No. 838,655. PATENTED DEC. 18, 1906.

J. R. SHARP.

HOIST.

APPLICATION FILED DEC. 28, 1905.

2 SHEETS—SHEET 1.

Fig. 1

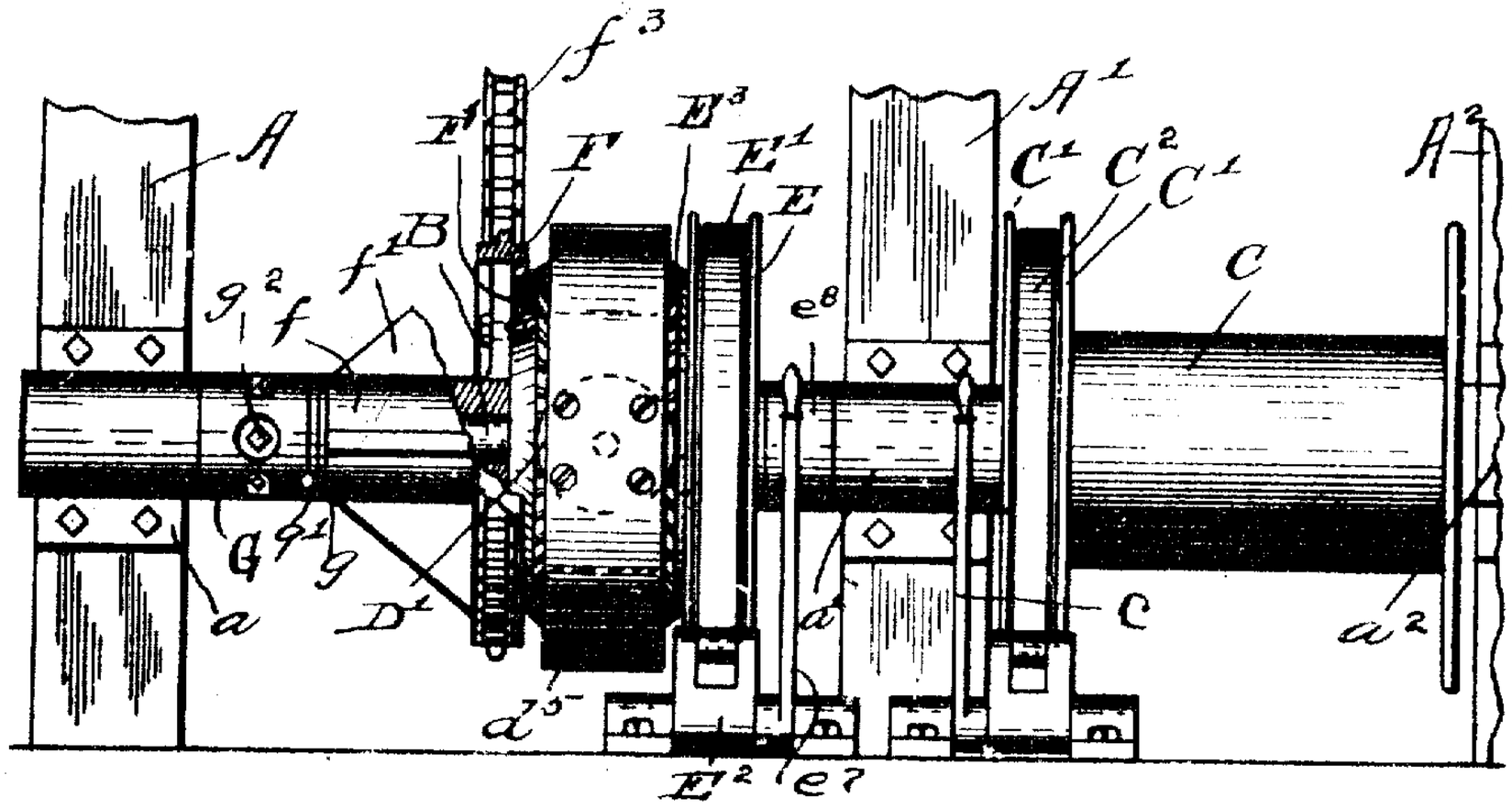


Fig. 2

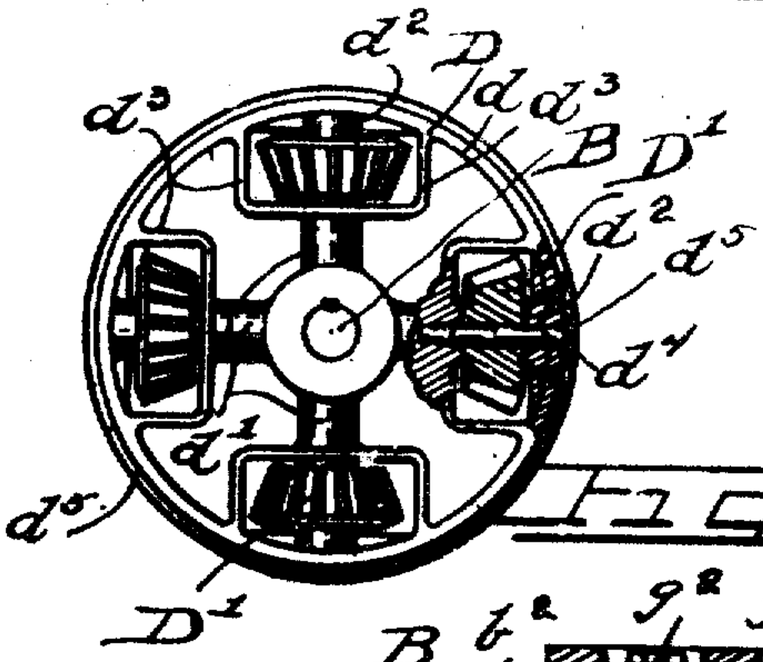


Fig. 3

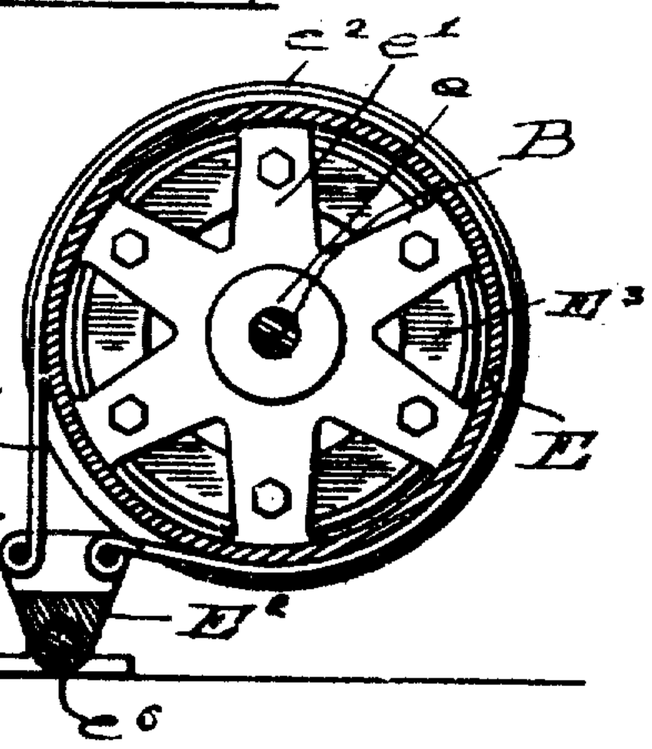
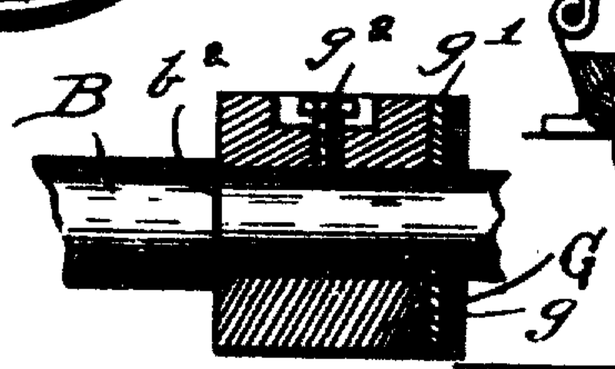


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5

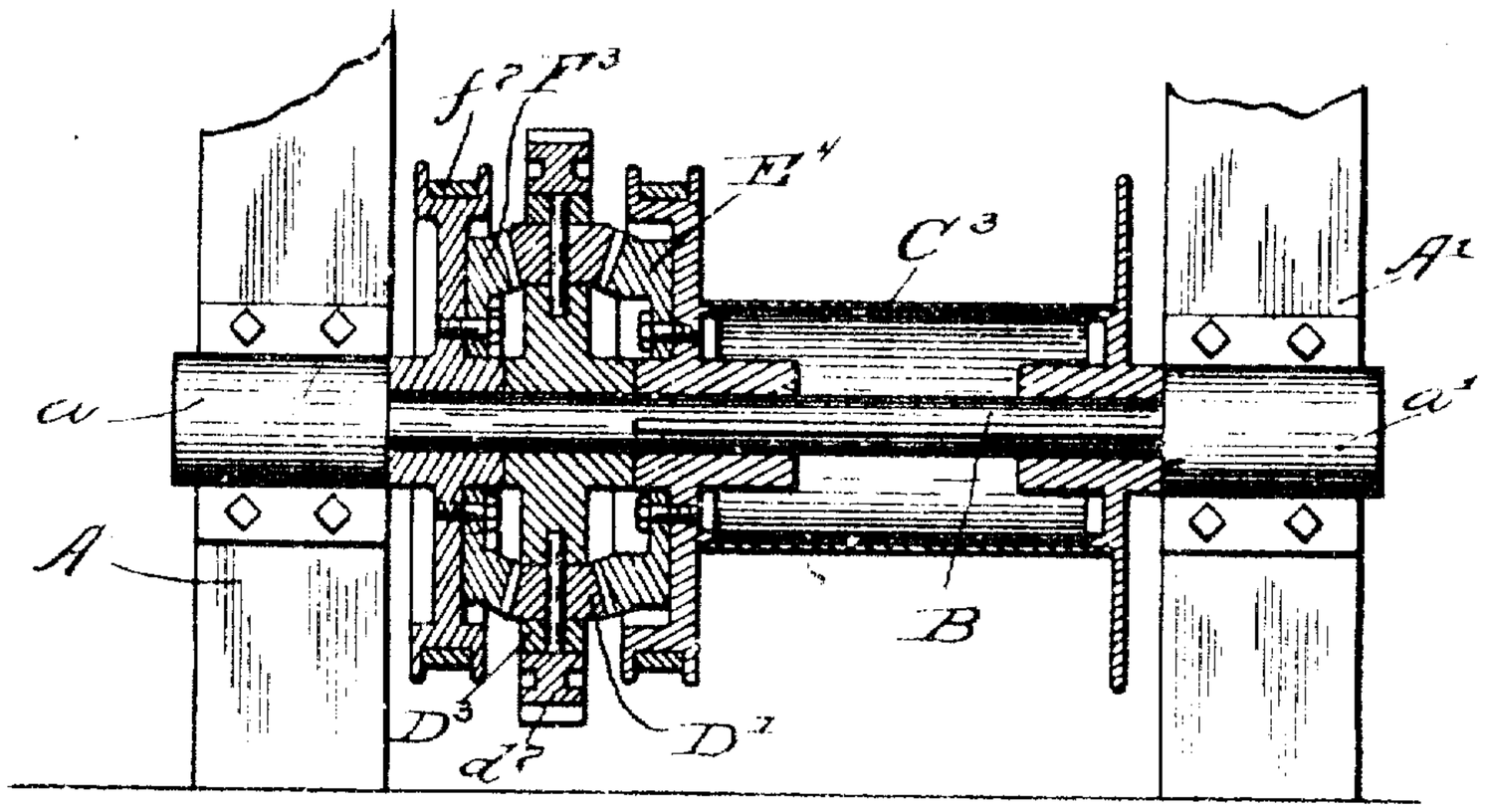
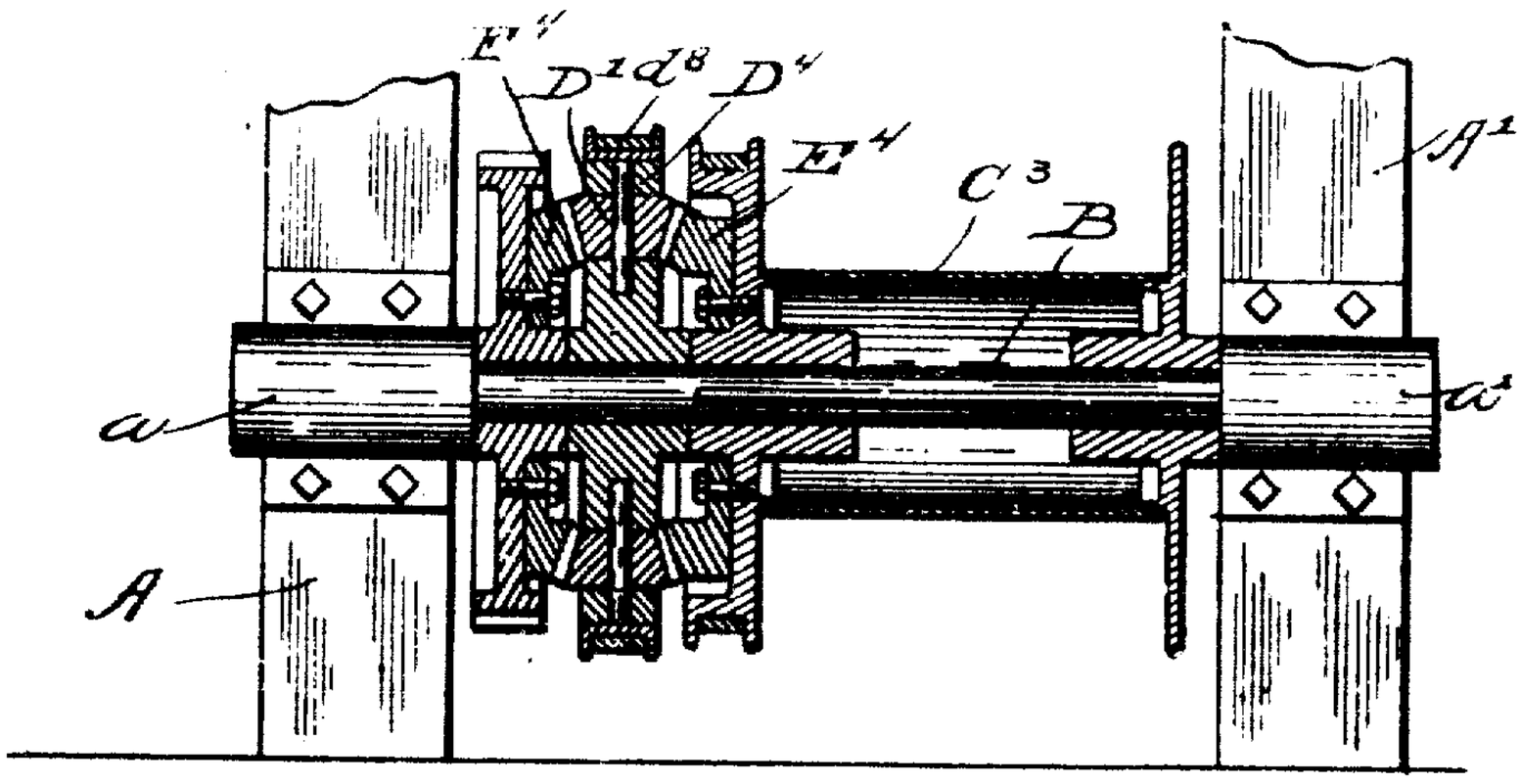


Fig. 6



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UNITED STATES PATENT OFFICE.

JAMES R. SHARP, OF CHICAGO, ILLINOIS.

HOIST.

No. 838,655. Specification of Letters Patent. Patented Dec. 18, 1906.

Application filed December 28, 1905. Serial No. 293,600.

To all whom it may concern:

Be it known that I, JAMES R. SHARP, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hoists; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in hoists, and is shown more particularly as a hoist such as used in well-drilling, though useful for any purpose for which a hoist is required.

In drilling wells where considerable weight must be supported upon the hoists and moved but a short distance at a time—as, for instance, when lowering tools into or hoisting tools from a well—it has heretofore been necessary to stop the motor or engine as each section is added to or taken from the rod or it is necessary to provide some type of shifting mechanism or power transmission device whereby the engine or motor can be disconnected from the drum during the intervals between hoisting or lowering. Various types of transmission devices have been tried for the purpose, though none of the same have proved entirely satisfactory, owing to the necessity of having the movements of the tool at all times under absolute control.

The object of the invention is to provide a hoisting mechanism whereby perfect control is maintained at all times of the object supported thereon and whereby the article supported upon the hoist may be allowed to run free and may be checked at any point in its descent or when hoisting and supported without stopping or varying the speed of the engine or motor or the adjustment of the transmission mechanism.

It is also an object of the invention to afford a strong, simple, and durable transmission of the class described not likely to get out of order and capable of transmitting the power of the motor with very slight loss of power and whereby the control is positive and instantaneous, thereby insuring maximum efficiency.

The invention consists in the matters hereinafter described, and more fully pointed out and defined in the appended claims.

In the drawings, Figure 1 is a side elevation, partly broken, of a device embodying my invention. Fig. 2 is a face view of the transmission-gear case. Fig. 3 is a section taken through the controlling-wheel. Fig. 4 is an enlarged transverse section of the split adjusting-collar. Figs. 5 and 6 are central longitudinal sections showing a somewhat more compact construction in which one of the gears is on the end of the drum.

As shown in the drawings, A, A′, and A^2 indicate the rigid posts or uprights, provided with alined bearings a, a', and a^2, and in which is journaled the main drum-shaft B. Rigidly secured on said drum-shaft between the uprights or posts A′ and A^2 is a hoisting-drum, and rigidly secured upon said shaft B and between the uprights or posts A and A′ is the gear-case D. Said gear-case as shown is circular in form, providing a relatively broad outer cylindric face d and is provided within the same with a spider, as shown, consisting of four arms d', which are approximately arranged ninety degrees apart, and extend radially and in alinement with a corresponding boss d^2 on the inner face of the periphery d, and, as shown, strong webs of metal d^3 connect the inner periphery d of the shell with the outer extremity of the arms d', thus affording compartments arranged equal distances apart and equal radial distances from the shaft and in each of which is journaled a beveled pinion D′, having a diameter greater than the width of said gear-case. As shown, said boss d^2 and the arm d' are drilled axially through the shell to receive a shaft d^4, as shown in Fig. 2, and on which said pinion is journaled, and, as shown, a metal plate d^5 is rigidly bolted to the shell to cover the end of the shaft and retain the same in place.

Journaled to rotate freely on the shaft B between the gear-case and the post A′ is a controlling-wheel E, which, as shown, comprises a spider having a hub e and arms e', on which is secured a rim e^2, of any suitable material, flanged on each side and engaging which is a steel or other suitable brake-band E′, the ends of which, as shown, are hinged to a broad arm E^2, pivotally engaged on the floor or frame by means of a shaft e^6 and which is actuated by a lever e^7 to draw said brake-band tight about the controlling-wheel or to release the same therefrom, as desired. A collar e^8 is secured on said shaft between the bearing a' and the controlling-wheel and against which the hub of said wheel bears. Rigidly bolted on the inner

face of said spider-arms c' is a beveled gear E^2, with which the beveled pinions D' are at all times in mesh. Rotatably secured in said shaft B on the opposite side of the gear-case from the controlling-wheel is a sprocket-wheel F, which, as shown, is provided with an elongated hub , through which said shaft passes. Strong integral ribs f' are inclined upwardly from said hub of the sprocket-rim, and bolted on the inner faces of the spider-arms of said sprocket-wheel, as shown in Fig. 1, is a beveled gear F', corresponding with the beveled gear E^2. Both of said beveled gears are at all times held fully in mesh with the beveled pinions D' by means of an adjusting-collar G, which, as shown, is a split collar, the parts of which are rigidly bolted together on the shaft and are engaged to rotate therewith by means of a set-screw g^2. As shown, said shaft is slightly reduced in diameter or, in other words, turned down to produce a shoulder b^2, against which the outer end of said collar bears adjacent to the bearing on the post A, and, as shown, brass or other suitable bearing-rings g and g' are interposed between said collar and the hub of sufficient thickness and number to take up the wear and to firmly engage the gears at all times with the beveled pinion. As shown, a sprocket-chain f^3 is trained around said sprocket-wheel and leads therefrom to a corresponding sprocket-wheel upon the driving-shaft of an engine or other suitable source of power.

The drum C, as shown, is provided at the end closely adjacent the upright or frame member A' with peripheral parallel flanges C', between which engages the brake-band C^2, similar to that already described and which, as shown, is operated by a lever c, which engages said band and whereby the tension thereof can be regulated and controlled at will.

The operation is as follows: The sprocket-wheel is driven continuously from the engine, but being free to rotate upon the shaft, as is also the controlling-wheel E, the pinions rotate and turn the controlling-wheel E in a direction opposite from the rotation of the sprocket-wheel, and the drum-shaft remains at rest. The brake-band C^2, controlled by the lever c, frictionally engages the drum and is capable of supporting any weight or stress to which the drum may be subjected. Should it be desired to rotate the drum—as, for instance, in hoisting—the lever e' is actuated to hold the controlling-wheel from rotation, whereupon the beveled gear F', connected with the continuously driven sprocket-wheel F, continues to rotate the pinions D', but inasmuch as the controlling-wheel cannot revolve the pinions revolve around the periphery thereof, thus revolving the gear-case and the shaft. Obviously the rate of rotation of the drum-shaft will depend upon the rate of drive of the sprocket-wheel and also, if or not, the controlling-wheel is rigidly held or is permitted to slip somewhat under the brake-band. Any such slippage obviously tends to reduce the speed or rotation of the drum. The operator stands in position to operate the drum-lever e and the lever e' for the controlling-wheel, and for this reason the mechanism is under his immediate and absolute control, inasmuch as the drum may be caused to revolve rapidly by rigidly engaging the controlling-wheel from rotation or at any slower rate of speed by permitting more or less slippage of the controlling-wheel beneath the brake-band. Should the rotation of the shaft be fast or slow, however, is of secondary importance, for the reason that by means of the drum-brake actuated by the lever e the rotation of the drum can be almost instantly stopped by simultaneously releasing the lever e' and actuating the lever e, cutting off the power and firmly supporting the load upon the drum.

If preferred, the beveled gear driven by the gears D' may be rigidly secured on the shaft or the drum, as indicated by E^4 on the drum C^3. The gear-cases D^3 D^4 in this construction rotate on their shafts, as does also the beveled gear F^3 or F^4 at the side of the gear-case D^3 or D^4 opposite the drum. In Fig. 5 a band-brake f^7 is applied to the beveled gear F^3, and a geared rim d^7 is provided on the gear-case, whereby the power is applied to the hoist. In the construction shown in Fig. 6 the band-brake d^8 is applied to a suitable rim on the gear-case D^4 and the power is applied on the beveled gear F^4. In either arrangement the transmission and the drum are both fully under control of the operator, who uses the drum-brake in lowering and the transmission-brake in hoisting and by the conjoint action of said brakes may support the load, may elevate it at high or low speed, or may control the descent by the use of either or both band-brakes.

Obviously though I have described the construction more particularly with reference to a well-hoist the same may be used for any purpose for which adapted, and I do not purpose limiting this application for patent otherwise than necessitated by the prior art, as many details of construction and arrangement may be varied without departing from the principles of my invention.

I claim as my invention—

1. The combination with a drum-shaft of a drum thereon, a friction-brake engaging the drum, a gear-case rigidly secured on the shaft, a plurality of beveled pinions engaged therein near the periphery and projecting beyond the faces of the wheel, a continuously-driven sprocket rotative on the shaft, a beveled gear thereon positively engaging said pinions, a controlling-gear on said shaft

meshing with said pinions and a friction-brake therefor whereby retarding of the controlling-gear acts to rotate the shaft at a rate dependent upon the retardation.

2. In a hoisting device, a drum, a shaft therethrough, a gear-case rigidly secured on said shaft, pinions engaged in the gear-case and projecting beyond each of the faces thereof, a driving-gear rotative on the shaft and meshing on one side with said pinions, a controlling-gear meshing with the other side of said pinions and rotative on the shaft and a brake adapted to control the rotation of the controlling-gear and acting to retard said controlling-gear thereby rotating the shaft.

3. A device of the class described embracing a rotative shaft, a drum rigidly engaged thereon, a gear-case on said shaft, pinions engaged therein near the periphery and projecting beyond each face thereof, a continuously-rotative driving-gear rotative on said shaft and meshing with said pinions, a gear on the shaft and meshing with said pinions on the opposite side from the driving-gear and a brake applied to one of said elements on the shaft other than the driving-gear and acting to retard or to stop the rotation thereof thereby driving and regulating the drive of the shaft.

4. In a hoisting mechanism the combination with a shaft of a drum rigid thereon, a band-brake for controlling the drum, a gear-case secured on the shaft, one or more pinions journaled radially in the gear-case and projecting beyond the faces thereof, a driving-gear rotatable on the shaft and intermeshing said pinions on one side thereof, a gear on said shaft and meshing with the opposite sides of said pinions a band-brake applied to one of the elements on said shaft other than the drum or the driving-gear and acting to drive the shaft by regulating the rotation of said element, a sprocket-wheel secured to the driving-gear and affording means for communicating rotation thereto.

5. A transmission device embracing a shaft, a drum thereon, a friction-brake for the drum, a constantly-rotating driving-gear on said shaft, a controlling-gear facing the same, pinions journaled radially of the shaft and rigidly secured thereto and engaging between said gears and acting to drive the shaft when the controlling-gear is held from rotation and means adjusting the driving-gear to said pinions.

6. A device of the class described comprising a drum-shaft, a drum rigidly engaged thereon, a spider having compartments in each arm adjacent the periphery and rigidly engaged on the shaft a pinion journaled radially of the spider in each compartment and projecting on each side of the arm and means for varying the speed of said drum.

7. A device of the class described embracing a wheel, radially-journaled pinions therein projecting beyond each face of the wheel, a shaft for each pinion seated in a radial bore through the shell of the wheel, a closing-plate acting to hold said shaft in place a shaft driven by said wheel, a drive-wheel rotatively engaged thereon, a gear on said drive-wheel engaging said pinion and a drum carried on said shaft.

8. In a hoist the combination with a gear-case having radially-journaled pinions therein projecting beyond its face, of a continuously-rotatable driving-gear engaging said pinions, a sprocket-wheel rigidly secured on said driving-gear, an elongated ribbed hub thereon, an adjacent collar bearing against the end of said hub whereby said gear is held in mesh with said pinions, a gear meshing with said pinions opposite the driving-gear, a brake applied to one of said elements and holding one relative of the other and a drum rotative with the gear-case.

9. A well-hoist embracing a shaft, a friction-controlled drum thereon, a lever therefor, a controlling-gear rotatable on said shaft and constantly in mesh with the driving means and gears intermeshing between the driving means and the gear and rigidly secured on the shaft acting to turn the same when the controlling-gear is held or retarded and a lever-operated band-brake engaged on said controlling-gear whereby the operator can control the rate of the hoist or descent or support the load on the drum independent of the engine speed.

10. A well-hoist embracing a continuously-driven element, a revoluble drum, power-transmitting means between said driven element and the drum, a band-brake thereon acting to couple said element with the drum and a band-brake on the drum.

11. In a device of the class described a continuously-driven gear, a shaft, a transmission thereon, a drum rigidly engaged on said shaft, a transmission-brake coupling the drum with said gear and a band-brake on the drum whereby the operator by operating said brakes may hoist, support or lower the load, and control the speed of movement.

12. In a device of the class described the combination with a drum and its shaft of a gear-case on said shaft, a plurality of pinions journaled in said gear-case, a drive-gear rotatively engaged on the shaft and meshing with said pinions and a gear on the shaft and driven by said pinions.

13. A hoist embracing a shaft, a continuously-driven gear rotatively engaged thereon, a transmission-gear driven by said gear, a drum rigidly engaged on the shaft and revoluble by the transmission, a band-brake on one of said gears adapted to hold one relative of the other and a band-brake on the drum.

14. A device of the class described comprising a drum-shaft, a continuously-driven element thereon, a transmission-gear, a gear

engaged on the shaft on the opposite side of the transmission from said driven element, a drum engaged on said shaft, a band-brake engaged on one of said gears and a brake on said drum whereby the operator may support or lower the load and control the speed of movement thereof.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

JAMES R. SHARP.

Witnesses:
C. W. HILLS,
W. W. WITHENBURY.