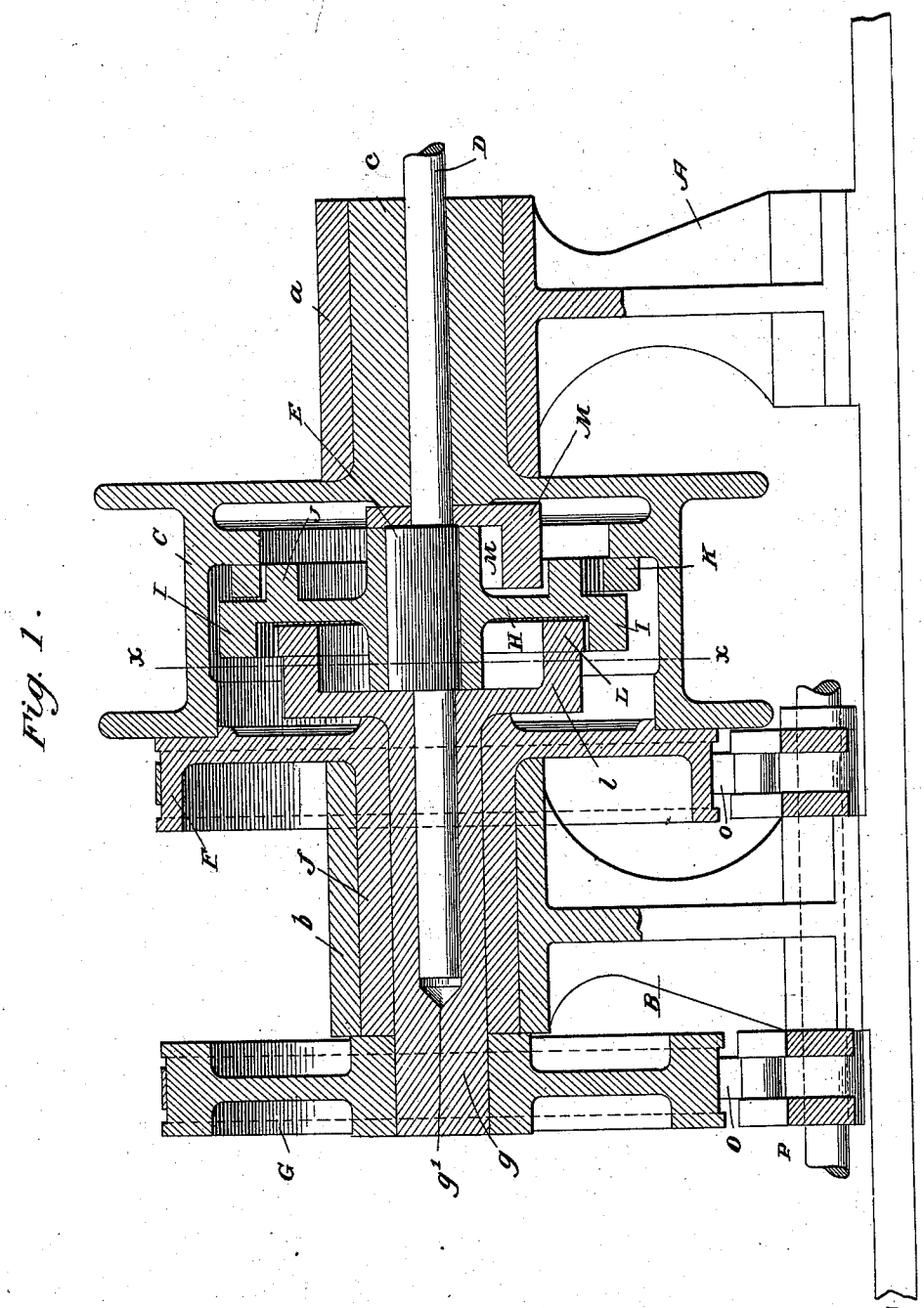
(No Model.) 2 Sheets—Sheet 1.

D. S. REGAN.

HOISTING MECHANISM.

No. 558,108. Patented Apr. 14, 1896.

Fig. 1.



Attest.
Edw. D. Duvall Jr.
A. M. Bayard

Inventor.
Daniel S. Regan
per Fred'k Tasker.
Atty.

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

(No Model.) 2 Sheets—Sheet 2.

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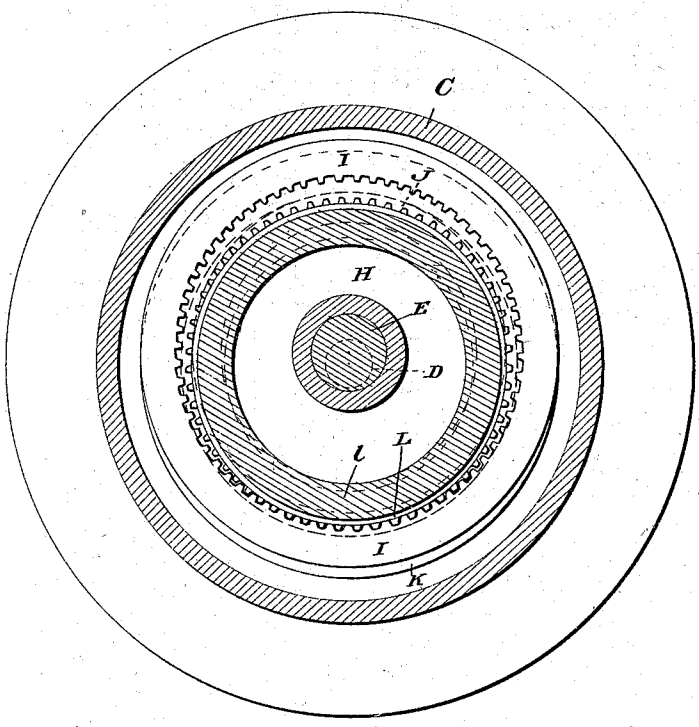

Fig. 2.

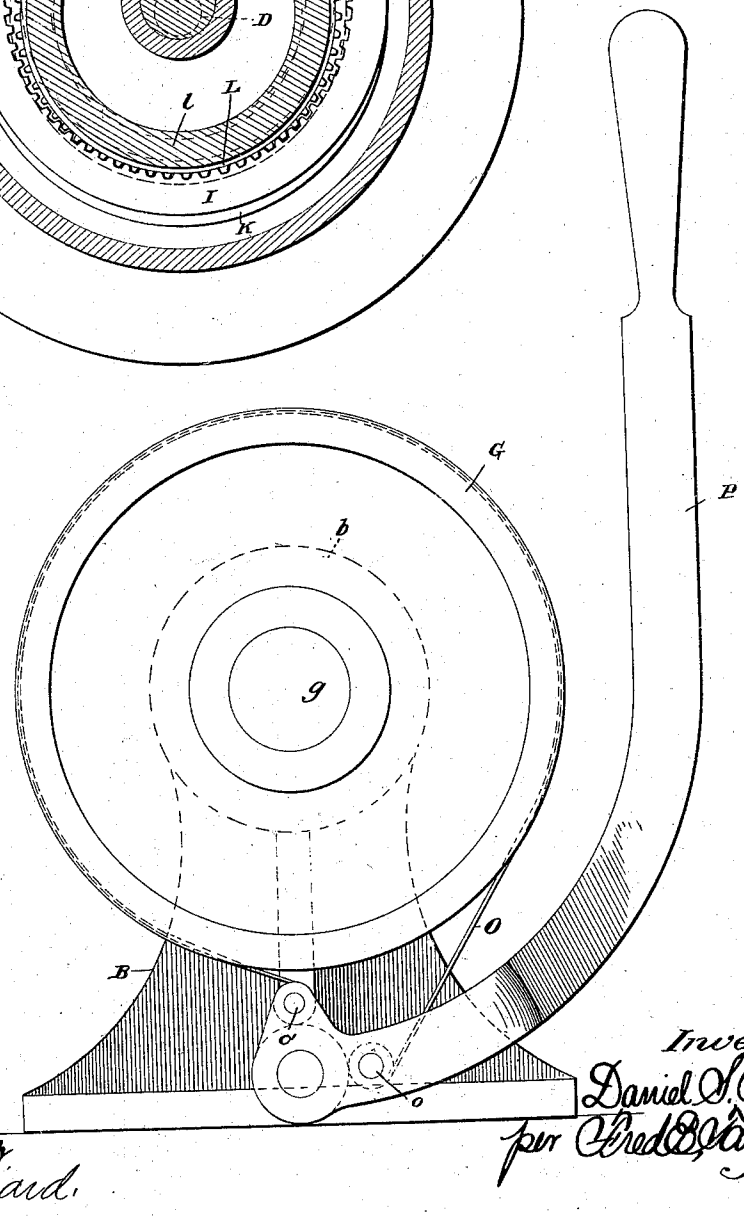

Fig. 3.

Attest.
Edw. D. Duvall. Jr
A. W. Bayard.

Inventor
Daniel S. Regan.
per Fred B. Baker.
Atty.

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

UNITED STATES PATENT OFFICE.

DANIEL S. REGAN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE POWER TRANSMITTER COMPANY, OF JERSEY CITY, NEW JERSEY.

HOISTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 558,108, dated April 14, 1896.

Application filed July 13, 1895. Serial No. 555,905. (No model.)

To all whom it may concern:

Be it known that I, DANIEL S. REGAN, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Hoisting Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to an improved hoisting mechanism for raising and lowering weights of various kinds.

The invention has for its object the adaptation of a new and improved form of reduction-gearing for use in this connection, so that the high speed of the driving-shaft, which may be the armature-shaft of an electric motor or some other high-speed prime mover, may be reduced to a lower speed in the hoisting-drum when rotating at a given ratio, the same depending upon the proportions of the different gears and their relation and combination relatively to each other. Said novel form of reduction-gearing just referred to has been made the subject of another application for Letters Patent, filed June 7, 1894, Serial No. 513,739. The invention set forth and claimed in the present application is therefore a carrying forward and adaptation of the invention described in said other application.

The invention therefore consists, essentially, in the construction, arrangement, and combination of parts substantially as will be hereinafter described and claimed.

Referring to the accompanying drawings, I have illustrated therein one preferred embodiment of my invention, the same being sufficient to explain the principles thereof and enable those skilled in the art to make and use the invention, and it will be understood that the details of construction and arrangement of parts may be varied to suit the exigencies of any particular case, and that parts of my invention may be used separately or in combination with other equivalent parts without departing from the spirit of my invention.

In the drawings, Figure 1 is a longitudinal sectional view of my improved hoisting mechanism. Fig. 2 is a cross-sectional view on the line *x x* of Fig. 1 and showing the relative arrangement of the various gear-wheels. Fig. 3 is a left-hand elevation showing the arrangement of the brake-levers and other parts of the brake mechanism.

Similar letters of reference designate corresponding parts throughout the different figures of the drawings.

A and B denote two separate standards mounted upon some suitable bed or platform and having their upper ends formed with the horizontal shaft-bearings *a* and *b*, respectively, which bearings are in horizontal alinement with each other.

C indicates a horizontal drum, on which is wound a suitable rope or cable adapted for hoisting purposes. This drum is provided on one side—as, for instance, the right-hand side, as shown in Fig. 1—with a central integral horizontal trunnion or journal *c*, that is supported in the bearing *a* and is arranged to rotate in said bearing. To the opposite side of the drum C is attached a wheel F, which is outside the flange of the drum and is formed integral with a sleeve-like trunnion or journal *f*, that is supported and revolves within the bearing *b*.

Another wheel G, similar to wheel F and having the same diameter, is situated close to the end of the bearing *b* opposite to where the wheel F is located, and wheel G is made integral with or is securely attached to horizontal shaft *g*, which passes through and is supported revolubly within the hollow trunnion or journal *f* before mentioned, the opposite end of shaft *g* being within the drum C and having formed integral with it a wheel *l*, which lies alongside of the wheel F. It will be evident that as wheel *l* is against the wheel F and the latter is against one end of the bearing *b*, while the wheel G is close against the other end of said bearing *b* and likewise close against the end of the hollow trunnion *f*, which is integral with the sleeve F, these parts will all work nicely together without becoming dissociated, such intimate relation and correct working of the several mechanical parts being quite essential and necessary to the true performance of the proper function of the

hoisting mechanism as resulting from the action of the gearing, which is located inside of the hoisting-drum C and which is presently to be explained. The wheel *l* is either formed with gear-teeth or else a gear-tooth rim like L is secured thereto, as shown in Fig. 1, so that an external gear may thus be provided, situated within the drum C and integral, as it were, with the wheel G, inasmuch as it is integral with the shaft *g*, to which the wheel G is fastened, and hence any movement of the gear-wheel L will be transmitted simultaneously to the wheel G, and, reversely, any stoppage of the wheel G will simultaneously cause the wheel L to be brought to a standstill.

The driving-shaft D is a shaft which is adapted for rotation by any suitable kind of motor. It may be the armature-shaft of an electric motor and it may be any other kind of high-speed shaft. This shaft D is supported in the journal *c* and the drum C and passes through the drum and into the tubular recess *g'* in the shaft *g*. Said recess may pass partially or entirely through the shaft *g*. The recess *g'* therefore serves as a bearing for the end of the drive-shaft D. On the shaft D is an eccentric E, which is located centrally within the drum C. On this eccentric is a combined external and internal gear-wheel consisting of the web H, on one side of which is the internal gear-rim I and on the other side of which is the external gear-rim J, said internal gear I meshing with the external gear-wheel L already referred to, and said external gear J meshing with the internal gear-wheel K, which is attached to and forms a part of the drum C. The combined external and internal gear-wheel is mounted upon and driven by the eccentric E. It will thus be seen that the several gear-wheels just mentioned are inclosed entirely within and protected by the drum C. The combined external and internal gear-wheel, although eccentric to the axis of revolution of the shaft D, is concentric with the eccentric E. On the shaft D, preferably at a point close to the eccentric H, although it may be situated at any other desired point, I place a balance or balance-wheel M, which is securely fixed on the shaft. This balance is of great importance in making the movement of the gearing steady and uniform and avoiding irregularities and jerks, which strain and damage the machinery, and it is especially valuable when the gearing is employed with a high-speed prime mover—such as, for instance, an electric motor.

To each of the wheels F and G, which wheels for the sake of simplicity I denominate "brake-wheels," is applied some suitable form of brake-strap like that shown at O in Fig. 3 and having one end attached at the point *o* to lever P, while the other end is attached at the point *o'* to the end of the brake-lever P. Hence the operator, by laying hold of the brake-lever and by drawing the same toward himself, can tighten the strap upon the periphery of the wheel F or the wheel G, as the case may be, and thereby brake and stop the wheel. Of course it is evident that I will have a brake-strap and also an operating-lever for each of the wheels F and G.

I do not intend to be restricted to any precise form of strap or any particular kind of operating-lever, but reserve the liberty of employing such forms as may be deemed most suitable.

The operation of my improved hoisting mechanism is as follows: Suppose, for instance, that the brake is applied to the wheel G and said wheel is consequently caused to remain stationary, then likewise the gear-wheel L will remain stationary. Now as the shaft D rapidly revolves power will be communicated through the eccentric, the combined external and internal gear-wheel revolving loosely upon and driven by the eccentric, and the gear-wheels L and K, with which the combined external and internal gear-wheel engages, to the drum C, and said drum will consequently revolve at a rate of speed reduced below the speed of the shaft and in a direction of motion opposite to that in which the shaft D is revolving, and evidently the wheel F, which is attached to the drum C, will partake of the same reduced and reverse movement. The gearing, therefore, which I have combined with the hoisting-drum enables me to gain a very important and marked advantage in the use of the drum, because it permits said drum to be effectively used in combination with a high-speed prime mover, a result which heretofore has been impossible, owing to the absence of any efficient gearing arrangement for reducing the rate of movement of the prime mover to the rate at which the drum ought properly to revolve in the performance of its hoisting functions. If now we apply the brake to the wheel F and release the brake from the wheel G, the result will be that the drum C will be held stationary, which will consequently cause the internal gear K, which is carried by said drum, to likewise remain stationary, and as the shaft D revolves, as before, the result will be to communicate the reduced rate of motion through the aforesaid gearing, already described, to the gear-wheel L, the shaft *g* and the wheel G.

In the carrying of my invention into practical effect along the line indicated it becomes quite essential that the relative arrangement of the various mechanical parts, consisting of the drum, the wheels, the gearing, the drive-shaft, and the various bearings, should not vary materially from what I have herein illustrated and described, because in the present collocation of mechanical parts resides the effective combination which enables me to produce the enhanced and valuable result which I have herein described as pertaining to a hoisting-drum as the outcome of my invention. Therefore, although the present example of the invention is merely one embodiment, yet it is essential that in the practical

use thereof there should not be an extreme variation from the legitimate scope of the claims to be herein appended.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a hoisting mechanism, the combination of a hoisting-drum having on one side a central horizontal journal, a brake-wheel on said drum, said drum also having a horizontal sleeve-like journal located oppositely to the first-mentioned journal, the bearings supporting the said journals, the same being in horizontal alinement with each other, a second brake-wheel, a shaft which is supported within the sleeve-like journal, and to which said second brake-wheel is attached, a gear-wheel on said shaft within the drum, a drive-shaft which revolves within the aforesaid shaft and also within the drum-journal, an eccentric on said drive-shaft, and a gearing connection between said eccentric and the drum and the aforementioned gear-wheel, substantially as described.

2. In a hoisting mechanism, the combination of a hoisting-drum having on one side a central horizontal journal, a brake-wheel on the drum, said drum also having a horizontal sleeve-like journal, bearings for the two journals located in horizontal alinement with each other, a second brake-wheel, a shaft located within the sleeve-like journal of the first brake-wheel to which shaft the second brake-wheel is attached an external gear-wheel on said shaft within the drum, a drive-shaft supported in the drum-journal and also in a recess in the aforesaid gear-carrying shaft, an internal gear-wheel on the inside of the drum, an eccentric on the drive-shaft, a combined external and internal gear-wheel revolving loosely upon and driven by the eccentric, and respectively engaging the external gear attached to the gear-carrying shaft, and the internal gear carried on the interior of the drum, and suitable brake mechanism operating in connection with the two brake-wheels, substantially as described.

3. In a hoisting mechanism, the combination of a drum having a central horizontal journal, a brake attached to the drum, which drum has also a sleeve-like horizontal journal, bearings supporting the said journals in alinement with each other, a second brake-wheel, a shaft that revolves within the sleeve-like journal and carries said second brake-wheel, an external gear-wheel on said shaft and within the drum, said shaft having a recess extending through or partially through it, a drive-shaft supported within the drum-journal and the gear-carrying shaft, an eccentric on said drive-shaft within the drum, a combined external and internal gear-wheel revolving upon said eccentric and engaging the gear on the gear-carrying shaft, and an internal gear on the drum engaging the said combined gear-wheel, brake mechanism operating independently for either of the brake-wheels, all arranged so that the rate of rotation of the drum may be reduced below that of a high-speed drive-shaft, substantially as described.

4. In a hoisting mechanism, the combination of a revolving drum having hollow journals on each side, bearings supporting said journals, a shaft supported and revolving within the hollow journals of the drum, an eccentric on said shaft, a combined external and internal gear-wheel revolving upon and driven by the eccentric, and the external and internal gear-wheels engaging the combined gear-wheel, one of which gear-wheels is on the drum, and the other of which is on a shaft supported in one of the drum-journals.

In testimony whereof I affix my signature in presence of two witnesses.

DANIEL S. REGAN.

Witnesses:
OSCAR W. WHITE,
FRED E. TASKER.