No. 748,762. PATENTED JAN. 5, 1904.

E. LORIN.

RAISING OR HOISTING APPARATUS.

APPLICATION FILED AUG. 26, 1902.

NO MODEL.

fig. 1.

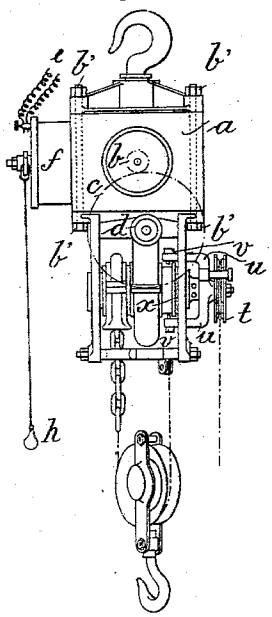


fig. 2.

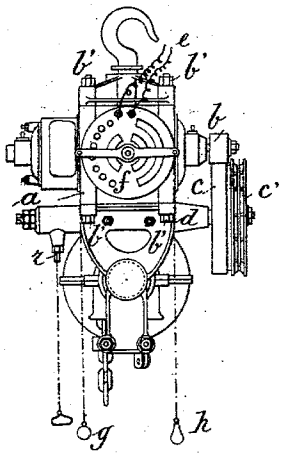


fig. 3.

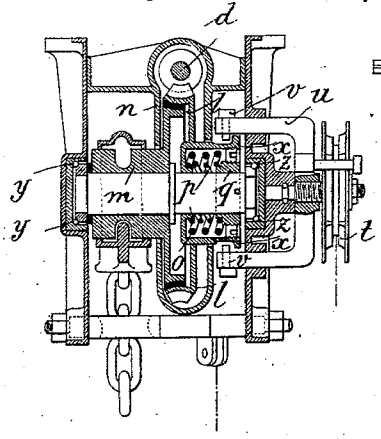
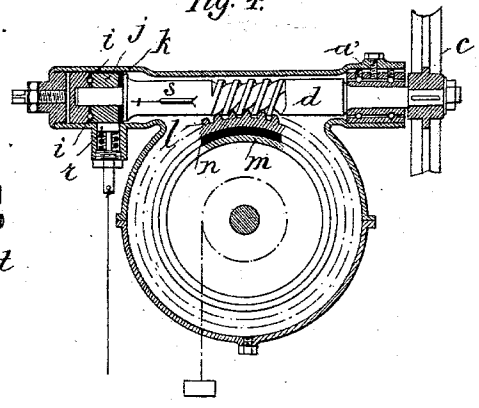


fig. 4.



Witnesses:

F. L. Durand

Ernest Jones

Inventor:

Ernest Lorin,

By Wm. E. Boulter,

Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 748,762. Patented January 5, 1904.

UNITED STATES PATENT OFFICE.

ERNEST LORIN, OF DOULAINCOURT, FRANCE.

RAISING OR HOISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 748,762, dated January 5, 1904.

Application filed August 26, 1902. Serial No. 121,115. (No model.)

To all whom it may concern:

Be it known that I, ERNEST LORIN, a citizen of the Republic of France, and a resident of Doulaincourt, France, have invented certain new and useful Improvements in or Relating to Raising or Hoisting Apparatus, of which the following is a specification.

The present invention relates to an improved raising and hoisting apparatus, which in view of known constructions has the following advantages:

First. The working is very smooth and the losses due to friction are reduced to a minimum by the use of ball-bearings.

Second. The lubrication of the principal parts is automatically effected by lubricant contained in a closed box or casing which surrounds and protects the mechanism.

Third. The load remains suspended on the stoppage of the motor or power device by an automatic brake coming into action and in spite of the reduction of the friction due to the ball-bearings.

Fourth. The load can slowly descend by reversing the direction of rotation of the motor.

Fifth. The load can descend rapidly at will and can be arrested at any desired point by the use of an automatic ratchet brake-regulator. The latter allows, moreover, of bringing the load back to the ground if the current or driving power is suddenly cut off.

Sixth. The load to be lifted is limited or controlled by a conical brake which slips and protects the motor against too great an intensity of current in case of an overcharge.

Seventh. The load-hook can upon reaching its maximum height be very quickly drawn back when discharged by hand or by a light counterweight.

Eighth. The apparatus can be used as an ordinary hoist if the supply of current is accidentally cut off.

Ninth. Finally, the apparatus is compact and forms a rigid whole which can be easily transported and suspended by a single hook.

In the drawings, Figure 1 is a side elevation of a hoisting device constructed according to my invention. Fig. 2 is a front elevation of the same. Fig. 3 is an axial section of the apparatus, on an enlarged scale; and Fig. 4 is a cross-section of the hoist axially through the worm-gear.

Like letters indicate like parts of the mechanism.

The apparatus comprises an electric motor a, the construction of which has been particularly studied for the present application. Its compact and rectangular form allows it to be arranged between four suspension-bolts b'. The transmission of power is effected through gearing $b\,c$, inclosed in a casing and operating a worm d. The current is supplied through a two-pole cable e and through a rheostat f, in the form of a commutator, which permits working in both directions. Operating-cords g h are provided for causing the ascent and descent of the load.

Upon the ascent of the load the worm-shaft d, journaled in ball-bearings i, turns under the influence of the motor, and the block or box j on the worm-shaft turns with the worm by friction, which, owing to an intermediate copper packing-disk k, is relatively considerable. In its turn the worm operates a gear-wheel l, the motion of which is transmitted to the drum m, the parts having conically-fitting surfaces with an intermediate copper packing n. The rotation of the drum or pulley through the upper friction-disk is regulated by the pressure of springs o p, which can be given a strong or slight pressure with the aid of a screw-nut q. Thus the friction between the toothed wheel l and the drum is so regulated that they slip when the drum meets with too strong a resistance—*i. e.*, upon an excessive loading of the hoist. This device is therefore called the "load-controller."

It should be noted that the arrangement has not only the object of avoiding damage to the hoist, but also of protecting the coil of the electric driving-motor which otherwise would be burned out on the release if it could not turn owing to an excessive load, whereas it can be always released by the slipping of the engaging parts, as if the load was normal.

The two springs o p are arranged instead of a single spring, so as not to completely release the conical parts, and consequently the load, in case of breakage of one of the springs. Thus if an accident occurs the load descends at a very moderate speed and even remains suspended if it does not exceed half of the maximum force of the hoist.

When the load ascends, upon pulling the

respective cord the rheostat takes up the median position and the current is interrupted. The worm and the motor would turn in the opposite direction under the action of the load, which would descend if the box *j* on the worm-shaft was not held by a pawl *r*, which engages with the teeth upon its circumference. The pressure exerted in the direction of the arrow *s* upon the copper washer *k* is sufficient to insure by the friction set up the rigidity of the worm and the suspension of the load. This type of brake is automatic by the pressure upon the copper box being proportionate to the load, which remains always suspended whatever its weight may be.

If it is desired to cause a slow descent of the load, it is sufficient to effect the rotation of the motor in the opposite direction by means of the rheostat, and with a slight expenditure of energy the friction upon the copper disk *k* will be overcome and the worm will turn in the direction required for the descent of the load, while the box *j* remains immovable during this operation. When a more rapid descent of the load is required, it will be sufficient to release the rheostat-cord, so as to cut off the current, and then upon pulling the cord attached to the pawl *r* the pressure against the box will be transmitted to the ball-bearings *i* and the worm will rotate, carrying with it the copper disk and the box *j*, as well as the coil of the motor, which, acting as a fly-wheel, controls the descent and limits the speed. As soon as the clutch-cord is released the worm continues to turn its flanged end, rubbing frictionally against the copper disk *k* for a moment; but it is gradually arrested and without shock, which is also the case with the load. Finally, when the load after being lifted to its destination is unhooked from the hoist it is useful to be able to return the hook to its initial position very quickly, so as to allow of a fresh load being raised without waste of time. To this end a small chain-wheel *t* is arranged, which operates, by means of a screw, a fork *u*, the extremities *v* of which engage and draw back the flanges *x* of the spring-casing. As this casing is integral with the toothed wheel, this drawing back of the casing disengages the wheel *l* from the drum *m*, so that the latter is rendered loose upon its shaft, and the hook can therefore run down very quickly.

The arrangement of the springs *o p* is such that the pressure which is exerted upon the conical parts for maintaining the engagement of the drum and wheel is transmitted to the ball-bearings *y z* on either side and only causes a slight resistance, while in order to insure a convenient efficiency of the device a ball-bearing *a'* is preferably arranged upon the bearing of the large operating-wheel *c*.

The large wheel or pinion of the motor can of course also be provided with a rim *c'*, suitable for receiving a chain, thereby allowing the use of the apparatus as an ordinary hand-hoist in case the electric current should fail or not be available. It will, moreover, be noted that with this system of brake the load can always be brought back to the ground if the current is accidentally cut off during the ascent, which cannot be done with the apparatus hitherto in use, where the load remains at its point of suspension if the apparatus comes to a standstill.

Suitable lubricant can be applied inside the hollow gearing or in the casing surrounding the same.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a raising and hoisting apparatus a motor, a motor-shaft, a worm-shaft, intermediate gearing between the motor-shaft and the worm-shaft, a toothed wheel engaging the worm-shaft, a pulley frictionally driven by the toothed wheel and conical meeting surfaces on the pulley and toothed wheel substantially as described.

2. In a raising and hoisting apparatus a motor, a motor-shaft, a worm-shaft, intermediate gearing between the motor-shaft and the worm-shaft, a toothed wheel engaging the worm-shaft, a pulley frictionally driven by the toothed wheel conical meeting surfaces on the pulley and toothed wheel, and double springs adapted to press the pulley and toothed wheel into engagement, substantially as described.

3. In a raising and hoisting apparatus, a motor, a motor-shaft, a worm-shaft, intermediate gearing between the motor-shaft and the worm-shaft, a toothed wheel engaging the worm-shaft, a pulley frictionally driven by the toothed wheel conical meeting surfaces on the pulley and toothed wheel, double springs adapted to press the pulley and toothed wheel into engagement, and means for separating the said parts substantially as described.

4. In a raising and hoisting apparatus, a motor, a motor-shaft, a worm-shaft, intermediate gearing between the motor-shaft and the worm-shaft, a toothed wheel engaging the worm-shaft, a pulley frictionally driven by the toothed wheel conical meeting surfaces on the pulley and toothed wheel, double springs adapted to press the pulley and toothed wheel into engagement, and means for separating the said parts comprising a fork engaging the spring-casing on the toothed wheel, a screw-spindle for same, and an operating-pulley mounted on said spindle, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERNEST LORIN.

Witnesses:
MAURICE FAND,
EMILE FAUGIE.