

C. C. SCHARPENBERG AND L. G. GATES.
HOISTING APPARATUS.
APPLICATION FILED MAR. 20, 1922.

1,437,685.

Patented Dec. 5, 1922.

4 SHEETS—SHEET 1.

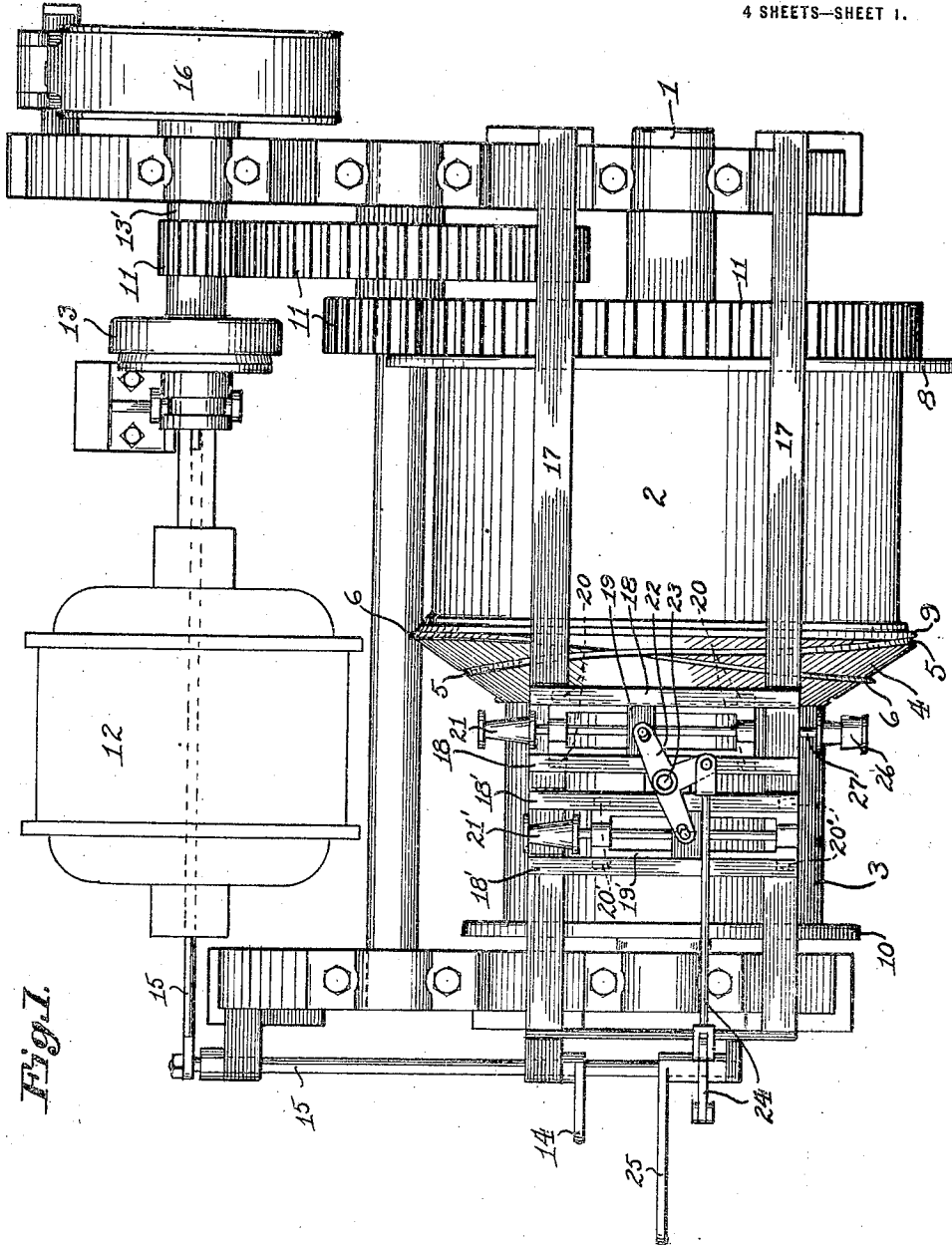


Fig. 1.

Inventors
Charles C. Scharpenberg,
Leroy G. Gates,
By *Reed & Reed,*
Attorneys

C. C. SCHARPENBERG AND L. G. GATES.
HOISTING APPARATUS.

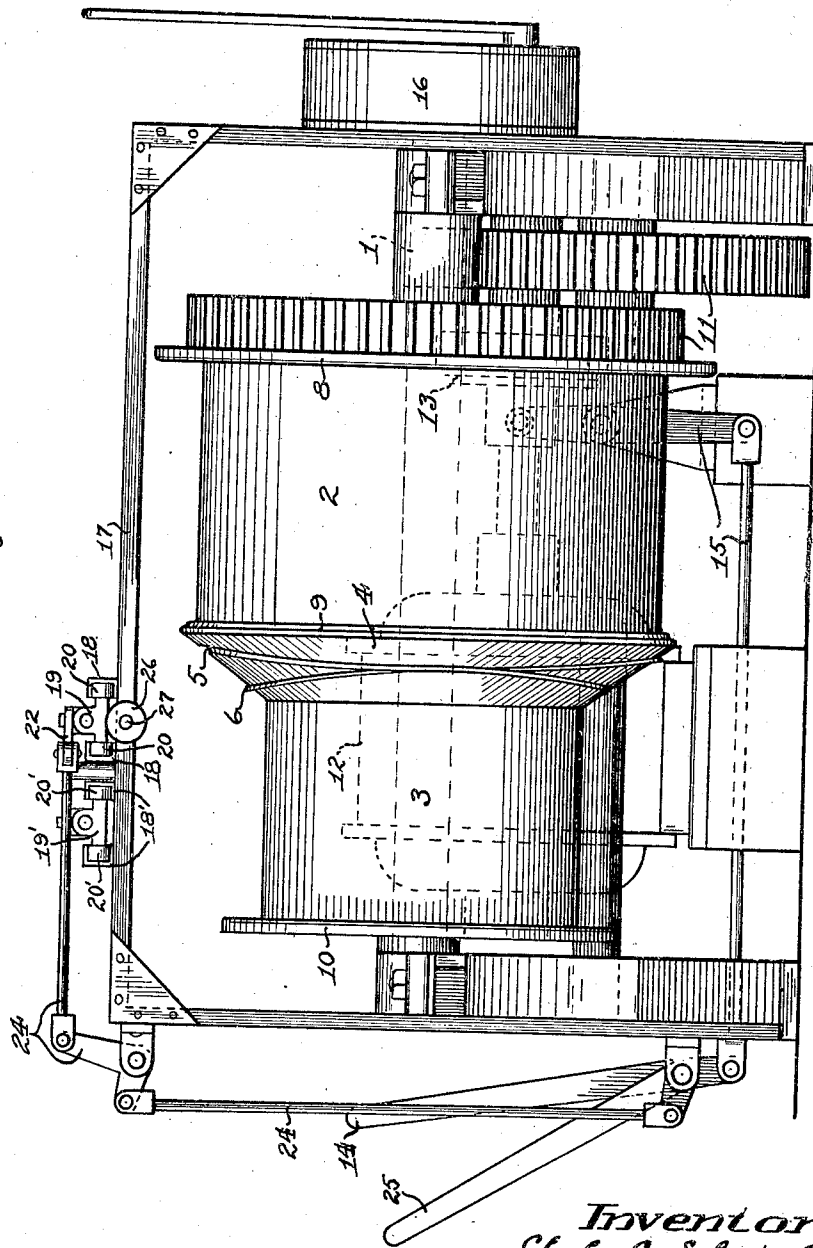
APPLICATION FILED MAR. 20, 1922.

1,437,685.

Patented Dec. 5, 1922.

4 SHEETS—SHEET 2.

Fig. 2.



Inventors,
Charles C. Scharpenberg,
Leroy G. Gates,
By *Booth & Booth, Attorneys*

C. C. SCHARPENBERG AND L. G. GATES.
HOISTING APPARATUS.
APPLICATION FILED MAR. 20, 1922.

1,437,685.

Patented Dec. 5, 1922.
4 SHEETS—SHEET 3.

Fig. 3.

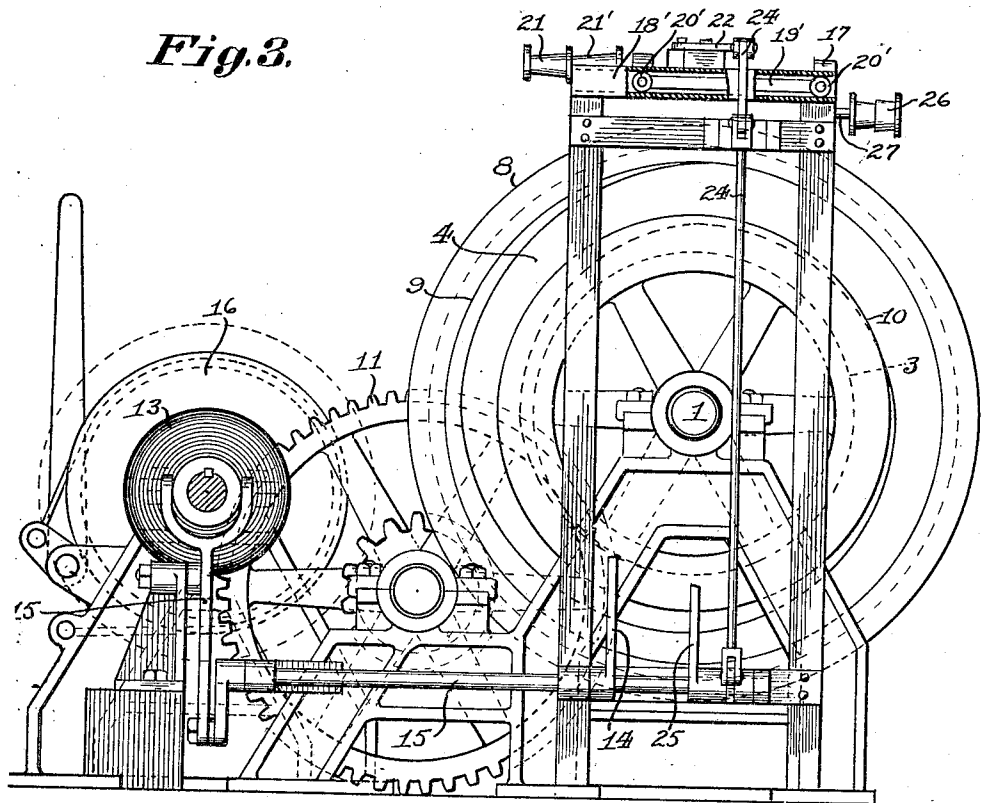
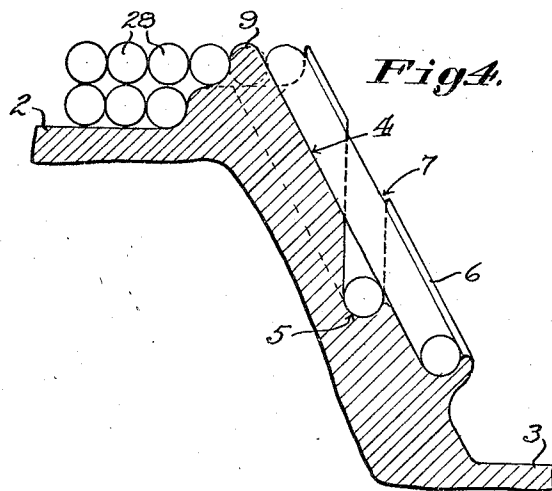


Fig. 4.



Inventors.
Charles C. Scharpenberg,
Leroy J. Gates,
By Booth & Booth, Attorneys

C. C. SCHARPENBERG AND L. G. GATES.
HOISTING APPARATUS.

APPLICATION FILED MAR. 20, 1922.

1,437,685.

Patented Dec. 5, 1922.

4 SHEETS—SHEET 4.

Fig. 5.

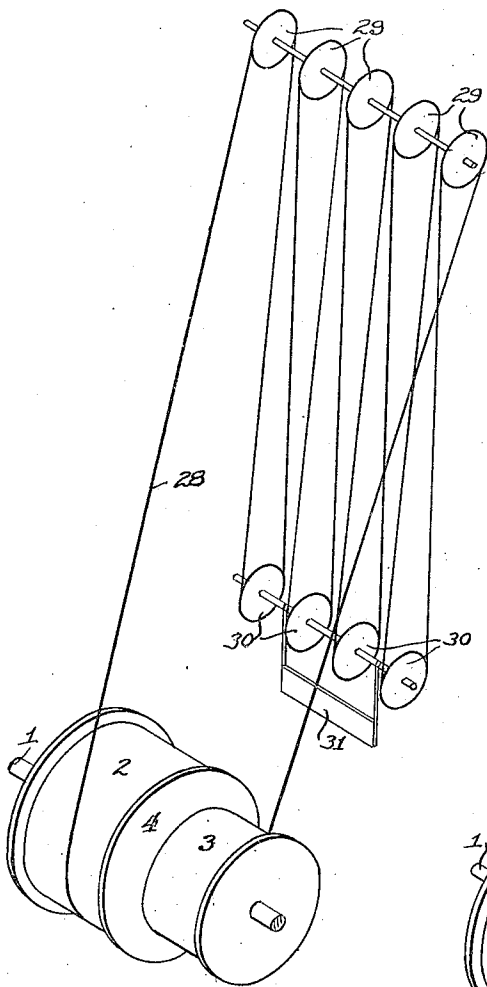
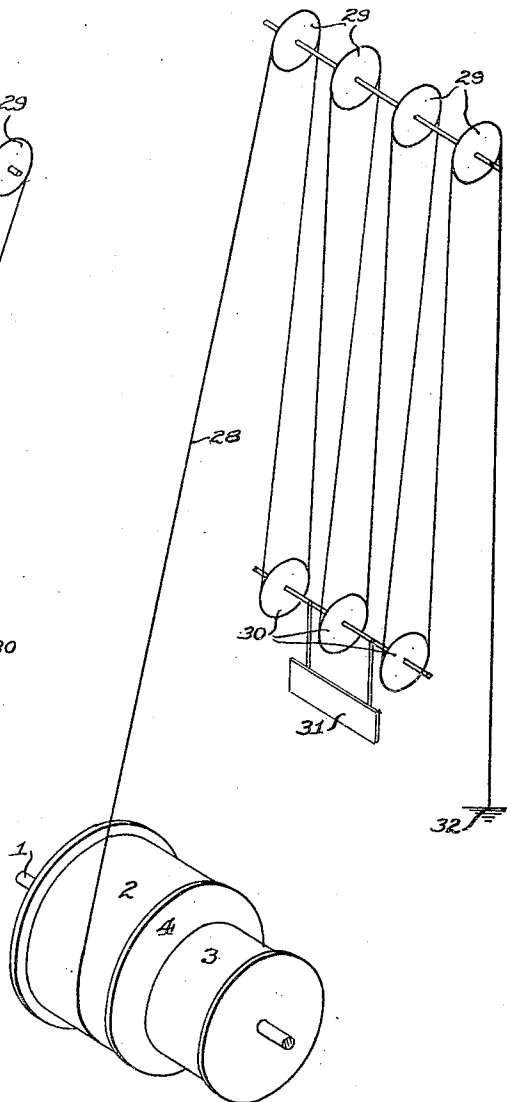


Fig. 6.



Inventors,
Charles C. Scharpenberg
Leroy J. Gates,
By Barth & Barth,
Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES C. SCHARPENBERG AND LEROY G. GATES, OF BAKERSFIELD, CALIFORNIA.

HOISTING APPARATUS.

Application filed March 20, 1922. Serial No. 545,244.

To all whom it may concern:

Be it known that we, CHARLES C. SCHARPENBERG and LEROY G. GATES, citizens of the United States, residing at Bakersfield, in the county of Kern and State of California, have invented certain new and useful Improvements in Hoisting Apparatus, of which the following is a specification.

The present invention relates to hoisting apparatus particularly adapted for use in connection with well-drilling rigs.

The objects of our invention are to provide a hoisting apparatus which enables the use of three different hoisting speeds with a single drum running at a constant speed, and to enable the change between two such hoisting speeds to be made while the hoisting operation is in progress, without changing the speed of the drum and without subjecting the hoisting cable to excessive strain such as that caused by sudden jar or jolt.

These objects are attained in our apparatus by the employment of a drum having two adjacent sections of different diameter, and means for transferring the cable, while in motion, from one section to the other. Thus, when winding the cable upon the larger drum section, the highest hoisting speed is obtained, and when winding it upon the smaller drum section, the intermediate hoisting speed is obtained. The change from either one of these speeds to the other is effected merely by shifting the moving cable from one drum section to the other, in a manner to be fully described hereinafter. The slowest hoisting speed is obtained by a differential action, one end of the cable being wound upon the larger drum section and the other end paid out from the smaller drum section.

Although our invention is herein described, in its preferred form, as a hoisting apparatus, especially adapted for use with well-drilling rigs, it will be obvious that it may be put to other uses, and, in fact, may be employed in any hoisting operation where more than one hoisting speed is desirable. Moreover, it is to be understood that changes may be made in the form and construction of our apparatus, as herein described and illustrated, without departing from the spirit of the invention as expressed in the claims hereto appended.

Our invention will now be fully de-

scribed with reference to the accompanying drawings, wherein—

Fig. 1 is a plan view of our hoisting apparatus.

Fig. 2 is a front elevation of the same.

Fig. 3 is a part-sectional end elevation, viewed from the left as seen in Figs. 1 and 2, the motor being omitted for the sake of clearness.

Fig. 4 is a sectional detail, enlarged, of the surface of the conical portion of the drum, showing the spiral grooves therein.

Figs. 5 and 6 are diagrams showing the methods of reeving the cable when using the highest and lowest hoisting speeds respectively.

Referring more particularly to the drawings, the reference numeral 1 designates a shaft, upon which is mounted a drum having two sections, one such section 2 having a larger diameter than the other section 3. These two sections are separated by a conical section 4, in whose surface is formed a spiral groove 5, Figs. 1, 2 and 4, running from the larger drum section 2 down to the smaller drum section 3. Said conical section 4 also has a spiral flange 6, running oppositely to the groove 5, said flange being interrupted where it crosses said groove, as shown at 7 in Fig. 4. The larger drum section 2 is provided with an end flange 8, Figs. 1 and 2, and with a flange 9 between said section 2 and the conical section 4, the latter flange being preferably of the same height as two superimposed layers of cable, as shown in Fig. 4. A flange 10, Figs. 1 and 2, is also provided at the end of the smaller drum section 3.

The drum is driven by means of suitable power-transmitting mechanism 11, shown in Figs. 1, 2 and 3 of the drawings as comprising a train of gears, from a motor or other convenient source of power indicated at 12. A clutch 13 is preferably interposed between the motor 12 and the gearing 11, said clutch being operated by a conveniently located lever 14 through suitable connecting linkage 15. A brake 16 is also preferably provided upon the end of the clutch shaft 13'. Said brake may be of any suitable construction, but for purposes of illustration it is shown in the drawings as a conventional form of band brake.

A fixed framework 17, Figs. 1, 2 and 3, is mounted above the drum, and carries two

adjacent pairs of transversely disposed channel-section guides 18 and 18' respectively. In these guides are horizontally movable slides 19 and 19', having rollers 20 and 20' operating respectively in the guides 18 and 18'. Freely rotatable flanged rollers 21 and 21' are carried by the respective slides 19 and 19', and are adapted, by the movement of said slides, to be moved into or out of the path of the cable as the latter is wound upon the smaller drum section 3. The slides 19 and 19' are inter-connected by a double-armed lever 22 fulcrumed at 23, and are operated, through suitable connecting linkage 24, by a hand lever 25, so that both rollers 21 and 21' may be withdrawn out of the path of the cable, or either one of said rollers, but not both simultaneously, may be moved out into the path of said cable. A third freely rotatable flanged roller 26 is mounted upon a fixed stud 27 extending from the framework 17 and is positioned above the opposite side of the smaller drum section 3, as shown in Figs. 1 and 3.

In the operation of the apparatus, it is intended that two layers of cable 28 shall be stored upon the larger drum section 2, between the flanges 8 and 9, as indicated in Fig. 4. At the beginning of the winding operation, therefore, the cable will at once run into the spiral groove 5, and follow the same down to the smaller drum section 3. Now if it be desired to use the highest winding speed, the guide roller 21 is moved out into the position shown in Fig. 1, to lie in the path of the cable, which is immediately turned back by said roller, and caused to be engaged by and follow the spiral flange 6 back to the larger drum section 2, after which it winds upon said larger section, crossing to the end flange 8 and then back to the starting point. Said larger drum section is of such diameter and length that the total length of cable to be wound can be accommodated thereupon in these two layers, so that the conical section 4 does not again enter into the operation. This high-speed winding operation is illustrated diagrammatically in Fig. 6, wherein is shown a typical arrangement of reeving the cable over fixed head pulleys 29 and movable blocks 30, the load being indicated at 31. The free end of the cable 28 is made fast to some fixed support at 32.

If the intermediate winding speed is to be employed, the start is made as before, the cable running down to the smaller drum section 3 in the spiral groove 5. In this case, however, both rollers 21 and 21' are at first withdrawn, out of the path of the cable, which thereupon winds upon the smaller drum section 3, crossing to its end flange 10, Fig. 1, and starting back toward the conical section 4. The roller 21 is now moved out into the path of the cable, which is thereby

constrained to continue winding upon the smaller drum section 3.

If, after starting to wind, as thus described, upon the smaller drum section 3, it is found that the load can be handled by the larger drum section 2, the roller 21' is moved cut into the path of the cable, which is thereby turned back before reaching the end flange 10 of the smaller drum section 3, and caused to travel back in the spiral flange 6 to said larger drum section, and to finish its winding thereupon.

When the lowest winding speed is to be used, the free end of the cable is first made fast to the smaller drum section 3, as indicated in Fig. 5. The drum is then rotated in the reverse direction, thereby unwinding the two layers of cable which are normally stored upon the larger drum section 2 and winding them upon said smaller section 3. During this preliminary operation the load is, of course, released from the movable blocks 30 and supported by any convenient means, not shown. The guide roller 26, Fig. 1, prevents the cable, which is being wound upon the smaller drum section 3, from traveling up the conical section 4 and interfering with the cable which is being unwound from the larger drum section 2. When sufficient cable has been transferred from the larger to the smaller drum section, the load is hooked on, and the drum again reversed. The cable then winds upon the larger drum section 2, and pays out more slowly from the smaller drum section 3, thus raising the load at a comparatively low speed. During this operation the cable is prevented from running off the larger drum section 2 by its flange 9.

We claim:—

1. A hoisting apparatus comprising a controllable cable-winding drum having a section of relatively larger diameter, a section of relatively smaller diameter, and an intermediate conical section having two relatively oppositely directed helical guides adapted to transfer the cable in either direction between said larger and smaller sections.

2. A hoisting apparatus comprising a controllable cable-winding drum having a section of relatively larger diameter, a section of relatively smaller diameter, and an intermediate conical section having two relatively oppositely directed helical guides adapted to transfer the cable in either direction between said larger and smaller sections; and controllable means for guiding the cable to be effected by one or the other of said guides.

3. A hoisting apparatus comprising a controllable cable-winding drum having a section of relatively larger diameter, a section of relatively smaller diameter and an intermediate conical section, said conical

section having a helical groove leading from the larger to the smaller section and a reversed helical flange leading from the smaller to the larger section; and a member adapted to be moved into and out of the path of the cable to turn it back to the flange of the conical section to be thence returned to the larger section or to allow it to continue from the groove of the conical section to and upon the smaller section and to wind back and forth thereon.

4. A hoisting apparatus comprising a controllable cable-winding drum having a section of relatively larger diameter, a section of relatively smaller diameter and an intermediate conical section, said conical section having a helical groove leading from the larger to the smaller section and a reversed helical flange leading from the smaller to the larger section; a member adapted to be moved into and out of the path of the cable to turn it back to the flange of the conical section to be thence returned to the larger section or to allow it to continue from the groove of the conical section to and upon the smaller section and to wind back and forth thereon, and a second member associated with the smaller section adapted to direct the cable at any period of its winding on said section back to the flange of the conical section to be returned to the larger section.

5. A hoisting apparatus comprising a controllable cable-winding drum having a section of relatively larger diameter, a section of relatively smaller diameter and an intermediate conical section, said conical section having a helical guide leading from the larger to the smaller section and a reversed helical guide leading from the smaller to the larger section; and a roller associated with said drum adapted to be moved into and out of the path of the cable to turn it back to the reversed guide of the conical section to be thence returned to the larger section, or to allow it to continue from the first guide of the conical section to the smaller section and to wind back and forth thereon.

6. A hoisting apparatus comprising a

controllable cable-winding drum having a section of relatively larger diameter, a section of relatively smaller diameter and an intermediate conical section, said conical section having a helical guide leading from the larger to the smaller section and a reversed helical guide leading from the smaller to the larger section; a roller associated with said drum adapted to be moved into and out of the path of the cable to turn it back to the reversed guide of the conical section to be thence returned to the larger section, or to allow it to continue from the first guide of the conical section to the smaller section and to wind back and forth thereon; a second roller associated with the smaller section of the drum, adapted to direct the cable, at any period of its winding on said section, back to the reversed guide of the conical section to be returned to the larger section; and means for moving said rollers in unison in relatively opposite directions.

7. A hoisting apparatus comprising a controllable cable-winding drum having a section of relatively larger diameter, a section of relatively smaller diameter and an intermediate conical section, said conical section having a helical guide leading from the larger to the smaller section and a reversed helical guide leading from the smaller to the larger section; a roller associated with said drum adapted to be moved into and out of the path of the cable to turn it back to the reversed guide of the conical section to be thence returned to the larger section, or to allow it to continue from the first guide of the conical section to the smaller section and to wind back and forth thereon, and a third roller associated with said drum adapted to initially transfer, by a reversed rotation of the drum, a stored length of cable from the larger to the smaller section to be retransferred, by normal rotative direction of the drum, to the larger section.

In testimony whereof we have signed our names to this specification.

CHARLES C. SCHARPENBERG.
LEROY G. GATES.