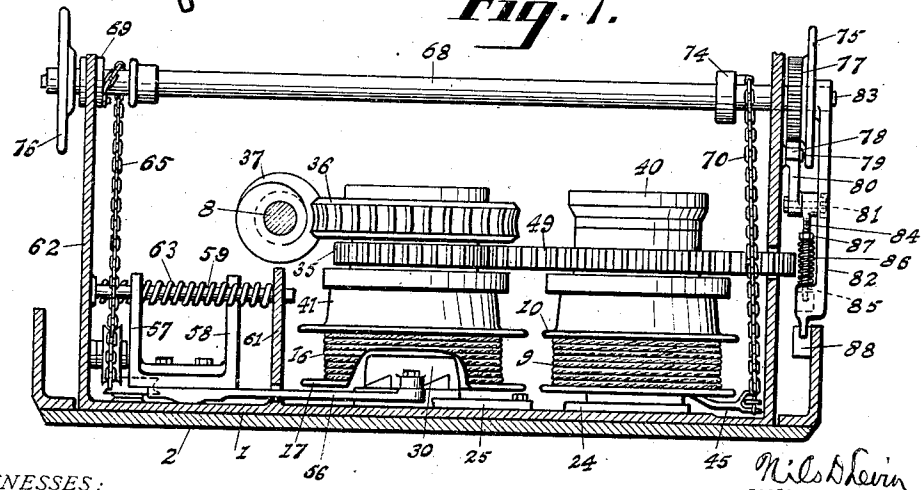

Fig. 6.

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UNITED STATES PATENT OFFICE.

NILS D. LEVIN, OF COLUMBUS, OHIO, ASSIGNOR TO THE JEFFREY MANUFACTURING COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF OHIO.

ROPE-WINDING APPARATUS.

1,378,357. Specification of Letters Patent. Patented May 17, 1921.

Original application filed August 1, 1913, Serial No. 782,522. Divided and this application filed June 12, 1919. Serial No. 303,545.

To all whom it may concern:

Be it known that I, NILS D. LEVIN, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Rope-Winding Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

The present invention relates to improvements in rope winding and controlling apparatus, and particularly to improvements in apparatus of this class which must be used in restricted space and through which great power must be transmitted. For example; it is well adapted for use as a means for feeding forward and for retracting the heavy, cumbersome active parts of an apparatus for mining, breaking out and loading coal from its native bed; and for moving bodily an entire apparatus of this sort when it is required to be taken from one position of operation to another.

These and other objects will appear in the following specification, reference being had to the accompanying drawings of which—

Figure 1 is a general plan view of a coal mining and loading machine equipped with my improved rope winding devices.

Fig. 2 is a side elevation of the machine illustrated in Fig. 1.

Fig. 3 is a cross sectional view taken along the line III—III of Fig. 1.

Fig. 4 is a diagrammatic plan view showing the feeding mechanism of the mining machine, other parts being removed for the sake of clearness.

Fig. 5 is a sectional view taken along the line V—V of Fig. 3.

Fig. 6 is a cross sectional view taken along the line VI—VI of Fig. 4.

Fig. 7 is a fragmentary detail of one of the clutch operating levers.

Fig. 8 is a detail of the clutch locking mechanism.

Like numerals refer to similar parts in the several figures.

In my co-pending application, Serial No. 782,522, filed August 1st, 1913, is disclosed a mining and loading machine adapted to dislodge material from the face of a coal vein, transport it rearwardly of the machine, and discharge it into a pit car suitably positioned upon the mine tracks in the rear of the machine. The feeding mechanism whereby the coal dislodging elements are moved relative to the supporting base of the machine, and whereby the machine is moved bodily relative to the material to be mined, comprises the devices hereinafter described and claimed, and this application is intended as a division of the earlier application above referred to.

As shown in the drawings this mining and loading machine comprises five principal parts. These are the undercutting mechanism, indicated by the character A in Figs. 1 and 2; the vertical shearing devices B—B; the breaking down mechanism C; the primary conveyer D, and the secondary loading conveyer E. These several parts are coöperatively connected together and are mounted upon the main frame 1. This main frame 1 is supported upon a pan or subbase 2 which rests directly upon the floor of the mine in which the machine is being operated. The main frame 1 is movable longitudinally of the pan 2 to feed the coal cutting and breaking down mechanisms to their work, and the pan 2 is bodily movable over the floor of the mine to position the machine relative to the material to be mined. Mounted upon the base frame 1 is a motor 3 by which the several elements of the machine are actuated. This motor may be of any preferred construction, but for purposes of illustration I have indicated an electric motor provided with a starting box 4, fuse box 5, and terminal connections 6, and to which power is supplied from any convenient source of electric current through a flexible conductor cable 7. The motor 3 is connected through a suitable train of gearing with a power shaft 8 which extends longitudinally of the machine and from which various elements of the machine are actuated. As the details of the undercutting mechanism, vertical shearing devices, breaking down mechanism, and the primary and secondary conveyers, form no part in the present invention description of them at this time is not thought to be required.

The main frame 1 is moved relative to the pan 2 to advance the cutting and breaking down mechanisms into the coal, by means of the rope controlled devices which will be described. For feeding the machine for-

ward a feed rope 9 is provided which is connected to be wound upon the drum 10 mounted on the main frame. From the drum 10 the rope 9 extends over a sheave 11 mounted on the main frame, and over a sheave 12 mounted at the forward end of the pan 2. After passing around the sheave 12 the rope extends backward to the sheave 13 mounted on the main frame adjacent the sheave 11, and across the machine to a similar sheave 14. From the sheave 14 the rope extends forward to a point of attachment 15 at the front end of the pan. It will be clear that when the drum 10 is rotated the rope 9 will cause the main frame, and attached parts, to be moved forward with respect to the pan, the tractive force being divided between the two sides.

16 is a rope for pulling the main frame and attached parts backward with respect to the pan. This rope is connected to be wound upon the drum 17, and from the drum extends backward between two guide sheaves 18—18. From the sheaves 18 the rope can be extended to the right or to the left and can be secured to one or the other of the hooks 19—19 formed on castings 20—20 attached to either corner of the pan, as shown in Fig. 4. It will be clear that when the drum 17 is rotated the rope 16 will act directly to pull the main frame and attached parts backward. Mounted on the castings 20—20 are guide sheaves 21—21 over which the rope 16 may be passed when it is to be used for moving the machine as a whole laterally or otherwise in a manner to be hereinafter described.

The drums 10 and 17 are mounted for rotation upon two stationary vertical shafts 22 and 23, the bottom ends of which are threaded into the castings 24 and 25 suitably secured to the bottom wall of the main frame 1. These shafts have suitable extensions which engage apertures in the bottom plate of the main frame casting to assist in preventing lateral displacement. The upper ends of the shafts 22 and 23 are fitted into apertures in the plate 26 and are held against rotation by suitable cotter pins 27.

Freely journaled upon the shaft 23 is a sleeve 28 upon which is journaled the drum 17. The drum 17 is supported on a ball bearing 29 which rests upon the hub 30 journaled on the shaft 23 and formed integral with an operating lever 31. The lower side of the hub 30 is formed with inclined or wedge shaped teeth adapted to coöperate with similar teeth formed on the casting 25. The hub of the drum 17 is provided at 32 with an annular recess, and into this recess there extends a cylindrical flange 33 which projects downwardly from a collar 34 formed on the sleeve 28. Mounted in the recess 32 is a series of clutch disks alternately keyed to the hub of the drum and to the flange 33 in the manner common to multiple disk friction clutches, when the lever 31 is moved to turn the hub 30 in one direction. The teeth on the bottom of the hub co-act with the teeth on the casting 24 to lift the hub and the drum, thus pressing the clutch disk together to cause the transmission of power from the sleeve 28 to the drum 17. When the lever 31 is moved to turn the hub in the other direction the drum is lowered and the clutch is released. Fitted to the upper part of the sleeve 28 is a spur gear 35 and also a worm gear wheel 36 which engages the worm 37 keyed to the power shaft 8 through which power is derived to actuate the winding drums. 38 is a nut on the shaft 23 and between this nut and a shoulder on the shaft 23 is a ball bearing 39 upon which rests the ring 40. The ring 40 is secured to the sleeve 28 by the screw bolts which secure the gears 35 and 36 to the sleeve 28. The ball bearing 39 thus serves to support both of the gears and the sleeve. Formed on the drum 17 is a cylindrical flange 41 which forms an oil well in which the clutch is contained.

The drum 10 is mounted and driven similarly to the drum 17. 42 is a sleeve rotatably mounted on the shaft 22 and upon this sleeve the drum 10 is journaled. The drum 10 rests upon the ball bearing 43 which in turn rests upon the hub 44 having an operating lever 45. The hub 44 is formed with inclined teeth similar to those on the hub 30, and these teeth co-act with similar teeth on the casting 24. It is to be noted however, that the teeth on the parts 30 and 25 are inclined oppositely from those on the parts 44 and 24 so that movement of the levers 31 and 45 in the same direction will engage one drum and release the other.

The hub of the drum 10 is provided with a recess 46, and a flange 47 formed on the collar 48 of the sleeve 42 extends into this recess. In this recess are clutch disks secured alternately to the hub and to the flange. These disks can be brought into and out of contact by turning the hub 44. Secured to the sleeve 42 is a spur gear 49 which meshes with the spur gear 35. A ball bearing 50 is interposed between the nut 51 and a shoulder on the shaft 22, and a ring secured to the gear 49 and the sleeve 42 rests upon this ball bearing. In this way the gear and the sleeve are supported. A cylindrical flange 52 extends upward from the drum and forms an oil reservoir for inclosing the clutch. 53 and 53 are guards partly surrounding the drums 10 and 17. They serve to prevent the escape of loose coils of rope from the drum. The operating levers 31 and 45 are connected together by means of a link 54.

For holding the two levers in central position so that both of the clutches are normally

disengaged there is provided a spring balancing device which is connected to the hub 44 at 55. 56 is a transversely sliding reach rod connected to the hub 44 at 55, and carrying two upwardly extending arms 57 and 58 which are apertured to receive transverse bars 59 and 60 mounted between the parts 61 and 62 of the main frame casting. A spring 63 is interposed between the arm 57 and the flange 61 and a similar spring 64 is interposed between the arm 58 and the rib 62. The two springs 63 and 64 oppose each other and tend to hold the rod 56 in its central position. Attached to the lever 31 is a chain 65 which passes over the sheaves 66 and 67, is wrapped around one end of the transverse hollow shaft 68 and its end secured to a collar 69 fixed to said shaft. A chain 70 is secured to the lever 45 at 71 and bears against the segment 72 which is also formed on the hub 30. The chain 70 passes over the sheave 73 and is wound upon the other end of the hollow shaft 68 in the opposite direction to the chain 65 and is secured to the collar 74. The hollow shaft 68 is supported at one side of the machine by means of the collar 69 which rests in a bearing aperture in the side wall of the main frame, and at the other side of the machine this shaft rests directly in a suitable aperture formed in the side wall of the main frame casting. Hand wheels 75 and 76 are fixed to the ends of the hollow shaft 68, and by means of these hand wheels the shaft may be turned to wind the chains 65 or 70.

To the hand wheel 75 on one side of the machine is bolted a ratchet wheel 77, illustrated in Figs. 6 and 8. This ratchet wheel is adapted to engage with either end of a double acting pawl 78, pivotally supported upon a stud 79 secured to the main frame. The pawl 78 has a downwardly extending tail 80 to which is secured a pin 81 which extends through and is slidable in a slot in the lever 82. This lever 82 is secured to a transverse shaft 83 which extends through and is journaled in the hollow shaft 68. Pivotally attached to the pin 81 is a rod 84 slidable in an aperture of the lug 85 formed on the lever 82. A compression spring 86 abuts at its upper end against a nut 87 on the rod 84, and at its lower end against the lug 85. The spring thus acts to press the rod 84, and with it the pin 81, upwardly, into the position shown in Fig. 8. In this way the pawl 78 is rocked into engagement with the ratchet wheel 77. However, when the lever 82 is moved to the central vertical position the pawl will be disengaged from the ratchet wheel and the shaft 68 will be free to turn in either direction. By moving the lever 82 in one direction or the other the pawl 78 can be brought into position to lock the ratchet wheel 75 and the shaft 68 against rotation in either direction as is desired.

When it is desired to feed the machine forward to cause the cutting and breaking down mechanism to advance into the coal, the operator turns the shaft 68, by means of the hand wheel 75, in the direction to cause the chain 70 to be wound, thus causing the engagement of the clutch which controls the drum 10. As soon as the shaft 68 has been turned sufficiently to engage the clutch, the lever 82 is moved forward, thus preventing the shaft from rotating in the direction to unwind the chain 70. When the operative parts have moved forward to the extreme limit of their travel the lever 82 engages the lug 88 attached to the pan 2, forcing the lever 82 rearwardly to a central position, at which the pawl 78 releases the ratchet 77 and permits the pressure of the spring 63 to unwind the chain 70 and move the lever 31 into the neutral position, thereby disengaging the clutch and stopping further winding of the rope 9.

To retract the operative parts of the machine the operator turns the hand wheel to rotate the shaft 68 in the direction to wind the chain 65, and cause the engagement of the pull back drum 17, it being assumed that the pull back rope is connected to one or other of the hooks 19. As soon as the clutch is engaged the lever 82 is moved toward the rear to cause the pawl 78 to engage the ratchet 77 and prevent unwinding of the chain 65, thus holding the clutch engaged. As soon as the parts reach the rear limit of travel the lever 82 engages the lug 89 attached to the pan 2 and is moved forwardly to the central position, thus disengaging the pawl 78 from the ratchet wheel 77 and permitting the spring 64 to act to release the clutch and stop the winding of the rope 16.

The pull back rope 16 may also be used to move the machine bodily from place to place. When so used the rope 16 is detached from the hook 19, and a sufficient amount is unwound to permit it to be attached to a stationary abutment outside of the machine, or to be passed around suitably anchored snatch blocks, such as are indicated at 90 in Fig. 4, and its end attached to a suitable hook 91 at the forward part of the machine. When so connected the winding of the rope 16 will cause the machine to move bodily toward such abutments, and by proper positioning said abutments the machine may be moved to any desired position.

When the several lines of work to be performed by an apparatus of the class above described are considered, it is observed that high power must be provided, and this power demands the employment of heavy and strong transmitting devices. And the conditions prescribed by the mine room allow but small space within which to arrange this heavy, powerful and cumbersome mechanism. I provide strong primary abut-

ments in the form of the stationary shafts or journal bearings 22, 23, each of which is at each of its ends stepped in strong holders. These are short and vertically arranged so that they can be placed in the restricted space under the conveyer and between the parts at the sides. Each of the shafts 22 and 23 and the train of parts supported thereon are independent of the other shaft and its train, the only connection between them being the intermeshing gears. Friction clutches of the most powerful sort can be used, each having a vertically arranged series of numerous alternately disposed companion clutch disks. Each long series of friction disks is housed in the over-lapping, hollow cylindrical elements carried respectively by the clutch elements, and the total friction surface can be largely extended in the restricted available space. By positioning the shafts 22 and 23 vertically and on different axes, and arranging the vertically adjustable cable drums at their lower ends, in the way shown, the cables are near the floor level and present no obstruction in relatively high horizontal planes, either inside the boundaries of the machine elements or outside thereof.

What I claim is:—

1. In a winding mechanism, the combination with two adjacent stationary shafts, a rotatable sleeve upon each of the shafts, intermeshing gears fixed to said sleeves, means to rotate the gears, a rotatable rope winding drum upon each sleeve, and clutch mechanism arranged to optionally connect either of said drums with its respective sleeve.

2. In a winding mechanism, the combination with two adjacent parallel stationary shafts, a rotatable sleeve upon each shaft, intermeshing gears fixed to said sleeves, means to rotate said gears, a rotatable rope winding drum upon each sleeve, and clutch mechanism arranged to optionally connect either of said drums with its respective sleeve.

3. In a winding mechanism, the combination with two adjacent vertical stationary shafts, a rotatable sleeve upon each shaft, intermeshing gears fixed to said sleeves, means to rotate said gears, a rotatable rope winding drum upon each sleeve, and clutch mechanism arranged to optionally connect either of said drums with its respective sleeve.

4. In a winding mechanism, the combination with two adjacent vertical stationary shafts, of a rotatable sleeve upon each shaft, intermeshing gears fixed to said sleeves, means to rotate said gears, a rotatable rope winding drum upon each sleeve, a clutch within each drum, and clutch controlling mechanism arranged to cause the engagement of either of said clutches to connect the respective drums and sleeves.

5. In a winding mechanism, the combination with two adjacent vertical stationary shafts, of a rotatable sleeve upon each shaft, intermeshing gears fixed to said sleeves, means to rotate said gears, a rotatable rope winding drum upon each sleeve, a clutch within each drum, and interlocking clutch controlling devices adapted to optionally cause the engagement of either of said clutches to connect the respective drums and sleeves.

6. In a winding mechanism, the combination with two adjacent vertical stationary shafts, of a rotatable sleeve upon each shaft, intermeshing gears fixed to said sleeves, means to rotate said gears, a rotatable rope winding drum upon each sleeve, a clutch within each drum, automatically acting devices tending normally to hold said clutches disengaged, and clutch controlling mechanism arranged to optionally cause the engagement of either of said clutches to connect the respective drums and sleeves.

7. In a winding mechanism, the combination with a plurality of adjacent stationary shafts, a rotatable sleeve upon each shaft, a gear fixed to each sleeve and connected to a common source of rotative power, a rotatable rope winding drum upon each sleeve, a clutch within each drum, automatically acting devices tending normally to hold said clutches disengaged, and manually operable clutch controlling devices to optionally hold any one of said clutches closed.

8. In a winding mechanism, the combination of two drums mounted for free rotation, ropes arranged to be wound upon the drums in opposition to each other, clutches arranged to connect the drums with a source of power to wind their respective ropes, a clutch lever arranged to control each of the clutches, automatically acting means tending normally to maintain both of said clutches open, a manually rotatable shaft, chains connected to both clutch levers and oppositely windable upon said shaft to alternately effect the engagement of said clutches against the action of said automatically acting means, means to lock said shaft against rotation in both directions, and means automatically acting when a predetermined amount of rope has been wound to release said shaft and permit said first mentioned automatically acting means to open said clutches.

9. In a winding mechanism, the combination of two drums mounted for free rotation, ropes arranged to be wound upon the drums in opposition to each other, clutches arranged to connect the drums with a source of power to wind their respective ropes, a clutch lever arranged to control each of the clutches, automatically acting means tend-

ing normally to maintain both of said clutches open, a manually rotatable shaft, chains connected to both clutch levers and oppositely windable upon the shaft to alternately effect the engagement of the clutches, a ratchet upon the shaft, a double acting pawl arranged to engage the ratchet to lock it against rotation in either direction, and means automatically acting when a predetermined amount of rope has been wound to disengage said pawl from said ratchet and permit the first mentioned automatically acting means to open said clutches.

10. In a winding mechanism, the combination with a winding drum and a rope windable thereon, of means including a clutch to connect the drum with the source of power to wind the rope, a clutch controlling lever, a spring arranged to normally maintain the clutch lever in neutral position, a chain connected to said lever, a shaft upon which the chain is windable, manually operable means to rotate the shaft to wind the chain against the action of the spring and thereby move the clutch lever into operative position, a ratchet upon the shaft, a pawl engageable with the ratchet to prevent the unwinding of the chain, and means automatically acting when a predetermined amount of rope has been wound upon the drum to disengage the pawl from the ratchet.

In testimony whereof I affix my signature, in presence of two witnesses.

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Witnesses:
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