Dec. 6, 1927. 1,651,569

A. H. WILSON

HOISTING MACHINE

Original Filed July 20, 1925 2 Sheets-Sheet 1

Fig. 1.

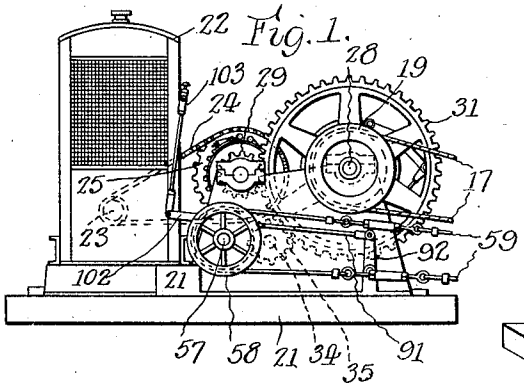


Fig. 6.

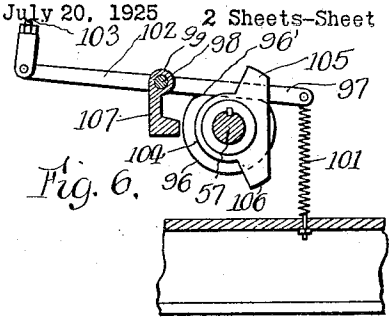
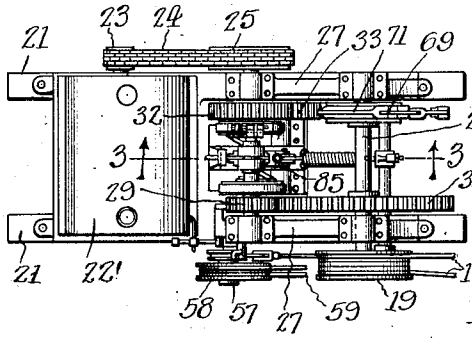


Fig. 2.



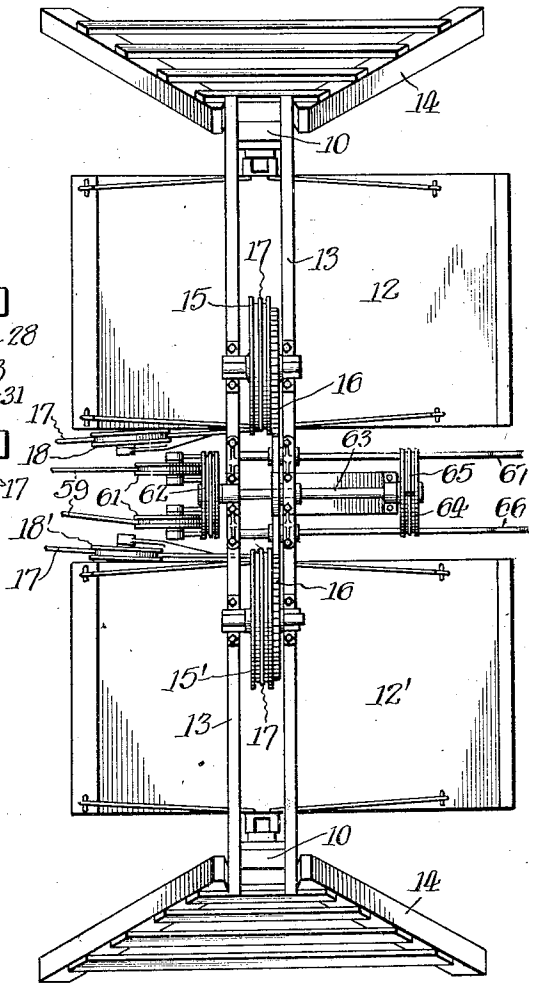
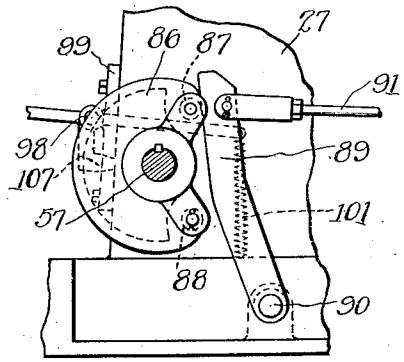


Fig. 5.



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Fig. 3.

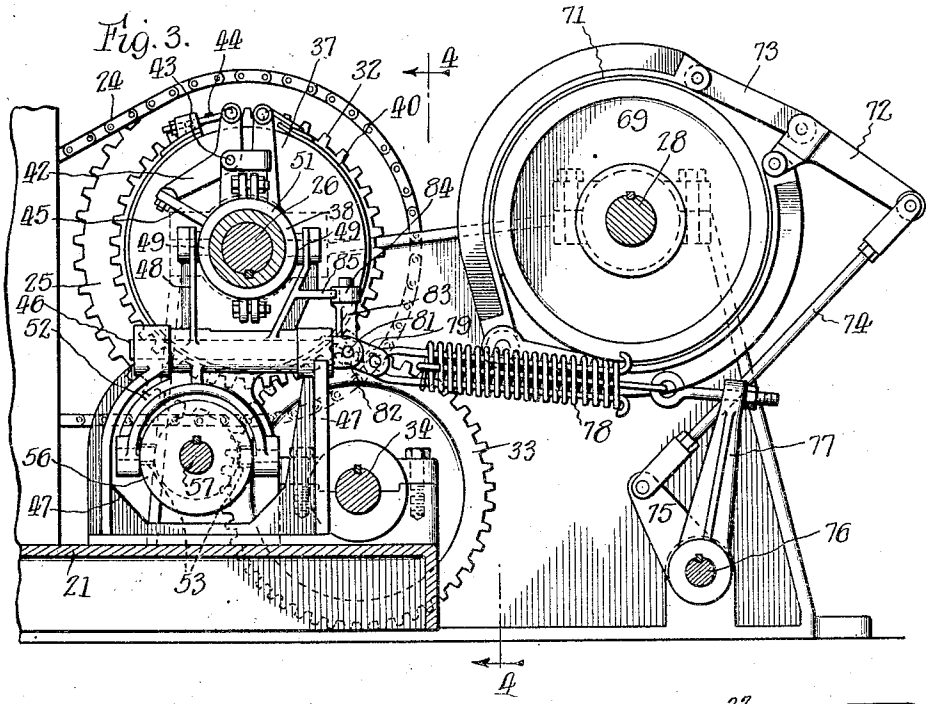
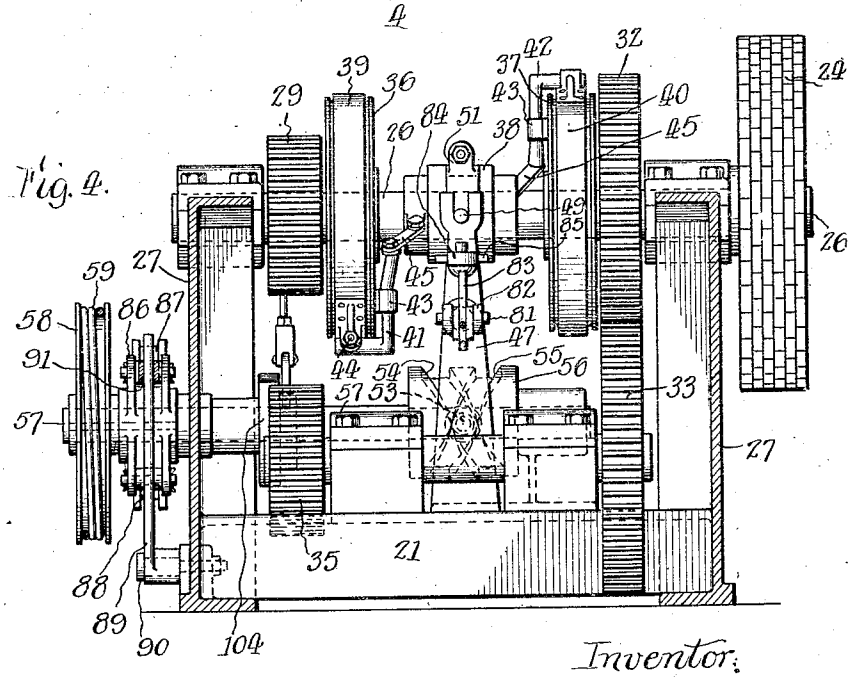


Fig. 4.



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UNITED STATES PATENT OFFICE.

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HOISTING MACHINE.

Original application filed July 20, 1925, Serial No. 44,672. Divided and this application filed January 6, 1926. Serial No. 79,538.

This invention relates to hoisting machines, having reference more particularly to power-driven hoisting machines of the type employed to operate the lifts of building material elevators, although capable of use in other relations and for other purposes.

This application constitutes a division of an application heretofore filed by me on the 20th day of July, 1925, Serial No. 44,672 wherein I have described and claimed an improved building material elevator of the type employing a pair of lifts operated by a single cable so as to have alternating service and return movements, and equipped with both automatic and manual controls whereby the lifts may be stopped automatically at the highest story or by hand at that or any lower intermediate story.

The general object of the present invention is to provide an improved and more efficient and automatic apparatus for operating and controlling the elevator operating cable. Other more detailed objects are to provide improved mechanism for operating the cable winding drum from the motor, to provide improved mechanism for reversing the rotation of the cable winding drum, to provide an improved brake mechanism for the cable winding drum, to provide an improved clutch for reversing the direction of drive of the drum, to provide an improved automatic lock for maintaining the clutch in neutral position, and to provide an automatic brake release mechanism operable simultaneously with the shifting of the clutch from neutral to one or the other working position.

Still other objects and attendant advantages of the invention will be apparent to persons skilled in the art as the same becomes better understood from the following detailed description, taken in connection with the accompanying drawings wherein I have illustrated a practical and approved embodiment of the invention, and in which—

Fig. 1 is a side elevation view of the hoisting machine, including a diagrammatic illustration of a gas engine motor therefor;

Fig. 2 is a top plan view of the hoisting machine, showing also in top plan a typical building material hoist adapted to be operated thereby;

Fig. 3 is an enlarged section through the cable operating, reversing and braking mechanism taken on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged section of the same mechanism in a plane at right angles to that of Fig. 3 and taken on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary view in elevation of the automatic brake release mechanism;

Fig. 6 is a fragmentary view, partly in elevation and partly in vertical section, of an automatic motor throttle control.

Referring to the drawings, at the right of Fig. 2 is shown in top plan a typical form of building material elevator, such as the hoisting machine of the present invention is mainly designed to serve, comprising essentially a pair of vertical elevator guides 10 located in a common plane and braced laterally by frame struts 14, a pair of horizontal beams 13 rigidly connecting and spacing the elevator guides 10, a pair of lifts 12, 12′ slidably mounted in the guides 10, cable supporting pulleys 15, 15′, journaled on and between the beams 13 and equipped with suitable ratchet mechanism indicated at 16 for preventing backward rotation of the pulley except when the lift is to be lowered, and a single continuous cable 17 which extends from the top cross-beam of the cage 12 over the supporting pulley 15, thence downwardly beneath an idler pulley 18 mounted on the base of the elevator frame, thence laterally of the elevator frame to a winding drum 19 of the hoisting machine, around which it is passed several times, in order to obtain a secure frictional grip thereon, thence back beneath a second idler pulley 18′ on the base of the elevator frame, thence upwardly and over the supporting pulley 15′, with its other end attached to the upper cross-bar of the cage 12′; the length of the cable being such that when one cage is in its lowest position, the other cage will be in its highest position.

Describing next the operating and controlling means for the lifts, on a base 21 at some distance from the bottom of the elevator frame is mounted a motor conventionally indicated at 22, this motor being preferably a gas engine which, within the purview of the invention, may be substituted by a steam engine, an electric motor, or any other source of power. The shaft 23 of the

motor, through a chain 24, and sprocket wheel 25 drives a shaft 26 journaled in suitable bearings on a pair of pillow blocks 27 mounted on the base 21. In suitable bearings on said pillow blocks 27 is also journaled a drum shaft 28, fast on one end of which is the cable winding drum 19. Loose on the shaft 26 is a spur gear 29 meshing with and driving a large spur gear 31 fast on the drum shaft 28. Also loose on the shaft 26 is another spur gear 32 driving an idler gear 33 fast on a countershaft 34, which shaft has fast thereon a spur gear 35 also meshing with and driving the large gear 31 (Fig. 1) in the reverse direction. Fast with the spur gears 29 and 32 are clutch drums 36 and 37 respectively (Fig. 4), and splined on the shaft 26 between said clutch drums is a clutch sleeve or collar 38. Mounted on the clutch drums 36 and 37 are clutch bands 39 and 40 respectively which are clutched on and released from the drums through the agency of elbow levers 41 and 42 that are fulcrumed on the inner sides of the clutch drums (Fig. 4) at 43 and are adjustably connected by screw-threaded links 44 to one end of the clutch band and are actuated by pull and thrust links 45 connecting the other arms of the levers with the opposite ends of the clutch sleeve 38. When the clutch sleeve is shifted endwise, one clutch band is released and by a further shift in the same direction the other is applied. The clutch sleeve 38 is shifted by a vertically disposed clutch shifting lever fulcrumed on a shaft 46 (Fig. 3) journaled in uprights 47 on the base block 21; the upper forked arm 48 of the lever embracing radial pins 49 in a collar 51 encircling the clutch sleeve 38, and the lower forked arm 52 of the lever carrying pins or rollers 53 engaged with oppositely inclined cam grooves 54 and 55 in a circular cam 56 that is keyed on a countershaft 57 underlying and parallel with the shaft 26. Fast on an overhanging end of the shaft 57 is a pulley 58, around which is wound several turns of a controlling cable 59. The two reaches of said cable are extended beneath pulleys 61 mounted on the base of the elevator frame, and extend thence upwardly one or more times around a pulley 62 (Fig. 2) that is fast on a shaft 63 journaled between the cage-supporting pulleys 15, 15′ on suitable bearings on the top cross bars 13. On the other end of shaft 63 is a pulley 64, to the periphery of which is attached a cord or chain 65, the depending limbs of which are attached respectively to a pair of handle levers 66 and 67 (Fig. 2) that are fulcrumed at one end to the inner uprights of the guide frames, 10, 10′. When both of the handle levers 66 and 67 are horizontal, the clutch 38 is in intermediate or neutral position. When one handle lever is depressed, the cam shaft 57 is rocked through the cable 59 and pulley 58 to clutch one of the gears 29 and 32 to the drive shaft 26 and thereby rotate the winding drum 19 in one direction, the other handle lever being simultaneously raised. When the other handle lever is depressed below horizontal position, the clutch shaft 57 is turned in the opposite direction, and the other of the spur gears 29 and 32 is clutched to the drive shaft 26, thereby rotating the winding drum in the reverse direction.

On the winding drum shaft 28 is a brake which is normally applied by spring pressure, but is automatically released each time the clutch 38 is shifted to drive the winding drum in either direction. And in association with the brake-applying mechanism there is a device, actuated by the same spring which applies the brake, for automatically locking the clutch 38 in intermediate or neutral position.

Referring to Figs. 2 and 3, fast on shaft 28 is a brake drum 69 encircled by a brake band 71, the ends of which are drawn together or separated by a well-known device comprising an elbow lever 72 and a link 73. The lever 72 is connected by a link 74 to an arm 75 fast on a rock shaft 76. Also fast on the rock shaft 76 is an upstanding arm 77, the upper end of which is connected through a well-known form of adjustable elastic link, including a coil spring 78, to the substantially horizontal arm 79 of an elbow lever that is pivoted at its elbow at 81 between a pair of pivot lugs 82 (Fig. 3) on the upper end of the standard 47. The upstanding arm 83 of said elbow lever carries a roller 84 that, under the pull of the spring 78, tends to seat itself in a semi-circular notch formed in the front edge of a horizontal projection 85 formed on the upper arm 48 of the clutch shifting lever. When the roller 84 is so seated, the clutch 38 is yieldably retained in intermediate position, but when the clutch is shifted by the turning of the cam 56, the roller 84 rides out of the notch to one side or the other.

The brake is automatically released each time the clutch is shifted to connect the drum shaft with the drive shaft through either of the direct and reversing gear trains. This release mechanism is best shown in Figs. 1, 4 and 5, and comprises the following. Keyed on the shaft 57 is a segment cam 86, in the peaks of which are journaled upper and lower rollers 87 and 88 that lie opposite one edge of an arm 89 pivoted at 90 to the base. The upper end of the arm 89 is connected by a thrust link 91 (Fig. 1) to the upper end of an arm 92 that is fast on the rock shaft 76. When the clutch shaft 57 is partially rotated by the cable 59 and pulley 58 to engage the drum shaft with either of its oppositely driving gear trains, one of the cam rollers 87 and 88 pushes the arm 89 and

thrust link 91 forwardly, and releases the brake and holds it released against the pull of the spring 78, until the clutch has been shifted back to neutral position. The brake is thus automatically released and held released during the elevating movement of either cage, and is automatically applied by the spring 78 simultaneously with the termination of the hoisting movement.

In Figs. 1 and 6 I have also illustrated a simple device for automatically controlling the motor 22 from and by the turning movements of the clutch shaft 57, so as to open the throttle, or equivalent motor control, when either clutch is thrown in, and choke the throttle so as to stop or idle the motor when the clutch is thrown to neutral and the motor is not under load. Fast on the shaft 57 is a segment cam 96, the flat side 96′ of which directly underlies one arm 97 of a lever that is pivoted on a pin 98 in a casting 99 (Fig. 6) attached to the rear side of the pillow block 27. The lever arm 97 is normally drawn downwardly by a tensile spring 101. The other arm 102 of the lever is connected by a link 103 to the throttle of the motor 22. The spring 101 tends to rock the lever in a direction to close or choke the throttle and thus stop or idle the motor. When the clutch shaft 57 is turned in either direction to connect one or the other of the gear trains with the drum shaft, the segment cam 96 raises the lever arm 97 against the pull of the spring 101, and thus opens the throttle or other motor starting device.

The clutch shaft 57 is also preferably equipped with a movement-limiting device that limits the rotative movement of the shaft 57 to an extent just sufficient to completely close one clutch and open the other. Referring to Fig. 6, fast on the shaft 57 is a disc 104 formed with a pair of oppositely extending arms 105 and 106. Integral with and laterally offset from the bracket casting 99 is a depending stop member in the form of a foot 107. When the shaft 57 has been rotated a quarter turn in one direction, its further movement is arrested by contact of the arm 105 with the upper side of the foot 107; and when said shaft has been rotated to the same extent in the reverse direction, further rotation is arrested by contact of the arm 106 with the lower side of the foot 107.

While I have herein shown and described one practical and approved physical embodiment of the operative principles underlying the present invention, it is manifest that the structural details and arrangements thereof may be considerably varied without departing from the substance of the invention or sacrificing any of the advantages thereof; and hence, I do not limit the invention to the specific mechanism herein disclosed for purposes of illustration, but reserve such modifications, variations and mechanical equivalents as fall within the spirit and purview of the appended claims.

I claim—

1. In a combined clutch-brake mechanism for hoisting machines, the combination of a frame, a shaft journaled in said frame, gears loose on said shaft, a cable-winding drum adapted to be rotated in opposite directions from said gears respectively, a brake, clutches fast with said gears, a slidable clutch-operating member splined on said shaft between said clutches, a cam shaft journaled in said frame, a cam on said cam shaft, a lever pivoted on said frame engaged at one end by said cam and at its other end engaged with said clutch-operating member, a spring normally applying said brake, means for releasing said brake against the pull of said spring when said clutch-operating member is shifted to working position, and means for turning said cam shaft.

2. In a combined clutch-brake mechanism for hoisting machines, the combination of a frame, a shaft journaled in said frame, gears loose on said shaft, a cable winding drum adapted to be rotated in opposite directions from said gears respectively, a brake, clutches fast with said gears, a slidable clutch-operating member splined on said shaft between said clutches, a cam shaft journaled in said frame, a cam on said cam shaft, a lever pivoted on said frame engaged at one end by said cam and at its other end engaged with said clutch-operating member, a spring normally applying said brake, means for turning said cam shaft, and means actuated from said cam shaft operating to release said brake against the pull of said spring when said clutch-operating member is shifted to working position.

3. In combination with claim 2, a detent actuated by said brake spring serving to yieldably lock said lever in a position corresponding to the intermediate or neutral position of said clutch-operating member.

ALEXANDER H. WILSON.