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C. L. CARMAN.

HOISTING AND DUMPING APPARATUS.

No. 552,513. Patented Jan. 7, 1896.

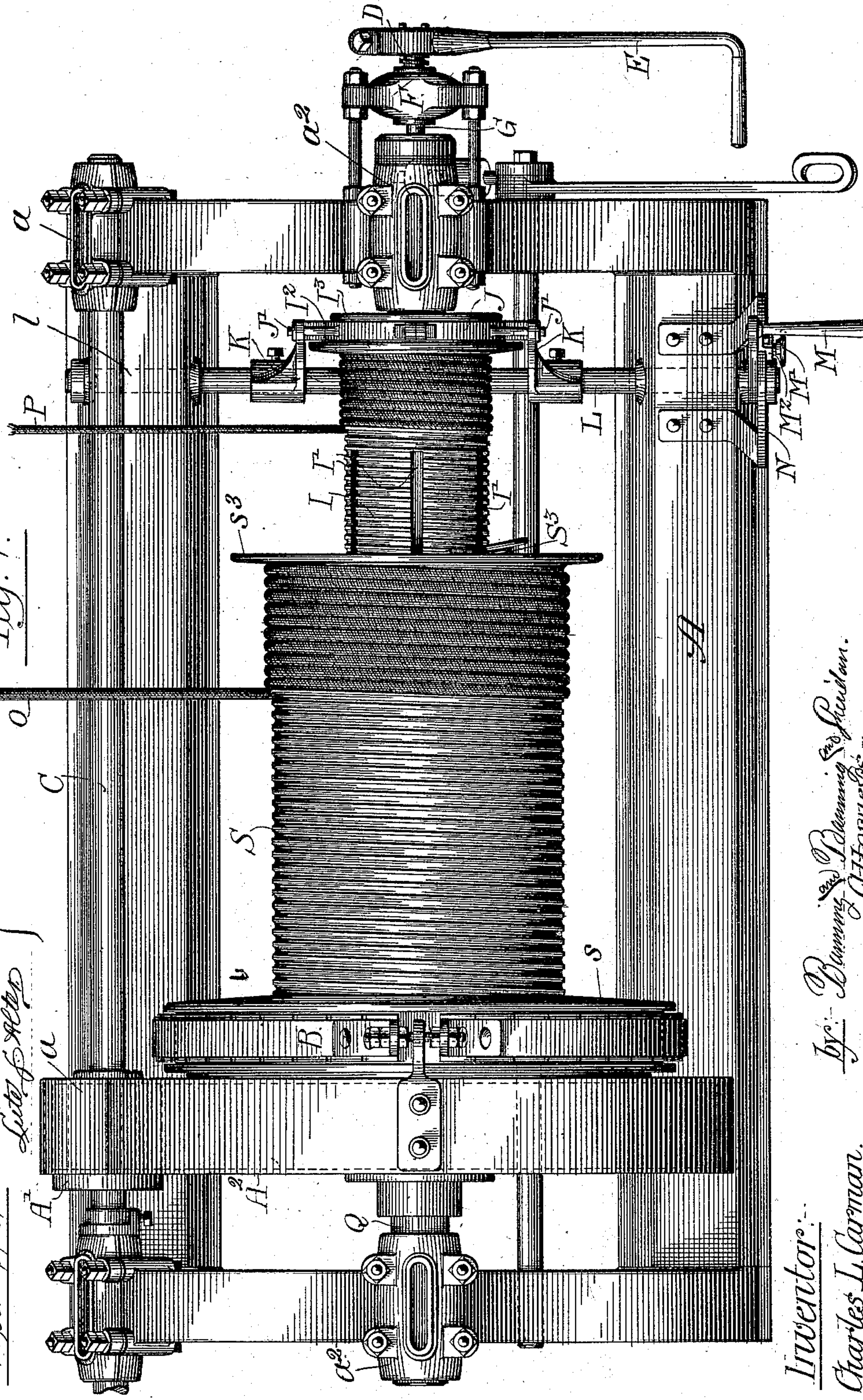

Fig. 1.

Witnesses:
Louis M. Whitehead.
Lite J. Alter

Inventor:
Charles L. Carman.
by Bunning and Bunning and Sheridan
Attorneys.

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C. L. CARMAN.

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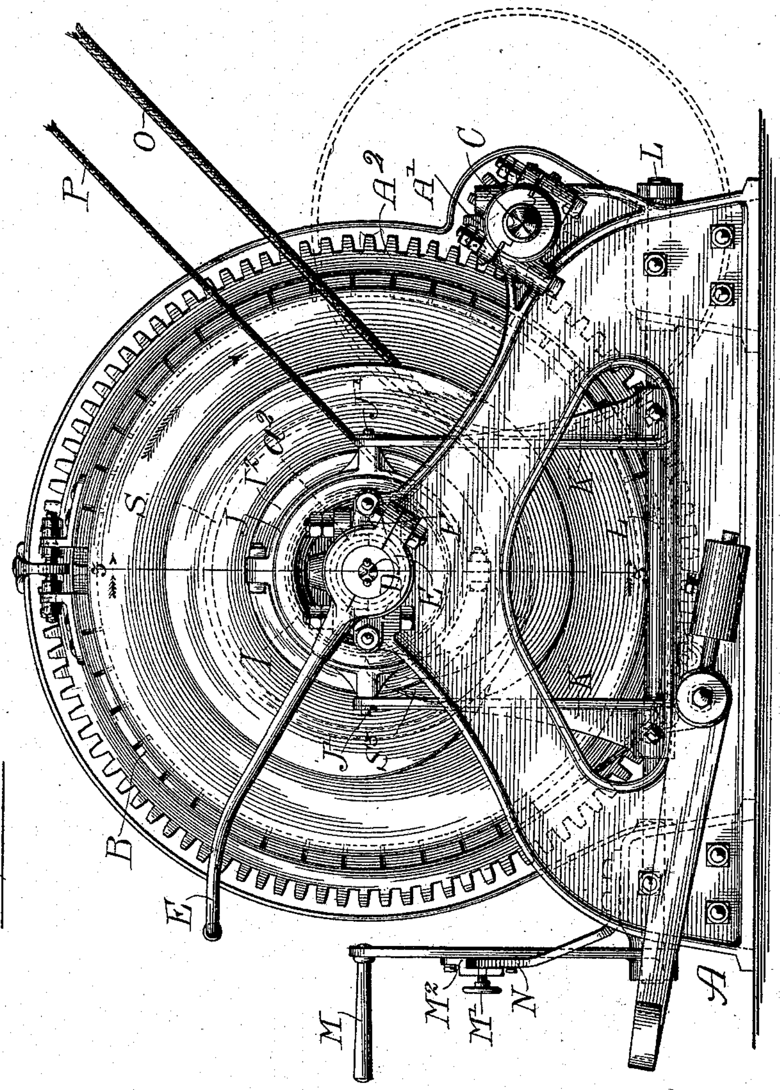
Fig. 2.



Witnesses:-
Louis M. F. Whitehead.
Lute S. Alter

Inventor:-
Charles L. Carman.

by:-
Banning & Banning & Sheridan. Attorneys.

ANDREW B. GRAHAM. PHOTO-LITHO. WASHINGTON, D.C.

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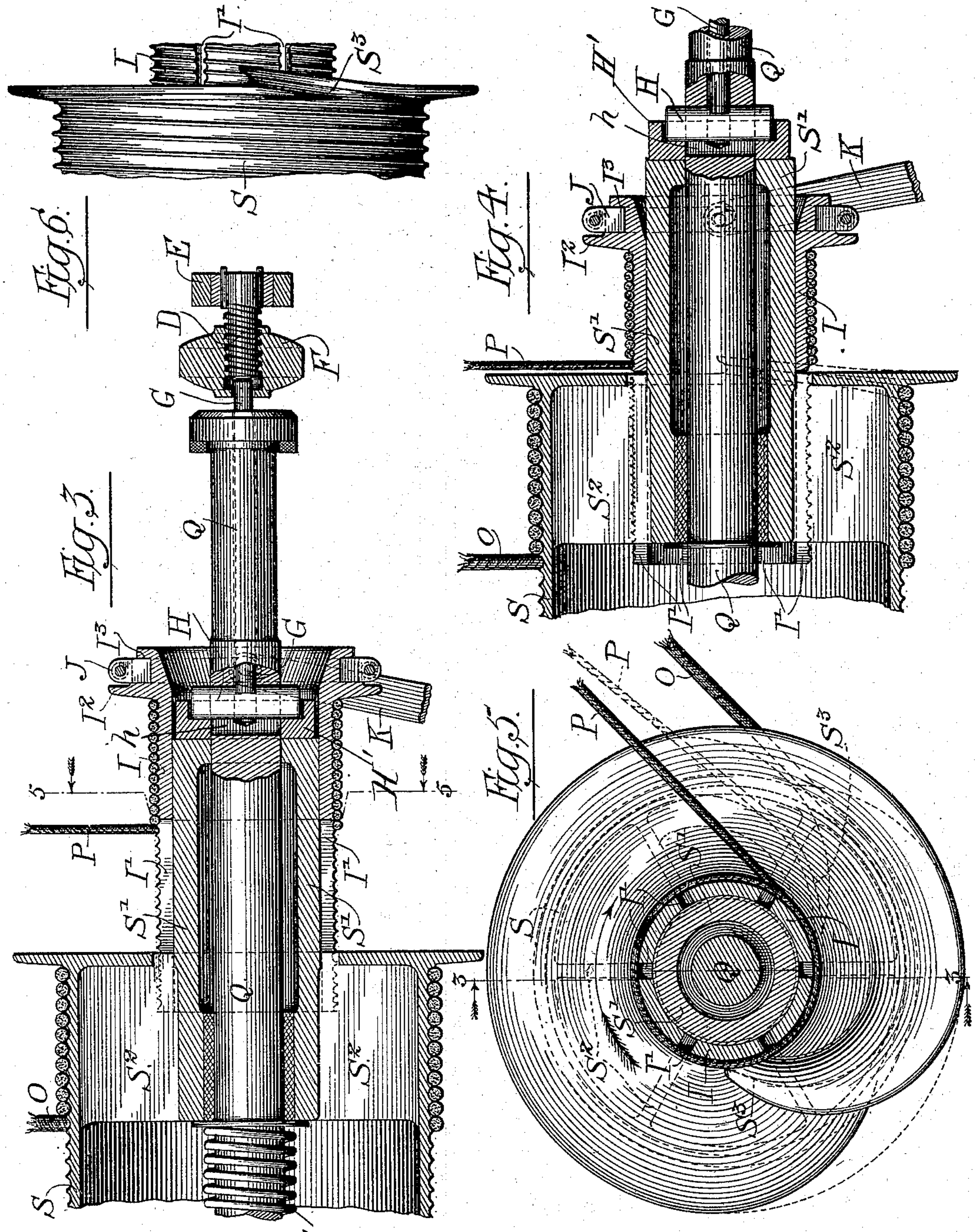
C. L. CARMAN.

HOISTING AND DUMPING APPARATUS.

No. 552,513. Patented Jan. 7, 1896.



Witnesses:-
Louis M. F. Whitehead.
Lute S. Alter

Inventor:-
Charles L. Carman.
by:- Banning & Banning & Sheridan.
Attorneys.

(No Model.) 5 Sheets—Sheet 4.

C. L. CARMAN.

HOISTING AND DUMPING APPARATUS.

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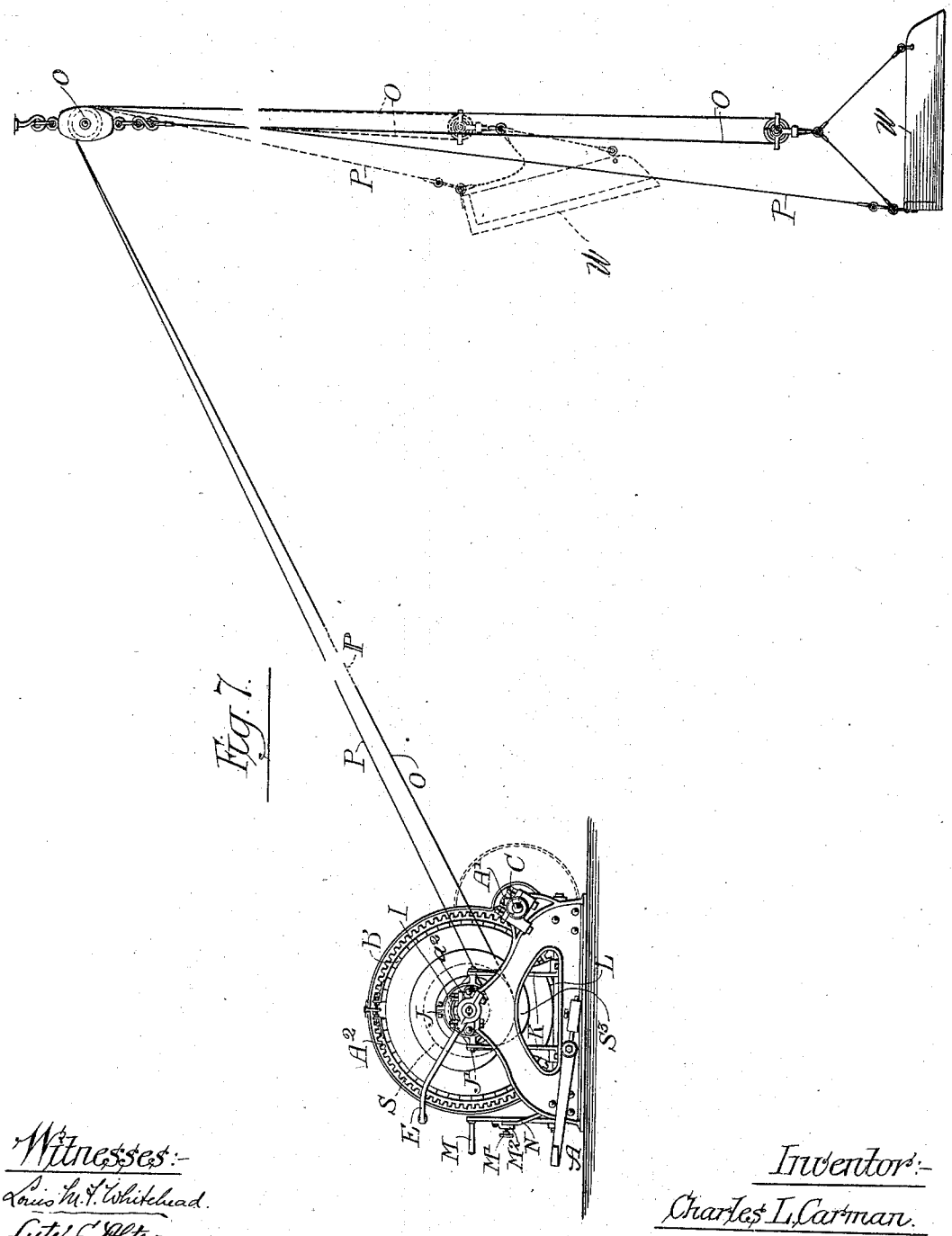


Fig. 1.

Witnesses:-
Louis M. T. Whitehead.
Lutley S. Wilkes

Inventor:-
Charles L. Carman.
by:- Banning & Banning & Heidelberg.
Attorneys

(No Model.) 5 Sheets—Sheet 5.

C. L. CARMAN.

HOISTING AND DUMPING APPARATUS.

No. 552,513. Patented Jan. 7, 1896.

Fig. 9.

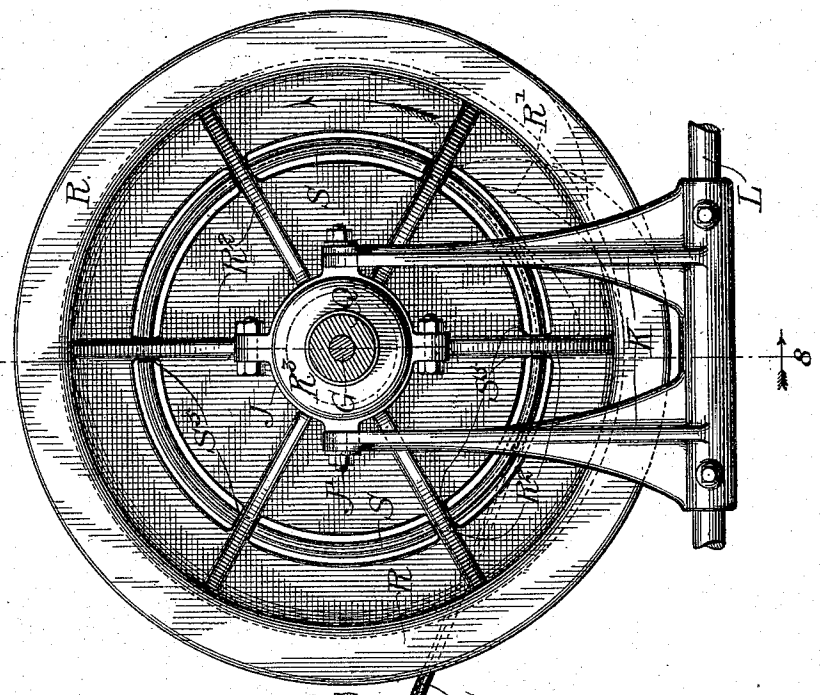
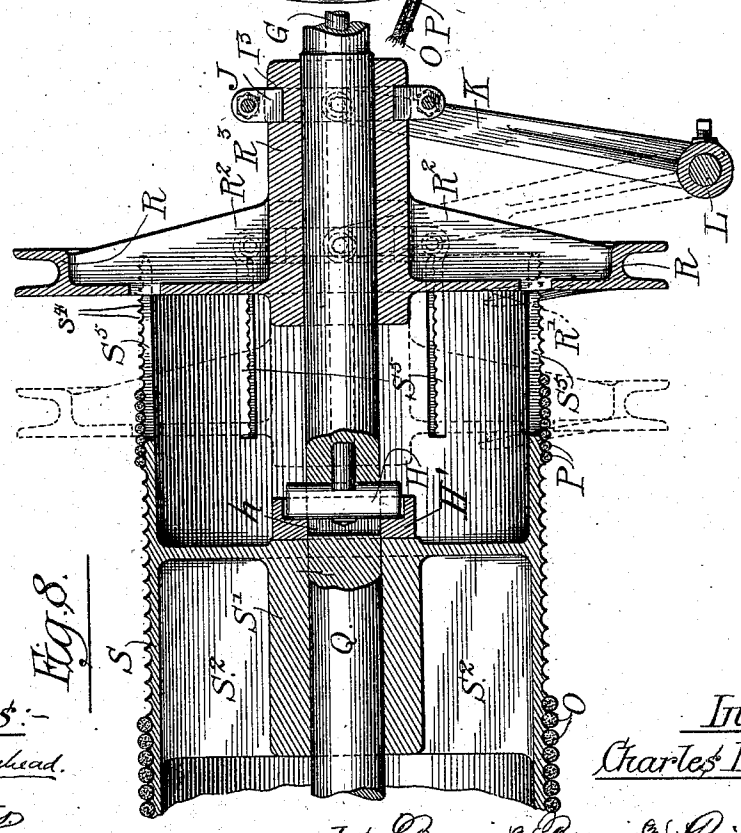


Fig. 8.



Witnesses:-
Louis M. T. Whitehead.
Lute L. Alley

Inventor:
Charles L. Carman.

by: Banning & Banning & Sheridan.
Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES L. CARMAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GATES IRON WORKS, OF SAME PLACE.

HOISTING AND DUMPING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 552,513, dated January 7, 1896.

Application filed April 15, 1895. Serial No. 545,778. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. CARMAN, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Hoists, of which the following is a specification.

My invention relates to hoisting mechanism and particularly to means for automatically dumping a skip, car or bucket, so as to deliver a load of material at a desired point.

The object of my invention, therefore, is to provide, in combination with hoisting mechanism, a simple, economical and efficient automatic dumping attachment; and the invention consists in the features and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a plan view of my improved power-hoist. Fig. 2 is an end elevation of the same. Fig. 3 is a detailed longitudinal section on line 3 of Figs. 2 and 5 taken through the dumping-drum and a portion of the main hoisting-drum, the dumping-drum being shown in the position it will occupy when it is intended to dump the load at the top or finish of the lift. Fig. 4 is a similar view to that shown in Fig. 3, showing the dumping-drum in one of its intermediate positions. Fig. 5 is an end view of the main drum, taken on line 5 of Fig. 3, showing the dumping-drum in section. The dotted outline shows the changed position of the dumping-line as it mounts on the helical spiral groove from the dumping-drum to the main drum. Fig. 6 is a detail of a portion of the end of the main drum, showing the spiral groove for guiding the dumping-rope from the dumping-drum to the main drum. Fig. 7 is a general diagrammatic view showing the arrangement of the hoisting-rope, dumping-rope, pulleys and hoist, and also in dotted outline the position of the tray and bucket at the time of dumping; and Figs. 8 and 9 show modifications hereinafter described.

In describing my improvement I will only describe in detail and minutely that portion of the mechanism which I consider to be new; and as the general form and construction of the machine is of the usual and ordinary form it will be readily understood by those skilled in the art and accustomed to the use of such machines from a glance at the drawings. I do not, therefore, deem it necessary to enter into minute details of the ordinary parts, which would only tend to confuse the artisan and make a long and unnecessary specification.

In constructing my improvement I use a frame A, of the desired form and size, and adapted to support and hold the different operative parts in their relative positions. Mounted in suitable bearing portions *a a* of the machine is a driving-shaft C, which is provided with a driving-pinion A′, adapted to engage with and drive a main gear A^2, which is secured to and mounted upon a rotating shaft Q in suitable bearings a^2 in the frame portion. Mounted loosely upon the rotating shaft Q is a main winding-drum S, which is provided with an enlarged flanged portion *s*, adapted to receive the brake B, which may be operated in any well-known manner. The left-hand portion of the main drum and the right-hand portion of the main gear are provided with frictional surfaces adapted to engage with each other, so that during such engagement the rotary motion of the gear is imparted to the drum to wind up the lift-rope O. In order to obtain this frictional engagement, the main winding-drum is provided with an elongated hub S′, which is bored axially and mounted loosely upon the shaft Q. (See Fig. 3.) This shaft is provided with an internal axial opening at the right-hand side, into which is fitted a thrust-rod G, engaging with a cross-key H, which is loosely fitted in a keyway *h*. Loosely mounted upon this shaft, and between the cross-key H and the free end of the elongated hub, is a cup-shaped washer H′, against which the cross-key impinges. A yoke F is secured to the right-hand end of the frame portion and provided with a central threaded opening in which is inserted an actuating-screw D, which impinges against the outer free end of the thrust-rod G. This actuating-screw is provided with a lever E, by which it may be moved in or out. Interposed between the elongated hub S′ and the main gear is a helical spring *s′*, which tends to normally separate the main gear and the wind-

ing-drum. As the lever E is depressed, it forces the thrust-rod and engaging parts into contact with the hub of the main drum, and such drum into frictional contact with the gear. By raising the lever E the spring s' automatically disengages the parts.

So far this description has only shown parts that are ordinarily used in common practice, and I make no claim to these parts singly as being new.

In ordinary instances the main drum is used to wind up a rope, which raises the ordinary tray or bucket. It is often desirable to tilt this tray or bucket at a desired point, so that, irrespective of the action of the engineer, the same may be tilted automatically at a desired point every time. To provide simple, economical and efficient mechanism for accomplishing this dumping of the tray, bucket, car, or other mechanism automatically, at the desired point, is the principal object of my invention. To construct this automatic dumping attachment I mount upon the extending end of the elongated hub of the main winding-drum (see Figs. 3 and 4) an auxiliary drum I, of less diameter than the main drum. This auxiliary drum is provided with slots I′, which span the arms S^2 in the end of the main drum that connect the elongated hub and the cylindrical portion of the drum. This slotting of the auxiliary drum and the engagement with the arms S^2 provides means by which the small drum is positively rotated with the large drum, but is permitted to have an independent lateral motion. This auxiliary drum is provided with the ordinary helical groove, around which the dump-rope P may be wound. As both drums, the main and the auxiliary, rotate simultaneously and their ropes are wound up at the proper ratio of speed, the rope P will in time contact the flange s^3 of the main winding-drum. This flange, when properly made to accomplish my object, is provided with an involute portion (see Fig. 5) in which is a helical spiral groove S^3, so that the dumping-rope will leave the auxiliary drum, and by means of this helical spiral groove (see Fig. 6) be wound upon the main drum at an accelerated speed to tilt the bucket or tray.

In order to accomplish the dumping at any specified time, it is desirable to have means for imparting the desired lateral motion to the auxiliary drum, so that the proper amount of winding-surface may be exposed. For this purpose the outer end of the auxiliary drum is provided with a flange I^2, provided with an annular groove I^3, in which is inserted a split ring J, having trunnions J′ J′. Levers K are mounted upon a suitable rock-shaft L, which is vibratingly mounted in bearings l of the frame portion. These vibrating levers are provided with elongated slots that engage the trunnions of the split collars. The outer end of the rock-shaft is provided with a hand-lever M, by which the rock-shaft may be vibrated, so as to move the auxiliary drum, by the mechanism above described, laterally toward or away from the main winding-drum. In order to hold this rock-shaft in the desired position, and by it the auxiliary winding drum in the desired relation to the main winding-drum, the hand-lever M is provided with a hand-screw M′, mounted on a suitable clip M^2, so as to engage with the quadrant N, that is bolted to the main frame. (See Fig. 2.) By turning the hand-screw in to engage the quadrant the hand-lever may be held in any desired position.

It will thus be seen that the dumping of the car will take place at a high point of its lift when the auxiliary drum is at its outermost limit, and at a low point in its lift when the auxiliary winding-drum is at its innermost limit or nearest to the main winding-drum, so as to present the minimum amount of winding-surface.

Describing Fig. 7, this figure shows an arrangement of pulleys and blocks known as the "double fall." By the use of these, the speed of the rope O on the main drum is twice that of the load. The dumping-rope P, which is attached directly to the heel of the tray, moves with but half the speed of the hoisting-rope, and, therefore, the dumping-drum should be exactly half the diameter of the main winding-drum. Supposing the tray W, as shown in solid lines in Fig. 7, is at the bottom of the excavation, the auxiliary drum is moved so as to obtain the desired relation between it and the main winding-drum—that is, so that the auxiliary drum will wind up just so much of the rope as will be commensurate to the point between where the load is taken and the point where it is desired to dump it. The mechanism is then secured in that position and the main driving mechanism started. As the winding-surface of the auxiliary drum is completely filled with the rope, the dump-rope contacts the helical spiral groove in the flange of the main drum, and, taking an accelerated speed, dumps the tray, as shown in dotted outline, Fig. 7. It is obvious, however, that any arrangement of rope and tackle may be used to elevate the load in place of the one above described, without departing from the spirit of my invention. This may be accomplished by any suitable change in the proportion of the diameters between the two drums.

When it is necessary to attach the elevating-rope O directly to the car or skip, it will then be necessary to wind the dumping-rope upon an auxiliary winding-surface of the same diameter as the main drum, as they both must have the same speed up to the point of dumping, at which place the speed of the dumping-rope must be increased to dump the load. To accomplish this, I make the main winding-drum (see Figs. 8 and 9) without the flanged or helical groove and extend the drum-shell to the right to provide an auxiliary winding-surface s^4 for the dumping-rope. The main winding-drum, as before, is provided with the

usual elongated hub and mounted loosely upon the rotating shaft Q, a portion of which only is herein shown. To change the relation of the auxiliary winding-surface upon which the dump-roll is wound to the desired proportion between it and the main winding-surface, I provide a movable rotating flange R, which is provided with a helical spiral groove R′, to give the dumping-rope, as it leaves the auxiliary winding-surface, an accelerated speed to tilt or dump the tray. The auxiliary winding-surface of the drum is slotted, as at s^5, so that the arms R^2 of the rotating flange may enter the same and the flange be rotated positively with the drum, but permitted to partake of an independent lateral motion. The rotating flange is provided with a hub portion R^3, which is mounted loosely on the shaft Q, so as to have independent lateral and rotary motions from such shaft. To move the flange laterally upon this shaft, and by it change the relation of the auxiliary and main winding-surfaces, the hub portion R^3 is provided with an annular groove I^3, similar to that shown in the ordinary machine, and which is provided with a similar split ring J, having the trunnions, &c., as hereinbefore described in connection with my preferred form, so that by vibrating the rock-shaft L, as described, the rotating flange may be moved away from or toward the winding-surfaces and the relation of such surfaces changed.

In this, as in the previously-described structure, when the dumping-rope has been wound upon all of the auxiliary winding-surface it contacts the spiral groove in the rotating flange and is given an accelerated speed, so as to tilt the car or tray at the desired time. It will thus be seen that the relation between the diameters of the two drums—the auxiliary and main winding—is arbitrary, and must bear the same proportion to each other that the speed of the ropes do.

While I have described my invention with more or less minuteness as regards details, I do not desire to be limited thereto unduly, any more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, construction and arrangement, the omission of parts and substitution of equivalents, as circumstances may suggest or necessity render expedient.

I claim—

1. In a hoist, the combination of a main winding drum upon which a lifting rope may be wound, an auxiliary winding drum upon which a dumping rope may be wound, means for changing the area of the operative winding surface of the auxiliary drum, means for accelerating the speed of the dumping rope at the desired period of time, and lifting and dumping ropes substantially as described.

2. In a hoist, the combination of a main winding drum upon which a lifting rope may be wound, an auxiliary winding drum upon which a dumping rope may be wound, means for changing the relative area of the winding surface of the auxiliary drum, an involute flange provided with a spiral groove adapted to receive the dumping rope after it has been wound around the surface of the auxiliary drum and to give it an accelerated speed for the dumping of a tray or similar mechanism, and lifting and dumping ropes substantially as described.

3. In a hoist, the combination of a main winding drum upon which a lifting rope may be wound, an auxiliary winding drum upon which a dumping rope may be wound, a flanged portion provided with a spiral groove of larger relative diameter than the auxiliary winding drum and adapted to receive the dumping rope and to give it an accelerated speed, one of such parts—the flanged portion of the auxiliary winding drum—having an independent longitudinal movement for the purpose of changing the area of the operative winding surface of the auxiliary drum, means for giving such movable portion the desired longitudinal motion, and means for holding such portion in its desired longitudinal position, and lifting and dumping ropes substantially as described.

4. In a hoist, the combination of a main winding drum upon which a lifting rope may be wound, an auxiliary longitudinally movable winding drum upon which a dumping rope may be wound and which latter is adapted to rotate positively with the main winding drum but having an independent longitudinal motion to change the area of its operative winding surface, and lifting and dumping ropes substantially as described.

5. In a hoist, the combination of a main winding drum upon which a lifting rope may be wound, an auxiliary longitudinally adjustable winding drum upon which a dumping rope may be wound and which latter is adapted to rotate positively with the main winding drum but has an independent longitudinal motion, means for moving the auxiliary winding drum longitudinally to change the area of its operative winding surface, a flanged portion provided with a spiral groove adapted to receive the dumping rope as it leaves the auxiliary winding surface and to give it an accelerated speed, and lifting and dumping ropes substantially as described.

6. In a hoist, the combination of a main winding drum upon which a lifting rope may be wound, an auxiliary winding drum of smaller diameter upon which a dumping rope may be wound, a flanged portion adjacent to the point where the main and auxiliary winding drums contact said flanged portion provided with a spiral groove to give the dumping rope an accelerated speed, and lifting and dumping ropes substantially as described.

7. In a hoist, the combination of a main winding drum upon which a lifting rope may be wound, an auxiliary longitudinally movable winding drum of smaller diameter than the main winding drum upon which a dumping rope may be wound and which latter is

adapted to move positively with the main winding drum but partaking of an independent longitudinal motion, means for moving the auxiliary winding drum longitudinally to change the area of its operative winding surface, a flanged portion upon the main winding drum provided with a spiral groove to receive the dumping rope and give it an accelerated speed, and lifting and dumping ropes substantially as described.

8. In a hoist, the combination of a main winding drum upon which a lifting rope may be wound, an auxiliary winding drum of relatively smaller diameter than the main winding drum and which latter drum is longitudinally movably mounted in such main winding drum so as to partake of its rotary motion but having an independent longitudinal motion, one of such drums—preferably the main winding drum—provided with a spiral groove formed upon the end where such drums contact for the purpose of receiving the dumping rope and giving it an accelerated speed, means for moving the auxiliary winding drum longitudinally to change the area of its operative winding surface, and means for holding such auxiliary drum in its desired longitudinal position, substantially as described.

CHARLES L. CARMAN.

Witnesses:

THOMAS F. SHERIDAN,

THOMAS B. MCGREGOR.