(No Model.)

W. ROTH.

HOISTING MACHINE.

No. 438,187. Patented Oct. 14, 1890.

Fig: 7.

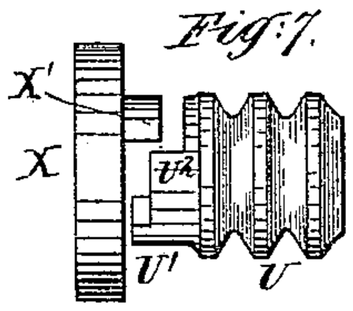


Fig: 8.

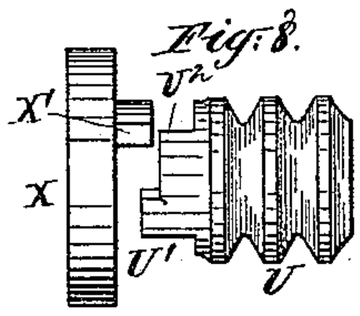


Fig: 9.

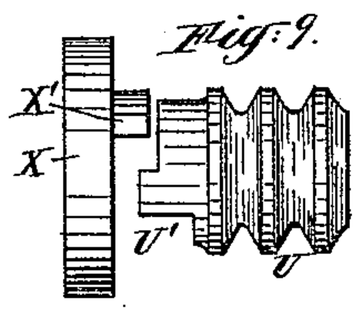


Fig: 1.

Fig: 2.

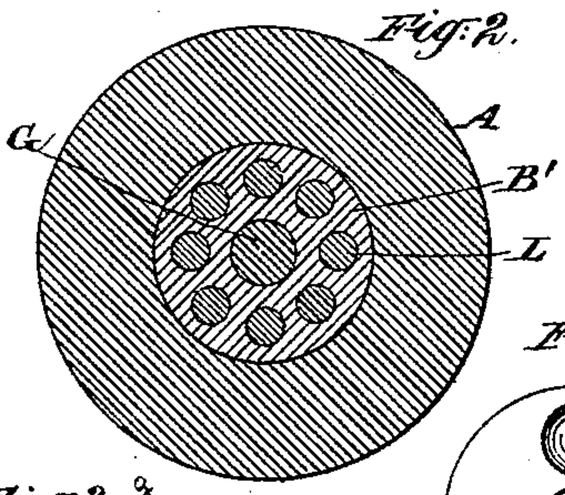


Fig: 3.

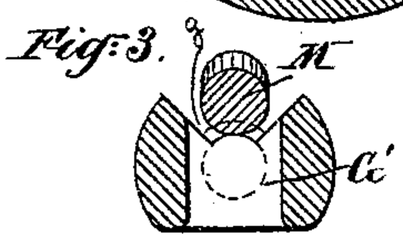


Fig: 4.

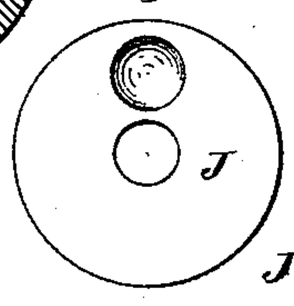


Fig: 5.

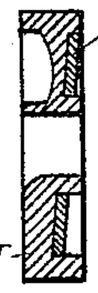


Fig: 6.

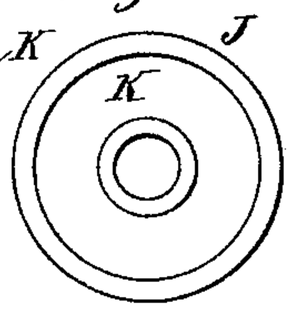
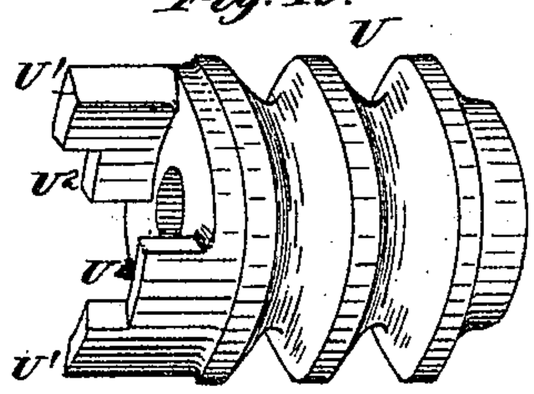


Fig: 10.



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ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM ROTH, OF NEW YORK, N. Y.

HOISTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 438,187, dated October 14, 1890.

Application filed February 20, 1890. Serial No. 341,116. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ROTH, a citizen of the United States, residing in the city and county of New York, in the State of New York, have invented a certain new and useful Improvement in Hoisting-Machines, of which the following is a specification.

One of the favorite modes of operating such machines is by providing a gear-wheel which is allowed to revolve freely on a gyrating center within an internally-geared windlass having a different number of teeth, with provisions for taking hold of the windlass and giving a slow and strong rotary motion to the windlass. I have in a patent to me dated September 14, 1886, No. 349,123, shown a good example of such machine. My present invention here employs the same general arrangement. I have in the present invention provided more efficient and convenient means for holding the load suspended, or lowering it when required. The provisions for communicating the required slow and powerful turning motion may be identical with those in that patent. I will describe my present invention as additional to the invention patented in 1886; but it will be understood that the provisions in that patent for reducing the friction may be omitted, if desired.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a central longitudinal section showing the entire machine. The remaining figures show details. Fig. 2 is a section on the line $x\ x$ in Fig. 1. Fig. 3 is a section on the line $y\ y$ in Fig. 1, looking from the right. Fig. 4 is a view of the left face of one of the wheels. Fig. 5 is a cross-section of the same. Fig. 6 is a view of the right face of the same wheel. Figs. 7, 8, and 9 are side views of one of the wheels and a sleeve which is adjusted at will into and out of engagement therewith. Fig. 7 shows the sleeve engaged with the wheel, holding the parts in condition for hoisting or lowering. Fig. 8 shows the sleeve moved endwise sufficiently to disengage it from the wheel, but before the wheel has lost any of its velocity. Fig. 9 shows the parts a fraction of a second later after the wheel has been so far retarded by friction as to fall backward a little. Fig. 10 is a perspective view of the same sleeve.

Similar letters of reference indicate like parts in all the figures where they appear.

A is a frame or case which is relatively fixed, and serves to support the other parts. It is shown as carried on bearing-wheels to allow it to be readily traversed along on a suitable track, but is otherwise without motion. Certain parts thereof will be designated, when necessary, by supernumerals, as A′.

B is a strong windlass having large hollow bearings, one of which B′ is traversed centrally by a quick-running shaft G, through which the power to effect the hoisting is received, and is also traversed by a series of loose pins L, which lie parallel to the axis, and when the machine is being worked, reciprocate rapidly endwise, as will presently appear. The mechanism at the other end is that of the patent of 1886, a freely rocking spherical bearing or ball O, traversed by an unequal lever M, constituting a universal joint in the bearing, another ball O′ bearing in a spur gear-wheel D, receiving the short arm of the lever M just outside the bearing B^2 and provisions for causing the gyrating motion of this lever M to slowly turn the windlass B with little friction. The mechanism at the other end B′, the right in Fig. 1, is mainly of interest.

The operating-shaft G, instead of, as heretofore, finding its bearing entirely in this end of the machine, is bifurcated and extended longitudinally the whole effective length of the windlass, and is allowed a bearing at the end G^2, so that it is effectively steadied and supported. The lever M revolves with it, being held by its long arm in a notch g in the partial wheel G′, which is formed in the quick-shaft G, just within the bearing B′. When the operator desires to hoist, he turns the quick-shaft G either by the force of men or by power applied through a belt. I have shown a pulley G* adapted to receive either a rope turned by men or a round belt driven by power. The nature of this force is not essential. I will assume it to be the force of one or more men applied through a chain or rope H, running on the pulley G* and capable of being worked or released intelligently and rapidly.

At the inner end of the bearing B′, between such bearing and the flange or wheel G′, is a space, in which is loosely mounted a wheel J and a hard ring K. The latter ring applies against an oblique face of the wheel J, which wheel is strongly supported in the framing against end movement. Its inner face, that toward the left in Fig. 1, receives the extended end of the lever M in a sufficient recess provided. This wheel J is compelled by its engagement by the long arm of this lever M to revolve with the shaft G.

A sufficient length of the shaft G intervenes between the pulley G* and the bearing B′ to admit the following parts: A sleeve U, feathered on G, so that it is compelled to revolve therewith but is free to be moved endwise, a loose wheel X, housed in the fixed framing and strongly confined thereby against end movement, and a hard ring Y, applying against an oblique inner face of such wheel. The outer face of the wheel X is formed with projections X′ and the inner end of the axially-sliding sleeve U is formed with projections U′, adapted to engage them.

Q is a light lever turning on a fixed center at *q*, taking hold of the sleeve U by means of one or more rings or collars on the latter, and operated by a weight Q′ and by a cord Q^2, operated by the attendant. When he releases the cord Q^2, the gravity of Q′ turns the lever Q into the position shown in Fig. 1, and holds the sleeve U U′ out of contact with the wheel X X′. When he pulls the cord Q^2, he swings the lever to the left and engages the sleeve U U′ with the wheel X X′ by the engagement of the projections U′ X′, and compels the wheel X to turn with a speed exactly coinciding with that of the wheel J.

The smoothly-finished pins or rods L are mounted in the bearing B′ parallel to the shaft G and surrounding it. The ends of these pins L are rounded, and apply against the hard rings K and Y, respectively.

When the operator pulls the cord Q^2 and slides the sleeve U inward, so that its recessed end engages the projections X′ on the outer face of the wheel X, this wheel X turns at the same rate as the wheel J, and the oblique faces of the wheels J and X, acting through their respective hard rings K and Y, cause the several pins L to reciprocate rapidly through the holes in which they are mounted, being driven in one direction and the other alternately by the corresponding oblique faces of the wheels J X. While this condition obtains, the hoisting-machine is in gear. If the operator turns the shaft G, he will, through the lever M and its efficient connections, slowly turn the windlass B in the direction to hoist. If he rests and takes care to hold the rope H efficiently, and thus to directly hold the shaft G by his strength, the load W will remain motionless, and if he relaxes his hold on the rope he will allow the gravity of the load to revolve the parts in the reverse direction and effect the lowering. In brief, this is the condition for raising or lowering. In either movement the rods L will reciprocate rapidly but idly between the wheels J and X, both of which are revolved in the same direction and at the same rate. Now suppose the attendant wishes to hold the load suspended without maintaining any force on the operating-rope H. He has simply to relax the strain on the controlling-cord Q^2 and the gravity of the weight Q′ will turn the lever Q into the position shown in Fig. 1, detaching the sleeve U U′ from the wheel X and allowing the latter to stop or to fall behind the position of the wheel J. When this absence of harmony occurs, the oblique faces of the wheels J and X, which are presented toward each other, are thrown out of parallel, and now, instead of idly reciprocating the pins L, they act with great force against them to urge the wheels J and X apart, inducing a strong pressure and friction against the interiors of their respective housings and causing the motion to be instantly and reliably arrested. The strong frictional action, sometimes technically known as "binding," holds the load stationary for any period. When it is to be again moved, either to lower or to further hoist, the operator first operates the hoisting-rope H to take up the slack and relieve the parts from the binding-strain, and then pulls the controlling-cord Q^2 and slides the sleeve U endwise to engage it with the wheel X. So soon as this is effected the wheels J and X again commence to move in unison, and the hoisting or lowering may be effected as at first.

The notch or aperture *g* in the wheel G′ is made somewhat wider than the lever M, which it is to receive. This allows the wheel to be turned to a sufficient extent to relieve the parts from the binding-strain after each arrest of motion.

I provide each of the projections U′ on the sleeve U, with an offset U^2, which is a safeguard against the wheels getting too much out of unison under any conditions.

The hard rings K and Y may be exchanged and thicker or thinner substituted to increase or diminish the amount of slack or lost motion.

I claim as my invention—

1. In a hoisting-machine having a quick-shaft G and a windlass B with suitable connecting-gear, the combination therewith of a wheel J, compelled to revolve with the quick-shaft, and another wheel X, with provisions, as the lever Q and cord Q^2 and sleeve U, for engaging and disengaging it at will, the said wheels J and X being formed with equal oblique faces presented toward each other and strongly housed in a casing A, and also with intermediate provisions, as the pins L, reciprocated between the said wheels, arranged to bind when the loose wheel X is liberated and to turn freely when the loose wheel is carried around with the wheel J, all substantially as herein specified.

2. In a hoisting-machine, the removable and exchangeable rings K and Y, in combination with the windlass B, quick-shaft G, and suitable connecting-gear, and with the pins L, adapted to reciprocate longitudinally, the wheels J and X, having faces adapted to reciprocate the rods, and provisions U Q Q′ Q^2 for setting one of the wheels free and re-engaging it with the quick-shaft again at will, so as to bind and release the working parts, the hard rings K and Y being arranged to defend the wheels from wear or injury, as herein specified.

In testimony whereof I have hereunto set my hand at New York city, this 14th day of February, 1890, in the presence of two subscribing witnesses.

WILLIAM ROTH.

Witnesses:
HARRY T. SHRIVER,
WALTER SHRIVER.