(No Model.)

A. & J. ROBERTSON.

HOISTING MACHINE.

No. 392,758. Patented Nov. 13, 1888.

Fig. 1.

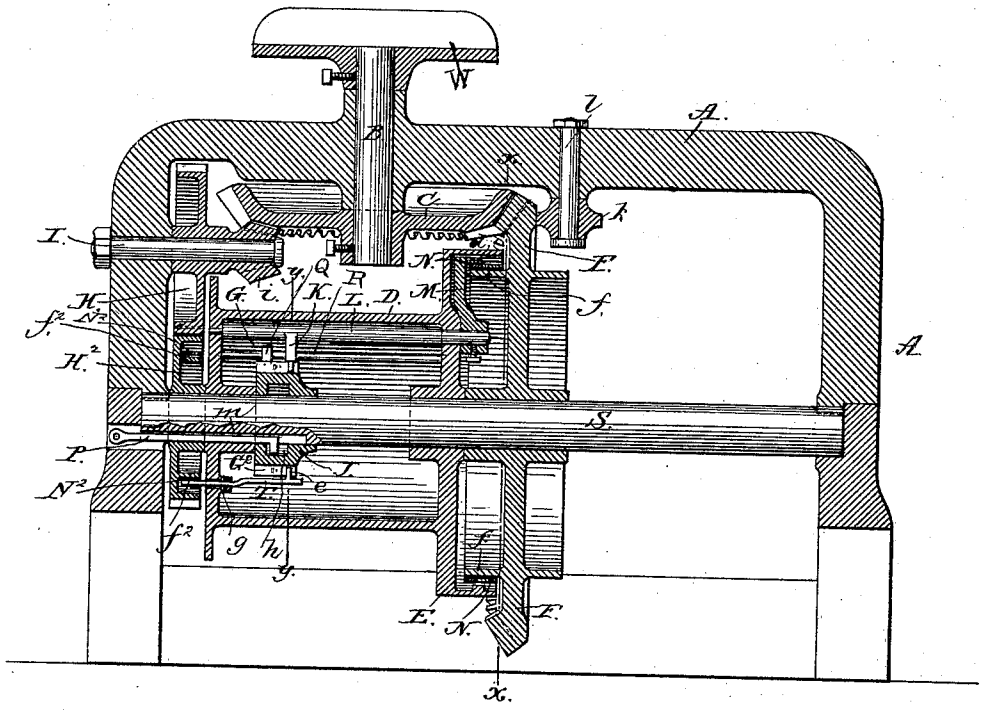

Fig 6

Fig. 2.

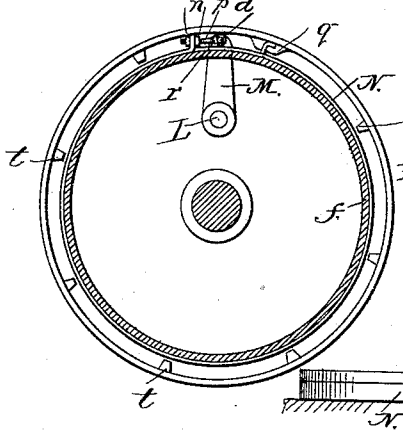

Fig. 3.

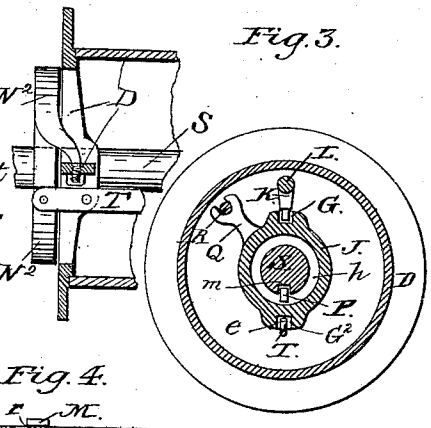

Fig. 4.

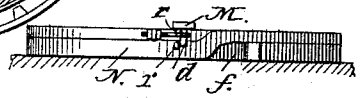

Fig. 5.

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UNITED STATES PATENT OFFICE.

ALEXANDER ROBERTSON AND JAMES ROBERTSON, OF WELLAND, ONTARIO, CANADA.

HOISTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 392,758, dated November 13, 1888.

Application filed December 13, 1887. Serial No. 257,767. (No model.) Patented in Canada September 21, 1886, No. 24,977.

To all whom it may concern:

Be it known that we, ALEXANDER ROBERTSON and JAMES ROBERTSON, of Welland, in the Province of Ontario and Dominion of Canada, have invented a new and Improved Hoisting-Machine, (which was patented in Canada September 21, 1886, No. 24,977,) of which the following is a full, clear, and exact description.

The object of the present invention is to improve the construction of hoisting-machines, so that greater working capacity of such machines will be secured; and the invention consists in the construction and combinations of various parts of the machine, all substantially as will hereinafter more fully appear, and be pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a central vertical longitudinal section through the machine. Fig. 2 is a partial vertical cross-section on the line *x x*, Fig. 1. Fig. 3 is a partial vertical cross-section on the line *y y*, Fig. 1. Fig. 4 is a plan view of one of the friction-belts, showing its disposition on and relation with a friction-flange of one of the gears. Fig. 5 is a detail plan view of the sleeve for operating the friction-belts, and Fig. 6 is a detail view hereinafter referred to.

A suitable frame-work, A, is provided for maintaining all the parts of the machine, in which is secured a stationary main shaft, S, a vertical rotatable shaft, B, and a horizontal shaft, I.

C represents a gear secured on the vertical shaft B, having two beveled toothed faces, the teeth of one face meshing into a gear, F, journaled on the main shaft, and the teeth of the other face engaging the beveled pinion *i*, formed upon or attached to a gear-wheel, H, rotatable on or with the horizontal shaft I, said gear-wheel H in turn meshing into a gear, H^2, journaled on said shaft S, it being observed that a greater speed may be imparted to the gear H^2 than to the gear F, which difference of speed may be varied, as desired, by changing the relative sizes of the gears.

Friction-flanges *f* f^2 are formed upon or attached to each of the gears F H^2, and upon each of these flanges is made to engage, when desired, a friction-belt, N or N^2, attached each by its opposite ends to parts of or carried by the drum D, loosely mounted on the shaft S between the gears F and H^2.

An interiorly-chambered sleeve, J, is placed upon the shaft S, which sleeve is provided on its one side with an extended arm, Q, slotted or forked at its outer end to engage a longitudinally-extending pin or rod, R, rigidly secured on the drum, and thus the sleeve is retained against rotation except in unison with the drum, and yet it is free to be moved endwise on the shaft.

An angular or curved cam-groove, G, is formed upon the periphery of the sleeve J, in which engages the end of the arm K upon a longitudinally-extending rock-shaft, L, having a bearing in the drum D, and upon the end of said shaft L is a radial or crank arm, M, to a pin, *d*, in the end of which is attached one end of a flexible belt, N, the other end of which is securely attached to a flange, E, of the drum D. An angular or curved peripheral cam-groove, G^2, is also formed on another portion or side of the sleeve J, in which engages the angular end *e* of a horizontally-arranged lever-arm, T, intermediately pivoted in one end wall of the drum, as at *g*, and to its outwardly-extended end is secured one end of the flexible friction-belt N^2, the other end of said belt being attached to the drum D, as shown in Fig. 6. An annular groove, *h*, is also formed in the inside of the sleeve J, with which engages a projection on a bar, P, sliding in a groove, *m*, in the shaft S.

Now, it will be seen that on power being applied to the end of the bar P to force it longitudinally in one direction, and with it the sleeve J, the action of the cam-groove G upon the arm K will be such as to impart an oscillating motion to the shaft L and arm M, which will draw taut the flexible belt N upon the flange *f* of gear F, thus forming a friction-clutch between the drum D and said gear F. In like manner, on the bar P being forced in the reverse direction, the friction-clutch on the gear F will be released, and by means of the

other cam-groove, G^2, on the sleeve, operating through the pivoted lever T at the other end of the drum, the other belt, N^2, is caused to bind on the flange f^2 of the gear H^2, thus forming a friction-clutch between the drum D and said gear H^2, and this relation of the parts is illustrated in Fig. 1, and in construction these parts are so formed and arranged that, with the sleeve forced in a manner to bring the intermediate portion of its grooves opposite the ends of the arms K and T, neither flange will be clutched. As particularly shown in Figs. 2 and 4, the belt is given two turns around the flange *f*, its one end secured between nuts *n n* on a screw-pin, *p*, which is pivoted by pin *d* on the end of the arm M, and its other end secured in a recessed lug, *q*, on the inner side of the flange E.

Pins or projecting studs *r* on each coil of the belt impinge against the pin *d* to force the coils open when the arm M is thrown back, and the inner face of the drum-rim E is provided with a series of inwardly-extended lugs, *t t*, for maintaining the friction-belt central and free of the friction-flange *f* when thrown out of clutch. The belt N^2 is similarly arranged in relation to the flange f^2 of gear H^2, with its free end held to the end of lever I.

A friction-pulley, *k*, is journaled in a stud, *l*, on the frame A. The purpose of this pulley is to support the gear F against the pressure of the gear C, and thus relieve the shaft S from unnecessary wear.

W represents the sweep-socket detachably secured upon the upper end of the shaft B, as shown in Fig. 1.

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

1. The combination, with a shaft, a gear-wheel having a flange, *f*, and a drum, D, thereon, of a rocker-shaft, L, having a bearing in said drum, an arm upon said rocker-shaft, a flexible friction-belt disposed about said flange *f* and by one end secured to said arm and by its other end secured to a suitable part of said drum, and a means, substantially as shown, for rocking said shaft L, substantially as and for the purpose described.

2. The combination, with a shaft, a gear-wheel having a flange, *f*, a drum, D, and a cam-grooved sleeve on said shaft, of a rocker-shaft, L, having a bearing in said drum and provided with an arm engaging said cam-grooved sleeve and an arm, M, a flexible friction-belt disposed about said flange *f* and by one end secured to said arm M and by its other end secured to a suitable part of said drum, and a means for securing a slide of said sleeve, substantially as and for the purpose described.

3. The combination, with a shaft having a longitudinal groove, *m*, a gear-wheel having a flange, *f*, a drum, D, on said shaft, provided with a flange, E, and a sleeve, J, on said shaft having an internal annular groove, of a rocker-shaft, L, having a bearing in said drum and provided with an arm engaging said cam-grooved sleeve and an arm, M, a flexible belt disposed about said flange *f* and by one end secured to said arm and by its other end secured to said flange E, and a rod, P, disposed in said shaft-groove *m* and engaging said sleeve J, substantially as and for the purpose described.

4. The combination, with a shaft, a gear-wheel having a flange, *f*, and a drum, D, on said shaft, provided with a flange, E, having internal lugs, *t t*, a rocker-shaft having a bearing in said drum, provided with an arm, M, a flexible friction-belt disposed about said flange *f* and by one end secured to said arm and by its other end secured to said flange E, and a means, substantially as shown, for securing a rock of said shaft, substantially as and for the purpose described.

5. The combination, with a shaft, a gear-wheel having a flange thereon, a drum, D, having a longitudinal rod, R, and a sliding cam-grooved sleeve, J, having arms Q engaging said rod R, of a rock-shaft, L, having a bearing in said drum and provided with an arm engaging said cam sleeve and an arm, M, a flexible friction-belt disposed about said flange *f* and by one end secured to said arm M and by its other end secured to a suitable part of said drum, and a means, substantially as shown, for securing a longitudinal slide of said sleeve, substantially as and for the purpose described.

6. The combination, with a shaft, a gear-wheel having a flange, *f*, and a drum, D, provided with a flange, E, having internal lugs, *t t*, on said shaft, of a rock-shaft having a bearing in said drum, provided with an arm, M, and a flexible friction-belt disposed about said flange *f* and secured at one end to the arm M and at its other end to the flange E, said rock-shaft connected to and operated by the shaft, substantially as shown and described.

7. The combination, with a drum, a flanged gear loosely mounted at each end of said drum, and friction-belts carried by the drum adapted to engage the said flanged gears, of a driving-gear located between said flanged gears and an intermediate gear between said driving-gear and one of the flanged gears, substantially as described.

8. The combination, with a fixed shaft and a drum loosely mounted thereon, provided with an annular flange, of a gear also loose on said shaft and provided with an annular flange passing within the flange of the drum, a friction-belt secured by one end to the flange of the drum and encircling the flange of the gear, a lever fulcrumed in the drum and attached by one end to the free end of the friction-belt, and means, substantially as shown, for operating the lever, substantially as set forth.

9. The combination, with a fixed shaft, a drum loose thereon having an annular flange, a gear loose on said shaft having an annular flange, a friction-belt having one end secured to the

flange of the drum and its other end to a lever fulcrumed in said drum, and said lever provided with a stud, of a sleeve loose on said shaft held to rotate with the drum and provided with a cam-groove on its periphery engaging the stud of the lever, and means for sliding said sleeve, substantially as shown and described.

10. In a hoisting-machine, the combination, with a rotatable driving shaft and gear, of a stationary shaft, S, and shaft I, flanged gears F and H^2, rotatable on said shaft S, the gear F meshing with said driving-gear, a gear on said shaft I meshing with said flanged gear H^2 and having a pinion engaging with said driving-gear, a rotatable drum, D, on said shaft S, friction-belts carried by said drum, and means whereby said belts may be engaged with and disengaged from said flanged gears, substantially as and for the purpose described.

11. The combination, with a fixed shaft and a drum mounted thereon provided with an annular flange, of a gear also loose on said shaft and provided with an annular flange passing within the flange of the drum, and a friction-belt secured at one end to the flange of the drum and encircling the flange of the gear, and a lever fulcrumed in the drum and attached by one end to the free end of the friction-belt and its opposite end connected to and operated by the shaft, substantially as shown and described.

12. The combination, with a rotatable driving shaft and gear, of a stationary shaft, S, a double-cam-grooved sleeve, J, thereon, and a shaft, I, gears F and H^2, having flanges $f f^2$, rotatable on said shaft S, the gear F meshing with said driving-gear, a gear on said shaft I meshing with said flanged gear H^2, having a pinion engaging with said driving-gear, a rotatable drum on said shaft S, having a rocker-shaft, L, provided with an arm engaging said cam-grooved sleeve and an arm, M, said drum also having a lever, T, intermediately pivoted thereon engaging said cam-grooved sleeve, a flexible friction-belt disposed about said flange f, by one end secured to said arm M, and by its other end secured to a suitable part of said drum, a flexible friction-belt disposed about said flange f^2, secured by its ends to said lever T, and a means for sliding said sleeve, substantially as and for the purpose described.

13. In a hoisting-machine, the combination, with a stationary frame and a driving-shaft, B, and gear C, rotatable thereon, a stationary shaft, S, having longitudinal groove m, a double-cam-grooved sleeve, J, thereon, having internal annular groove, h, and a shaft, I, and gears F and H^2, rotatable on said shaft S, having flanges f and f^2, the gear F meshing with the driving-gear, and a gear, H, on said shaft I meshing with said gear H^2, having a pinion engaging with said driving-gear, of a rotatable drum, D, on said shaft S, having flange E, and provided with a rocker-shaft, L, having arm K, engaging one groove of said cam-sleeve, and an arm, M, said drum having a pivoted lever, T, engaging the other groove of said cam-sleeve, a flexible friction-belt disposed about said flange f, by one end secured to said arm M, and by its other end secured to said flange E, a flexible friction-belt disposed about said flange f^2, secured by its ends to said lever T, and a rod, P, disposed in said shaft-groove m, engaging said sleeve J, all substantially as and for the purpose described.

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