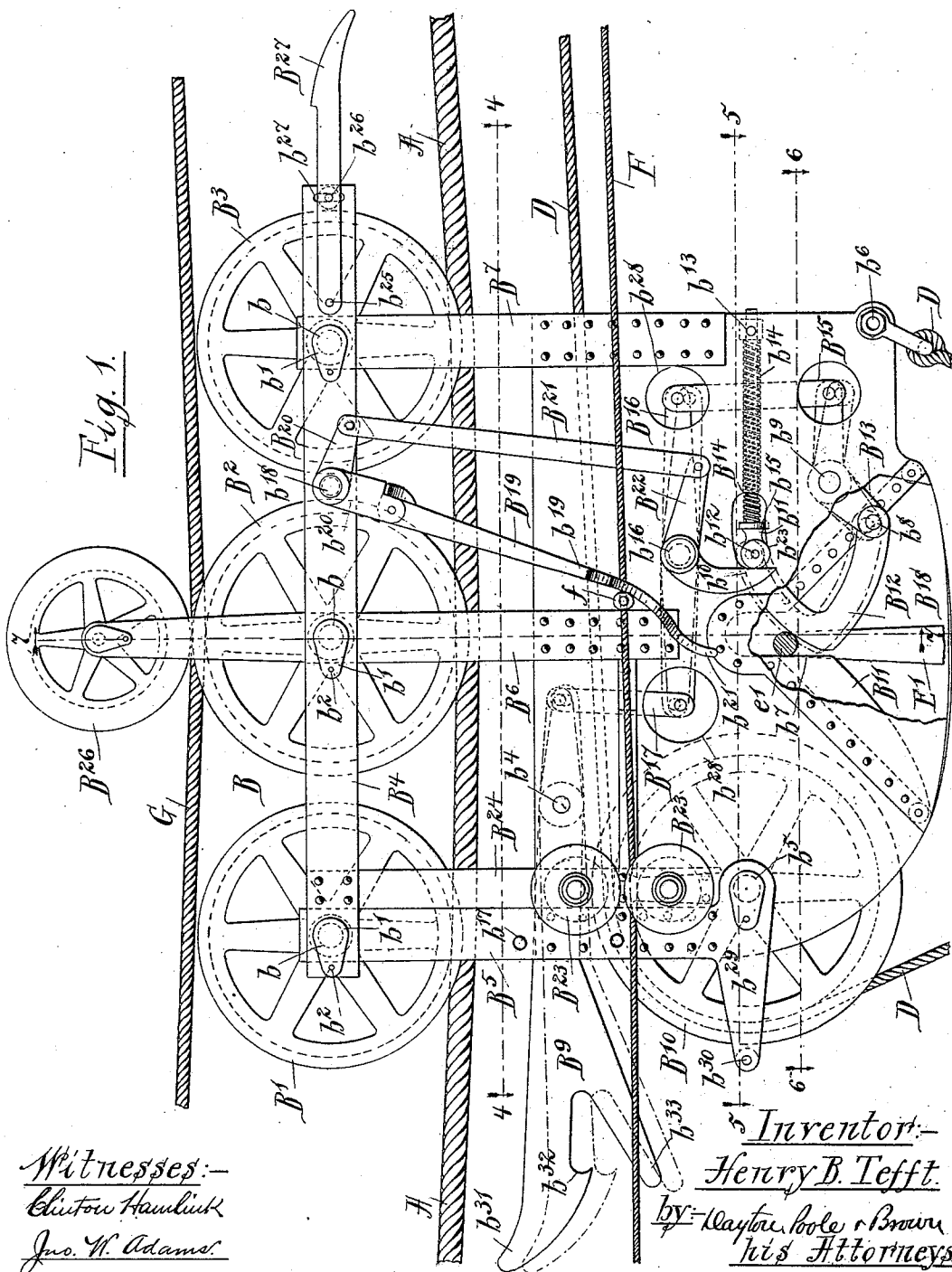


H. B. TEFFT.

HOISTING AND CONVEYING APPARATUS.

No. 532,837.

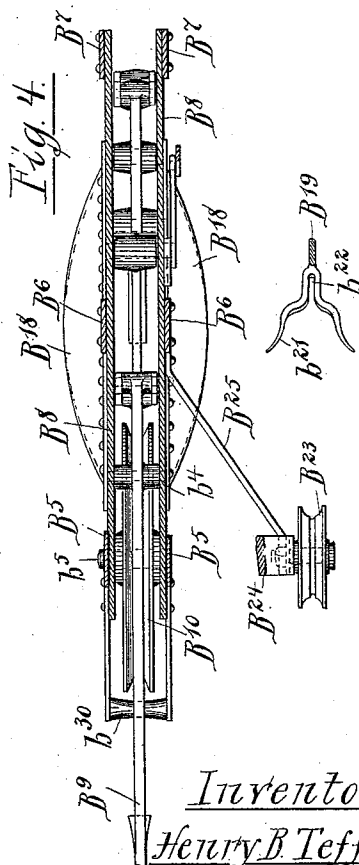
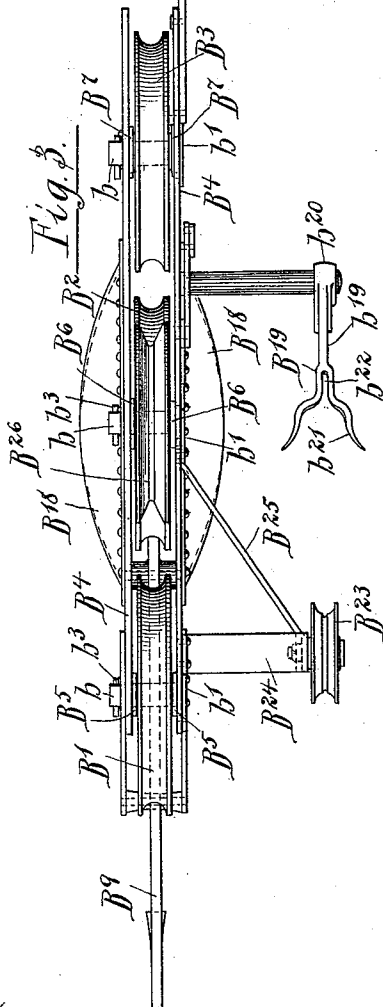
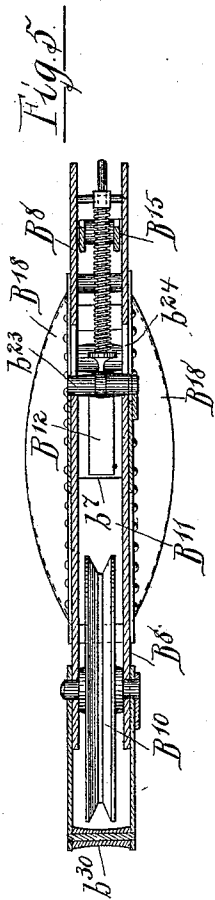
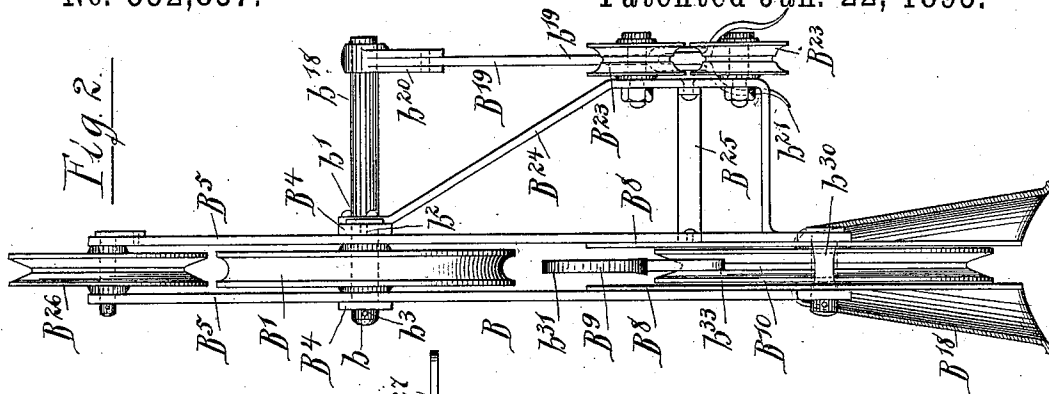
Patented Jan. 22, 1895.



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Witnesses:
Clinton Hamlin
Jno. W. Adams

Inventor:
Henry B. Tefft.
by: - Clayton, Poole & Brown,
his Attorneys

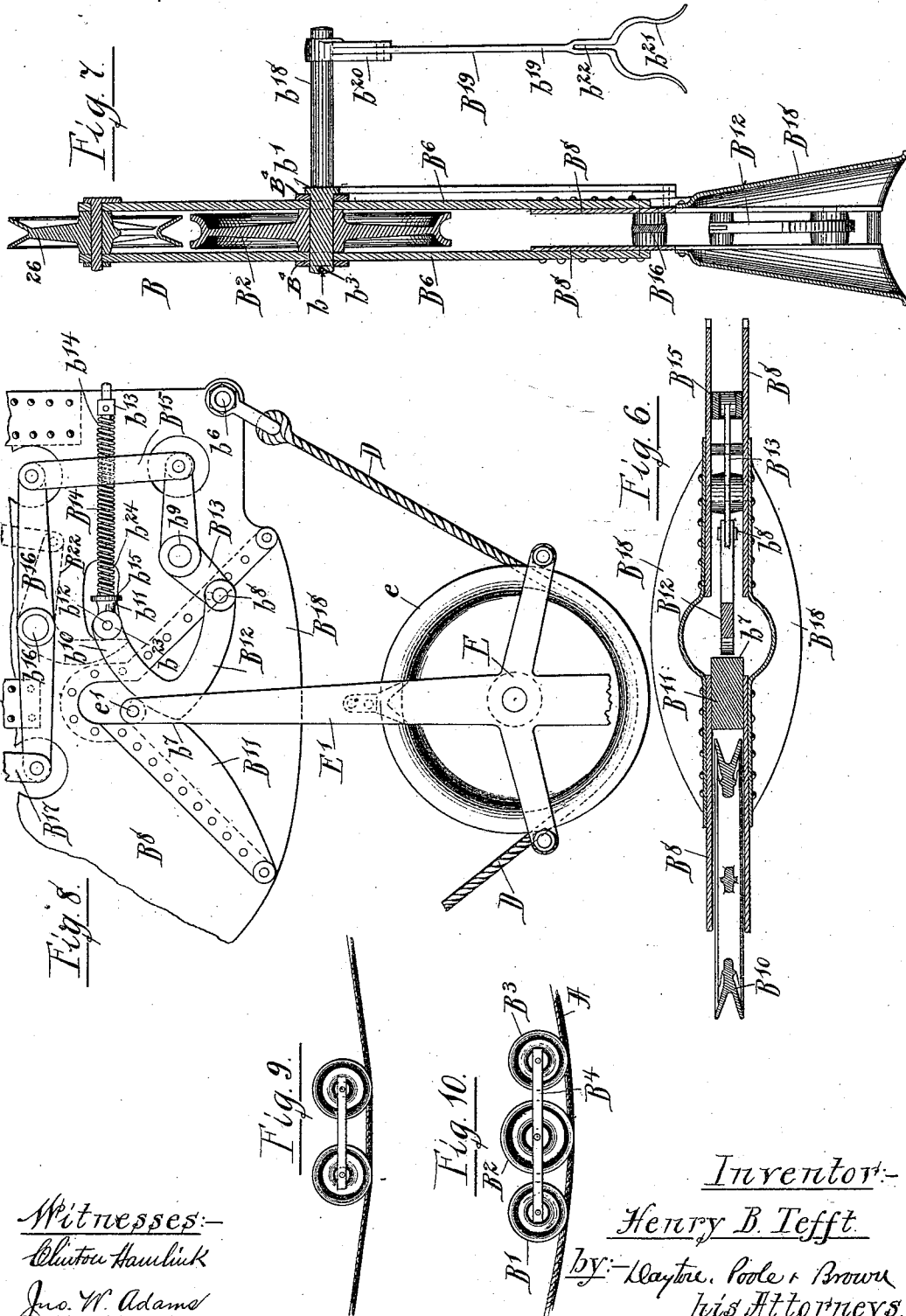
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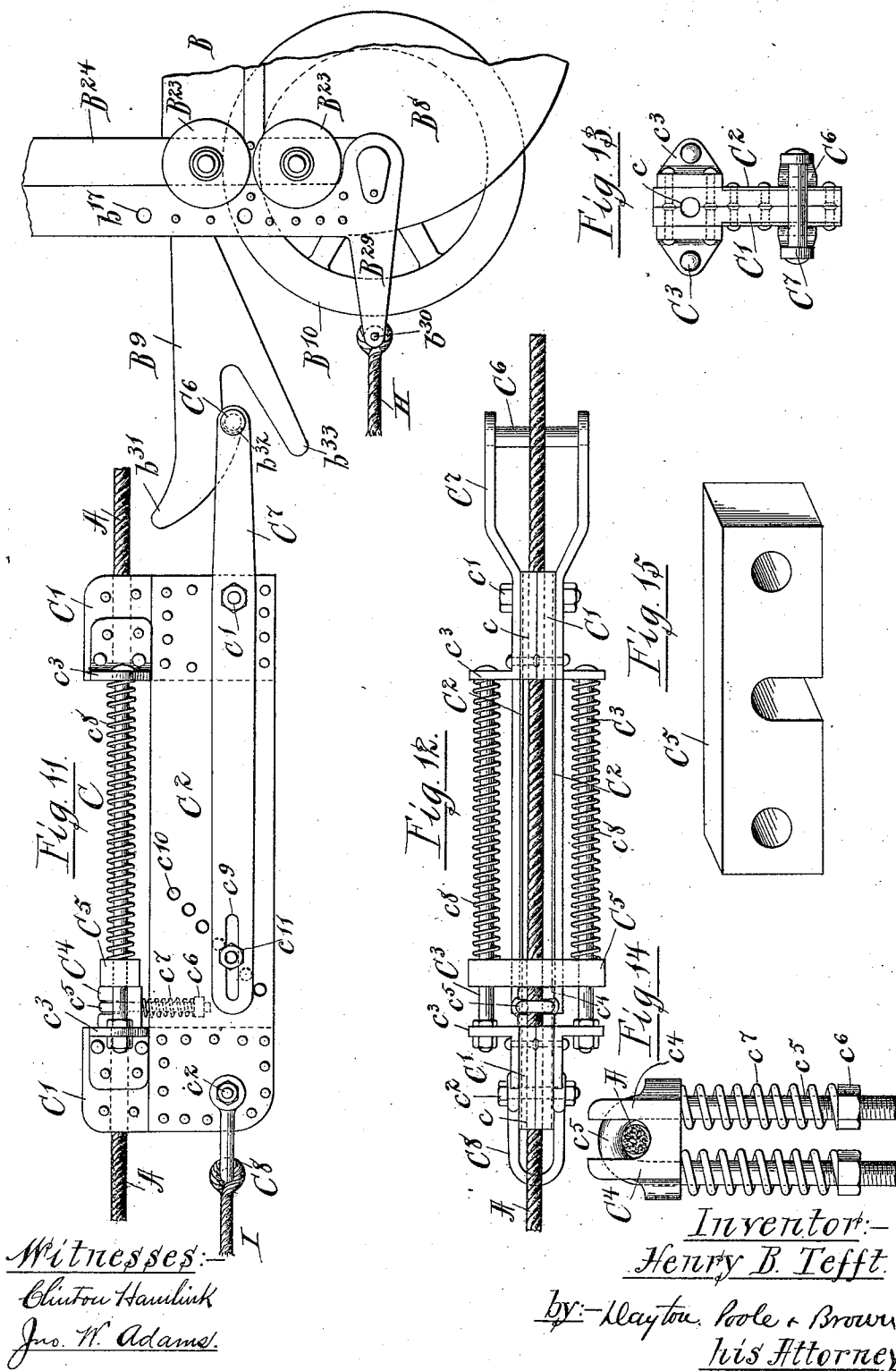
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H. B. TEFFT.

HOISTING AND CONVEYING APPARATUS.

No. 532,837.

Patented Jan. 22, 1895.



UNITED STATES PATENT OFFICE.

HENRY B. TEFFT, OF CHICAGO, ILLINOIS.

HOISTING AND CONVEYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 532,837, dated January 22, 1895.

Application filed August 16, 1894. Serial No. 520,456. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. TEFFT, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hoisting and Conveying Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in hoisting and conveying apparatus of that kind in which the load or bucket is suspended beneath a traveling transfer carriage running upon an elevated way, by means of a rope which passes over a sheave on the carriage and serves both to hoist the load and to draw the carriage along after the load has been hoisted; and it relates more particularly to that class of such apparatus in which a suspended rope or cable forms the elevated way upon which the transfer carriage travels, although in several of its features my invention is equally adapted for use in an apparatus in which the elevated way is a rigid structure provided with suitable tracks for the guidance of the carriage running thereon.

The object of my invention is to provide an improved construction in various parts of hoisting and conveying apparatus of the character referred to, and it consists in the matters herein set forth and particularly pointed out in the appended claims.

In the accompanying drawings: Figure 1 is a side elevation of the transfer carriage of a hoisting or conveying apparatus constructed in accordance with my invention. Fig. 2 is an end elevation thereof with parts in section. Fig. 3 is a top plan view of the carriage. Figs. 4, 5, and 6 are horizontal sections on lines 4—4, 5—5, and 6—6, respectively, of Fig. 1. Fig. 7 is a vertical section on lines 7—7 of Fig. 1. Fig. 8 is a fragmentary view of the lower part of the transfer carriage with one of its sides removed showing the manner of locking the tackle-block thereto. Fig. 9 is a diagrammatic view showing the deflection of the cable way produced by a carriage provided with two supporting wheels. Fig. 10 is a similar view showing the deflection of the cable way caused by my improved three-wheel

carriage. Fig. 11 is a side view of the head block by means of which the carriage is locked to the cable at one end of its path. Fig. 12 is a plan view thereof. Fig. 13 is an end view of the head-block. Fig. 14 is an enlarged detail of the headblock clamp. Fig. 15 is a detail of one of the transverse bars against which the headblock springs bear.

In said drawings A designates the suspended cable forming the elevated way upon which the traverse carriage B is adapted to travel. As herein shown the running gear of the carriage B comprises three grooved supporting wheels B' B^2 B^3 adapted to run upon the cable A and journaled between parallel side bars B^4 of the carriage upon short axles b which serve to connect said side bars. The axles b pass through suitable apertures in the side bars B^4 and are prevented from turning therein by being formed at one end with crank shafted heads b' through which dowel pins b^2 are passed into the adjacent side bar. Transverse cotters b^3 on the other end of the axles normally prevent the withdrawal of the same.

The supporting wheels B' B^2 B^3 are so arranged that the lowest point of the periphery of the center wheel B^3 or the point of its engagement with the cable A is lower than the lowest points of the end supporting wheels B' B^2 so that the pressure of said wheels upon the cable A will tend to maintain in the cable approximately the natural curve ordinarily due to the sagging of the cable between its points of support. The advantage in this regard of three supporting wheels, arranged as described, over two supporting wheels, will be evident from an inspection of diagrammatic views Figs. 9 and 10 which are illustrative of the action of the two sets of wheels upon the supporting cable. When only two wheels are used, as shown in Fig. 9, the cable between the wheels will be stretched so taut as to be practically straight and will extend at a considerable angle with the main portions of the cable on either side of the carriage; while with the three wheel structure, as shown in Fig. 10 in a slightly exaggerated form, the bending of the cable produced by the passage of the carriage will be very much diminished. Inasmuch as such bending of the cable is one of the chief causes of its wear and deteriora-

tion and soon results in its destruction, the latter construction is therefore of great value in adding to the life of the cable. As herein shown, the three supporting wheels are journaled between the bars B⁴ in a common horizontal plane, the center wheel B³ being made somewhat larger in diameter than the end wheels B' B³ so that its periphery extends below the peripheries of said end wheels, in the manner and for the purpose stated. Obviously, however, a similar result might, if desired, be obtained by using wheels of equal size in which the axis of the center wheel is arranged slightly below the plane of the axes of the two end wheels.

The main body of the carriage B is supported below the cable A by means of flat depending hanger bars B⁵ B⁶ and B⁷ which are apertured at their upper ends to receive the axles b, and are placed upon said axles between the hubs of the supporting wheels and the side bars B⁴. At their lower ends the hanger bars are riveted to parallel plates B⁸ which form the sides of the main body of the carriage and serve to inclose the operative mechanism thereof between them. A rearwardly projecting hooked latching lever B⁹ is pivoted upon a pin b⁴ between the rear upper portions of the plates B⁸ and is adapted when brought in contact with a head-block C, which is secured to the cable A, to lock the carriage B against further movement upon the cable until the latching lever is released from engagement with the head-block. Below said latching lever, a grooved pulley or sheave B¹⁰ is journaled upon a transverse bearing pin b⁵ passing through the plates B⁸, and also in this instance through the lower ends of the rear depending bars B⁵. Said sheave B¹⁰ is adapted to receive the hoist or fall rope D which passes through the carriage B from the front thereof, between the side plates B⁸ and around said pulley B¹⁰, and which is attached at its end to a transverse pin b⁶ extending between the plates B⁸ at the lower front corner of the carriage. Between the sheave B¹⁰ and the pin b⁶ said fall rope D passes beneath the sheave e of a tackle block E to which the bucket or other burden to be hoisted is attached. Obviously with this construction when the carriage B is locked to the head-block C by means of the latch B⁹ the first result of the winding in of the fall rope D is to hoist the tackle-block E together with any load which may have been attached to the same. The side bars E' of said tackle-block are extended above the sheave e thereof and are connected at their upper ends by a transverse pin e'. When the block is hoisted as described said bars E' are adapted to pass upwardly between the plates B⁸ of the carriage B and thereby effect the engagement of the cross pin e' with a locking device of a construction somewhat similar to that disclosed in my prior patent, No. 483,183, dated September 27, 1892, by means of which the tackle-block is, for the time being, locked to the car-

riage, and the latch B⁹ of the latter is released from the head-block C. Such locking mechanism is in this instance constructed as follows:

B¹¹ designates an inclined block rigidly bolted between the plates B⁸ with its under face inclined upwardly toward the center of the carriage and terminating in a vertical face b⁷. Said block B¹¹ is adapted to guide the cross pin e' of the tackle block against a locking bar B¹² which is pivoted at its lower end b⁸ to the lower end of a bell crank lever B¹³. The latter is pivotally mounted between the plates B⁸ upon a pin b⁹ located at a point on the opposite side of the center of the carriage from the block B¹¹. From the point of its pivotal engagement with the bell crank lever B¹³ the locking bar B¹² extends upon an upward inclination approximately to the vertical face b⁷ of the block B¹¹ and from thence is bent sharply back upon itself so as to incline upwardly away from said vertical face b⁷. The upper end b¹⁰ of the locking bar B¹² is recessed to receive the rear end b¹¹ of a rod B¹⁴ and is pivotally secured thereto by a pivot pin b¹². The front end of the rod B¹⁴ passes loosely through an aperture in a block b¹³ which is pivoted at its ends in the side plates B⁸. A coiled spring b¹⁴ is placed upon the rod between the block b¹³ and a shoulder b¹⁵ at the inner end of the rod and exerts constant pressure on the latter and consequently on the locking bar B¹² and tends to hold the same against the stationary block B¹¹. The front end of the bell crank lever B¹³ is pivotally connected by links B¹⁵ with the front end of a substantially horizontal lever B¹⁶ which is pivoted between its ends upon a pin b¹⁶ extending between the plates B⁸. The rear end of the lever B¹⁶ extends beneath the rear end of the latching lever B⁹ and is pivotally connected therewith by links B¹⁷ between which the fall rope D passes before it reaches the sheave B¹⁰. With this construction, when the tackle block is raised by the winding in of the fall rope, its transverse pin e' will obviously be guided to the juncture of the block B¹¹ and locking bar B¹² and will force back said locking bar against the tension of the spring b¹⁴ so as to pass above the bar and permit the same to spring back into place. The fall rope is then slackened slightly to permit the tackle-block to descend until the pin e' rests upon the upper side of the locking bar when the weight of the tackle block and its supported load will force the same down so as to oscillate the bell crank lever B¹³, raise the latch B⁹, and release the carriage from the head block C. Obviously, therefore, the latch B⁹ cannot be raised until the tackle block has been locked to the carriage and consequently there is no possibility of the latter being released before the tackle block is locked thereto. As herein shown, the lower central portions of the plates B⁸ are cut out adjacent to the block B¹¹ and locking bar B¹² and are provided with downwardly flaring

hooded portions B^{18} , which are riveted to the side plates B^8 and serve to insure the correct entrance of the bars E' and cross pin e' of the tackle block into the bottom of the carriage, and to direct said pin against the locking bar.

The engineer who is controlling the hoisting machinery will be apprised of the proper moment to slack away on the fall rope and release the carriage, by the sudden increase of the tension which will occur in said fall rope as the tackle-block reaches the upward limit of its movement and consequently comes to a sudden stop, it being customary in practice to make the parts of the apparatus strong enough to resist the strain of the hoisting machinery when the movement of the tackle-block is thus suddenly arrested.

The movement of the latch B^9 is maintained within proper limits by a transverse pin b^{17} extending between the rear hanger bars B^5 a short distance above the said latch, and the bell crank lever B^{13} . The movement of the latter will also be limited by said pin b^{17} . The actual movement of the bell crank B^{13} is very slight so that the downward movement of the locking bar B^{12} due to the pressure of the pin e' will also be very slight, and the pin e' will thereafter be securely held upon the upper portion of the locking bar and between the same and the vertical surface b^7 of the block B^{11} until released by the withdrawal of the locking bar B^{12} from said block. As a means of accomplishing such withdrawal of the locking bar at any desired point in the travel of the carriage I employ, in this instance, a separate releasing or button rope F of small diameter suspended a little at one side of and below the cable A . Said button rope is adapted to be engaged by a jointed arm B^{19} rigidly mounted at the outer end of a stud b^{18} which projects laterally from the side bars B^4 and supports said arm in the same vertical plane with the button rope. The lower portion b^{19} of the arm B^{19} is pivoted to its upper portion b^{20} so as to be free to swing rearwardly thereon while held against forward movement relatively thereto. The lower end of the arm B^{19} is forked to form a widespreading guide b^{21} , the upper portion of which is narrowed to a mere slot b^{22} only wide enough to permit the button rope F to pass freely through it.

An adjustable stop or button f is placed upon the button rope at that point in the travel of the transfer carriage at which it is desired to release the tackle block and bucket from its engagement with the carriage and to permit the same to be lowered to receive its load. When the transfer carriage is drawn forward after having the tackle block locked within it in the manner described, the arm B^{19} strikes the button f and rides freely over the same, but on the return movement of the carriage, it is swung bodily about the axis of the stud b^{18} so as to oscillate the latter. At the inner end of the stud adjacent to the nearer

side bar B^4 is a rigidly attached radial arm B^{20} , extending forwardly from said stud. The outer end of said arm B^{20} is pivotally connected by a link B^{21} with the forward end of a bell crank lever B^{22} which is pivotally mounted on the adjacent side plate B^8 , in this instance by being rigidly secured to the adjacent end of the pivot pin b^{16} of the lever B^{16} . The lower end of the bell crank lever B^{22} extends downwardly behind an integral hub or boss b^{23} formed on the upper end of the locking bar B^{12} and projecting laterally through a slot or aperture b^{24} in the side plate B^8 , so that when the lever B^{19} is oscillated by contact with the button f , the lower end of the bell crank lever B^{22} will be moved forwardly against said boss b^{23} and will thereby withdraw the locking bar B^{12} from beneath the pin e' , and permit the tackle block to be lowered. In the particular construction thus described the locking bar B^{12} will be tripped only on the return movement of the carriage. Obviously, however, a similar but oppositely arranged mechanism may, if desired, be provided on the other side of the carriage and adapted to engage with a second button rope so as to trip the latch and lower the bucket at the other end of its path. Such duplicate tripping devices will not be required when, as is ordinarily the case, the bucket which is attached to the tackle block is dumped either by the reversal of the bucket or by the release of a trap door in its bottom while the tackle block remains locked to the carriage; but in cases where it is found necessary to lower the bucket or load before dumping or depositing the same, some means for releasing the tackle block from the carriage when the dump is reached must obviously be provided, and in such case, the duplicate tripping mechanism referred to may conveniently be employed to permit the lowering of the load at the desired point. As herein shown the hub or boss b^{23} is formed on both sides of the locking bar and projects out through a slot b^{24} in each of the plates B^8 so that the tripping mechanism may readily be applied at any time.

For the purpose of constantly maintaining the button rope F in proper relation to the lever B^{19} , I have in this instance provided vertical guide pulleys B^{23} B^{23} mounted near the rear of the carriage and in the plane of the rope, upon a laterally projecting bracket formed by a bent bar B^{24} which is riveted at its upper end to the adjacent cross bar B^4 and at its lower end to the adjacent plate B^8 . Said pulleys B^{23} normally support the button rope F at the proper height to pass through the slot b^{22} of the arm B^{19} but do not interfere with the relative movement of the rope and carriage, the grooves in their peripheries being made large enough to permit the button f to pass freely between them. A horizontal brace bar B^{25} secured at one end of the bracket bar B^{24} at a point between the guide pulleys B^{23} , and at its other end to the adja-

cent plate B⁸ near the middle thereof, serves to prevent the bracket from being distorted by any undue pressure or blow upon the same.

As herein shown the middle hanger bars B⁶ are extended upwardly above the middle supporting wheel B² and have pivotally mounted between their upper ends a guide wheel B²⁶ which co-operates with the middle supporting wheel B² in forming a guide for a relatively small rope G, used for supporting the hoisting or fall rope D, in a familiar manner. The links or trolleys (not shown) which serve to support the fall rope from the supporting rope, and are commonly known as fall rope carriers, are successively picked up, as the carriage advances, by a forwardly projecting arm B²⁷. Said arm is in this instance adjustably secured to the side bar by being pivoted at its rear end upon a pin b²⁵ engaging said side bar and by being secured at the front end of the side bar by means of a clamping bolt b²⁶ passing through a vertical slot b²⁷ in said bar. The side plates B⁸ of the carriage are also shown provided with apertures b²⁸ at points opposite the pivotal connections between the links B¹⁵ and B¹⁷ with the levers B¹³ and B¹⁶ through which the pivots are inserted when the parts are being assembled. The lower ends of the rear hanger bars B⁵ are shown formed with rearwardly projecting portions b²⁹ connected at their ends by a transverse pin b³⁰ to which is attached the tail rope H by means of which the carriage is returned to its starting point after the bucket has been dumped. The head-block C is in this instance adapted to be secured to the cable A by a yielding connection and is designed not only to resist the tendency of the carriage B to be drawn away from said head-block while the bucket is being hoisted, but to act as a yielding buffer by means of which the strain upon the cable due to the carriage striking against the head-block in its return movement will be so cushioned as to prevent the cable or carriage from being injured by the shock. To this end said head-block is constructed as follows:

C' C' designate two pairs of cast iron blocks which are secured between the ends of thin side plates C², and are provided in their adjacent upper faces with semi-circular recesses c which co-operate to form apertures through which the cable A is adapted to freely pass. Each of the blocks C' is securely riveted to its adjacent plate C² and the two sections of the head block thus formed are clamped together by transverse bolts c' and c². Laterally projecting angle irons or brackets c³ are secured to the upper portions of the blocks C' on either side of the apertures through which the cable A passes, and serve to support parallel yoke rods C³ which extend longitudinally of the carriage at either side of the cable A.

C⁴ designates a clamp located upon the cable A between the end blocks C' of the head-block. Said clamp comprises a grooved block

c⁴ which is placed beneath or above the cable A and a U-shaped bolt c⁵ which is placed over or beneath the cable A and has its ends passed up or down through suitable apertures in the grooved block. The ends of the bolt c⁵ are screw threaded and provided with nuts c⁶, and also with coiled springs c⁷ which are inserted between the nuts c⁶ and the under surface of the grooved block. By screwing up the nuts c⁶ the springs c⁷ may obviously be compressed to any desired degree, and the cable A will thus be yieldingly clamped between the grooved block and the loop of the U-shaped bolt with a greater or less pressure accordingly as the springs c⁷ are more or less tightly compressed.

C⁵ designates a transverse bar of wood or metal apertured to slide upon the yoke rods C³ and recessed at its center to pass freely over the cable A. Coiled springs c⁸ are placed upon the yoke rods between the ends of the bar C⁵ and the front brackets c³ of the head block so that when the head-block is forced rearwardly said springs will be compressed and will serve to cushion its stoppage or bring it gradually to a state of rest. The transverse locking pin C⁶ which is adapted to be engaged by the latching lever B⁹ is supported between the outer ends of forwardly projecting lateral arms C⁷ bolted to the sides of the head block. The connection between the said lateral arms and the block is in this instance made adjustable by pivoting the arms at the front of the block upon the clamping bolt c' thereof, and by providing in the rear ends of the arms longitudinal slots c⁹ through which and through any one of an inclined row of holes c¹⁰ in the plates C² a bolt c¹¹ may be passed. Obviously, with this construction, by engaging the bolt c¹¹ with one or the other of the holes c¹⁰ the arms C⁷ may be tilted or inclined so as to either raise or lower the locking pin C⁶, as necessary for bringing it in position to engage with the latching bar B⁹ of the carriage.

The latching bar B⁹ of the carriage B is provided with an upwardly and rearwardly inclined lower face b³¹ terminating at its lower end in a hook b³² adapted to drop behind the locking pin C⁶ and prevent the forward movement of the carriage, said inclined face b³¹ first riding up on the pin C⁶ and lifting the latching bar so as to release the locking device and permit the tackle-block and bucket to descend. Said bar is also provided with a downwardly and rearwardly projecting lug b³³ extending beneath the hook b³² and forming a shoulder at its base which is adapted to abut against the locking pin C⁶ and receive the shock of the collision between the carriage and the head block. Said lug b³³ also serves to engage the underside of the pin and positively force the latching bar downward in position to hook over the pin. With this construction it will be obvious that in its return movement the latch B⁹ will strike the pin C⁶ and force the latter backward to a greater or less extent

against the tension of the springs c^3 , the latter obviously operating to form a cushion between the head block and clamp C^4 , by means of which the stock of the collision is cushioned and the carriage is gradually brought to rest. Furthermore the yielding engagement between the clamp C^4 and the cable A is designed to be sufficiently loose to permit the clamp to slide slightly on the cable under excessive shocks, and also to permit the head block to be drawn rearwardly by means of a rope I attached to a clevis C^8 pivoted to the bolt c^2 at the rear of the head-block, without unloosening the clamp C^4 , when it is desired to increase the length of the path of the transfer carriage. The head block may thus be drawn back on the cable to provide for the increased travel of the carriage made necessary by the progress of the excavation, without its being necessary for an attendant to climb up to the head block for the purpose, an operation often difficult and dangerous.

By the arrangement of the parts described in which the fall rope is secured to the front of the carriage, passed through the tackle block, around a sheave at the rear of the carriage and thence out at the front of the same, the direction of rotation of the tackle block sheave when the latter is hoisted is reversed from the direction resulting in the usual construction when the fall rope is secured to the rear portion of the carriage and passed over a sheave at the front thereof, *i. e.*, the rope draws upward out of the tackle block sheave on the rear side thereof instead of drawing downward into the sheave on that side. This is of great advantage in dredging or excavating against a bank which faces forwardly or in the direction toward which the excavated material is discharged, since in such case the rear side of the tackle block is liable to rub or scrape along the bank so that when the rope runs downwardly into the blocks on that side, stones and other débris are frequently drawn into it to its serious damage; while when the rope draws upwardly out of the block on that side, the direction of movement of the rope and of the tackle block sheave ordinarily prevents the entrance of débris and serves to eject any which may happen to enter, thus adding greatly to the life of the fall rope and tackle block.

I claim as my invention—

1. The combination with a suspended cable, of a transfer carriage provided with three supporting wheels mounted to run upon said cable, the lowermost point of the middle supporting wheel being below the lowermost points of the front and rear supporting wheels, substantially as described.

2. The combination with a suspended cable, of a transfer carriage provided with three supporting wheels mounted to run upon the cable, the axes of which are arranged in a common plane, the middle supporting wheel being of larger diameter than the end supporting wheels, substantially as described.

3. The combination with a transfer carriage, of a latching lever, a sheave, mounted in the carriage, a fall rope passing over said sheave and supporting a tackle-block, and a locking device for said tackle block comprising a pivoted locking bar, a bell crank lever to which said locking bar is pivoted, a spring applied to said locking bar to actuate the same, and a horizontally arranged connecting bar pivoted between its ends and connected at one end with the said bell crank lever and at its opposite end with the latching lever, substantially as described.

4. The combination with a transfer carriage, of a pivoted latching lever on said carriage projecting from the rear end thereof, a sheave, a fall rope secured to the carriage and passing over said sheave, a tackle block, a locking bar, a bell crank lever to which said locking bar is pivoted, a spring applied to said locking bar to actuate the same, and a pivoted bar for transmitting motion from the bell crank lever to the latching lever connected by links with an inwardly projecting arm of the latching lever and with said bell crank lever, substantially as described.

5. The combination with a transfer carriage, of a pivoted latching lever, a sheave, a fall rope passing over said sheave and secured to the carriage, a tackle block provided with a cross pin, an inclined block on the carriage, a pivoted locking bar opposed to said inclined block and adapted to engage the cross pin of the tackle block, a bell crank lever to which the locking bar is connected, a rod pivoted to the upper end of the said locking bar, and a spring applied to give endwise movement to said rod for actuating the locking bar, said bell crank lever being connected with and adapted to give movement to the said latching lever, substantially as described.

6. The combination with a transfer carriage comprising supporting wheels and side plates, of a latching lever, a sheave mounted between said plates, a fall rope passing over the said sheave, a tackle block provided with a cross pin, an inclined block secured between said side plates, a locking bar located between the side plates and opposed to the inclined block, a bell crank lever to which the locking bar is pivoted, a rod pivoted to the upper end of the locking bar, a spring for actuating the locking bar, a jointed arm pivoted to the side of the carriage and provided with a rigid arm adjacent to the pivotal axis thereof, a bell crank lever, a rod connecting the said rigid arm with the bell crank lever, and a lateral boss of the upper end of the locking bar projecting through a slot in the side plate and adapted for engagement with the said bell crank lever, substantially as described.

7. The combination with a transfer carriage, of a pivoted latching lever, a sheave, a fall rope passing over said sheave, a tackle block provided with a cross pin, a locking device on the carriage comprising an inclined block, a pivoted locking bar opposed to said

inclined block, and a spring for actuating said locking bar, a bell crank lever to which the locking bar is pivoted at its lower end and which is connected with the said latching lever, a jointed arm pivoted to the carriage and connected with the upper end of the locking bar, and means embracing a stationary stop for actuating the said jointed arm, substantially as described.

8. The combination with a transfer carriage, of a pivoted latching lever, a sheave, a fall rope passing over said sheave, a tackle block provided with a cross pin, a locking device comprising an inclined block, a locking bar opposed to said inclined block, and a spring for actuating said locking bar, a bell crank lever to which the locking bar is pivoted and which is connected with said latching lever, a jointed arm pivoted to the carriage, a bell crank lever which is connected with and moved by said jointed arm and is adapted to act upon the upper end of the locking bar, and means embracing a stationary stop adapted to engage and actuate the jointed arm in the movement of the carriage, substantially as described.

9. In a hoisting and conveying apparatus, the combination with an elevated way, of a transfer carriage mounted to run upon said way, means for detachably holding the carriage from movement upon the way, a sheave, a fall rope passing around said sheave, a tackle block, locking devices on the carriage adapted to engage and hold the tackle block when the latter is hoisted, a button rope, an arm on the carriage adapted to engage a stop or button on said button rope, and connections between said arm and the locking device whereby the tackle block may be released by the movement of the arm, substantially as described.

10. In a hoisting and conveying apparatus, the combination with an elevated way, of a transfer carriage mounted to run upon said way, means for detachably securing the carriage against movement along the way, a sheave, a fall rope passing around said sheave, a tackle block, a cross pin on the tackle block frame above its sheave, an inclined block at the lower part of the carriage, a locking bar pivoted at its lower end, a spring for forcing the locking bar toward the block, a button rope, a stop or button on said button rope, a jointed arm pivoted to the frame and adapted to be swung bodily when passing over the button in one direction, and connections between said arm and the locking bar for withdrawing the latter from the block when the arm is bodily moved by the button, substantially as described.

11. In a hoisting and conveying apparatus, the combination with an elevated way, of a transfer carriage mounted to travel on said way, means for detachably securing the carriage against movement on the way, a sheave, a fall rope, a tackle block, a locking device on the carriage adapted to detachably secure the tackle block to the carriage when the block is

hoisted, a button rope, guide pulleys between which said button rope passes, a jointed arm pivoted to the carriage and provided at its lower end with a fork embracing said button rope, a stop on the button rope, and connections between said arm and the locking device for releasing the tackle block, substantially as described.

12. The combination with a transfer carriage, of a pivoted latching lever, a sheave, a fall rope passing over said sheave, a tackle block, an upwardly projecting frame on the tackle block provided with a cross pin, a locking device on the carriage adapted to engage said pin said locking device comprising a downwardly flaring hooded portion, an inclined block within said hooded portion, a pivoted locking bar opposed to said inclined block, a bell crank lever to which the locking bar is pivoted at its lower end, a spring applied to actuate said locking bar, substantially as described.

13. The combination with a transfer carriage comprising supporting wheels and parallel side plates, of a latching lever projecting from the rear of the carriage, a sheave mounted between said plates, a fall rope passing over said sheave and secured to the carriage, a tackle block mounted in the bight of the fall rope and provided with a cross pin, an inclined block secured between the side plates, a locking bar opposed to the inclined block, a bell crank lever to which the locking bar is pivoted, a rod pivoted to the upper end of said locking bar, a spring mounted on said rod for actuating the locking bar, a lever pivoted between the plates, links connecting the ends of said lever with the ends of the latching lever and the bell crank lever, a jointed arm pivoted to the carriage, an arm rigidly connected with said jointed arm at the pivoted axis thereof, a lateral boss on the upper end of the locking bar projecting through a slot in the side plate adjacent to the said arm, a bell crank lever engaging said lug at one end and having its opposite end pivotally attached to the end of the said arm, and means embracing a stationary stop for actuating the jointed arm, substantially as described.

14. The combination with a suspended cable, of a transfer carriage mounted to run on said cable, and a head block to which said carriage is adapted to be detachably secured, said head block being yieldingly secured to the cable so that the collision of the carriage therewith is cushioned and the strain on the cable and carriage relieved, substantially as described.

15. The combination, with a suspended cable, of a transfer carriage mounted to travel on said cable, a fall rope for drawing the carriage in one direction, a tail rope for drawing the carriage in the other direction, a head block on the cable toward which the carriage is drawn by the tail rope and to which said carriage is adapted to be detachably secured, a clamp embracing the cable, and springs in-

terposed between the head-block and clamp, substantially as described.

16. The combination with a suspended cable, of a transfer carriage mounted to run on said cable, a clamp yieldingly embracing said cable, a head block mounted loosely on the cable and provided with longitudinal bars, springs upon said bars affording a yielding cushion between the clamp and head block, and a rope attached to the head block for drawing the head block and clamp bodily along the cable, substantially as described.

17. The combination with a suspended cable, of a transfer carriage mounted to run on said cable, a hooked latching lever on the carriage, and a head block secured to said cable provided with a transverse pin adapted to be engaged by said lever, and arms for supporting the pin, which arms are pivoted at the front of the carriage and provided at their rear ends with slots through which and through any one of a series of holes in the head block a bolt is inserted to hold the arms in a desired position, substantially as described.

18. The combination with a suspended cable, of a traveling transfer carriage mounted to run on said cable, a head block yield-

ingly connected to said cable, a transverse pin on said head block, and a pivoted latching lever of the transfer carriage formed with a rearwardly inclined face terminating at its lower end in a hook adapted to pass behind said transverse pin and provided with a downwardly and rearwardly inclined lug attached at a point in the front of the said hook and forming a shoulder adapted to engage the front of the pin and receive the shock of the collision between the carriage and head block, substantially as described.

19. The combination with a cable way, of a head block yieldingly secured to the cable by means of a clamp comprising a grooved block, a U-shaped bolt having its ends passed through apertures in said block, and springs on the ends of the bolts engaging the under surface of the block, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

HENRY B. TEFFT.

Witnesses:

C. CLARENCE POOLE,
TAYLOR E. BROWN.