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Patented Nov. 18, 1902.

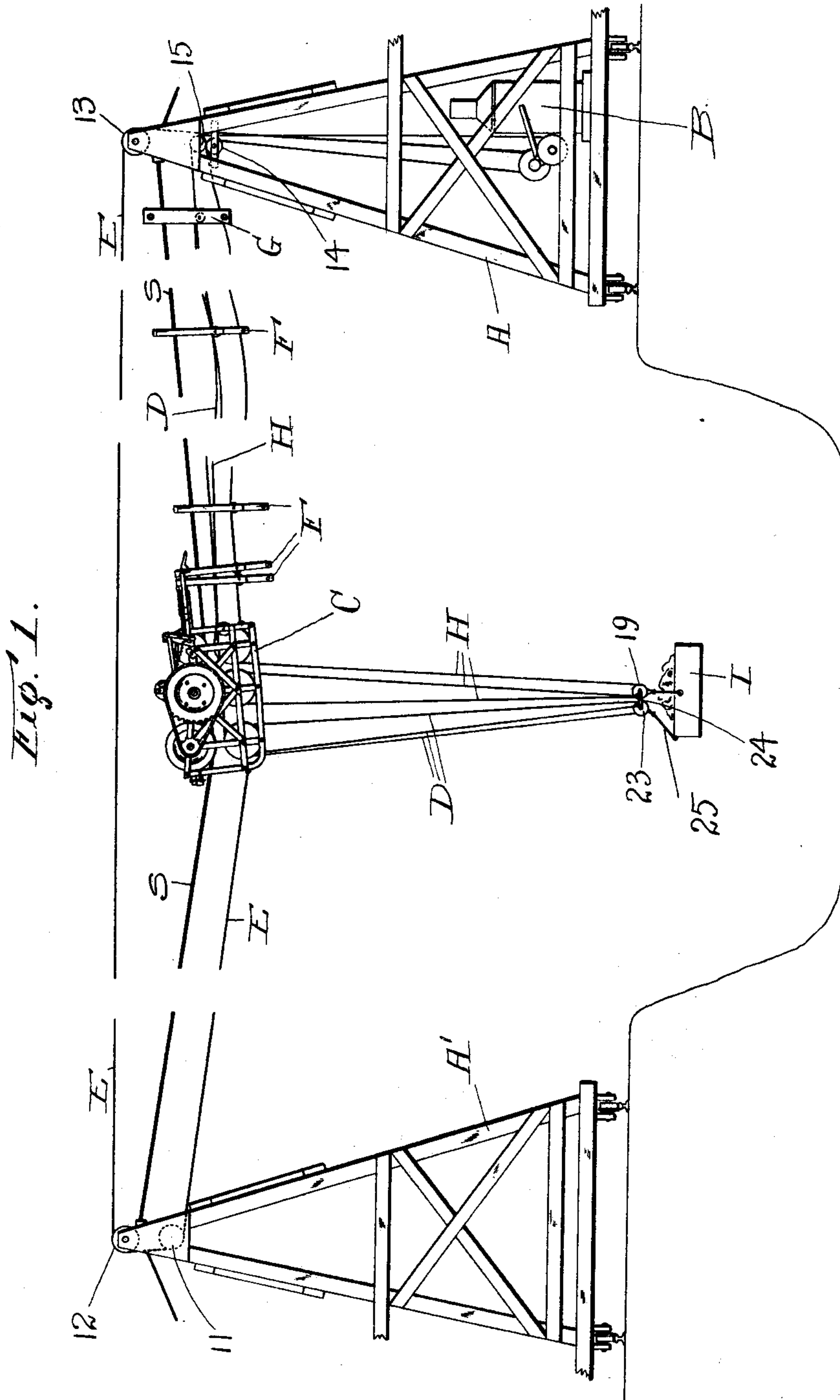
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HOISTING AND CONVEYING MECHANISM.

(Application filed Oct. 8, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
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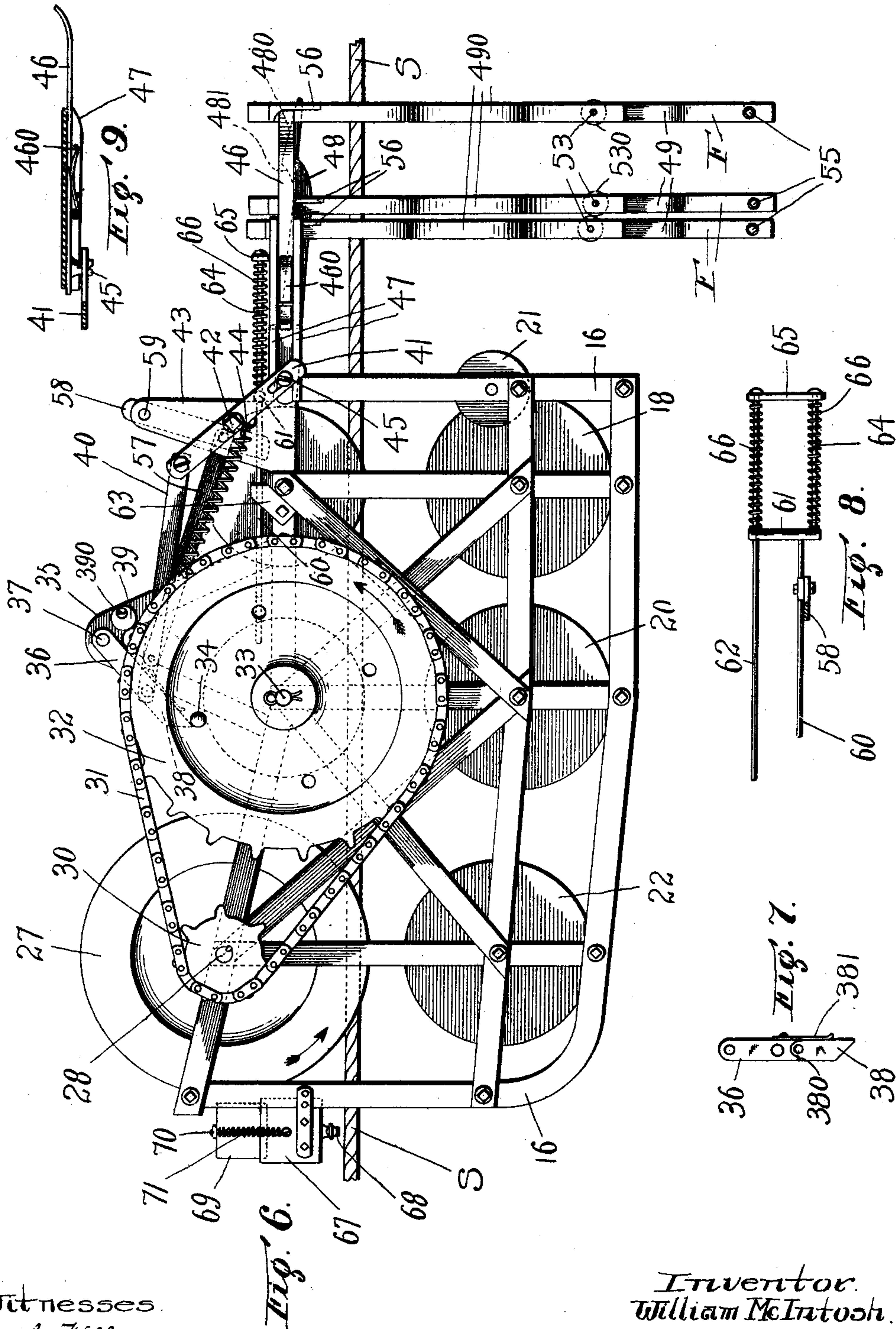
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UNITED STATES PATENT OFFICE.

WILLIAM MCINTOSH, OF CLINTON, MASSACHUSETTS.

HOISTING AND CONVEYING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 713,909, dated November 18, 1902.

Application filed October 8, 1901. Serial No. 77,939. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MCINTOSH, a citizen of the United States, residing at Clinton, in the county of Worcester and State of Massachusetts, have invented a new and useful Hoisting and Conveying Mechanism, of which the following is a specification.

The object of this invention is to improve hoisting and conveying apparatus used in excavating or loading and unloading.

The improvements particularly relate to improved means for supporting the operating rope or ropes and to a means for automatically controlling the supporting devices.

The form of mechanism to which my invention most particularly relates is that now in common use for excavating. This consists of two towers between which a strong suspension means is arranged, this means usually consisting of a heavy cable. Traveling on this cable is a carriage. Running to this carriage are the operating-ropes, which usually consist of an endless running rope for traveling the carriage back and forth on the supporting-cable, a hoisting-rope, and a dumping-rope for the bucket. These ropes pass over pulleys to windlasses or drums operated by an engine. When a device of this kind is used to span a considerable distance, it is necessary to provide means depending from the supporting-cable for supporting the operating rope or ropes. This means consists of what are termed "carriers," which are small frames carrying pulleys over which the operating rope or ropes pass. As the carriage moves back and forth, it is obvious that it is necessary to leave these supporting-carriers at proper distances apart along and depending from the supporting-cable. The common way of doing this is to use what is known as a "button-line" between the two towers. This button-line consists of a rope stretched between the two towers, having buttons of varying sizes attached thereto at proper distances apart for the purpose of distributing the carriers by disengaging the same from the carriage. Not only is this button-line an expensive part, but it is inefficient in operation in practice, as it is apt to clog or stick the various parts. It then becomes necessary to send a man out along the cable to repair the breakdown. This is an extremely dangerous

and hazardous undertaking. This button-line is the main source of trouble in operating devices of this character.

The object of this improvement is to do away with this button-line and to provide a positive, sure, and accurately-operating mechanism for distributing the carriers at predetermined distances along the suspension-cable. To do this, I provide a new and improved means or operating mechanism, preferably carried and located upon the carriage itself, which is actuated by the movement of the carriage in such manner as to release and deposit the carriers in their proper positions depending from the supporting-cable. This mechanism is so arranged that no matter how the carriage is traveled backward or forward the carriers will always be distributed at the proper distances apart. The novelty of my operating mechanism for this purpose resides in the fact that a horizontal pusher or detacher is used and arranged to engage and detach the outermost of the series of carriers. Another point of novelty thereof resides in the fact that this horizontal pusher is spring-actuated, which spring is set and released by a mechanism which substantially forms a trigger mechanism, so that the pusher will operate only when the carriage reaches the proper point, and then very quickly.

By this improvement not only is the button-line entirely done away with, making a considerable saving in the construction and erection of the structure, as there is one less rope to stretch, but the same has the advantage of positive operation and the further advantage that in case of clogging the carriage can be pulled to one side of the apparatus and the necessary adjustment and repair made without sending a man out on the cable.

The accompanying three sheets of drawings, forming part of this application, show one specific way of practicing my invention in connection with the specific apparatus just described.

Referring to said drawings, Figure 1 is a partial side elevation of an apparatus embodying my invention. Fig. 2 is an enlarged side elevation of the carriage. Fig. 3 is a plan of the same. Fig. 4 is an end elevation of one of the supporting-carriers. Fig. 5 is an enlarged sectional view taken on the line 5 5

of Fig. 4, showing the construction of what I hereinafter term the "supporting-clips." Fig. 6 is a view similar to Fig. 2 with the parts in a different position. Fig. 7 is a detail view of the latched operating-lever. Fig. 8 is a detail plan view of a spring mechanism used to control the carriage, and Fig. 9 is a detail sectional view illustrating the mounting of a part I term the "pusher."

Referring to the drawings and in detail, A A' designate two towers. These towers are usually mounted on tracks, and extending outwardly from each tower is a large weighted frame or support, which frames or supports are usually mounted upon supplemental tracks. These last parts are not shown, as they are of common construction.

B designates an engine which for the purpose of illustration is shown in the tower A, although it is usually placed on the extending weighted part of the tower to help balance the parts. It is shown in the present position for the purpose of illustration.

S designates the suspension or supporting cable, which is extended between the two towers. C designates the carriage, which is arranged to move back and forth on said cable. One or more operating-ropes extend to said carriage. When a device of this kind is used in locations where there is a considerable distance between the two towers, it becomes necessary to support the operating-ropes extending to the carriage so that they will come in proper position and so that they will not interfere with each other.

F designates a number of supporting-carriers. These carriers are arranged to hang from the suspension-cable and to carry pulleys, as hereinafter described, for supporting the operating-ropes. The problem in connection with these carriers is to disconnect them, one after the other, at predetermined distances of the travel of the carriage—say every one hundred feet—and leave the same hanging from the supporting-cable and supporting and positioning the operating-ropes. My improvement, as hereinafter described, consists of a most efficient mechanism for this purpose, having the advantages previously recited. Generally three operating-ropes are used—one to travel the carriage back and forth, one to lift the bucket, and one to dump the bucket.

In the drawings, E designates the rope which is used to travel the carriage back and forth on the cable. This rope is sometimes called the "endless" rope. The end of the same is attached to the left-hand end of the carriage, and the same then passes around sheaves 11 and 12 in the tower A', back to the tower A, around sheave 13 to a suitable drum, which is operated by the engine, and then from this drum around a suitable sheave 14 back to the carriage, to which it is secured. By traveling this rope in one direction or the other the carriage will be pulled positively forward or backward on the suspension-cable.

H designates the hoisting-rope. The same passes from its drum around sheave 15 in tower A, in between the frames 16 and 17 of the carriage C, over a sheave 18, journaled on a stud fitted between said frames, down over a pulley 19, supporting the hoisting-bucket I, back up over a pulley 20, journaled on a stud secured between the said carriage-frames, and then down again to the bucket-carrying frame, to which the end of the rope is secured. It is evident that by taking up or letting out on this rope the bucket will be raised or lowered.

D designates the dumping-rope. The same passes from its operating-drum over a pulley in tower A, parallel with the pulley 15, to a guide-pulley 21, mounted on a stud secured in the frame 16 of the carriage, to a pulley 22, journaled on a stud secured between the carriage-frames 16 and 17, down to a pulley 23, journaled in a frame 24, which connects by a rod 25 to one side of the bucket, back up over a pulley 26, journaled on the same stud as pulley 22, and then down again to the frame 24, to which the end of the rope is secured.

When the carriage is traveled back and forth on the suspension-cable, the hoisting and dumping ropes are taken up or let out to compensate for this movement. When the operating-rope is operated to raise or lower the bucket, the dumping-rope is operated therewith, but in such way as not to tip the bucket over. When it is desired to dump the bucket, the dumping-rope is taken up, tipping the bucket over in the frame and emptying the contents thereof. The arrangement of the drums and windlasses for operating these ropes in this manner is not shown or described at length in this case, as the same is well understood and forms no part of the present invention.

The carriage C has a large supporting-sheave 27, which fits on the supporting-cable S and which is rigidly secured on an axle or shaft 28, journaled in the frames 16 and 17 of the carriage. The carriage is also supported by another sheave 29, which runs on said supporting-cable and which is journaled on a stud secured in said frames, as shown. Arranged on the end of the shaft 28 of the supporting-sheave 27 is a sprocket-pinion 30, which is geared by a sprocket-chain 31 to a sprocket-gear 32, journaled on a stud 33, secured in the frame 16. It will thus be seen that as the carriage is traveled back and forth on the cable the gear 32 will be rotated at a comparatively slow speed, as the sprocket-chain is arranged to decrease the speed. Said gear 32 has a number of holes in the same, into any one of which a pin 34 can be inserted.

35 designates a bracket which is secured to and which extends up from the frame 16. A lever 36 is mounted on a pivot 37, secured in this frame. The end of this lever is provided with a latch 38, which has a shoulder 380 and which latch is kept in normal position by a spring 381, as shown in Fig. 7. By

this construction it will be seen that the latch can be moved to the right from the position shown in Fig. 7, but that pressure on the latch to the left will move the lever 36. The lever 36 comes to adjusted position to the right by striking against a bushing 39, which is eccentrically mounted on a stud 390, secured in said bracket 35. By turning this bushing on the stud the bearing-point on said lever can be adjusted. Said lever connects by a link 40 to a lever 41, mounted on a pivot 42, projecting from a bracket 43, secured to the frame 16. A strong spring 44 is arranged between said bracket 43 and the lever 36, and the same tends to pull said lever 36 normally to the right and to keep the same normally against the bushing 39. The end of the lever 41 is slotted, and fitting in said slot is a screw or pin 45, which is secured on a part 46 I term a "pusher." This pusher is mounted in guides 47, projecting from the frame 16, so as to be capable of a longitudinal sliding movement, and the same is kept in position by means of a spring 460, which is mounted on one pin and pressed into engagement with the pusher by means of another pin, as shown in Fig. 9.

48 designates a part I term the "horn." The same has a hooked end—that is, it has an incline 480 running down to a point and an incline 481 running up to the high point of the incline 480. This horn is arranged to pick up and carry the supporting-carriers. Each of these supporting-carriers is substantially the same, and one of these carriers is shown in detail in Fig. 4. The same consists of two inner frames 49 and two outer frames 490. Between the tops of these frames is arranged a small roller 50, running on a stud under which the horn 48 catches. A stud 51 is secured between said frames, and the same carries spring-clips 52, as shown, to engage the suspension-cable S and bite on the same to keep the carrier in place, even if there is considerable sag or incline to the supporting-cable. These clips are circular or curved in horizontal cross-section where they bear on the supporting-cable for this purpose, as shown in Fig. 5. Secured between one frame 49 and the frame 490 is a stud 53, on which runs a roll or small sheave 530 for supporting and positioning the hoisting-rope H. Secured between the other frames 49 and 490 is a stud 54, on which a similar roll or small sheave 540 is mounted for supporting and positioning the dumping-rope D. A cam-piece 56 is secured on each carrier, as shown, the purpose of which cam-piece is to cause the carrier to raise or lift when engaged by the end of the pusher. To keep the carriers in position on the end of the horn and to prevent them from accidentally becoming disengaged, I provide the following mechanism: A link 57 is secured by means of a suitable stud to the link 40, previously described. This link 57 connects to a lever 58, mounted on a pivot 59, secured in the bracket 43, extend-

ing up from the frame 16. The end of this lever connects to a rod 60, which is secured to a bar 61, as shown in Fig. 8. Also extending from this bar is a rod 62, these rods being journaled or mounted in bearings 63, secured to the frames 16 and 17. The rod 62 is extended through the bar 61 and is preferably secured thereto, and another rod 64 is arranged to extend from said bar 61. Fitting loosely on the ends of these rods 62 and 64 is a push-bar 65, the ends of said rods 62 and 64 being headed over to keep said push-bar in place, although the same fits loosely on said rods. Springs 66 are arranged on said rods 62 and 64, between the bar 61 and the bar 65. By this means a yielding abutment is provided for pushing on the bunch of carriers on the horn.

The operation of the device is as follows: The carriage is first provided with as many carriers as is deemed proper for the particular length of suspension-cable, and the sprocket-gearing is arranged to operate in connection with the particular number of carriers selected—that is to say, a number of sprocket-pinions are provided of different sizes and the particular one selected is secured on the shaft 28, and by adding or taking out a few links of the chain 31 the proper relation is obtained with the sprocket-gearing to operate, as hereinafter described. The operating-ropes are trained over the small supporting-pulleys arranged in the supporting-carriers. Suppose now that the carriage starts from its position at the right and moves to the left the distance which it is considered proper to leave one of the supporting-carriers—say sixty, eighty, or one hundred feet. The pin 34 is so adjusted in the gear 32 that when the carriage reaches this position it will just engage the latch on the end of the lever 36. Now as the carriage continues its movement to the left said pin will move said lever 36 and by means of the previously-described connections will move the pusher to the right to lift the outermost carrier over the high point of the horn, as shown in Fig. 2. The continued movement of the carriage will then push this carrier off of the end of the horn and drop the same down on the supporting-cable. This outermost carrier can be lifted and kicked off the horn in this manner, as the movement to the left of the lever 36 will release the spring-relieved push-bar 65 from contact with the innermost carrier. The incline 481 on the horn is made comparatively steep and abrupt, so that when the parts are in their normal positions the spring-relief rod or bar 65 will bear on the innermost of the carriers and will hold the series of carriers tightly in place up against said incline. This will keep the series of carriers on the horn bunched together, so that they cannot rattle off or become accidentally detached therefrom. When the pusher is to operate, this mechanism will be moved back, so as to relieve the pressure on the series of

carriers, whereby the pusher can easily and readily detach the outermost of the series of carriers. When the detaching action has taken place, this mechanism will push the remaining carriers up toward the incline 481 on the horn, thus pushing what is then the outermost carrier into proper position for the next detaching operation, and thus bunching the remaining carriers against said incline.

So soon as the carrier by this continued movement to the left causes the pin 34 to pass the lever 36 the heavy spring 44 will bring the parts back to the position shown in Fig. 2 and will cause the spring-relieved push-bar 65 to engage and keep the remaining carriers in position on the horn. When the carriage travels another predetermined distance to the left, another supporting-carrier will be dropped off the horn in a similar manner. This action will take place as the carriage moves to the left. When the carriage moves to the right, the mechanism before described will not be actuated, as the pin 34 will simply ratchet under the latch 38 without actuating the lever 36.

As the carriage moves to the right the pointed end of the horn will engage under the roller 50 of the carriers and will pick the same up. A plank or board is usually placed on the end of the carriage to receive the impact or blow of the contact of the carriers as they are picked up in this manner, as in practical operation the carriage is moved very rapidly. In this way it will be seen that a carrier is deposited or kicked off at a predetermined point on the cable and that the same operation leaves the carrier at the same place, or substantially the same place, no matter how the carriage is moved, forward or backward, or what the extent of these movements is.

It is an especially advantageous operation to have the means which operates the carriers engage and move only the outermost carrier, as the remaining carriers are not disturbed and there is no possibility of detaching but one carrier at a time. It is also a particularly advantageous point to have the detaching means operate only when the carriage reaches a position in its travel near a point where a carrier is to be detached, as by this arrangement the carriers will be accurately distributed and always left at the same point, and the wear and tear of the incessant backward and forward motions of the carriage within the limits of the points where the carriers are to be detached or picked up will not come on the detaching mechanism. In this manner the operating-ropes extending to the carriage from the tower A will be properly supported and positioned so as not to interfere with each other.

By adjusting the gearing as before described the kick-off can take place at any distance desired. It will also be seen that by this construction the "button-line" is entirely eliminated. It will also be seen that the construction of the carriers is much sim-

plified, as they do not have to be provided with means to support or engage the button-line.

Usually it is not necessary to support the traveling rope which returns from the tower A' to the tower A or that portion of the traveling rope which is at the left of the carriage, as indicated in the present drawings. It is obvious, however, that by properly proportioning the carriers, both parts of this traveling rope can be supported, and that by using a duplicate set of carriers, operated in the same manner at the left of the carriage, that part of this rope which is at the left of the carriage can be supported along the length of the suspension-cable.

While I have shown and described the invention as applied to one specific form of hoisting or conveying mechanism on a supporting-cable, it is evident that the automatic idea is capable of application to all apparatus of this general character.

It is considered good practice in the apparatus previously described to slush the supporting-cable once in a while with heavy oil or grease. This generally is done by hand. To do away with this hand operation, I provide the following mechanism: A cylinder 67 is secured on the ends of the frames 16 and 17 of the carriage. This cylinder is provided with a valved outlet 68. A piston 69 is fitted into said cylinder and has a bar 70 extending across its top. This bar 70 is pulled down by springs 71. When it is desired to slush the suspension-cable, the cylinder 67 is filled with the proper material, which can be done by removing the piston. The piston is then put in place in the cylinder, the valve 68 is opened the proper degree, and the springs 71 will force the piston down into the cylinder, and this will force the slush out through the valve. Then by traveling the carriage back and forth the length of the cable as many times as desired the cable can be properly treated.

I have described the foregoing device and means in detail as complying with the statute which requires me, as a prerequisite to obtaining a patent, to describe the best form of mechanism now known to me for carrying out my invention.

The foregoing means is the best form of mechanism now known to me for the before-recited purposes; but I do not wish to be limited in the broad claims which I make in this application to the details of such mechanism, as other plans and arrangements can be devised by a skilled mechanic without departing from the scope thereof.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a hoisting or conveying apparatus, suspension means, a carriage traveling thereon, an operating rope or ropes extending to the carriage, a series of supporting-carriers for the operating rope or ropes, a horn car-

ried by the carriage for supporting said carriers, a horizontal pusher arranged to engage only the outermost carrier on the horn, and means actuated by the travel of the carriage
5 for operating said pusher.

2. In an apparatus of the class described, a carriage having a supporting-horn, a number of supporting-carriers mounted on said horn, a spring-actuated pusher arranged to engage
10 only the outermost carrier on the horn, and a trigger mechanism for setting said spring and releasing the pusher, arranged to operate only when the carriage reaches a position in its travel near the point where a carrier is to
15 be detached.

3. In an apparatus of the class described, a carriage having a supporting-horn, a number of supporting-carriers mounted on said horn, a horizontally-moving pusher arranged to en-
20 gage only the outermost of said carriers, a spring for actuating said pusher, and a trigger mechanism actuated by the travel of the carriage in one direction only for setting said spring and releasing said pusher, arranged
25 to operate only when the carriage reaches a position in its travel near the point where a carrier is to be detached.

4. In an apparatus of the class described, a carriage having a supporting-horn, a number
30 of supporting-carriers mounted on said horn, means for engaging and detaching the outermost carrier on the horn, holding means for keeping the carriers bunched together in position on the horn, and means for releasing
35 the holding means as an outermost carrier is engaged and kicked off the horn.

5. In an apparatus of the class described, a traveling carriage having sheaves running on the suspension means, and a horn, a number
40 of supporting-carriers mounted on the horn, a pusher for detaching said carriers from the horn, connections for operating the pusher from one of said sheaves, and a cam mounted on each of said carriers in position so that the
45 pusher will lift up the outermost carrier and push the same off the end of the horn.

6. In an apparatus of the class described, a carriage having sheaves running on the sus-
50 pension means, and a horn, a number of supporting-carriers mounted on the horn, a pusher for detaching said carriers one at a time from the horn, a wheel operated by the travel of the carriage and having a project-
55 ing pin, a latched lever operated by said pin, and connections from the same to the pusher, whereby the pusher will only be actuated as the carriage moves in one direction.

7. In an apparatus of the class described, a carriage having sheaves running on the sus-
60 pension means, and a horn, a number of supporting-carriers mounted on the horn, a pusher for detaching said carriers one at a time from the horn, a wheel operated by the travel of the carriage and having a project-

ing pin, a latched lever operated by said pin, 65
connections from the same to the pusher, whereby the pusher will only be actuated as the carriage moves in one direction, a spring for keeping the lever in normal position, and
70 adjusting means for determining this normal position.

8. In an apparatus of the class described, a traveling carriage having sheaves running on the suspension means, and a horn, a number of supporting-carriers carried by the horn, 75
a pusher for detaching the carriers from the horn, a holding mechanism having a spring-relief for keeping the carriers bunched together on the horn, means for operating the
80 pusher, and for withdrawing the spring-pressure of the holding mechanism as the pusher operates.

9. In an apparatus of the class described, a carriage having sheaves running on the sus-
85 pension means, and a horn, a number of supporting-carriers mounted on the horn, a pusher for detaching the carriers one at a time from the horn, a holding means for keeping the bunch of carriers together on the end
90 of the horn, consisting of two rods having a push-bar loosely fitted on the ends thereof, and springs bearing on said push-bar, whereby a spring-relief is provided, and means for withdrawing said rods as the pusher operates
95 to detach a supporting-carrier.

10. In an apparatus of the class described, a carriage having sheaves and a horn, a
100 pusher mounted in ways on said carriage so as to be capable of a horizontal motion, the end of said pusher being brought into position near the end of said horn, so that the same will engage the outermost of a series of supporting-carriers, and connections from
105 one of said sheaves for actuating said pusher.

11. A supporting-carrier for the purpose 105
described, consisting of frames carrying small supporting pulleys or sheaves, and spring-clips curved in horizontal cross-section extending down therefrom in position to bite
110 and hold the carrier in position on the suspension means.

12. A supporting-carrier for the purpose
115 described, consisting of two inner frames and two outer frames secured together at the top, a stud connecting the same under which the horn of the carriage can engage, and rolls or pulleys journaled on studs secured between
120 each part of the outer frame and one of the inner frames, and between the two members of the inner frame.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM MCINTOSH.

Witnesses:

LOUIS W. SOUTHGATE,
JOHN B. GILMORE.