W. TRAVELL.

TRANSFER MECHANISM.

APPLICATION FILED DEC. 27, 1918.

1,333,948. Patented Mar. 16, 1920.

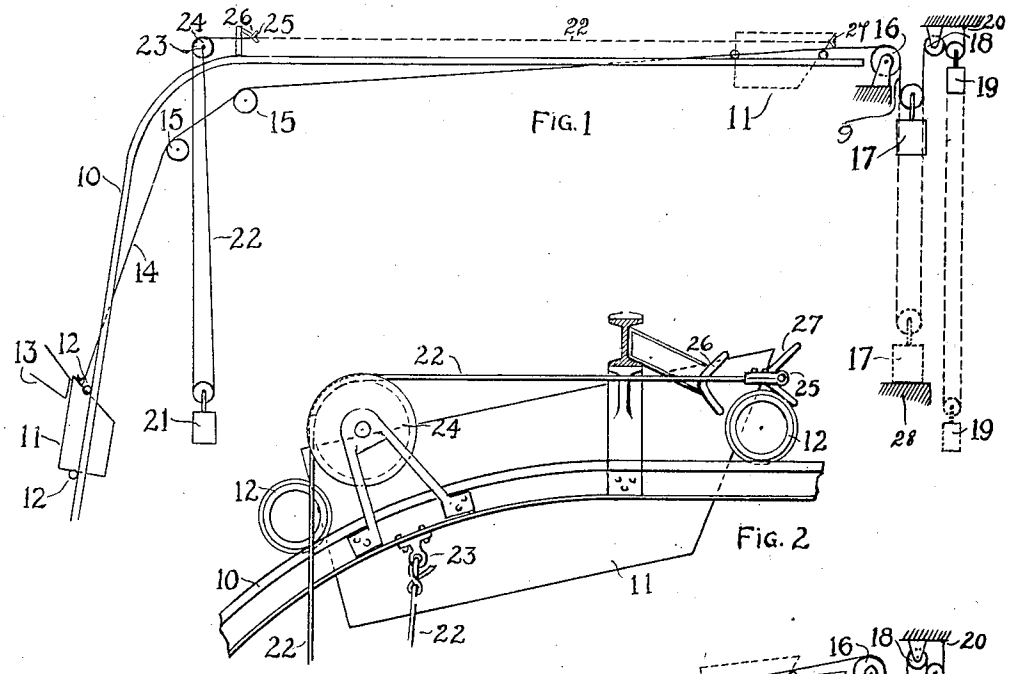


FIG. 1

FIG. 2

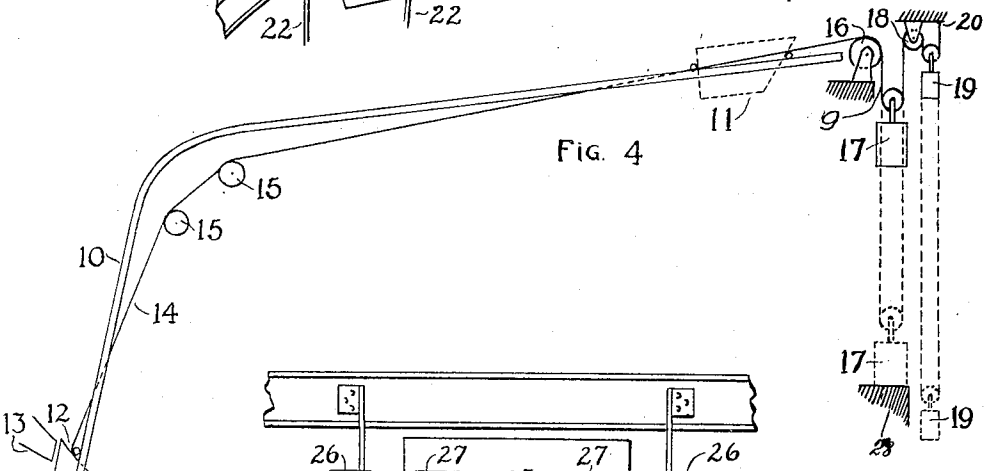


FIG. 4

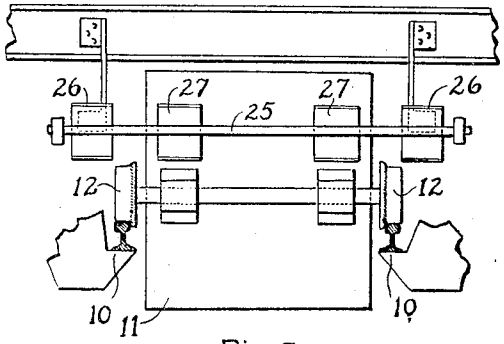


FIG. 3

INVENTOR:
WARREN TRAVELL.
BY Mitchell, Chadwick & Kent
ATTYS.

UNITED STATES PATENT OFFICE.

WARREN TRAVELL, OF NEW YORK, N. Y.

TRANSFER MECHANISM.

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To all whom it may concern:

Be it known that I, WARREN TRAVELL, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented new and useful Improvements in Transfer Mechanisms, of which the following is a specification.

This invention relates to improvements in hoisting and traversing apparatus. More particularly it relates to skip hoists. Hitherto skip hoists have commonly been arranged in two separate mechanisms, one to hoist and dump, and another to receive at the elevated level, convey to the desired distance and there to dump; or else have been arranged in pairs on parallel ways, with two parallel hoisting and traversing portions, and two cars, one on each, joined by a cable passing around a drum at the top so that each car balances the weight of the other. This obviously requires each car to travel to the end of the way in each direction in order that the other may get, or discharge, its load at the terminus of its own way. It is an object of the invention to provide an elevating and transporting machine which shall be an improvement upon both of these types. To that end the invention provides for doing the work with apparatus that can be loaded at various distances from the bottom of the hoist; that can work a single skip, double skips usually requiring apparatus which is too expensive and of greater capacity than is necessary to handle the work at a single station; that uses but a single machine for both hoisting and transporting, instead of two machines often used hitherto for this; and to do this with the same size of hoisting engine for the combined hoist and transporter as would according to present practice be used on a common skip hoist alone.

It is also the object of the invention to provide the other advantages that are characteristic of the construction disclosed.

In the accompanying drawings, which illustrate one embodiment of the invention,

Figure 1 is a side elevation showing apparatus embodying the invention, more or less diagrammatically;

Fig. 2 is a side elevation on a larger scale of a detail;

Fig. 3 is an end elevation of the same detail; and

Fig. 4 is a side elevation similar to Fig. 1 showing a modification.

The drawings represent apparatus having a way 10, represented as a pair of rails forming a track, having a portion which is nearly vertical for the hoist, being inclined so that a skip 11 rising along it rests against it, and having another portion extending horizontally or approximately so for the traverse motion. This latter may extend to any desired distance. In the form of the invention to which Figs. 1, 2 and 3 apply it is horizontal. In the form to which Fig. 4 applies it is so approximately horizontal that it is herein referred to as horizontal being horizontal in effect, so far as the traverse action is concerned, but is really slightly inclined for a purpose and in a way hereinafter explained.

The skip 11 may consist of a receptacle of any suitable type equipped with wheels 12 adapted to travel on the way. The whole is suitably positioned with respect to loading chutes 13 or 13′. Attached to the skip is a hauling rope 14 which passes over suitable sheaves 15 to a power controlled drum 16, around which it is wrapped. This drum may be driven by any suitable means, not shown, such as an electric motor or a steam engine. From the drum a rope which is so arranged as to be practically a continuation of the hauling rope, but which for convenience of reference is here given the distinguishing reference numeral 9, extends to a counterweight 17 and passes under a sheave on this counterweight. This, called the large or skip-balancing counterweight, is preferably sufficiently heavy to balance nearly the entire weight of the skip while the skip is on the hoisting portion of its way; or else heavy enough to balance the skip and half of its usual load. From it the continuation of hauling rope 9 passes up to and over a fixed sheave 18, forming the bight supporting the large counterweight 17, and then passes under the sheave of another counterweight 19, herein referred to as the rope counterweight, which hangs in another bight in the rope, and is passed to a fastening as at 20. The function of this latter counterweight is to take up slack rope

when the skip is on the horizontal or traverse portion of its travel. For clearness of illustration it is shown as being separate from the counterweight 17, but it is not necessarily so. The pair of counterweights make a certain total pull on the rope, part of which ceases when the descent of the weight 17 is arrested as hereinafter described. But any other arrangement by which a part of the total pull ceases when the skip reaches the top of its vertical rise would suffice, for example, if the total counterweight hung together on the rope 9, and were so arranged that on getting down to a certain point part of the weight settled upon a support, leaving the reduced weight to continue downward while the skip traversed the horizontal part of the way.

The distance of travel of counterweights 17 and 19 may be shortened or lengthened by using single, double, triple or multiple part reeving of rope 9.

A third counterweight 21 herein called the back traverse counterweight, is supported in a bight of another rope 22, one end of which is fast at a point 23 and the other end of which passes over a sheave 24, illustrated as being at the same locality, and is attached to a movable traverse bar 25. The traverse bar finds a position of rest in a pocket 26 adapted to engage and hold it when it is guided thereto by suitable means on the skip hereinafter to be described. This pocket stop for the traverse bar is located at the junction between the hoisting and traversing part of the way 10, so that when the skip is on the hoisting portion of its way, going in either direction, or stationary, the skip is free and clear of the counterweight 21. The pocket 26 may consist of a pair of simple angular recesses as clearly illustrated in Figs. 2 and 3, suitably supported and braced so as to arrest and hold the traverse bar 25 whenever that moves into engagement therewith. The skip is provided with similar pockets 27, in the form of a pair of angular recesses at a proper elevation on the forward end of the skip, adapted to engage the bar 25 just as the pockets 26 are adapted to engage it. These pockets, 26 and 27, both open in the forward direction of traverse; and the bar is supported upon either set, 26 or 27, according to which is forward of the other. It cannot escape to fall out because of the pull of rope 22, which keeps it in the deepest part of the pocket in the horizontal direction in which that rope is always pulling. Assuming that the parts are at rest in the position illustrated in Fig. 1, with the skip at the bottom of its hoist and the counterweight 21 at the bottom of its fall, sustained there by the engagement of the traverse bar 25 in the pocket 26, and assuming that the skip then begins its hoist and traverse movement, the hoist is completed without affecting this counterweight; but at the end of the hoist the pocket 27, coming from behind, engages the traverse bar 25 and carries it forward out of the pocket 26 as the skip moves onward to whatever distance the skip travels, as for example, to the position illustrated in dotted lines at the right of Fig. 1. In so doing the draft of the rope 22 raises the back traverse counterweight 21. This counterweight is sufficiently heavy to overcome ordinary causes of retardation, such as friction and minor irregularities in the level of track, and to drag the skip back from its dotted line position to the head of the hoist. Automatic means for moving the skip backward along the horizontal part of its way is thus provided, because the counterweight 21 is constantly pulling through the rope 22, and the skip will start backward as soon as it is released. In so doing, the traverse bar 25 will engage the fixed pocket 26, when it reaches it, and the pocket 27 on the skip will go on empty from there, the skip being relieved of the counterweight 21 as soon as it reaches the head of the hoist.

A fixed support 28 is provided for the skip-balancing counterweight, so that when the counterweight descends far enough it rests upon this support and no longer tends to move the skip. This support is herein represented diagrammatically as a pedestal 28, but obviously it may be constructed in any suitable manner. It is preferably arranged so that the skip-balancing counterweight 17 reaches it and is supported by it when the skip has reached the top of its hoist and is about to proceed on its traverse. As the skip proceeds, the rope 9 passes idly around the sheave attached to this counterweight and around the sheave 18, paying out slack which is taken up by the rope counterweight 19. This rope counterweight is so much lighter than the skip-balancing counterweight 17 that the latter holds it at its upmost limit of travel until the counterweight 17 has settled down upon its support 28, after which the counterweight 19 can descend as fast as the paying out of slack in the rope permits.

The operation of the device as a whole is as follows: The skip being loaded and at the bottom of its hoist, the operator sets the hoisting drum in motion in direction to raise the skip and move it forward on the traverse, and the drum is continued under power until the skip has reached the point where it is to be dumped by any suitable means. At that point power is shut off and may remain so until the skip has been loaded again at the bottom of its hoist, the return being automatic. During the cycle thus accomplished the skip was raised over the hoisting part of its way, picked up the traverse bar 25 at the top of its hoist, car-

ried that bar along with it on the traverse, incidentally raising the counterweight 21, was pulled backward by the counterweight 21, and descended the hoist by its own weight. During the rise of the skip the power had to raise not much more than the weight of the load within the skip, for the weight of the skip itself was largely balanced by the counterweight 17. During the horizontal part of the travel the load required no raising, and the skip none, but the power had to raise the counterweight 21, incidental friction being neglected. The counterweight 19 being less than the counterweight 21, does not interfere with the return. The counterweight 21 draws the skip backward on the horizontal track, raising the counterweight 19, until the latter reaches the top limit of its travel and the skip reaches the top of its hoist, and the counterweight 21 reaches its lower limit of travel where it is held by engagement of the traverse bar 25 with the fixed pocket 26, all of which points are reached approximately simultaneously. Then gravity begins to draw the skip down the hoist, the counterweight 17 rising simultaneously. The nearly balanced arrangement of parts makes the movement easy to control by brake on the drum.

If desired, the counterweight 17 may be made heavier than the skip, so that it, for example, balances the skip and half of its load. In that case less power is needed at the drum, and it will be used during both directions of travel. On the rising of the skip it has to lift only half of the load, the other half and the skip itself being balanced by the large counterweight 17. On the descent it has to raise that part of the weight of the counterweight 17 which is not balanced by the weight of the empty skip 11.

Fig. 4 illustrates a modification in which what is herein called the "horizontal" part of the track is only approximately so, and is in fact gently inclined upward from the top of the hoist. By this construction the skip itself performs the function of the counterweight 21, and gravity takes the car backward along the gently inclined "horizontal" or traverse part until the top of the hoist is reached when the counterweight 17 comes into action.

Numerous variations may be made from the specific construction and arrangement of apparatus illustrated without departing from the scope of the invention. It is intended to cover in this patent whatever features of patentable novelty exist in the invention disclosed, barring the structure of skip, which forms the subject matter of a separate copending application for patent.

As the claims refer to the rope 9 merely as a "continuation" of the rope 14, I desire to mention particularly that there may be various and equivalent arrangements within the meaning of this phrase without these ropes being physically continuous or even contiguous. The structure shown diagrammatically in Figs. 1 and 4 may be taken as representing them all, as the main idea in this respect is that as the hauling rope 14 is wound on the drum, its extension 9 is at the same time unwound and paid out. The rope 9 may be physically continuous with the hauling rope 14; or it may be separately attached to drum 16 but wound on in a direction opposite to the winding thereon of rope 14; or it may be wound on a separate drum connected with drum 16, so that as rope 14 is wound on drum 16, rope 9 is unwound and paid out from its drum; and in this case the two drums may be of different diameters.

I claim as my invention:—

1. In transfer mechanism, the combination of a way having a hoist and a traverse portion, a skip adapted to move thereon, a counterweight for the skip while it is on the hoist-way, means continuously connecting the counterweight to the skip, means to relieve the skip of the pull of the counterweight when the skip reaches the top of the hoist-way, and a power device operating to draw the skip up the hoist-way and along the traverse-way.

2. In transfer mechanism, the combination of a way having a hoist and a traverse portion; a skip adapted to move thereon; a rope, and power means applicable thereto for drawing the skip over the hoist-way and traverse-way; there being a continuation of the rope paid out by said drawing means; a counterweight hanging on said continuation rope and assisting the drawing means; and means to arrest descent of the counterweight when the skip passes from the hoist-way to the traverse-way.

3. In transfer mechanism, the combination of a way having a hoist and a traverse portion; a skip adapted to move thereon; a rope, and power means applicable thereto for drawing the skip over the hoist-way and traverse-way, there being a continuation of the rope paid out by said drawing means; a counterweight hanging on said continuation rope and assisting the drawing means; means to arrest descent of the counterweight when the skip passes from the hoist-way to the traverse-way; and another counterweight on said continuation, less than the first, and arranged to descend and take up slack of rope after arrest of descent of the first mentioned counterweight.

4. In transfer mechanism, the combination of a way having a hoist and a traverse portion, a skip, and means including a rope to move it thereon; a counterweight and second rope to draw the skip backward over the traverse-way; and two devices, register-

ing together, one fixed facing forward on the skip and the other stationarily fixed facing likewise at a position which the skip passes as it passes backward from the traverse-way to the hoist-way, each of which devices is adapted to pick up from the other the rope holding said counterweight; whereby the skip and counterweight inter-act while the skip is on the traverse-way and not while it is on the hoist-way.

5. In transfer mechanism, the combination of a way having a hoist and a traverse portion, a skip, and means including a rope to move it thereon; a counterweight and second rope to draw the skip backward over the traverse-way; and two devices, registering together, one fixed facing forward on the skip and the other stationarily fixed facing likewise at a position which the skip passes as it passes backward from the traverse way to the hoist-way, each of which devices is adapted to pick up from the other the rope holding said counterweight; whereby the skip and counterweight inter-act while the skip is on the traverse-way and not while it is on the hoist-way; there being a continuation of said first rope, beyond and paid out by the said moving means; and a counterweight for the skip thereon arranged and adapted to act when the skip is on the hoist-way and be arrested from descent when the skip is on the traverse-way.

6. In single skip transfer mechanism, the combination of a way having a hoist and a traverse portion, a skip and a power device to move it thereon; a weight approximating the weight of the skip arranged to pull on the power device and assist it when the skip is on the hoist-way, but be free therefrom when it is on the traverse way; and a separate and smaller counterweight arranged and adapted to be raised as the skip moves forward on the traverse-way and to descend, drawing the skip, as the skip moves backward over the traverse-way, and means whereby said counterweight is disconnected from the skip while the skip is on the hoist-way.

7. In transfer mechanism, the combination of a way having a hoist and a traverse portion, a skip and means to move it thereon; a counterweight and rope arranged to oppose the forward movement of the skip on the traverse-way; a bar, on said rope, arranged across the way; means on the skip to engage and hold said bar, thereby drawing its rope, as the skip moves forward; and fixed means beside the way adapted to engage said bar while held by the skip moving backward, and to hold it while the skip continues down the hoist-way.

8. In transfer mechanism, the combination of a way having a hoist and a traverse portion, a skip and means to move it thereon; a counterweight and rope arranged to oppose the forward movement of the skip on the traverse-way; a bar, on said rope, arranged across the way; and pockets, on the skip and fixed beside the way, opening forward, registering together as the skip passes the fixed point, each set being adapted to engage said bar while it is held by the other at such passing.

9. In transfer mechanism, the combination of a way having a hoist and a traverse portion, a skip and means to move it thereon; a counterweight and rope arranged to oppose the forward movement of the skip on the traverse-way; a bar on said rope, arranged across the way; and pockets, on the skip and fixed beside the way, opening forward, registering together as the skip passes the fixed point, each set being adapted to engage said bar while it is held by the other at such passing; said pockets being in duplicate on the skip, one on each side of the forward portion thereof; and being in duplicate one at each side of the way at the fixed point with the skip passing between them.

10. In transfer mechanism, the combination of a single track way, having hoist and horizontal traverse portions; a skip adapted to run thereon, and a rope and drawing means therefor; a skip-balancing counterweight arranged to draw while the car rises on the hoist-way; and a second counterweight arranged to take up rope slack while the car advances along the horizontal way; a third counterweight sufficient to draw the car backward over the horizontal portion of the way; and means whereby the skip picks up the third counterweight at the top of the hoist-way while moving forward, and is freed from the same at the same point while moving backward.

11. In transfer mechanism, the combination of a single track way, having hoist and horizontal traverse portions; the horizontal way and hoist-way being of diverse lengths, a skip adapted to run thereon, and a rope and drawing means therefor; a skip-balancing counterweight arranged to draw while the car rises on the hoist-way; and a second counterweight arranged to take up rope slack while the car advances along the horizontal way.

12. In transfer mechanism, the combination of a way having a hoist and a traverse portion, a skip and means to move it thereon; and a pair of counterweights, one of which is adapted for the skip and the inclination of the hoist-way, and the other for the skip and the forces tending to draw it backward on the traverse-way, each being arranged to operate only in its own respective part of the way.

13. In transfer mechanism, the combination of a way having a hoist and a traverse portion; a skip, and a rope with power

means for controlling its position thereon; a continuation of the rope beyond the power means; and compound counterweight apparatus thereon, the compounded parts being arranged to absorb and pay out rope with heavy pull while the skip is on the hoist-way, and with lighter pull while it is on the traverse-way.

14. A transfer mechanism, organized as a complete system with a single skip and a single way having hoist and traverse portions, comprising, in combination with the said skip and way, a power device and a rope continuously connected for drawing and holding the skip; a counterweight arranged to balance the weight of the skip when the skip is on the hoisting portion; and means relieving the skip of the said counterweight when the said skip is on the traverse.

Signed by me at New York this 6th day of April, 1918.

WARREN TRAVELL.

Witnesses:
J. WILLARD TRAVELL,
J. D. TRAVELL.