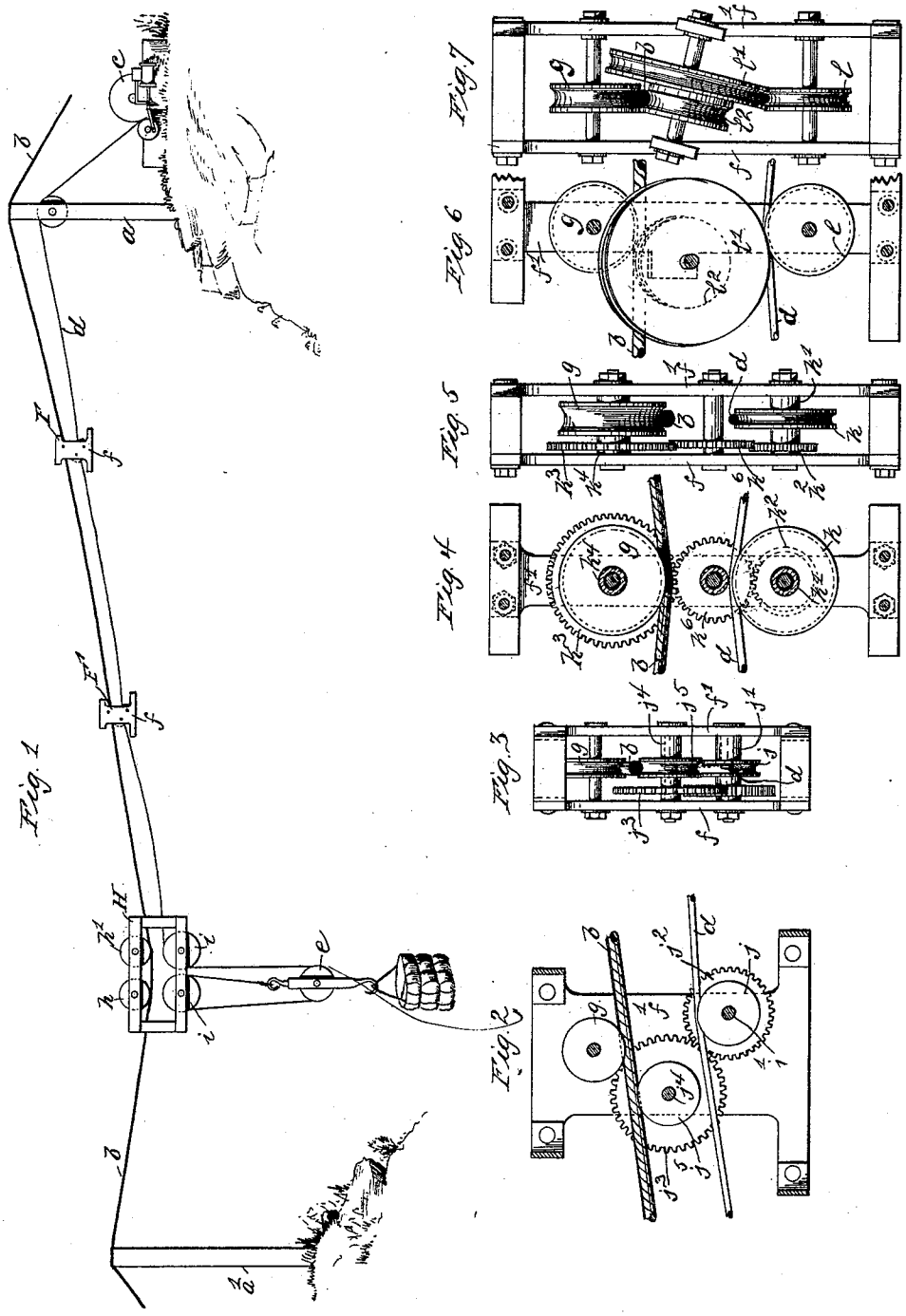
(No Model.) 2 Sheets—Sheet 1.

C. M. NORTH.

CONVEYING APPARATUS.

No. 480,029. Patented Aug. 2, 1892.



Witnesses
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Fred'k Kemper.

Inventor
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(No Model.)

2 Sheets—Sheet 2.

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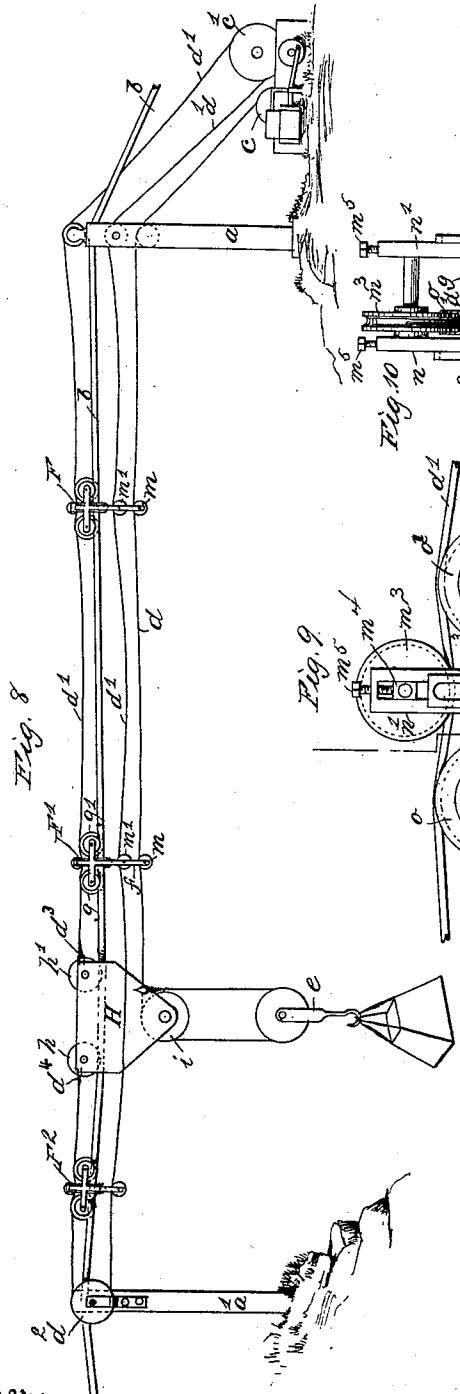

Fig. 8

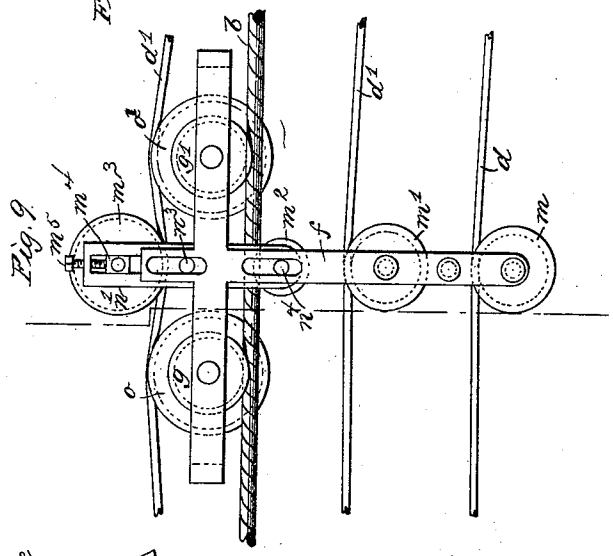

Fig. 9

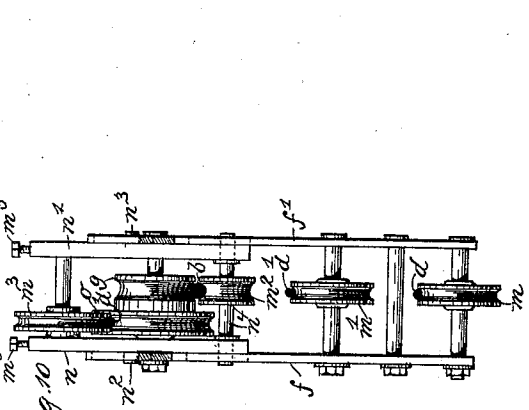

Fig. 10

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UNITED STATES PATENT OFFICE.

CHARLES M. NORTH, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO THE LIDGERWOOD MANUFACTURING COMPANY, OF NEW YORK, N. Y.

CONVEYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 480,029, dated August 2, 1892.

Application filed March 8, 1892. Serial No. 424,135. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. NORTH, of Montclair, in the State of New Jersey, have invented a new and useful Improvement in Conveying Apparatus, of which the following is a specification.

Heretofore it has been customary in apparatus employing a load-supporting carriage traveling on a cable and also employing traveling rope-carriers, to regulate the travel of the rope-carriers, either by flexible connections between them or by stops located along their path of travel, and cause them to follow the carriage in its outward movement, either by an attachment between them and the carriage or by their own gravity.

My invention has for its object to provide new means whereby the travel of the rope-carriers is actuated and regulated; and it consists of driven mechanism whereby the carrier is caused to progress along the cable or trackway.

In the accompanying drawings, Figure 1 is a side view of a conveying apparatus containing one form of my invention. Fig. 2 is a side view of one of the rope-carriers shown in Fig. 1 with the side plate removed. Fig. 3 is an end view of one of the carriers shown in Fig. 1. Figs. 4 and 5 are a side and end view of another form of the rope-carrier, the side plate in Fig. 4 being removed. Figs. 6 and 7 are a side and end view of another form of carrier, the side plate in Fig. 6 being removed. Fig. 8 is a side view of another form of apparatus embodying my invention. Figs. 9 and 10 are a side and end view of the rope-carrier shown in Fig. 8.

In all the figures, a and a' are the towers.

b is the cable or trackway.

c is the hoisting-engine drum.

d is the fall-rope.

e is the fall-block.

F, F′, and F² are the series of rope-carriers.

$f f'$ are the side plates of the rope-carrier.

g is a sheave mounted in the rope-carrier and running on top of the cable or trackway.

H is the load-carriage.

h h' are the sheaves mounted on the load-carriage and running on top of the cable or trackway.

i are the sheaves mounted on the carriage, over which the fall-rope runs.

The device which is driven in each of the examples shown is a wheel bearing against the cable, because the cable is the only stationary member which happens in the apparatus in which I have shown my invention applied to be adjacent to the carrier throughout the extent of its traveling movement, and because the wheel happens to be the form of device employed in that apparatus for the connection between the cable and the carrier. Another member might be substituted for the cable and some other driven device might be subitstuted for the wheel.

I will first describe the construction of carrier shown in Figs. 2 and 3, which is especially designed for employment, as shown in Fig. 1, in connection with an inclined cable or trackway. j is the sheave over which the fall-rope d runs and which is fixed upon an axle j'. j^2 is a gear-wheel fixed to the same axle and which engages with the gear-wheel j^3, fixed upon the axle j^4. j^5 is a sheave fixed upon the axle j^4. The axles j' and j^4 are journaled in the side plates f and f' in the relative positions shown with respect to the axle of the sheave g, so that on the uphill side of a vertical line drawn through the center of the sheave g is located the center of the sheave j, and on the downhill side of the same line is located the center of the sheave j^5. The effect of this arrangement is that the weight of fall-rope d upon the sheave j, tending to swing that sheave vertically below the sheave g, presses the sheave j^5 against the under side of the cable b, so as to clamp that cable firmly between the sheaves g and j^5; or, in other words, the wheel g constitutes a center of suspension for the rope-carrier and the center of gravity of the rope-carrier itself, and any weight supported by it will tend to assume a position vertically beneath the center of suspension. The downward pressure of the fall-rope d upon the sheave j moves such center of gravity toward a vertical line drawn

through the center of suspension as far as the pressure of the sheave j^5 against the under side of the cable will admit. This being so, it is evident that whenever the fall-rope d travels so as to turn the sheave j the rotation of that sheave will be communicated through the gears j^2 j^3 and their axles to the sheave j^5, so as to cause that sheave to run along the cable and propel the carrier in the same direction in which the fall-rope d is moving. This mode of operation will take place when the carriage is moving out; but when the carriage moves in it will push the various carriers ahead of it, and as each carrier is pushed the tendency will be to tilt it so that the engagement between the sheave j and the cable is broken, because the carrier, as shown in Fig. 2, is broader at the bottom than at the top, and will therefore be pushed at the bottom before it is pushed at the top.

In the arrangement shown in Figs. 4 and 5 the fall-rope sheave k, the axle k' upon which it is fixed, the gear k^2, fixed upon the same axle, the gear k^3, fixed upon the axle k^4, the sheave g, fixed upon the same axle, and the intermediate gear k^6 are all arranged with their axes in the same vertical plane, the pressure between the cable and the driven sheave g being due to the fact that the sheave g is on top of the cable, and therefore supports the weight of all the parts. In this arrangement the rotation of the sheave k due to the travel of the fall-rope d is communicated through the gears k^2, k^3, and k^6, so as to cause the sheave g to travel on the cable in the same direction in which the fall-rope d is moving.

In Figs. 6 and 7 the fall-rope d is clamped between the fall-rope sheave l below it and a sheave l' above it. The sheave l' is fixed to a concentric sheave l^2, between which and the sheave g the cable b is clamped. To enable the clamping to be effectually accomplished, the center of the sheaves l and l^2 is placed, as shown in Fig. 6, to one side of the plane between the center of the sheaves l and g. To enable the sheave l' to be made large enough in diameter relatively to the sheave l^2 for the purpose of reducing the speed, the sheave l' may be tilted, as shown in Fig. 7, so that it will engage with the fall-rope while the same is vertically below the cable, but will at its top avoid conflict with the cable and the sheave g while the sheave l^2 bears against the cable. It will now be seen that motion of the fall-rope d will be communicated through the sheave l' to the sheave l^2, which is thereby impelled to travel along the cable in the same direction as that in which the fall-rope d moves.

The construction shown in Fig. 8 shows a horizontal cable or trackway, on which the carriage is propelled by an endless rope d', actuated by the driven drum c', and which passes around the sheave d^2 on the distant tower a' and is secured to the carriage at d^3 and d^4. With this arrangement for propelling the carriage, the device or wheel g on the carriage F may be driven in the manner shown in Figs. 9 and 10 independently of the fall-rope. m is the sheave in the carrier for supporting the fall-rope. m' is the sheave for supporting the lower branch of the endless rope. g and g' are the sheaves running on the cable. n n' are the side plates of a supplemental frame, arranged to slide vertically on the side plates f f' and held from lateral movement by the pins n^2 and n^3 and the ends of the axle n^4, projecting into slots in the side frames f f'. In this supplemental frame are journaled the axle n^4 of sheave m^2, that bears against the under side of the cable between the sheaves g and g', and also the sheave m^3, that bears against the rope d', having its axis of rotation vertically above the axle of sheave m^2. The sheave m^3 is journaled in boxes m^4, vertically adjustable in the supplemental frame by means of the set-screws m^5. Fast to the sheaves g and g', respectively, are the sheaves o and o', that bear against the under side of the rope d', which is therefore clamped between them and the sheave m^3. It will now be seen that motion of the endless rope d' will be communicated through the sheaves o and o' to the sheaves g and g', which is thereby impelled to travel along the cable in the same direction as that in which the carriage moves.

Whichever form of those above described is adopted the general mode of operation is the same. When the load-carriage proceeds from the tower a toward the tower a', it pulls the fall-rope or the endless rope, as the case may be, with it. This fall-rope or endless rope, as the case may be, acts as a motor to drive the mechanism located upon each of the carriers and engaging with the cable, and thereby causes each carrier to follow the carriage, though with less speed. The speed at which each carrier advances will be regulated by the diameter of the wheels or gears interposed between the sheave, receiving motion from the fall-rope or the endless rope and the sheave bearing against the cable, so that in the series of rope-carriers on each side of the carriage each one of the series will travel faster than those farther away from the carriage. By this means each series of rope-carriers will space itself along the cable at proper distances apart for all positions of the carriage.

It will be observed that in the arrangement shown in Fig. 1 the same rope that is supported by the carriers constitutes the member following in the wake of the load-carriage, by which the propelling mechanisms on the carriers are actuated, but that in the arrangement shown in Fig. 8 the member traveling in the wake of the carriage, by which the rope-carrier-propelling mechanism is actuated, is distinct from the fall-rope, which is carried by but performs no part of the propelling function. I therefore do not wish to be un-

derstood as limiting myself to the performance of the propelling function by the same member that is supported.

I believe that I am the first one to actuate the travel of the rope-carrier by positively-driven mechanism of any kind located upon the carrier, and I therefore do not wish to be understood as limiting myself to the details of construction heretofore described, since I am aware that the form, number, and relative arrangement of the parts may be varied to a large extent without departing from the principle of my invention.

I claim—

1. In a conveying apparatus, in combination, a cable or trackway, a load-carriage, a rope traveling therewith, and a rope-carrier containing a wheel adapted to be turned by said traveling rope, a wheel adapted to bear against the cable or trackway, and connections between said two wheels, whereby the rotation of the first is communicated to the second, substantially as described.

2. In a conveying apparatus, in combination, a cable or trackway, a load-carriage, a rope traveling therewith, and a series of rope-carriers, each containing a wheel adapted to be turned by said traveling rope, a wheel adapted to bear against said cable or trackway, and connections between said two wheels, whereby the rotation of the first is communicated to the second, the said connections being constructed to produce various speeds as between different members of the series, substantially as described.

3. In a conveying apparatus, in combination, a cable or trackway, a load-carriage, a rope traveling therewith, and a rope-carrier containing a wheel adapted to be turned by said traveling rope, a wheel adapted to bear against said cable or trackway, and connections between said two wheels, whereby the rotation of the first is communicated to the second at a reduced speed, substantially as described.

4. In a conveying apparatus, in combination, a cable or trackway, a load-carriage, a rope traveling therewith, and a rope-carrier mounting the following parts, viz: two wheels between which the cable or trackway is clamped, a third wheel adapted to support said traveling rope, and connections whereby the rotation of said third wheel is communicated to one of the two wheels first mentioned, substantially as described.

5. In a conveying apparatus, in combination, a cable or trackway, a load-carriage, a rope traveling therewith, the supports by which said cable or trackway is stretched on an incline, and a rope-carrier mounting the following parts, viz: a wheel adapted to run on top of the cable or trackway, two wheels arranged below on opposite sides of a vertical line dropped from the center of the first wheel, and connections between said lower two wheels, one of said lower two wheels being adapted to support said traveling rope and the other being adapted to bear against the under side of the cable or trackway, substantially as described.

6. In a conveying apparatus, in combination, a cable or trackway, a load-carriage, a rope extending to said load-carriage and running approximately parallel with the cable or trackway, and a rope-carrier mounting the following parts, viz: a traction device adapted to travel on the cable or trackway and mechanism actuated by said rope, whereby the movement of said traction device, and thereby that of the carrier, is controlled, substantially as described.

7. In a conveying apparatus, in combination, a cable or trackway, a load-carriage, a rope extending to said carriage and running approximately parallel with the cable or trackway, and a series of rope-carriers, each of which mounts the following parts, viz: a traction device adapted to travel on the cable or trackway and mechanism actuated by said traveling rope, whereby the movement of said traction device, and thereby that of the carrier, is controlled, substantially as described.

8. In a conveying apparatus containing a cable or trackway, a carriage, a rope extending to said carriage and running approximately parallel with the cable or trackway, a rope-carrier, a device mounted on said carrier, adapted to travel on the cable or trackway, and a device mounted on said carrier, adapted to engage with said rope, the combination, with said devices, of connections whereby the motions of one of said devices are communicated to the other, substantially as described.

9. In a conveying apparatus containing a cable or trackway, a carriage, a rope extending to said carriage and running approximately parallel with the cable or trackway, a series of rope-carriers, a device mounted on each of said carriers, adapted to travel on the cable or trackway, and a device mounted on each of said carriers, adapted to engage with said rope, the combination, with said devices on each carrier, of connections whereby the motions of one are transmitted to the other, the speed of said transmission being in decreasing series from the carriage toward the end of the cable or trackway, substantially as described.

10. In a conveying apparatus, in combination, a load-carriage, a cable or trackway, a member connected with the carriage and extending along the cable or trackway, a rope-carrier, mechanism mounted thereon engaging with and driven by said member, propelling mechanism, also mounted upon said carrier, and means whereby the movement of the mechanism driven by said member is communicated at a reduced speed to said propelling mechanism, substantially as described.

11. In combination, a cable or trackway, a load-carriage, a fall-rope extending to said load-carriage, and a fall-rope carrier mounting the following parts, viz: a propelling device engaging with said cable or trackway and mechanism engaging with said fall-rope, whereby the motions of said fall-rope are communicated to said propelling device, substantially as described.

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