July 2, 1946. W. P. LEAR 2,403,095

TRAVERSING HOIST

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Fig. 1

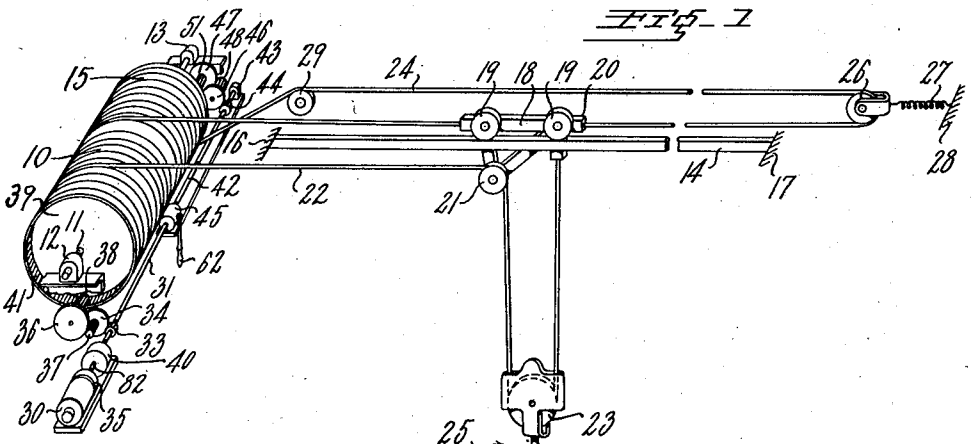
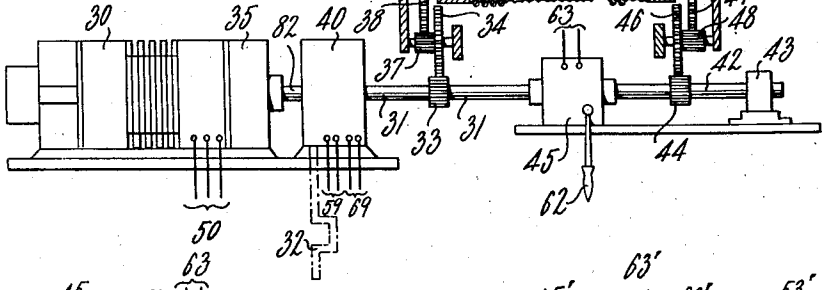


Fig. 2



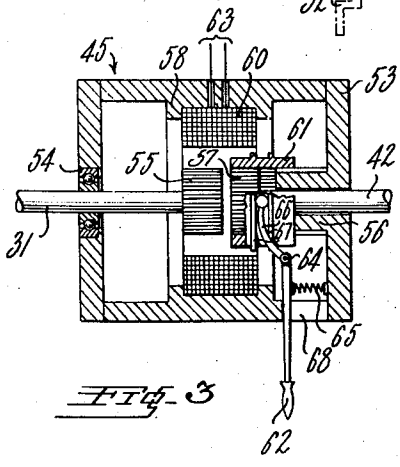


Fig. 3

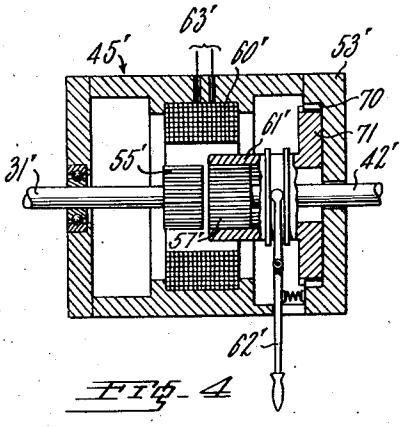


Fig. 4

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TRAVERSING HOIST

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Fig. 5

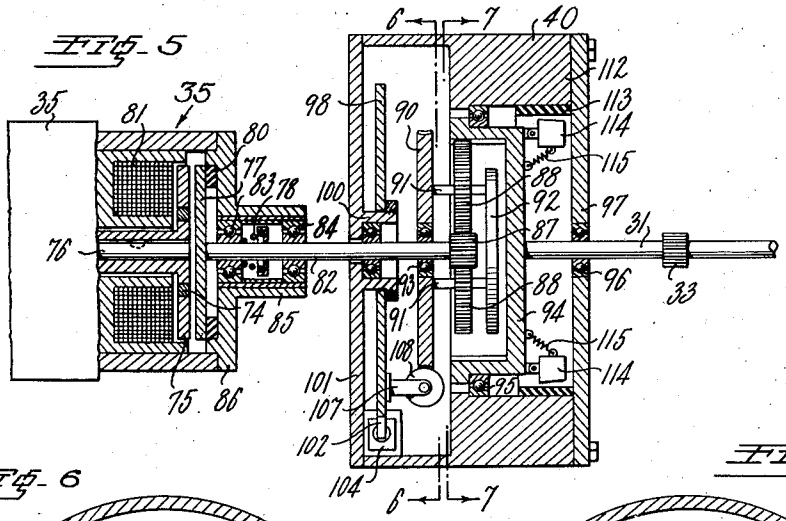


Fig. 6

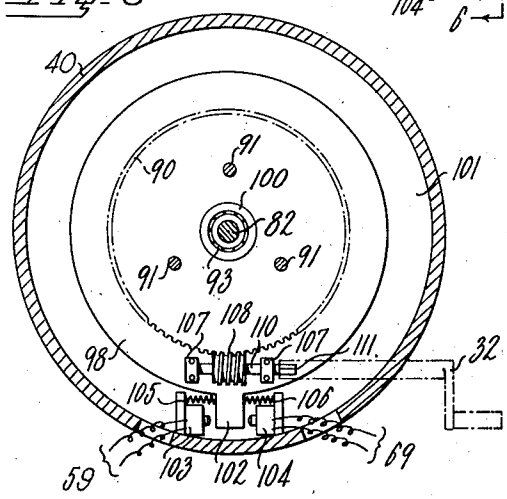
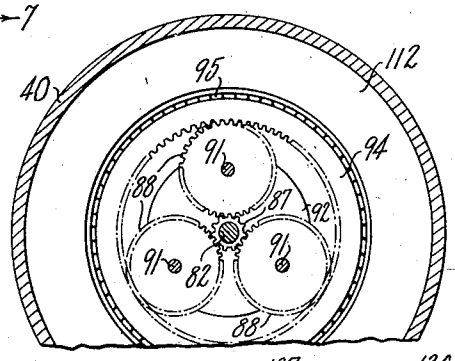


Fig. 7



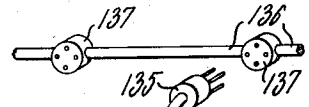
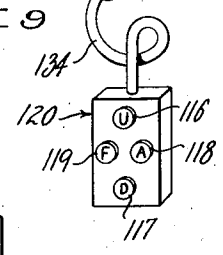


Fig. 9



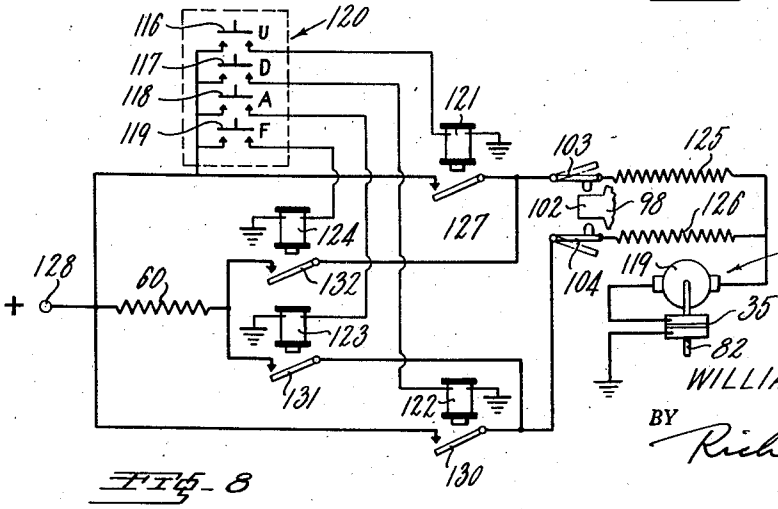


Fig. 8

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Patented July 2, 1946 2,403,095

UNITED STATES PATENT OFFICE

2,403,095

TRAVERSING HOIST

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Application October 19, 1943, Serial No. 506,797

16 Claims. (Cl. 212—87)

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This invention relates to a traversing hoist which may be either power or manual driven, incorporating a novel torque limiting arrangement, and particularly suitable for use in cargo airplanes.

With the widespread increase in the use of aircraft as cargo carriers, there has come a demand for a cargo handling unit which is compact, light in weight, adapted for either manual or power actuation, and included protective features. Due to the rather confined space in cargo planes, such mechanism must be easily manipulated and adapted to be controlled from any one of several points.

It is therefore among the objects of this invention to provide a traversing hoist which may be either power or manual driven; to provide such a hoist including means for limiting the load handled thereby to a safe value; to provide such a hoist including a hoisting drum and a traversing drum and selectively operable mechanism for connecting the two drums for actuation as a unit; to provide such a hoist including means for limiting the rate of lowering the load to a safe value; to provide such a hoist including control means effective to control the operation thereof from any one of a number of points; and to provide such a hoist which is compact, light in weight, simple in construction and reliable in operation.

These and other objects, advantages and novel features of the invention will be apparent from the following description, taken in connection with the accompanying drawings. In the drawings:

Fig. 1 is a schematic perspective view of the traversing hoist illustrating the relationship between the hoisting and traversing drums and the lifting and traversing elements associated therewith.

Fig. 2 is a schematic elevation view partly in section, illustrating the hoisting and traversing drums and the control arrangements associated therewith.

Fig. 3 is a longitudinal sectional view of a coupling device for connecting the hoisting and traversing drums together for traversing the load.

Fig. 4 is a longitudinal view through a modified form of the coupling device shown in Fig. 3.

Fig. 5 is a horizontal sectional view through a torque limiting, speed governing, and manual drive unit embodied in the invention.

Fig. 6 is a cross-sectional view taken on the line 6—6 of Fig. 5.

Fig. 7 is a cross-sectional view taken on the line 7—7 of Fig. 5.

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Fig. 8 is a schematic wiring diagram illustrating a control circuit forming part of the invention.

Fig. 9 is a perspective view illustrating a novel control unit effective to control the operation of the mechanism from any one of a number of given points.

Referring to Fig. 1, the traversing hoist of the invention comprises a hoisting drum 10 and a traversing drum 15 in operative relationship with a traversing device, such as a trolley 20. Drums 10 and 15 are independently rotatably mounted on a shaft 11 supported in bearings 12, 13. Trolley 20 operates along a rail 14 extending between supports diagrammatically illustrated at 16 and 17, and includes a triangular frame structure 18 on which are mounted trolley wheels 19, 19 and a pulley 21. A hoisting cable 22 is secured at one end to the grooved hoisting drum 10, passes over the pulley 21, through a pulley 23 associated with a hoisting device such as a hook 25, and is fastened at its opposite end to trolley frame 18. An endless traversing cable 24 has one or more turns wrapped around grooved hoisting drum 15. At its other end, cable 24 passes around a pulley 26 secured by a tensioning device such as a spring 27 to a support schematically illustrated at 28. Adjacent drum 15, cable 24 passes over a pulley 29.

With the described arrangement, if hoisting drum 15 is held stationary, rotation of drum 10 will either wind up or pay out cable 22, thus raising or lowering hoisting device or hook 25. When it is desired to traverse the load along the rail 14, drums 10 and 15 are coupled together. Under such circumstance, cable 22 will be payed out at the same rate as cable 24 is moved in one direction; and will be drawn in at the same rate as cable 24 is moved in the opposite direction. Accordingly, hoisting device 25 will remain in a predetermined position relative to trolley 20.

The driving arrangements for drums 10 and 15 are illustrated in perspective in Fig. 1 and in schematic elevation in Fig. 2. As shown, an electric motor 30 is adapted to be coupled to a main drive shaft 31 through an electromagnetic clutch and brake unit 35 and a torque limiting and speed controlling unit 40. Unit 40 includes means providing for manual actuation of the mechanism by a device such as a crank 32 shown in broken lines. Shaft 31 is provided with a pinion 33 meshing with a spur gear 34 which drives another spur gear 36 through a pinion 37. Spur gear 36 is provided with a pinion 38 engaging an internal ring gear 41 formed around the inner side of drum

10 adjacent one of a pair of web members 39 rotatably supporting drum 10 on shaft 11. Similarly, drum 15 is actuated through the medium of a shaft 42 mounted at one end in a coupling device 45 and at the other end in a bearing 43. Shaft 42 is provided with a pinion 44 engaging a spur gear 46 driving a spur gear 47 through a pinion 48. Spur gear 47 is provided with a pinion 51 engaging an internal ring gear 52 on the inner surface of drum 15 adjacent one of a pair of web members 49 rotatably supporting drum 15 on shaft 11.

With the described arrangement, when motor 30 is energized, clutch 35 connects the motor to torque limiting unit 40. Through torque limiting unit 40, motor 30 drives shaft 31 to operate drum 10 to either pay out or draw in cable 22. Operation of drum 15 at the same time is dependent upon whether or not coupling 45 is conditioned to connect shaft 42 to driven shaft 31. Conductors 50 are provided for energizing motor 30 and clutch 35 and conductors 59 and 69 are provided to connect unit 40 in circuit with the other elements of the hoist.

Coupling device 45 is shown more fully in Fig. 3. As illustrated, it comprises a housing 53 in one end wall of which are mounted bearings 54 supporting shaft 31. The inner end of shaft 31 is provided with a pinion 55. Similarly, shaft 42 extends through a bearing 56 into the interior of housing 53. Bearing 56 is formed as a pinion integral with the right end wall of housing 53, and has a diameter equal to that of pinion 55. The inner end of shaft 42 is provided with a pinion 57 equal in diameter to pinion 55 and to pinion or locking member 56. An annular recess 58 is formed around the inner periphery of housing 53 to receive a magnetizing winding 60 energized through conductors 63. A clutch member 61 of magnetic material is provided with internal teeth having constant meshing engagement with pinion 57. Depending upon its position, clutch 61 will also be in engagement with either pinion 55 or locking member 56. As shown, it is in engagement with locking member 56 and therefore shaft 42 is disconnected from shaft 31 and is locked against rotation. Drum 15, in the position shown in Fig. 3, is thus held stationary. Upon energization of winding 60, clutch member 61 is drawn to the left until it is substantially centralized with respect to winding 60. During such movement, clutch 61 first engages pinion 55 and then becomes disengaged from locking member 56. This is a safety measure preventing rotation of shaft 42 until such time as it is coupled to shaft 31.

To provide for operation in the event of failure of the electric power supply, a manual operating device 62 is provided for clutch member 61, and comprises a lever 62 pivoted at 64 in housing 53, and normally held by compression spring 65 in a position urging clutch member 61 to the right. The upper end of lever 62 is provided with a fork 66 engaging between spaced flanges 67, 67 on clutch member 61. Lever 62 extends exteriorly of housing 53 through a slot 68 therein. When the lever is swung to the right, it moves member 61 to engage pinion 55 and then disengage locking device 56.

An alternative arrangement for the coupling device is illustrated in Fig. 4, in which like parts have been indicated by corresponding reference characters primed. In this instance, housing 53' is provided with an internal ring gear 70 integral therewith and adapted to engage a spur gear 71

formed integrally with clutch member 61'. Manual operation is provided by means of a lever 62' in the same manner as with the arrangement shown in Fig. 3. In the arrangement shown in Fig. 4, magnetization of winding 60' through conductors 63' will attract device 61' into a position substantially central of the winding 60.

The electromagnetic clutch and brake unit 35, and torque limiting unit 40, are shown in detail in Fig. 5. Magnetic clutch and brake unit 35 may be the same as that described and claimed in my Patent No. 2,267,114 issued December 23, 1941, entitled "Electromagnetic clutch." As shown, it comprises a driving disk 75 of magnetic material keyed to the motor armature shaft 76 and a driven disk 77 of magnetic material which is normally urged by a spring 78 into engagement with a fixed braking surface 80. Driving disk 75 preferably has a non-magnetic annular insert 74 therein as fully set forth in my said patent. A magnetizing winding 81 is provided and is preferably connected in either series or parallel circuit arrangement with motor 30. Upon energization of motor 30 and winding 81, driven disk 77 is snapped into magnetic and frictional coaction with driving disk 75 and the motor thereupon drives an output shaft 82 mounted in bearings 83, 84 in an extension 85 of the end plate 86 of motor 30. Upon deenergization of motor 30, spring 78 snaps driven disk 77 into substantially instantaneous engagement with brake surface 80, thus quickly stopping motion of shaft 82. Shaft 82 extends into the torque limiting, speed control and manual driving device 40.

On the outer end of shaft 82 is a pinion 87 which meshes with a plurality of planetary pinions 88 rotatably mounted on a worm wheel 90. As shown in Fig. 7, three planetary pinions 88 are provided. The shafts 91 of planetary pinions 88 are mounted at their opposite ends in a plate 92. Worm gear 90 is rotatably mounted on shaft 82 through bearings 93. Pinions 88 engage an internal ring gear 94 mounted in bearings 95, and connected to output shaft 31 mounted in bearings 96 in an end plate 97. A plate 98 is movably mounted on a bearing housing 100 formed in the end wall 101 of unit 45. This plate is provided with an abutment 102 disposed between two switches 103 and 104 each of which is included in the motor energizing circuit through conductors 59 and 69, respectively. Springs 105 and 106 normally maintain abutment 102 substantially midway between the switches as seen in Fig. 6.

Mounted in bearings 107, 107 on plate 98 is a worm 108 engaging worm wheel 92. Shaft 110 of worm wheel 108 is provided with a squared end 111 adapted to be engaged by crank handle 32 to provide for manual actuation. An inwardly projecting shoulder 112 is provided in unit 40, and on the inner surface of this shoulder is a brake surface 113. Brake surface 113 is adapted to be engaged by a plurality of weights 114 pivotally mounted on ring gear 94 and normally urged radially inwardly by springs 115.

The operation of unit 40 is as follows. Normally motor 30 drives shaft 82 through clutch 35. This rotates pinion 87 which in turn drives ring gear 94 through pinions 88. Torque is thus applied to shaft 31. When the torque exceeds a preset limit, worm gear 90 will tend to move, thus moving worm 108 and plate 98 clockwise or counterclockwise. Movement of plate 98 will cause abutment 102 to engage one or the other of the

switches 103, 104 to open the circuit for the motor. Opening of the motor circuit deenergizes clutch 35, and driven disk 77 is snapped into engagement with brake surface 80 by spring 78. This substantially instantaneously stops motion of shaft 31. If the speed of rotation of internal ring gear 94 exceeds a preset value, centrifugal force will urge weights 114 outwardly into engagement with braking surface 113, thus holding the speed of shaft 31 to a predetermined value. In manual operation, actuation of crank 32 will cause worm 108 to drive worm wheel 90. Motor 30 and clutch 35 being deenergized, brake surface 80 will hold disk 77, shaft 82 and thus pinion 87 against rotation. Accordingly, pinions 88 will drive ring gear 94 and thus shaft 31.

An electric control circuit for the mechanism of the invention is schematically shown in Fig. 8. Control is effected by means of push buttons 116, 117, 118, and 119, which respectively control the energization of relays 121, 122, 123 and 124. Push buttons 116 and 117 are "up" and "down" push buttons, and push buttons 118 and 119 are the "aft" and "forward" buttons, respectively. Motor 30 is reversible, being provided with two series field windings 125 and 126 and an armature 119. Winding 125 is effective to cause rotation of motor 30 in a direction to effect a winding of cable 22 on drum 10, while field 126 effects rotation of motor 30 in a direction to effect paying off of cable 22 from drum 10. When "up" push button 116 is pressed, it energizes relay 121. This relay 121 thereupon closes its contact arm 127 to energize motor 30 from one terminal 128 of a source of electric current through field 125. Electromagnetic clutch 35 is connected in series with motor 30 and is thus likewise energized to effect driving connection between motor 30 and unit 40. Coil 60 is not energized and therefore coupling device 45 holds traverse drum 15 stationary. Motor 30 rotates hoist drum 10 to draw in cable 22 and thus raise hook 25 and the load, trolley 20 being held stationary.

In a similar manner, push button 117 will energize relay 122 to close its contact arm 130 effecting energization of motor 30 through opposite field winding 126. Coil 60 not being energized, drum 15 and trolley 20 are held stationary. Motor 30 rotates drum 10 in a direction to pay out cable 22, lowering hook 25 and the load.

When it is desired to cause "aft" motion of the trolley 20, button 118 is depressed thus energizing relay 123. This relay will close its contact arm 131 to energize motor 30 through field winding 126. At the same time, energization of coil 60 of clutch device 45 is effected as this coil is connected in series with contact 131. Accordingly, traversing drum 15 will be coupled to hoisting drum 10, and both will operate as a unit to traverse trolley 20, to the right, or "aft" while maintaining hook 25 stationary as respects vertical movement.

Push button 119 will energize relay 124 to close its contact arm 132 and energize motor 30 through field 125 to effect traversing movement of trolley 20 in the opposite direction, energizing coil 60 to condition coupling unit 45 to connect drums 10 and 15 together. Trolley 20 is moved to the left or "forward" and drum 10 draws cable 22 in, thus maintaining hook 25 in the same vertical position. In each case, the circuit of the motor will be broken at the switches 103, 104 in the event that the torque exerted by the motor exceeds a preset value, through the medium of torque limiting device 40.

As shown in perspective in Fig. 9, push buttons 116 through 119 are all mounted in a remote control unit 120, which may be held in the hand of the operator. Control unit 120 is provided with a multi-wire cable 134 connected to a pronged plug 135. The control circuit for relays 121 through 124 is run in a cable 136 along the side of the aircraft, and suitable receptacles 137 are connected into the cable at predetermined intervals. Several such cables and control units 120 are provided thereby, so the operator may control the operation of the hoisting and traversing mechanism from any one of a number of predetermined positions. The several relays are preferably mounted in a control box at a suitable location.

While specific embodiments of the invention have been shown and described to illustrate the application of the principles thereof, it will be obvious to those skilled in the art that the invention may be otherwise embodied, without departing from such principles.

What is claimed is:

1. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; a traversing device; a pulley on said traversing device; a hoisting hook; a hoisting cable secured to said hoisting drum and said traversing device, said hoisting cable passing over said pulley and through said hoisting hook; a traversing cable passing around said traversing drum and secured at both ends to said traversing device; a power drive means in operative association with said hoisting drum; a torque limiting device interposed between said power drive means and said hoisting drum; means effective upon energization of said power drive means to connect the same to an element of said device; and selectively operable means effective to mechanically interconnect said drums for operation as a unit to traverse said device.

2. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; a traversing device; a pulley on said traversing device; a hoisting hook; a hoisting cable secured to said hoisting drum and said traversing device, said hoisting cable passing over said pulley and through said hoisting hook; a traversing cable passing around said traversing drum and secured at both ends to said traversing device; a power drive means in operative association with said hoisting drum; a torque limiting device interposed between said power drive means and said hoisting drum; means effective upon energization of said power drive means to connect the same to an element of said device; and a coupling device normally restraining motion of said traversing drum, said coupling device being actuable to mechanically couple said drums for operation as a unit to traverse said device.

3. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; a traversing device; a pulley on said traversing device; a hoisting hook; a hoisting cable secured to said hoisting drum and said traversing device, said hoisting cable passing over said pulley and through said hoisting hook; a traversing cable passing around said traversing drum and secured at both ends to said traversing device; a power drive means in operative association with said hoisting drum; a torque limiting device interposed between said power drive means and said hoisting drum; means effective upon energization of said power drive means to connect the same to an element of said device; a coupling device

normally restraining motion of said traversing drum, said coupling device being actuable to mechanically couple said drums for operation as a unit to traverse said device; electromagnetic means for actuating said coupling device; and manual means for independently actuating said coupling device.

4. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; a power drive means; a housing; a pair of aligned shafts having juxtaposed ends extending into said housing; gearing connecting one shaft to said hoisting drum and the other shaft to said traversing drum; mechanism, including a clutch, coupling said one shaft to said power drive means; a pinion secured to the end of each shaft; a coupling sleeve of magnetic material slidably mounted on and continuously engaging the one of said pinions secured to said other shaft; locking means formed on said housing adjacent said one pinion, said coupling sleeve being selectively engageable with the other of said pinions or with said locking means; magnetic means for moving said coupling sleeve from a position normally engaging said locking means to a position coupling said pinions to each other; and manually operable means for independently moving said coupling sleeve from a position normally engaging said locking means to a position coupling said pinions to each other.

5. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; a power drive means; a housing; a pair of aligned shafts having juxtaposed ends extending into said housing; gearing connecting one shaft to said hoisting drum and the other shaft to said traversing drum; mechanism, including a clutch, coupling said one shaft to said power drive means; said clutch being effective upon energization of said power drive means to connect the same to said one shaft; a pinion secured to the end of each shaft; an internally splined coupling sleeve of magnetic material slidably mounted on and continuously engaging the one of said pinions secured to said other shaft; locking means formed on said housing adjacent said one pinion, said locking means comprising an externally splined sleeve formed integrally with said housing; said coupling sleeve being selectively engageable with the other of said pinions or with said locking means; and magnetic means for moving said coupling sleeve from a position normally engaging said locking means to a position coupling said pinions to each other.

6. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; a power drive means; a housing; a pair of aligned shafts having juxtaposed ends extending into said housing; gearing connecting one shaft to said hoisting drum and the other shaft to said traversing drum; mechanism, including a clutch, coupling said one shaft to said power drive means; said clutch being effective upon energization of said power drive means to connect the same to one of said shafts; a pinion secured to the end of each shaft; locking means operatively associated with the one of said pinions secured to said other shaft, said locking means comprising an internal ring gear formed integrally with said housing, a coupling member comprising an internally splined sleeve mounted on and continuously engaging said one pinion and a spur gear integral with said sleeve; said coupling member being selectively movable between a position in which said sleeve engages the other of said pinions and a position in which said spur gear engages said internal ring gear; and magnetic means for moving said coupling member from a position normally engaging said locking means to a position coupling said pinions to each other.

7. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; power drive means in operative association with said hoisting drum; a housing; a pair of aligned shafts having juxtaposed ends extending into said housing; mechanism coupling said shafts to said hoisting drum and said traversing drum, respectively; means effective upon energization of said power drive means to connect the same to one of said shafts; a pinion secured to the end of each shaft; an internally splined coupling sleeve of magnetic material slidably mounted on and continuously engaging one of said pinions; locking means formed on said housing adjacent said one pinion, said locking means comprising an externally splined sleeve formed integrally with said housing; said coupling sleeve being selectively engageable with the other of said pinions or with said locking means; magnetic means for moving said coupling sleeve from a position normally engaging said locking means to a position coupling said pinions to each other; and manually operable means for independently moving said coupling sleeve from a position normally engaging said locking means to a position coupling said pinions to each other.

8. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; power drive means in operative association with said hoisting drum; a housing; a pair of aligned shafts having juxtaposed ends extending into said housing; mechanism coupling said shafts to said hoisting drum and said traversing drum, respectively; means effective upon energization of said power drive means to connect the same to one of said shafts; a pinion secured to the end of each shaft; locking means formed on said housing adjacent said one pinion, said locking means comprising an internal ring gear formed integrally with said housing, a coupling member comprising an internally splined sleeve mounted on and continuously engaging one of said pinions and a spur gear integral with said sleeve; said coupling member being selectively movable between a position in which said sleeve engages the other of said pinions and a position in which said spur gear engages said internal ring gear; magnetic means for moving said coupling member from a position normally engaging said locking means to a position coupling said pinions to each other; and manually operable means for independently moving said coupling member from a position normally engaging said locking means to a position coupling said pinions to each other.

9. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; power drive means in operative association with said hoisting drum; a housing; a pair of aligned shafts having juxtaposed ends extending into said housing; mechanism coupling said shafts to said hoisting drum and said traversing drum, respectively; means effective upon energization of said power drive means to connect the same to one of said shafts; a pinion secured to the end of each shaft; an internally splined coupling sleeve of magnetic material slidably mounted on and continuously engaging one of said pinions; locking means formed on said housing adjacent said one pinion, said locking means comprising an externally splined sleeve formed integrally

with said housing; said coupling sleeve being selectively engageable with the other of said pinions or with said locking means; magnetic means for moving said coupling sleeve from a position normally engaging said locking means to a position coupling said pinions to each other; and manually operable means for independently moving said coupling sleeve from a position normally engaging said locking means to a position coupling said pinions to each other; said coupling sleeve being so related to said other pinion and said locking means that, upon movement from its locking position, it will engage said other pinion before disengaging said locking means.

10. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; power drive means in operative association with said hoisting drum; a housing; a pair of aligned shafts having juxtaposed ends extending into said housing; mechanism coupling said shafts to said hoisting drum and said traversing drum, respectively; means effective upon energization of said power drive means to connect the same to one of said shafts; a pinion secured to the end of each shaft; locking means formed on said housing adjacent said one pinion, said locking means comprising an internal ring gear formed integrally with said housing, a coupling member comprising an internally splined sleeve mounted on and continuously engaging one of said pinions and a spur gear integral with said sleeve; said coupling member being selectively movable between a position in which said sleeve engages the other of said pinions and a position in which said spur gear engages said internal ring gear; magnetic means for moving said coupling member from a position normally engaging said locking means to a position coupling said pinions to each other; and manually operable means for independently moving said coupling member from a position normally engaging said locking means to a position coupling said pinions to each other; said coupling member being so related to said other pinion and said locking means that, upon movement from its locking position, it will engage said other pinion before disengaging said locking means.

11. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; a trolley; a pulley on said trolley; a hoisting hook; a hoisting cable secured to said hoisting drum and said trolley and engaging said pulley and said hook; a traversing cable passing around said traversing drum and secured at both ends to said trolley; a coupling device effective to couple said drums for operation as a unit to traverse said trolley while maintaining said hoisting hook in a predetermined position; electromagnetic means operative, when energized, to actuate said coupling device to couple said drums; an electric motor; an electromagnetic clutch and brake effective, upon energization of said motor to connect said motor to said hoisting drum, and, upon deenergization of said motor, to substantially instantaneously arrest motion of said hoisting drum; a first circuit means operable to energize said motor during a hoisting operation; and a second circuit means operable to energize both said motor and said electromagnetic means to traverse said trolley.

12. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; selectively operable means effective to mechanically interconnect said drums for operation as a unit; an electric motor; planetary gearing connected

to said hoisting drum; an electromagnetic clutch effective upon energization of said electric motor to connect the same to an element of said gearing; a speed governor connected to said gearing and effective to limit the angular velocity of said drums to a preset value; and torque limiting means operatively associated with said gearing and effective to deenergize said motor when the torque on said hoisting drum exceeds a preset value.

13. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; selectively operable means effective to mechanically interconnect said drums for operation as a unit; an electric motor; planetary gearing connected to said hoisting drum; an electromagnetic clutch effective upon energization of said electric motor to connect the same to an element of said gearing; a speed governor connected to said gearing and effective to limit the angular velocity of said drums to a preset value; torque limiting means operatively associated with said gearing and effective to deenergize said motor when the torque on said hoisting drum exceeds a preset value; and manual driving means connected to another element of said gearing.

14. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; selectively operable means effective to interconnect said drums for operation as a unit; an electric motor; a housing; a shaft rotatably mounted in said housing; an electromagnetic clutch and brake effective, upon energization of said motor to connect said motor to said shaft, and, upon deenergization of said motor, to substantially instantaneously arrest motion of said shaft; a driving pinion on the end of said shaft; a pair of switches mounted in spaced relation in said housing and each interposed in the energizing circuit of said motor; a plate movably mounted in said housing concentric with said shaft and having an abutment disposed between said switches; a worm mounted on said plate; a worm wheel rotatable on said shaft and engaging said worm; an internal ring gear rotatably mounted in said housing; driving means connecting said ring gear to said hoisting drum; a plurality of planetary pinions mounted on said worm gear and meshing with said driving pinion and said ring gear; and manual driving means connected to said worm; said plate moving, when the torque on said driving means exceeds a preset value, to cause said abutment to engage one of said switches to open the energizing circuit of said motor.

15. A traversing hoist comprising, in combination, a hoisting drum; a traversing drum; selectively operable means effective to interconnect said drums for operation as a unit; an electric motor; a housing; a shaft rotatably mounted in said housing; an electromagnetic clutch and brake effective, upon energization of said motor to connect said motor to said shaft, and, upon deenergization of said motor, to substantially instantaneously arrest motion of said shaft; a driving pinion on the end of said shaft; a pair of switches mounted in spaced relation in said housing and each interposed in the energizing circuit of said motor; a plate movably mounted in said housing concentric with said shaft and having an abutment disposed between said switches; a worm mounted on said plate; a worm wheel rotatable on said shaft and engaging said worm; an internal ring gear rotatably mounted in said housing; driving means connecting said ring gear to said hoisting drum; a plurality of planetary pinions

mounted on said worm gear and meshing with said driving pinion and said ring gear; manual driving means connected to said worm; said plate moving, when the torque on said driving means exceeds a preset value, to cause said abutment to engage one of said switches to open the energizing circuit of said motor; a brake surface on said housing adjacent said ring gear; and a plurality of brake shoes pivotally connected to said ring gear and effective to engage said brake surface when the speed of said ring gear exceeds a preset value.

16. A selective driving and torque limiting device comprising an electric motor; a housing; a drive shaft rotatably mounted in said housing; an electromagnetic clutch and brake effective, upon energization of said motor to connect said motor to said drive shaft, and, upon deenergization of said motor, to substantially instantaneously arrest motion of said drive shaft; a driving

pinion on the end of said drive shaft; a pair of switches mounted in spaced relation in said housing and each interposed in the energizing circuit of said motor; a plate movably mounted in said housing concentric with said drive shaft and having an abutment disposed between said switches; a worm mounted on said plate; manual driving means connected to said worm; a worm wheel rotatable on said drive shaft and engaging said worm; an internal ring gear rotatably mounted in said housing; driving means connected to said ring gear and a plurality of planetary pinions mounted on said worm gear and meshing with said driving pinion and said ring gear; said plate moving, when the torque on said driving means exceeds a preset value, to cause said abutment to engage one of said switches to open the energizing circuit of said motor.

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