June 8, 1937. J. M. BENSON 2,083,489

WINCH

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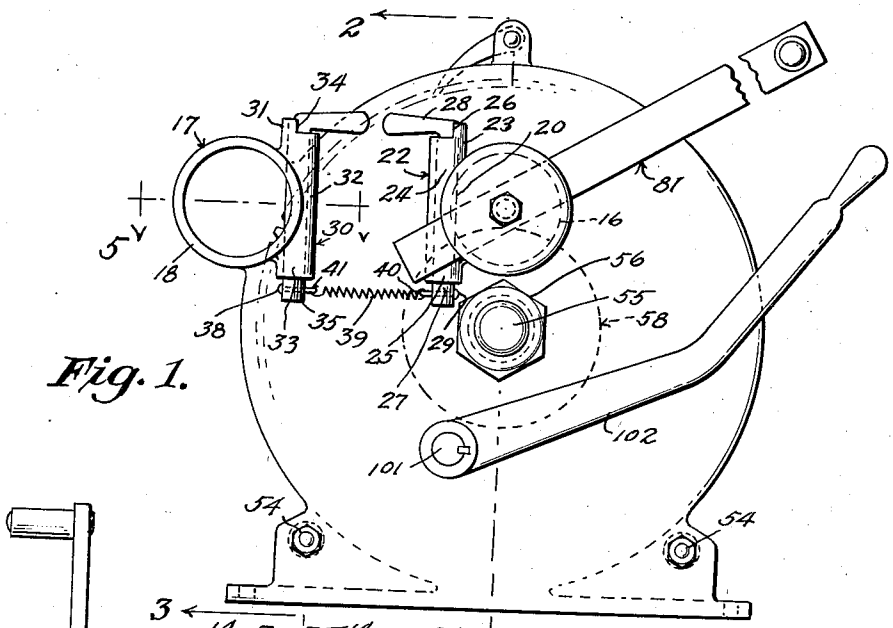


Fig. 1.

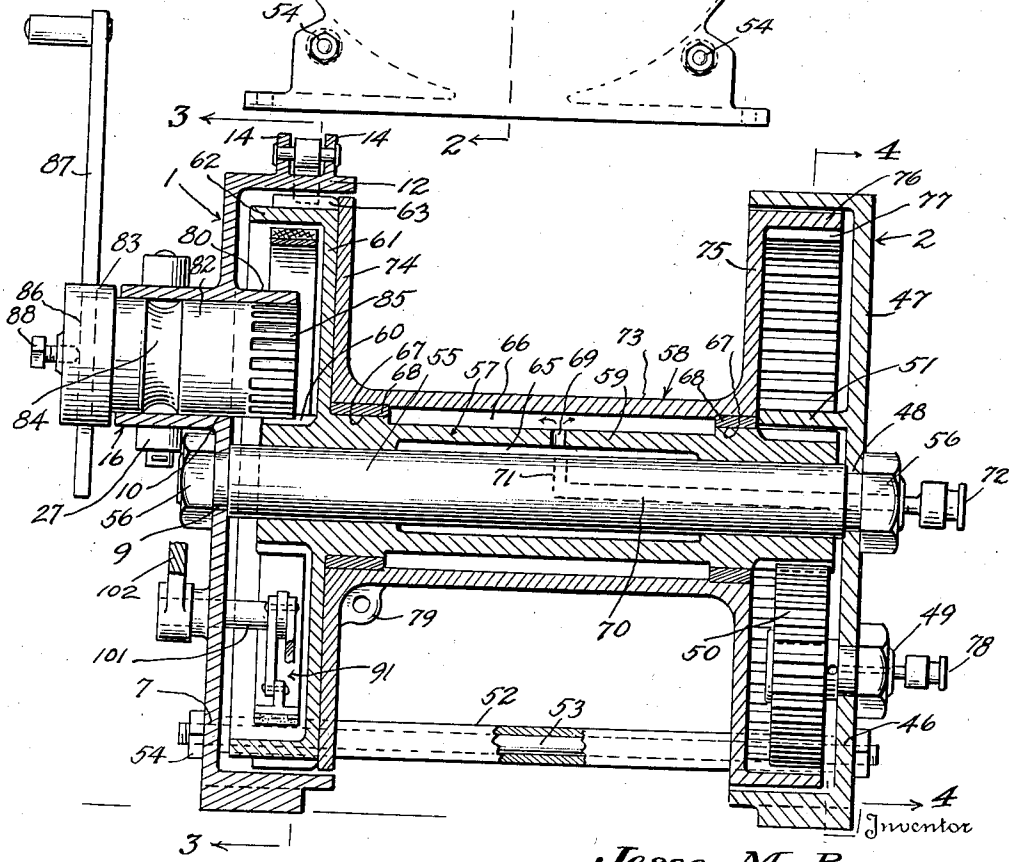


Fig. 2.

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Fig. 3.

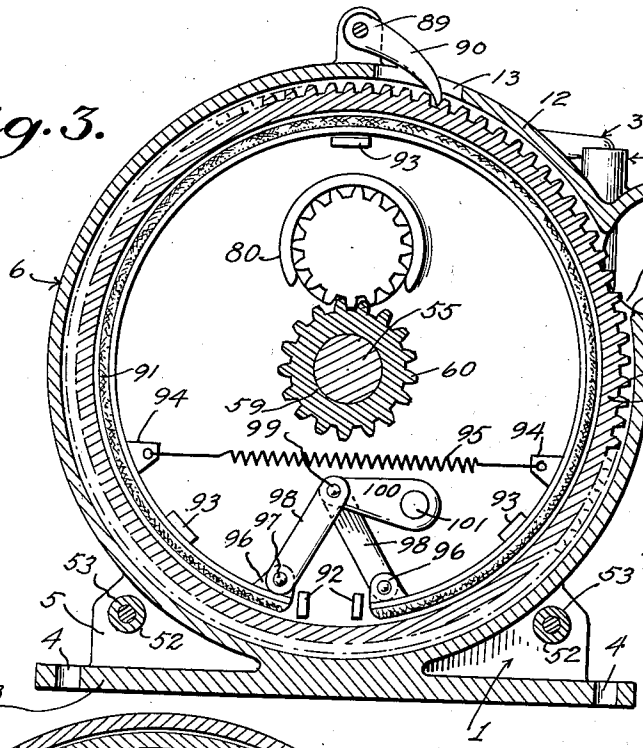


Fig. 6.

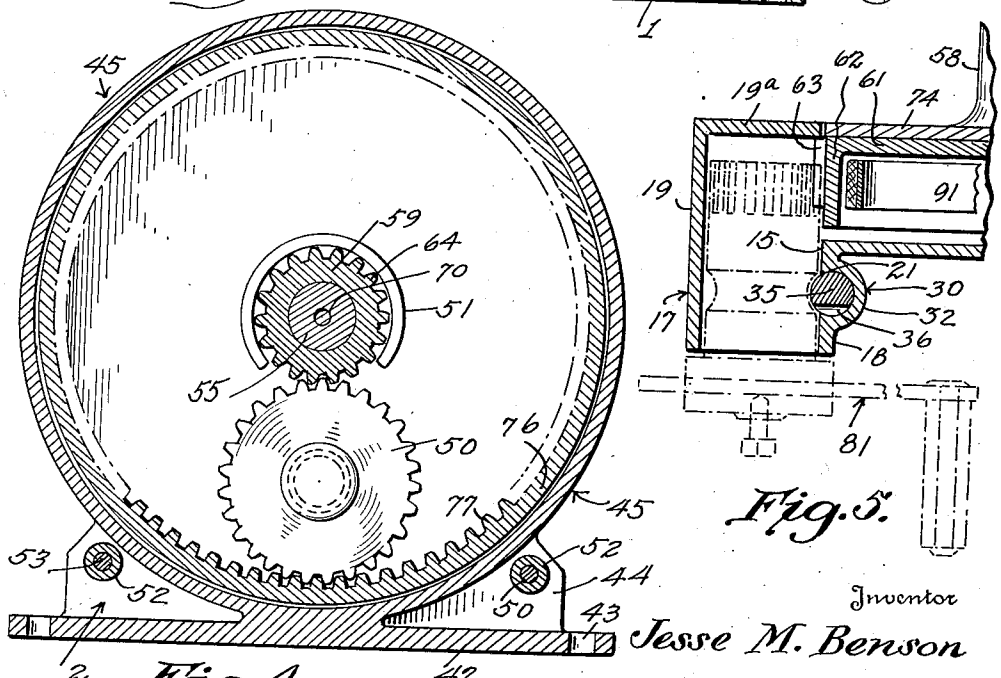


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE

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WINCH

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Application April 27, 1936, Serial No. 76,670

14 Claims. (Cl. 254—186)

This invention relates to a winch designed primarily for loading and unloading purposes, but it is to be understood that a winch, in accordance with this invention, is to be employed in any connection for which it may be found applicable.

The invention has for its object, a winch constructed in a manner as hereinafter set forth, including a revoluble drum on which and from which a cable is to respectively wind on and off, with the drum arranged in a manner relative to the other elements of the winch to prevent the application of torque to the drum, resulting in a smooth, even and non-retarded revolving of the drum during the operation of the winch, whether the latter is operated in a clockwsie or counterclockwise direction.

A further object of the invention is to provide, in a manner as hereinafter set forth, a winch including a stationary shaft, an operating shaft revoluble about the stationary shaft, a drum revoluble about the operating shaft, a drive for the operating shaft located adjacent one end of the drum and driven means for the drum located adjacent the other end of the latter and operated from the operating shaft, and with the aforesaid features of the winch being so related to each other to overcome the application of torque to the drum as they provide for maintaining the axis of the drum at all times parallel to the axis of said operating shaft when the winch is operated in clockwise or counterclockwise directions.

A further object of the invention is to provide, in a manner as hereinafter set forth, a winch capable of being operated in a clockwise direction at different speeds and in a counterclockwise direction at different speeds.

A further object of the invention is to provide, in a manner as hereinafter set forth, a winch including a revoluble drum, a driving means for selectively revolving the drum in clockwise and counterclockwise directions, and means for selectively operating said drum at different speeds in a clockwise and in a counterclockwise direction.

A further object of the invention is to provide, in a manner as hereinafter set forth, a revoluble drum, a driving means for the drum including meshed gears and with said driving means for the drum so arranged relative to the latter to provide the gears thereof to be, at all times during the operation of the winch, in uniform mesh resulting in a smooth, even, non-retarding revolving of the drum.

A further object of the invention is to provide, in a manner as hereinafter set forth, a winch for the purpose referred to, capable of being driven in a clockwise and a counterclockwise direction, including means for braking the operating movement of the winch when desired.

Further objects of the invention are to provide, in a manner as hereinafter set forth, a winch for the purpose referred to which is simple in its construction and arrangement, unusually strong, durable, compact, readily assembled, thoroughly efficient in its use, conveniently operated and comparatively inexpensive to manufacture.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and are as illustrated in the accompanying drawings wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is an elevation of the winch looking towards the outer face of one of its supports or heads,

Figure 2 is a section on line 2—2 Figure 1,

Figure 3 is a section on line 3—3 Figure 2,

Figure 4 is a section on line 4—4 Figure 2,

Figure 5 is a section on line 5—5 Figure 1, and

Figure 6 is a perspective view illustrating the form of the latching members employed.

The winch includes a pair of supports or heads 1, 2 disposed in parallel spaced relation.

The head 1 consists of a flat rectangular base plate 3 having openings 4 adjacent its ends for the passage of holdfast means for anchoring it to a support, not shown, a vertical web 5 of less length than, flush with the front edge, spaced from the end edges and integral with the upper face of plate 3, an upstanding substantially closed front and open rear annular housing 6 integral and having the outer face of its front flush with the outer face of the web 5. The latter extends laterally in opposite directions from the lower portion of the housing 6 and in proximity to its ends is formed with openings 7. The front 8 of housing 6 has an axial opening 9, an opening 10 of greater diameter than, arranged above and to one side of opening 9 and a semi-circular cutout 11 aligning in lateral spaced relation with respect to opening 10. The body 12 of housing 6 is formed at its top and at one side of its vertical median with a circumferentially extending slot 13 and a pair of upstanding spaced parallel lugs 14 at the upper end of slot 13. One

side of the body 12 of housing 6 has a transverse cutout 15 having its top and bottom edges registering with the ends of the edge of the cutout 11. Formed integral with the front 8 of housing 6 and registering with the wall of opening 10 is a tubular extension 16 constituting a guide for a purpose to be referred to. Formed integral with the front 8 and body 12 of housing 6 is an extension 17 consisting of a tubular front part 18 and a semi-circular rear part 19 having a closure piece 19a at its rear end. The said tubular part 18 projects forwardly from the front 8 of housing 6. The said semi-circular part extends laterally from the body 12 of housing 6. One half of the said tubular part 18 registers with the edge of the cutout 11. The side edges of the said part 19 register with the edges of the cutout 15. The extension 17 coacts with the cutouts 11, 15 to provide a guide for a purpose to be referred to. The extension 16 and the tubular part 18 of the extension 17 are arranged in parallel spaced relation.

That side of the extension 16 which opposes the said tubular part 18 has a vertical cutout 20. That side of the said tubular part 18 which opposes the extension 16 has a vertical cutout 21. The cutouts 20, 21 are disposed in parallel spaced relation. Formed integral with the cutout side of and extending above and depending below the extension 16 is a vertically disposed hollow member 22 having an upper tubular part 23, an intermediate semi-circular part 24 and a lower tubular part 25. The bottom of part 23, top of part 25 and edges of part 24 register with the edges of the cutout 20. The part 23 has its top edge formed with a notch 26. The member 22 provides a housing for a rotatable vertically movable latching member 27 of circular cross section extending into the extension 16 and having its intermediate portion reduced to form a segmental groove 27a for registering with the inner face of extension 16 to provide a clearance for a purpose to be referred to. The upper end of the latching member 27 is provided with a handle 28 for seating in the notch 26 for the purpose of detachably maintaining member 27 in non-latching position with the wall of the groove 27a directed towards the outer end of extension 16. The lower end of member 27 depends below the said part 25 and carries a cotter 29 for limiting the upward movement of the latching member 27 relative to the housing member 22. Formed integral with the cutout side of and extending above and depending below the said tubular part 18 of extension 17 is a vertically disposed hollow member 30 having an upper tubular part 31, an intermediate semi-circular part 32 and a lower tubular part 33. The bottom of part 31, top of part 33 and edges of part 32 register with the edges of the cutout 21. The part 31 has its top edge formed with a notch 34. The member 30 provides a housing for a rotatable vertically movable latching member 35 of circular cross section extending into the part 18 of extension 17 and having its intermediate portion reduced to form a segmental groove 36 for registering with the inner face of part 18 of extension 17 to provide a clearance for a purpose to be referred to. The upper end of the latching member 35 is provided with a handle 37 for seating in the notch 34 for the purpose of detachably maintaining the latching member 35 in non-latching position. The lower end of the latching member 35 depends below the said part 33 and carries a cotter 38 for limiting the upward movement of the latching member 35 relative to the housing member 30. There is associated with the latching members 27 and 35 a common controlling spring 39 therefor which tends to permanently shift the said members to non-latching position. One end of spring 39 is fixed to the eye 40 of the cotter 29 and its other end is fixed to the eye 41 of the cotter 38. The purpose of the latching members will be hereinafter referred to.

The support or head 2 consists of a flat rectangular base plate 42 having openings 43 adjacent its ends for the passage of holdfast means for anchoring it to a support, not shown, a vertical web 44 of less length than, flush with the front edge, spaced from the end edges and integral with the upper face of plate 42, an upstanding substantially closed front and open rear annular housing 45 integral and having the outer face of its front flush with the outer face of the web 44. The latter extends laterally in opposite directions from the lower portion of the housing 45 and in proximity to its ends is formed with openings 46 which are to align with the openings 7 in the web 5. The front 47 of housing 45 has an axial opening 48, an inwardly extending fixed stub shaft 49 carrying a revoluble power transmitting gear 50 and an inwardly extending split circular stop 51.

Arranged between and abutting against the inner faces of the webs 5 and 44 are parallel tubular spacing members 52 for the heads 1, 2. Extending through the aligning openings 7, 46 and the members 52 are tie rods 53 carrying on their ends securing nuts 54. The webs 5, 44, members 52, tie rods 53 and nuts 54 coact to secure the heads 1, 2 together and for maintaining said heads in parallel spaced relation..

Extending through the openings 9, 48 of the heads 1, 2 respectively, is a supporting shaft 55 provided with means, as at 56 at each of its ends coacting with and securing the shaft 55 stationary to the heads 1, 2.

The winch includes an operating shaft 57 for a revoluble drum 58. The shaft 57 revolves about the shaft 55. The drum 58 revolves about the shaft 57. The latter includes a tubular body part 59 formed lengthwise of one end terminal portion thereof with a circumferentially extending endless row of gear teeth, as at 60, to constitute a driving element of high sped for shaft 57. At the inner end of the teeth 60 there is formed integral with the said body part 59 an annular flat laterally extending disc 61 of slightly less diameter than that of and for extending into the body part 12 of housing 6. The disc 61 at its outer edge is formed with a forwardly directed annular flange 62 having its outer face formed circumferentially thereof with an endless row of transversely extending gear teeth 63 to constitute a driving element of low speed for shaft 57. The flange 62 is arranged in concentric spaced relation to the teeth 60. The other terminal portion of the body part 59 has formed lengthwise and circumferentially thereof with an endless row of gear teeth 64 constituting a power transmitting element. The end terminal portions of the body part 59 are of the same diameters. The body part 59 has its intermediate portion of reduced inner and outer diameters to form an internal groove 65, an external groove 66 and a pair of spaced peripheral shoulders 67 upon which are mounted bearing sleeves or collars 68. The intermediate portion of body part 59 is formed with a

lubricant conducting port 69 leading from groove 65 to groove 66. The shaft 55 is formed with an axially arranged lubricant conducting channel 70 and a diametrically disposed port 71 opening into groove 65. The channel 70 extends from a cup or fitting 72 carried by one end of the shaft 55 to the port 71.

The drum 58 includes a tubular body part 73 terminating at one end in a laterally extending flat annular flange 74 of slightly less diameter than the inner diameter of and extends into the housing 6. The other end of the body part 73 of the drum 58 merges into a laterally extending flat annular disc 75 of the same diameter as that of flange 74 and which is provided at its outer edge with a rearwardly directed annular flange 76 having its inner face provided throughout transversely thereof with an endless row of gear teeth 77. The flange 76 is arranged in housing 45. The teeth 77 are in permanent mesh with the gear 50. The latter is arranged below and permanently meshes with the teeth 64. That end of the body part 73 of the drum 58 provided with the disc 75 is arranged at the inner end of the teeth 64. The split sleeve 51 on the inner face of the front of housing 45 constitutes a stop for arresting the bodily shifting of the drum in a direction towards head 2 and also provides a protector for the teeth 64. The bearing sleeves or collars 68 are interposed between the tubular body part 73 of the drum 58 and the shaft 57. That end of the body part 73 of the drum 58 provided with the flange 74 abuts the disc 61. The latter for a portion of its diameter is reduced to provide a clearance between it and a portion of the disc 75. The shaft 49 is suitably ported for supplying lubricant to the gear 50. A lubricant fitting or cup 78 is attached to shaft 49. The tubular body part 73 of drum 58 has a peripheral apertured lug 79 for anchoring the inner end of the cable, not shown thereto. The inner face of the front of housing 6 has formed integral therewith a split collar 80 which forms an inward continuation of the extension 16.

The winch includes a rotatable actuating element 81 for selective engagement with the teeth 60 or 63 to selectively drive the shaft 57 at different speeds. When element 81 is in engagement with the teeth 60 and rotating, the shaft 57 is driven at a greater rate of speed than when element 81 is in engagement with the teeth 63 and rotated. The element 81 includes a rotatable short coupling shaft 82 provided with a head 83 at its outer end, an annular peripheral groove 84 intermediate its ends and a lengthwise extending circumferentially disposed endless row of gear teeth 85 at its inner end. The head 83 has a diametrically disposed passage 86 through which extends a handle member 87. The latter is adjustably secured to the shaft 82 by a binding screw 88 carried by head 83. The extensions 16, 17 provide guides for shaft 82. The shaft 82 is for selective passage through the tubular extension 16 to extend into the collar 80 or through the tubular part 18 of the extension 17 to extend into the housing 6. The teeth 85 are common to and are for selective meshing with the teeth 60 or 63. When shaft 82 extends through the extension 16, the teeth 85 mesh with the teeth 60 and on the revolving of element 81 the shaft 57 is operated at high or its greatest speed. When shaft 82 is extended through the tubular part 18 of extension 17, the teeth 85 mesh with the teeth 63 and on rotation of element 81 the shaft 57 is operated at its lowest speed. When shaft 57 is operated from either one of its driving elements at one end thereof, the power transmitting element, provided by the teeth 64 will also be operated and through the medium of the gear 50 and teeth 77, the drum 58 will be revolved. On rotating the element 81 in one direction, the shaft 57 will be operated in a clockwise direction and on rotating the element 81 is an opposite direction, the shaft 57 will be operated in a counterclockwise direction.

Mounted on a pivot 89 carried by the lugs 14 is a pawl 90 which functions when shifted in one direction to arrest back rotation of the operating shaft 57 when the drum is revolving clockwise. The pawl 90 coacts with the teeth 63 and constitutes a stop. It is to be understood that the pawl 90 and housing 6 may be so formed whereby the pawl 90 will arrest back rotation of the shaft 57 when the drum is revolving counterclockwise, or that two oppositely extending pawls may be mounted on pivot 89 and the housing so constructed to accord to prevent back rotation when the housing revolves clockwise or when it revolves anti-clockwise.

Opposing the front face of the disc 61 is an expandible and contractible brake element 91 of split ring-like form which also opposes and coacts with the inner face of the flange 62. The disc 61 has its front face formed with spaced parallel lugs 92 arranged in the path of the ends of element 91 to arrest the travelling of the latter in a circular part relative to disc 61. The latter also has its front face provided with spaced confiners 93 for element 91. The latter is provided at opposite sides thereof with aligning apertured lugs 94 to which the ends of a controlling spring 95 are anchored. The ends of element 91 are formed with a pair of inwardly extending apertured lugs 96 to which are pivotally connected, as at 97 one end of a pair of links 98. These latter have their other ends mounted on a common pivot 99 carried by one end of a lever arm 100. The other end of arm 100 is fixed to the inner end of rock shaft 101 mounted in the front of housing 6. The outer end of shaft 101 has keyed thereon an upwardly inclined angle-shaped handle 102 which when moved downwardly from its outer end rocks shaft 101 in a direction to apply the brake element 91 against the action of spring 95.

The groove 84 is common to the latching members 27, 35. When shaft 82 is passed into the tubular extension 17, it contacts member 27 turning it, against the action of its controlling spring, to have the wall of groove 27a align with the inner face of extension 17 to enable the shaft 82 to pass through said extension to engage with the teeth 60, by the time the engagement had properly been made, the groove 84 then opposes cutout 28 whereby member 27 is released and turns to extend into groove 84 to latch the teeth of shaft 82 in engagement with the teeth 60. The latching member 35 is operated in the same manner as latching member 25 and functions to latch the teeth of shaft 82 in engagement with the teeth 63.

When the actuating element 81 is in toothed engagement with the teeth 60, retained in such position by the latching member and rotated, the shaft 57 is revolubly driven at what may be termed high speed and on the revolving of shaft 57, the teeth 64 will drive gear 50 which meshing with the teeth 77 will provide for the revolving of the drum 58 in the same direction and at the same speed as that of shaft 57. When the actuating element 81 is in toothed engagement with the

teeth 63, retained in such position by the latching member 35 and rotated, the shaft 57 is revolubly driven at what may be termed low speed and on the revolving of the shaft 57, the teeth 64 will drive gear 50, which meshing with the teeth 77 will provide for the revolving of the drum 58 at the same speed and in the same direction as the drum 57.

When element 81 is operating the drum from the teeth 60, the drum operates at a greater speed than when the drum is operated by element 81 when engaged with teeth 63.

When it is desired to slacken or retard the operation of the drum, the braking mechanism is applied to the inner face of the annular flange 62.

What I claim is:

1. In a winch, an operating shaft provided at one end with a pair of spaced selectively actuated driving elements being so formed for selectively operating said shaft at different speeds in a clockwise or in a counterclockwise direction, said shaft being provided at its other end with a power transmitting element, a drum revolubly mounted on said shaft, means operated from said power transmitting element and engaging one end of the drum for revolving the latter, and a portable rotatable actuating element common to and for selective, detachable engagement with the driving elements to provide for the operating of said shaft.

2. In a winch, an operating shaft provided at one end with a pair of spaced selectively actuated driving elements being so formed for selectively operating said shaft at different speeds in a clockwise or in a counterclockwise direction, said shaft being provided at its other end with a power transmitting element, a drum revolubly mounted on said shaft, means operated from said power transmitting element and engaging one end of the drum for revolving the latter, a portable rotatable actuating element common to and for selective, detachable engagement with the driving elements to provide for the operating of said shaft, a pair of spaced parallel supports between which are arranged said shaft and drum, and a stationary shaft connecting said supports together and about which revolves said operating shaft.

3. In a winch, an operating shaft provided at one end with a pair of spaced selectively actuated driving elements being so formed for selectively operating said shaft at different speeds in a clockwise or in a counterclockwise direction, said shaft being provided at its other end with a power transmitting element, a drum revolubly mounted on said shaft, means operated from said power transmitting element and engaging one end of the drum for revolving the latter, a portable rotatable actuating element common to and for selective, detachable engagement with the driving elements to provide for the operating of said shaft, and means for automatically latching said portable element to that driving element actuated thereby.

4. In a winch, an operating shaft provided at one end with a pair of spaced selectively actuated driving elements being so formed for selectively operating said shaft at different speeds in a clockwise or in a counterclockwise direction, said shaft being provided at its other end with a power transmitting element, a drum revolubly mounted on said shaft, means operated from said power transmitting element and engaging one end of the drum for revolving the latter, a portable rotatable actuating element common to and for selective, detachable engagement with the driving elements to provide for the operating of said shaft, a pair of spaced parallel supports between which are arranged said shaft and drum, a stationary shaft connecting said supports together and about which revolves said operating shaft, one of said supports having means for the passage of said portable element to selectively engage said driving elements, and such support and said portable element having coacting means for automatically latching said portable element to that driving element actuated thereby.

5. In a winch, an operating shaft provided at one end with a pair of spaced selectively actuted driving elements being so formed for selectively operating said shaft at different speeds in a clockwise or in a counterclockwise direction, said shaft being provided at its other end with a power transmitting element, a drum revolubly mounted on said shaft, means operated from said power transmitting element and engaging one end of the drum for revolving the latter, a portable rotatable actuating element common to and for selective, detachable engagement with the driving elements to provide for the operating of said shaft, a pair of spaced parallel supports between which are arranged said shaft and drum, a stationary shaft connecting said supports together and about which revolves said operating shaft, one of said supports having means for the passage of said portable element to selectively engage said driving elements, such support and said portable element having coacting means for automatically latching said portable element to that driving element actuated thereby, and that support having means for the passage of said portable element being provided with a pivoted stop coacting with one of said driving elements to prevent the drum revolving in a contradirection to that direction in which it is driven.

6. In a winch, an operating shaft provided at one end with a pair of spaced selectively actuated toothed driving elements being so formed for selectively operating said shaft at different speeds in a clockwise or in a counterclockwise direction, said shaft being provided at its other end with a power transmitting element, a drum revolubly mounted on said shaft, means operated from said power transmitting element and engaging one end of the drum for revolving the latter, and a portable rotatable toothed actuating element common to and for selective, detachable engagement with the driving elements to provide for the operating of said shaft, the said driving elements being of different diameters and arranged in concentric spaced relation, one of said driving elements being formed from lengthwise extending inherent parts at one end of said shaft, and the other of said driving elements being in the form of an upstanding outer peripherally toothed horizontally disposed annulus integrally connected with said shaft at the inner end of the said inherent parts.

7. In a winch, an operating shaft provided at one end with a pair of spaced selectively actuated driving elements being so formed for selectively operating said shaft at different speeds in a clockwise or in a counterclockwise direction, said shaft being provided at its other end with a power transmitting element, a drum revolubly mounted on said shaft, means operated from said power transmitting element and engaging one end of the drum for revolving the latter, a portable rotatable actuating element common to and for selective, detachable engagement with the

driving elements to provide for the operating of said shaft, the said driving elements being of different diameters and arranged in concentric spaced relation, and means coacting with the outer one of said driving elements to prevent the drum revolving in a contradirection to that direction in which it is driven.

8. In a winch, a revoluble drum, an operating shaft provided circumferentially and lengthwise of the periphery of one of its end terminal portions with an endless row of teeth constituting a driving element for high speed of the shaft, a disk integral with the said end terminal portion formed with an annular flange arranged in concentric spaced relation to said teeth and having its outer face formed with an endless row of teeth constituting a driving element for slow speed of the shaft and provided circumferentially and lengthwise of the periphery of its other end terminal portion with an endless row of teeth constituting a power transmitting element, said drum being revolubly mounted on said shaft, an actuating element common to and for selective engagement with said driving elements to provide for the operating of said shaft, and means operated from said transmitting element and engaging with one end of the drum for operating the latter.

9. In a winch, a revoluble drum, an operating shaft provided circumferentially and lengthwise of the periphery of one of its end terminal portions with an endless row of teeth constituting a driving element for high speed of the shaft, a disk integral with the said end terminal portion formed with an annular flange arranged in concentric spaced relation to said teeth and having its outer face formed with an endless row of teeth constituting a driving element for slow speed of the shaft and provided circumferentially and lengthwise of the periphery of its other end terminal portion with an endless row of teeth constituting a power transmitting element, said drum being revolubly mounted on said shaft, an actuating element common to and for selective engagement with said driving elements to provide for the operating of said shaft, means operated from said transmitting element and engaging with one end of the drum for operating the latter, and means for automatically latching said actuating element to a selected driving element.

10. In a winch, a revoluble drum, an operating shaft provided circumferentially and lengthwise of the periphery of one of its end terminal portions with an endless row of teeth constituting a driving element for high speed of the shaft, a disk integral with the said end terminal portion formed with an annular flange arranged in concentric spaced relation to said teeth and having its outer face formed with an endless row of teeth constituting a driving element for slow speed of the shaft and provided circumferentially and lengthwise of the periphery of its other end terminal portion with an endless row of teeth constituting a power transmitting element, said drum being revolubly mounted on said shaft, an actuating element common to and for selective engagement with said driving elements to provide for the operating of said shaft, means operated from said transmitting element and engaging with one end of the drum for operating the latter, means for automatically latching said actuating element to a selected driving element, and a braking means for said operating shaft.

11. In a winch, a revoluble drum, an operating shaft provided circumferentially and lengthwise of the periphery of one of its end terminal portions with an endless row of teeth constituting a driving element for high speed of the shaft and drum, a disk integral with the said end terminal portion formed with an annular flange arranged in concentric spaced relation to said teeth and having its outer face formed with an endless row of teeth constituting a driving element for slow speed of the shaft and drum and provided circumferentially and lengthwise of the periphery of its other end terminal portion with an endless row of teeth constituting a power transmitting element, said drum being revolubly mounted on said shaft, an actuating element common to and for selective engagement with said driving elements to provide for the operating of said shaft, means operated from said transmitting element and engaging with one end of the drum for operating the latter, the said driving element for high speed of the shaft and drum having its circumference corresponding to that of the said power transmitting element.

12. In a winch, an operating shaft provided at one end with a pair of spaced selectively actuated driving elements being so formed for selectively operating said shaft at different speeds in a clockwise or in a counterclockwise direction, said shaft being provided at its other end with a power transmitting element, a drum revolubly mounted on said shaft, means operated from said power transmitting element and engaging one end of the drum for revolving the latter, and a portable rotatable actuating element common to and for selective, detachable engagement with the driving elements to provide for the operating of said shaft, said driving elements being of different diameters and said power transmitting element corresponding in diameter to the diameter of that driving element of smallest diameter.

13. The invention as set forth in claim 8 having combined therewith a pair of spaced parallel supports between which said drum and shaft are arranged, and a stationary shaft connecting said supports together and upon which said operating shaft revolves.

14. The invention as set forth in claim 8 having combined therewith a pair of spaced parallel supports between which said drum and shaft are arranged, a stationary shaft connecting said supports together and upon which revolves said operating shaft, one of said supports opposing in spaced relation the said driving elements and having means for the passage of said actuating element to a selected driving element, and said actuating element and the said support having coacting means for automatically latching the actuating element to a selected driving element.

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