

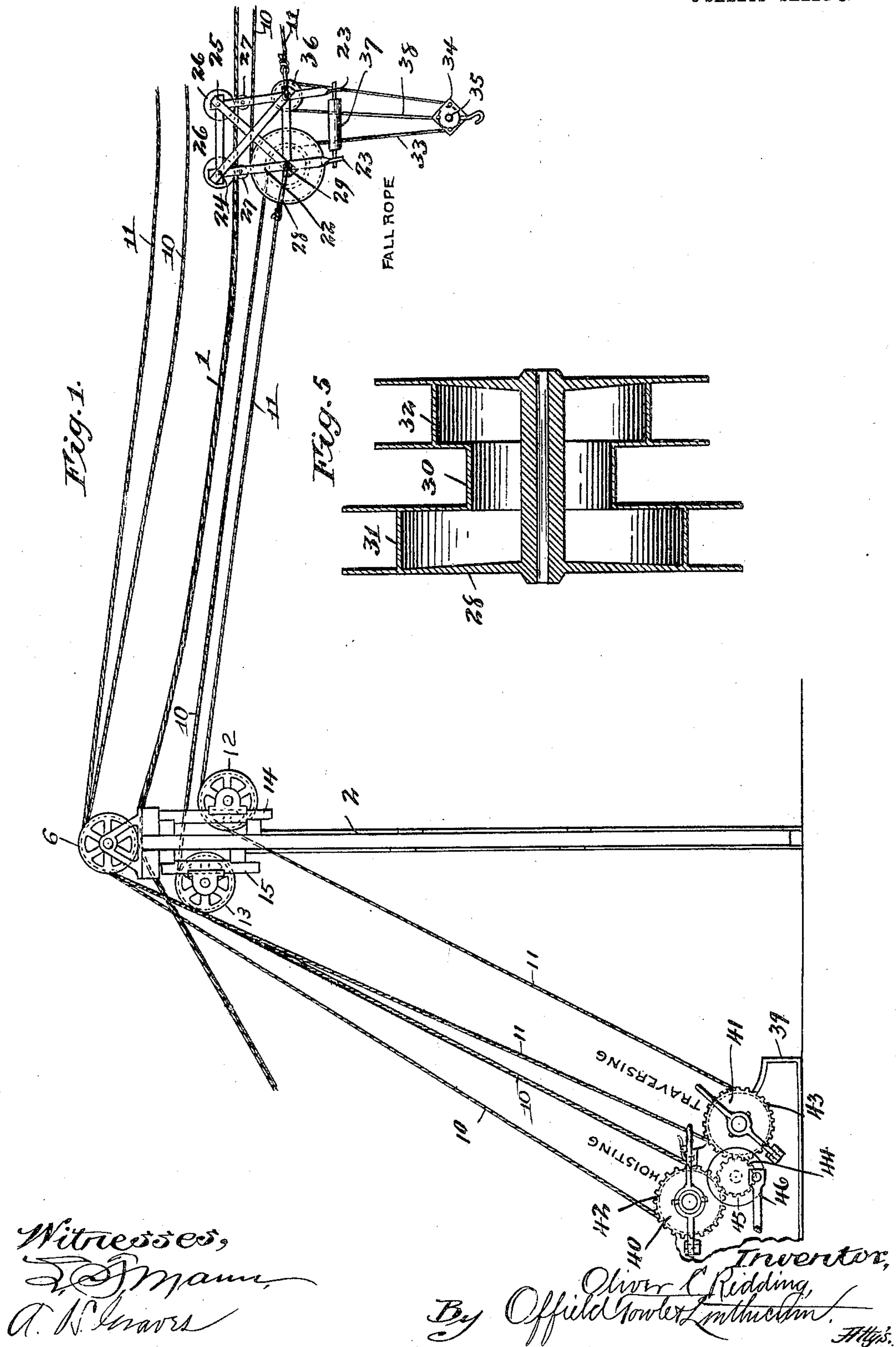
No. 822,770.

PATENTED JUNE 5, 1906.

O. C. REDDING.  
CABLEWAY.

APPLICATION FILED FEB. 20, 1906.

3 SHEETS—SHEET 1.



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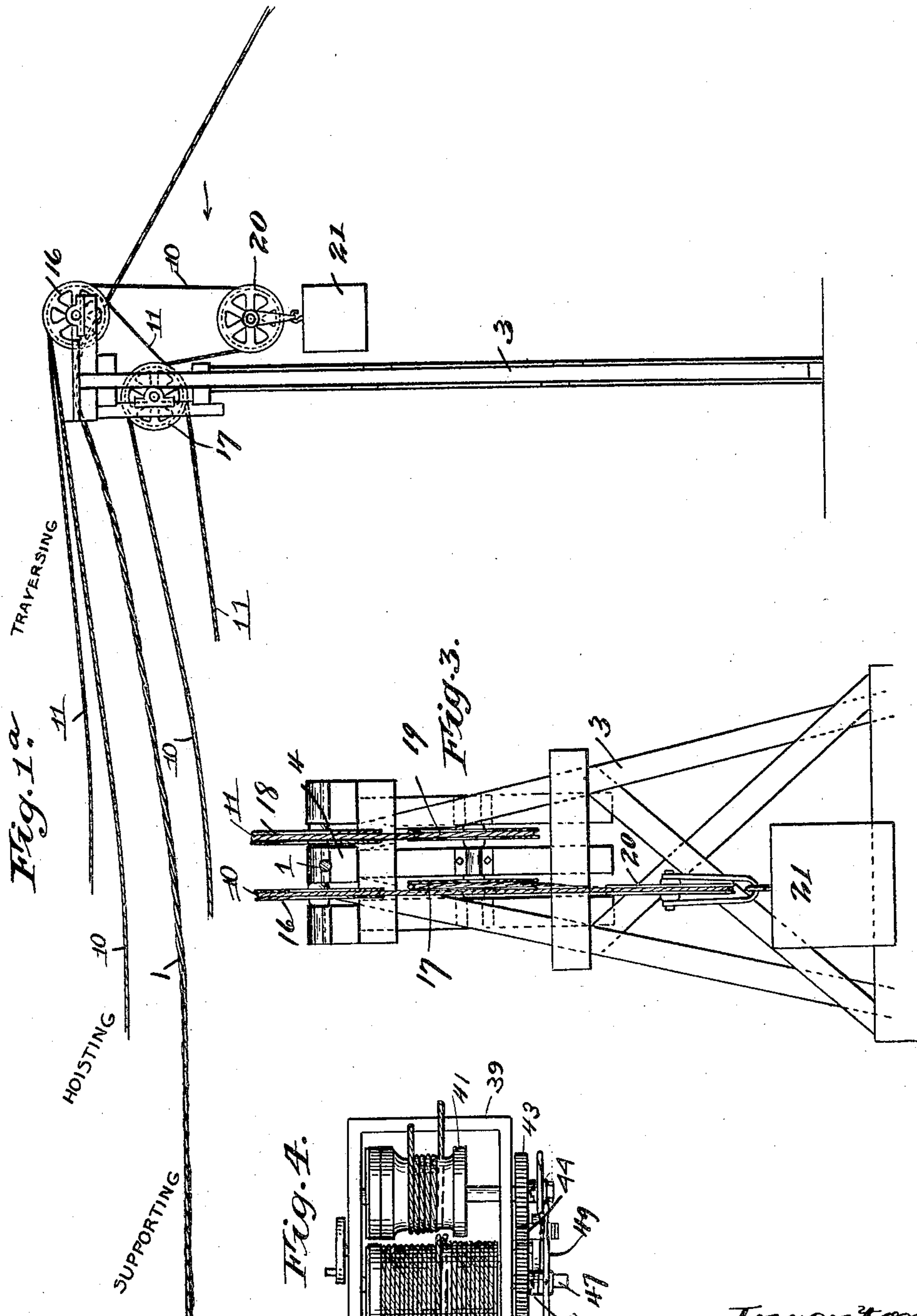
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3 SHEETS—SHEET 2.



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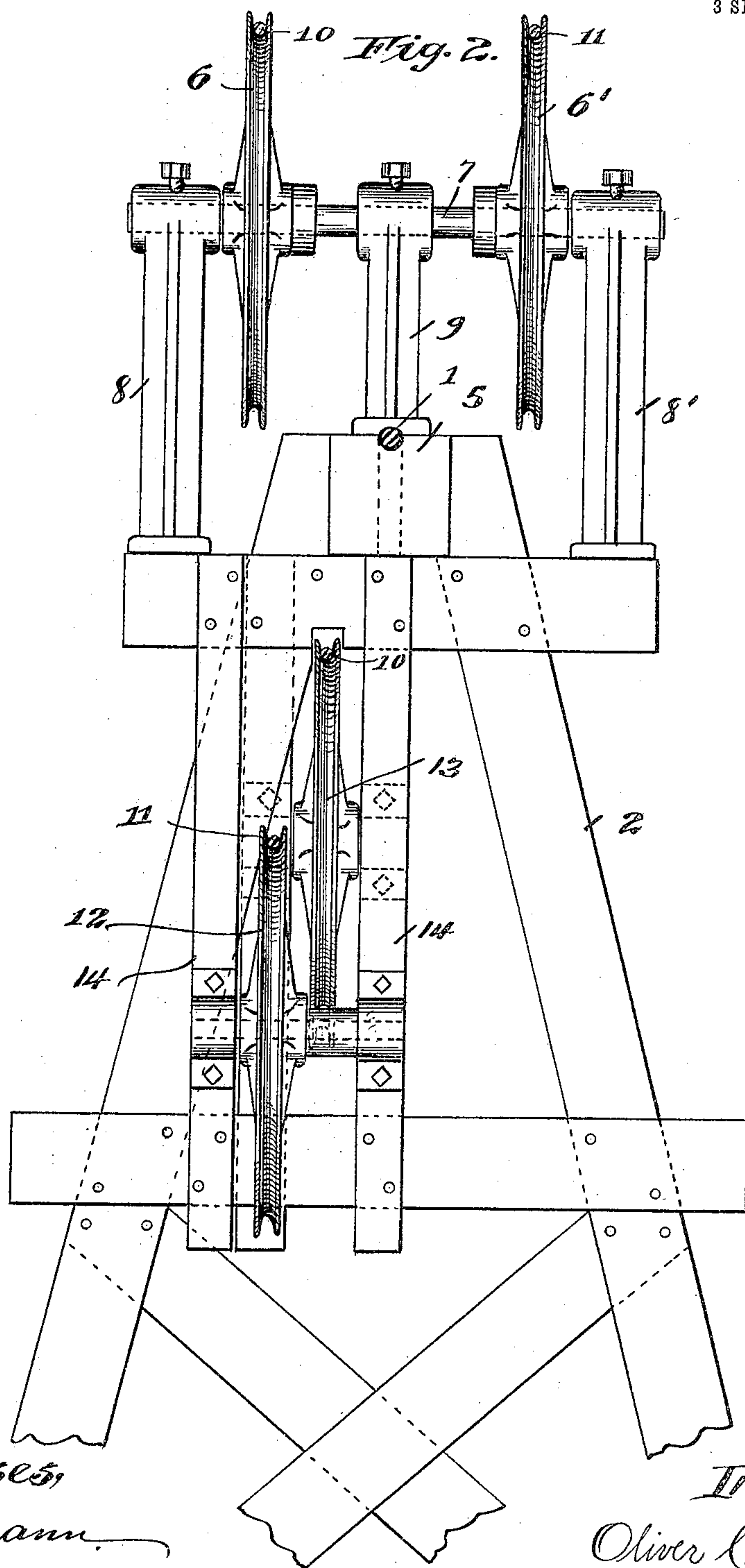
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## CABLEWAY.

No. 822,770.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed February 20, 1905. Serial No. 246,626.

*To all whom it may concern:*

Be it known that I, OLIVER C. REDDING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Cableways, of which the following is a specification.

This invention relates to improvements in cableways, and refers more specifically to apparatus of that type in which there is combined with a main supporting-cable a traveling carriage and cables connected with said carriage and with a suitable engine whereby the carriage is traversed along the supporting-cable and the excavator or bucket supported from the carriage raised and lowered at will.

Among the salient objects of the present invention are to provide a construction in which the tension of the hoisting-rope is maintained uniformly and at a sufficient tension to prevent undue sagging of said rope, even when used over relatively long spans; to so construct and arrange the tensioning device that it coöperates with the carriage and its weight contributes to the weight of the bucket or excavator in paying out the fall-rope; to provide a construction and arrangement in which the wear upon the several operating-cables is reduced to a minimum; to provide a construction in which the hoisting-rope is arranged to actuate a fall-rope drum upon the carrier through the medium of differential pulleys, the extension and retraction of the hoisting-rope as a whole being automatically taken up by the same tensioning device which contributes to the operation of the fall-block; to provide a construction and arrangement in which the several operations of lowering and hoisting the fall-block and traversing the carriage to and fro are accomplished by extremely simple and effective means, and in general to provide a simple and improved construction and arrangement of the character referred to.

The invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims, and will be readily understood from the following description, reference being had to the accompanying drawings, in which—

Figures 1 and 1<sup>a</sup> together show in side elevation a complete cableway excepting only the outer anchored ends of the main support-

ing-cable. Fig. 2 is an end elevation of the upper portion of that one of the trestles next to the hoisting-engine commonly termed the "head-tower." Fig. 3 is a similar view of the opposite end trestle or tail-tower. Fig. 4 is a plan view of the set of drums whereby the hoisting and traversing cables are operated. Fig. 5 is an axial sectional view of the fall-rope drum and integrally-formed differential pulleys.

Referring to said drawings, 1 designates as a whole the main supporting-cable, which, as usual, extends over the upper ends of the trestles (designated 2 and 3, respectively) and is seated in suitable saddle-blocks 4 and 5, it being understood that the extended ends of the cable are suitably anchored, as usual. The head-tower is provided with an upper pair of supporting-pulleys 6 6', rotatable independently of each other upon a fixed shaft 7, which is in turn supported upon suitable brackets 8, 8', and 9. The pulley 6 serves to support and carry one lap of a transmission or hoisting cable or rope, (designated 10,) while the pulley 6' similarly carries the upper lap of a traversing rope or cable 11. 12 and 13, respectively, designate a second pair of supporting-pulleys mounted between upright frame members 14 and 15, forming a part of the tower structure and located some distance below the upper pulleys 6 and 6'. The pulley 12 carries the lower lap of the traversing rope, while the pulley 13 supports the hoisting-rope. The trestle 3 is likewise equipped with four pulleys 16, 17, 18, and 19, respectively, of which the pulleys 16 and 17 carry the hoisting-rope and the other pair the traversing rope. The hoisting-rope is extended beyond the pulleys 16 and 17 to form a loop which engages a tension-pulley 20, carrying a tension-weight 21, it being understood that the tension pulley and weight are suspended in the loop and form an automatic take-up. (Best shown in Fig. 1<sup>a</sup>.)

Describing now the traveling carriage and referring more particularly to Figs. 1 and 5, said carriage comprises a pair of skeleton side frames 22, which are united at their lower ends by means of integral cross-bars 23 and at points above by a plurality of supporting-shafts, hereinafter described. 24 and 25 designate a pair of such shafts extending through the upper part of said carriage-frame transversely thereof, and upon



the central portions of these shafts are mounted the main supporting-wheels 26 of the carriage, these wheels being, as usual, grooved to engage the cable. At points  
 5 immediately below the cable are provided a second pair of wheels 27, likewise grooved and serving to confine the cable in engagement with the supporting-wheels and preventing the carriage from jumping the track.  
 10 28 designates as a whole the fall-rope drum, which is so constructed as to form in a single structure an intermediate drum portion proper, 30, and two differential pulley-sections 31 and 32, respectively, located at either side  
 15 of the drum, as shown clearly in sectional detail, Fig. 5. The drum is mounted upon a suitable supporting-shaft 29, extended through the side frames of the carriage. The fall-rope 33 (best seen in Fig. 1) has  
 20 one end connected to the fall-rope drum 30, is wound upon the latter, and extends thence down to the fall-block 34, passes around a pulley 35 therein, thence around an upper pulley 36, mounted in the carriage-frame, and back to the fall-block, to which it is attached, as indicated at 38.

The hoisting-engine and set of drums whereby the hoisting and traversing ropes are actuated may be of any preferred or  
 30 suitable construction; but as a subordinate feature of the present invention I have provided a set of drums involving a novel and peculiar arrangement. Describing said mechanism and referring more particularly  
 35 to Figs. 1 and 4, 39 designates a suitable supporting-frame within which are journaled a pair of drums 40 and 41, respectively, of which the former actuates the hoisting-rope and the latter the traversing rope or cable.  
 40 In order to actuate these drums, each is provided at one end with a gear 42 43, and upon the frame at a point between said gears is journaled a driving-gear 44, mounted upon the same shaft and rigid with a pitman-wheel 45, which is actuated in the usual  
 45 manner by the connecting rod or pitman 46 of a suitable engine or motor. (Not shown.) The gear 42 of the hoisting-drum is loosely mounted upon its shaft 47 and is controlled  
 50 by means of a clutch 48 and controlling-lever 49, so that the hoisting-drum may be thrown into or out of driving engagement with the driving-gear 44 by simply shifting the lever one way or another.

55 The traversing rope has a winch-like engagement with the traversing drum, or, in other words, that end of the rope which engages said drum simply passes around the latter a sufficient number of turns to insure  
 60 frictional driving connection. One lap of the traversing rope extends from the lower side of the drum over the pulley of the head-tower and thence to and is connected with the side of the carriage, as shown clearly in Fig.  
 65 1. Similarly, the upper lap of the traversing

rope extends from the side of the drum over the pulley 6' of the head-tower, thence to the corresponding pulley of the tail-tower, and thence back to and is connected to the opposite side of the carriage, thereby rendering  
 70 the traversing rope, in effect, endless, so that the carriage may be positively moved along in either direction. Means are also provided for locking the traversing drum against rotation, consisting in the present instance of a  
 75 friction-brake operated by the usual brake-lever. (Not shown.)

As is well understood by those skilled in the art, when an endless cable or rope is operated by engagement with the drum of the  
 80 driving mechanism winch-fashion, as hereinbefore described, the coils of the rope, in effect, travel longitudinally over the drum constantly during the rotation of the latter, and when the end coils reach the spool-head  
 85 or confining-flange of the drum the cable is caused to ride one coil upon another in such manner as to both produce a twisting effect upon the cable and also an undue wearing effect caused by one cable sliding laterally  
 90 upon the other. In the case of the hoisting-drum herein shown I have provided an arrangement which overcomes these objections, and while I have shown but one of the  
 95 drums so constructed and arranged in this improved manner, yet it is nevertheless to be understood that both driving-drums may be so constructed, if preferred. Describing now this arrangement, the drum 40 is made  
 100 of sufficient length and diameter so that one layer of coils upon the surface of the drum will equal the full traversing and hoisting length of the cable required for operation. With a drum of this capacity the two ends  
 105 of the cable or rope which engage the drum are secured to the respective ends of the drum and these ends reversely wound thereon in such manner that when the hoisting-rope is shifted to one extremity of movement practically all of the paying-out side  
 110 of the drum will be unwound, while a corresponding amount of the take-up side of the drum is occupied by coils. In other words, as one end of the rope unwinds the other winds up at an equal rate, and accordingly  
 115 the drum-surface is substantially filled at all times, the unwinding of one coil serving to wind on another in its place. The point of winding and unwinding obviously travels back and forth across the drum; but never-  
 120 theless there is no action of one coil riding upon another, as in the case of a drum with which the rope has what may be termed a "winch" engagement.

The hoisting-rope extends from the lower  
 125 side of the drum over the guide-pulley 13 of the head-tower to and is wound upon the smaller of the two differential pulley-sections of the fall-rope drum, or that designated 32, the end of this rope being attached directly  
 130



to the pulley. The opposite side of the hoisting-rope extends from the hoisting-drum over the upper pulley 6 of the head-tower, thence to the corresponding pulley 16 of the tail-tower, thence down around the tension-pulley 20, then over the lower guide-pulley 17 and back to the fall-rope drum, where it is wound upon the larger of the differential pulley-sections 31 and attached thereto. Owing to the difference in diameter between the differential pulleys 31 and 32, it will be obvious that as the fall-rope drum is rotated in one direction or another the length of the hoisting-rope as a total will be lengthened or shortened correspondingly, and accordingly the tension-weight 21 will be lowered or raised. It is a salient feature of the present invention to utilize this differential movement of the hoisting-rope in securing the reliable raising and lowering of the fall-block without changing the tension upon the hoisting-rope to such extent as to permit the latter to sag unduly or to an objectionable extent. Moreover, the arrangement is such that the prompt paying out of the fall-rope does not in any sense depend upon the weight of the fall-rope block and connected parts, but, on the contrary, is positive and effected by the coöperation of the hoisting-drum and tension-weight located at the tail-tower. To this end the take-up end of the fall-rope 33 is wound upon the fall-rope drum in such manner that as the hoisting-drum is rotated in that direction to wind the rope upon the smaller differential pulley and off the larger differential pulley the fall-block and tension-weight are both lowered, and, vice versa, when the hoisting-drum is rotated in a direction to unwind from the smaller differential pulley and wind up on the larger differential pulley the fall-rope is taken up and weight raised. It will be obvious from the foregoing that the weight of the tension-block acting on the larger differential pulley tends to rotate the latter against the restraining-rope engaged with the smaller differential pulley. It follows, therefore, that when it is desired to lower the fall-block it is only necessary to throw the hoisting-drum out of gear, whereupon the tension-weight 21 will insure the prompt lowering of the same. The operation of the mechanism in other respects is substantially similar to that of analogous cableways and will be readily understood in view of what has already been said. It may be briefly summarized, however, as follows: Assuming the carriage be at a point of loading and the fall-block elevated, the operator holds the traversing drum stationary while operating the hoisting-drum in the proper direction to lower the fall-block. The load having been attached, the hoisting-drum is reversed and rotated until the load has been elevated to the desired height, whereupon the driving-gear is shifted so as to rotate the

hoisting and traversing drums at the same speed and in the proper direction to draw the carriage to the point desired. The unloading is of course the exact opposite if the load is to be lowered before being detached. In this connection it is to be noted that a combined traversing and elevating operation may be effected by simply locking the hoisting-drum against movement while the fall-block is down and then rotating the traversing drum in the direction to draw the carriage in that direction which will insure the winding-up movement of the fall-rope drum. The differential engagement of the two ends of the hoisting-rope with the fall-rope drum will obviously bring about a combined traversing and hoisting effect. The reverse of the operation will of course effect a combined lowering and traversing movement.

It will be understood from the foregoing description that I provide a construction and arrangement which secures the several objects of the invention hereinbefore stated and enables me to dispense with the use of fall-rope carriers and other complications heretofore deemed necessary.

While I have herein shown and described what I deem a preferred embodiment of my invention, yet it will be obvious that the details of construction and arrangement may be modified without departing from the spirit of the invention, and accordingly I do not limit myself to these details except to the extent that they are made the subject of specific claims.

I claim as my invention—

1. In an apparatus of the character described, the combination of a supporting-cable, a carriage constructed to travel thereon and carrying a fall-rope drum, a fall-rope operatively connected with said drum, a hoisting-rope operatively connected with said fall-rope drum, a weighted tension-pulley operating upon the fall-rope drum supplemental to the weight of the fall-rope and connected parts and tending to unwind and lower said fall-rope and means for traversing said carriage to and fro.

2. In an apparatus of the character described, the combination of a supporting-cable, a carriage constructed to travel thereon, a fall-rope drum upon said carriage, a fall-rope operatively connected therewith, a differential pulley operatively connected with the fall-rope drum, a hoisting-cable operatively connected with said differential pulley, a tension device operatively connected with the hoisting-rope, and means for traversing the carriage to and fro.

3. In an apparatus of the character described, the combination of a supporting-cable, a carriage constructed to travel thereon and carrying a fall-rope drum, a fall-rope connected with said drum, a pair of differential pulleys, both operatively connected with



the fall-rope drum, a hoisting-cable operatively engaging both of said differential pulleys, the engaging parts of said rope being oppositely wound upon said differential pulleys, a tension device connected with said hoisting-cable and means for traversing the carriage to and fro.

4. In an apparatus of the character described, the combination of a supporting-cable, a carriage constructed to travel thereon and carrying a fall-rope drum, a fall-rope connected with said drum, a pair of differential pulleys operatively connected with said drum and of different diameter from each other, a hoisting-cable having parts which extend oppositely from the carriage operatively connected with the respective differential pulleys, a tension-pulley operatively connected with said hoisting-cable, a traversing rope operatively connected with the carriage and means for independently and simultaneously operating the hoisting-rope and traversing rope.

5. In an apparatus of the character described, the combination of a supporting-cable, a carriage constructed to travel thereon, a fall-rope drum mounted in said carriage and comprising three concentrically-disposed sections one of which constitutes the fall-rope drum proper another a small differential pulley and the other a larger differential pul-

ley, a fall-rope operatively engaged with the fall-rope drum proper, a hoisting-rope having one end coiled upon the smaller differential pulley, extending thence around a guide-support at one side of the carriage, back around a guide-support at the other side of the carriage, and thence to, and coiled upon the other differential pulley in a direction the opposite of its winding upon the first differential pulley, a tension-pulley operatively connected with that part of the hoisting-rope which extends directly from the larger differential pulley, a traversing cable operatively connected with the carriage and means for actuating the hoisting-rope and the traversing rope simultaneously at the same rate of travel or independently of each other.

6. In an apparatus of the character described, the combination of a supporting-cable, a carriage constructed to travel thereon, a drum upon said carriage, a fall-rope operatively connected with said drum, means for rotating said drum to hoist or lower the fall-rope comprising a cable and a weighted tension-pulley acting on said latter cable, substantially as described.

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