No. 779,758. PATENTED JAN. 10, 1905.

A. BECCHI.

CONVEYER.

APPLICATION FILED JULY 6, 1903.

4 SHEETS—SHEET 1.

Fig. 1.

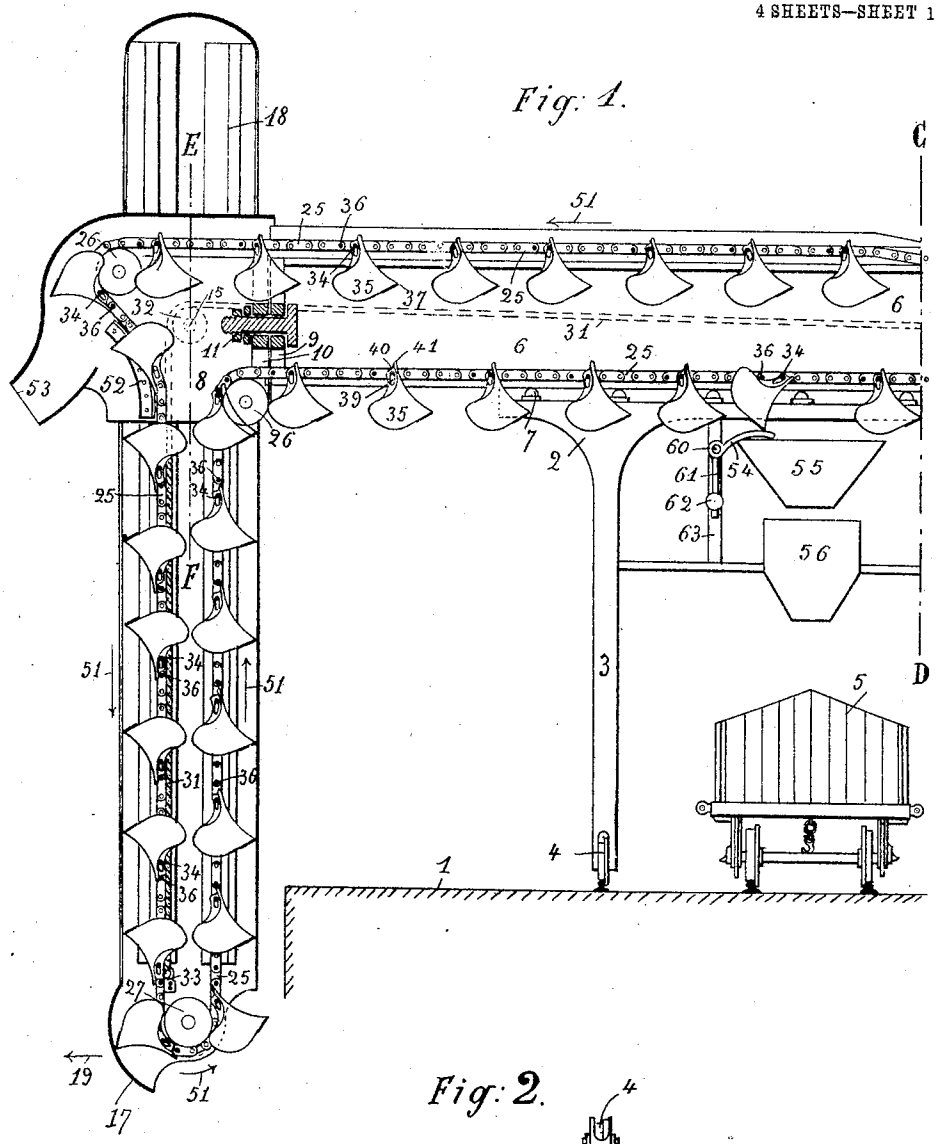
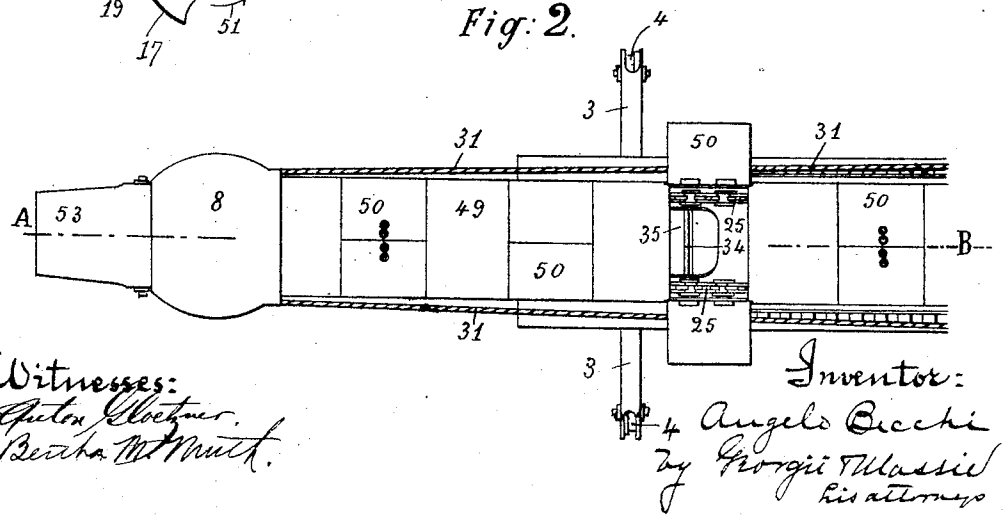


Fig. 2.



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4 SHEETS—SHEET 2.

Fig. 1a.

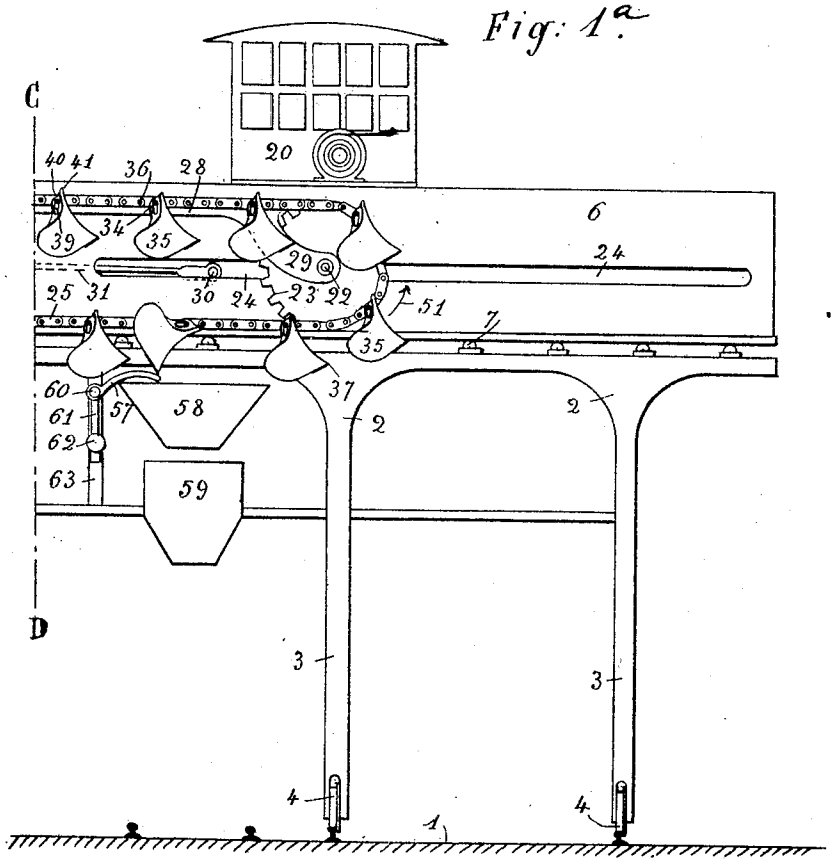
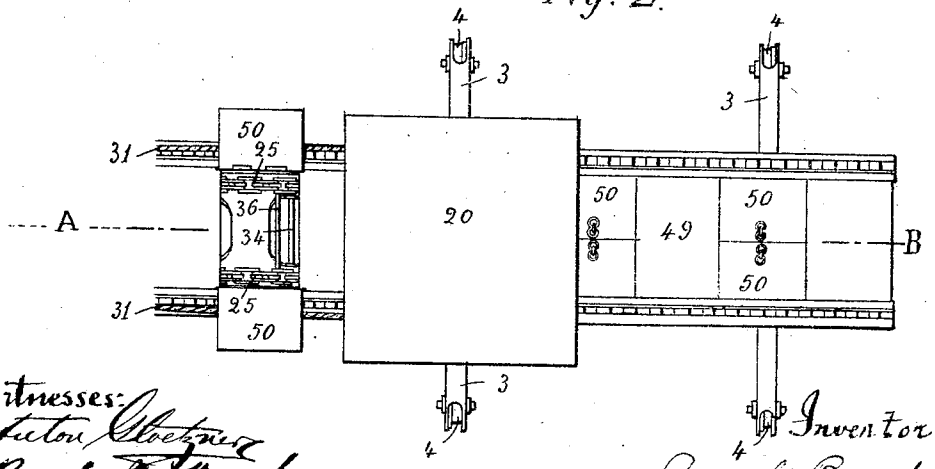


Fig. 2a.



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4 SHEETS—SHEET 3.

Fig. 3.

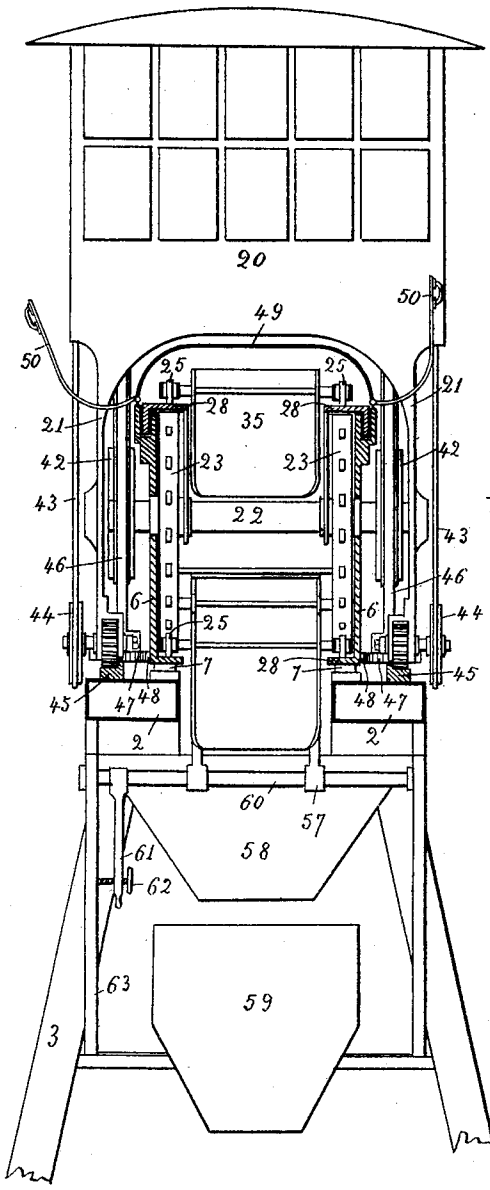


Fig. 5.

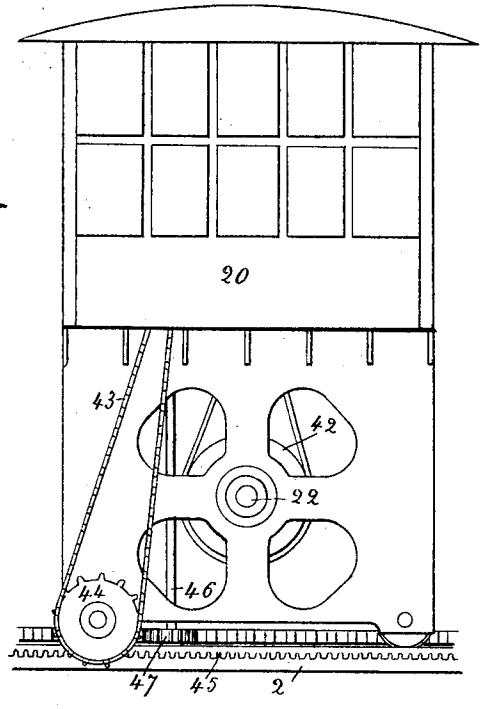
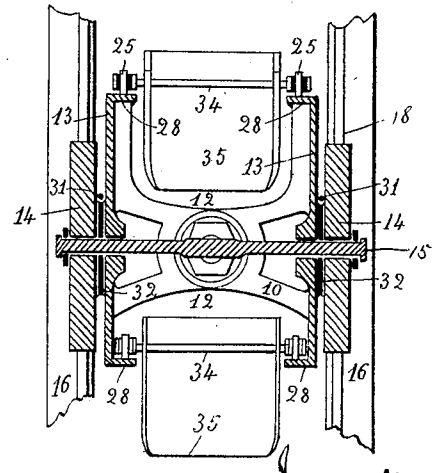


Fig. 6.



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No. 779,758. PATENTED JAN. 10, 1905.

A. BECCHI.

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APPLICATION FILED JULY 6, 1903.

4 SHEETS—SHEET 4.

Fig. 4.

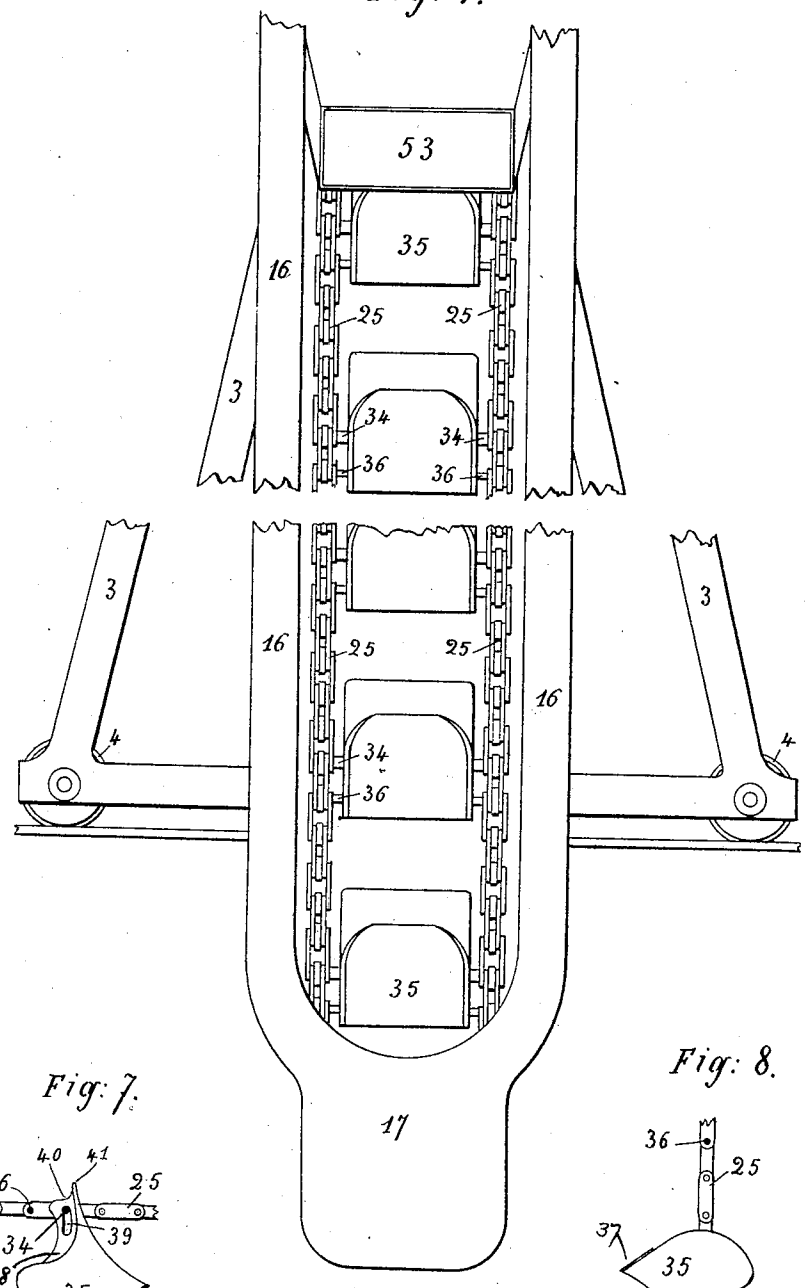
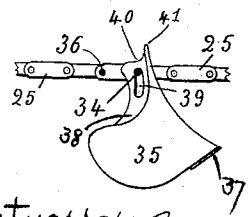
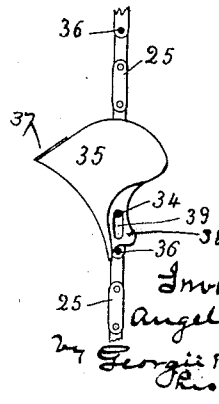


Fig. 7.



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Fig. 8.



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No. 779,758. Patented January 10, 1905.

UNITED STATES PATENT OFFICE.

ANGELO BECCHI, OF GENOA, ITALY.

CONVEYER.

SPECIFICATION forming part of Letters Patent No. 779,758, dated January 10, 1905.

Application filed July 6, 1903. Serial No. 164,434.

To all whom it may concern:

Be it known that I, ANGELO BECCHI, a subject of the King of Italy, residing at Genoa, Italy, have invented certain new and useful Improvements in Conveyers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to unloading apparatus, and particularly to means adapted for the extraction from ships and the like of cargoes in bulk, such as wheat, corn, coal, &c.

The object of the invention is, moreover, to provide unloading mechanism which shall be adapted to receive the cargo from the holds of vessels lying at a greater or less depth below or distance from the wharf and to deliver the same at the option of the operator in a vertical or a horizontal direction or to other vessels, lighters, or cars.

In order that my invention may be clearly understood, I have in the accompanying drawings illustrated a preferred embodiment of the same.

In the drawings, Figures 1 and 1ª constitute together a vertical section of the apparatus on the line A B of Figs. 2 and 2ª. Figs. 2 and 2ª together constitute a plan view of Figs. 1 and 1ª. Fig. 3 is a transverse section on the line C D of Figs. 1 and 1ª. Fig. 4 is a partial view of the interior of the vertical casing. Fig. 5 is a side elevation of the operator's cabin, showing a portion of the driving mechanism. Fig. 6 is a partial transverse section on the line E F of Fig. 1, and Figs. 7 and 8 are details of the carriers.

Referring to the drawings more in detail, upon the wharf or embankment 1 a supporting bridge or scaffolding 2 is constructed, having supports 3, provided at their lower ends with wheels 4, so arranged that the bridge may be moved longitudinally of the wharf upon rails suitably placed for the purpose of bringing the same into operative position with regard to a vessel lying at the wharf. Beneath the bridge cars 5, likewise running upon rails, may be placed to receive the cargo unloaded from the vessel. Upon the upper side of the bridge a tubular casing 6 is movably arranged by means of rolling supports 7. The end of this casing extends beyond the bridge, so that it may be brought over the vessel to be unloaded. The outer end of the casing is not integral with nor fixed rigidly to the casing proper, but is formed in the shape of a hood and is connected therewith by means of two vertical plates 9 and 10, secured to the casing and the hood, respectively, in parallel planes and connected with each other pivotally by means of a strong horizontal bolt or key 11. These plates 9 and 10 are provided with openings 12, Fig. 6, through which the carriers may pass, as is more fully explained hereinafter. Against the side walls 13 of the hood and externally thereto are arranged side plates 14, connected by a bolt or key 15. A vertical casing 16 depends from the hood and is provided at the lower extremity with a collector end 17, at which point the cargo is received by the carriers. This casing is arranged to be raised and lowered relative to the hood and horizontal casing by the provision of grooves or channels 18, in engagement with corresponding ribs on the side plates 14. By the construction just described it will be understood that the apparatus can be moved longitudinally of the wharf to reach the position opposite a vessel lying thereat, and the vertical casing 16 can be raised and lowered vertically and also adjusted horizontally to accommodate itself to the exact position of a vessel, and that, moreover, the slight movements of a vessel lying at the wharf, due to differences in load and also to the waves and tide, are readily accommodated by the pivotal connection of the vertical and horizontal casing.

Above the inner end of the horizontal casing 6 is arranged the cabin 20, which contains an electric motor, steam-engine, or other suitable source of power. The sides 21 of the cabin extend downward below the main body thereof and serve as bearings for a horizontal axle 22, upon which are keyed two toothed wheels 23. The horizontal casing 6 is provided with longitudinal openings or slots 24, which receive the ends of the axle 22 and permit of the displacement of the cabin and the axle 22 longitudinally of the casing in the operation of raising and lowering the vertical casing 16. Around each toothed wheel 23 a chain 25 passes and also around four bearing-

pulleys 26, arranged in the hood. At the bottom of the vertical casing a drum 27 is arranged, which forms the lower turning-point of the chain 25. Guide-plates 28 are arranged on the inside walls of the horizontal casing 6 and serve to support the chain 25, said guides being connected at the point 29 with the axle 22. At the point 30 on the sides of the cabin-walls are connected two metallic cables 31, extending lengthwise within the horizontal casing 6, passing around the pulleys 32, arranged in the hood 8, the bolt 15 serving as an axle, and thence to the bottom of the vertical casing 16, where they are fixed at the point 33 to the lower end 17 of the casing. It will thus be seen that as the cabin 20 advances along the horizontal casing 6 toward the vessel the cables 31 permit the casing 16 to be lowered by means of the channels 18 engaging the ribs on the plates 14, and the reverse movement of the cabin serves by the same means to elevate the vertical casing 16.

The chains 25 are connected at intervals by tie-rods 34, which serve as axles, upon which are pivotally mounted iron buckets or carriers 35. Other tie-rods, 36, are located adjacent to the rods 34 and serve not only to hold the chains in the same relative position, but also have an important function in the operation of the carriers, which will be more fully described. These carriers are provided with a reinforced edge or lip 37, which serves as a scoop for collecting a load. The opposite side of the carrier is extended and provided with wings 38, provided with a slot 39, which serves as a bearing for the axle 34, by which the carriers are suspended. The wings 38 are reduced at 40 to provide a nose 41, with which the tie-rods 36 engage during the descent of the carriers and serve to hold them in an inverted position, this being rendered possible by the sliding of each carrier upon its axle to the extent of the slot. This feature will be readily understood from an examination of Figs. 1, 7, and 8.

As stated, the cabin 20 is equipped with suitable power, such as an electric motor. The motor is connected in the usual manner with a pulley 42, mounted on the shaft 22, to which are keyed the gear-wheels 23 for driving the chain, as heretofore described. The motor is also connected by a drive-chain 43 with a gear 44, which drives a pinion along a rack 45, secured to the bridge 2, by which means the cabin is moved back and forth longitudinally of the horizontal casing 6, and thus is enabled to raise and lower the carrier mechanism by means of the cable 31, as previously described. In order to adjust the horizontal casing itself longitudinally with reference to the bridge, the cabin is anchored to the bridge in any suitable manner. (Not shown.) The shaft 46 is then driven by the motor and by means of the pinion 47 engages with the rack 48, which is fixed to the sides of the casing 6, and, the cabin being fixed, the casing 6 is moved thereby longitudinally upon the rolls 7.

The upper portion of the horizontal case is provided with a cover 48, having hinged doors 50, by which access may be had to the interior mechanism.

From the foregoing description the manner of operation will be readily understood. When it is desired to unload or transfer the cargo of a vessel at the wharf 1, the bridge 2 is moved upon the rails until it reaches a point opposite the vessel. This movement occurs comparatively seldom, as ordinarily a vessel will be brought to a point opposite the bridge. The unloading mechanism and the vessel having been brought to a position opposite to each other, the horizontal casing 6 is advanced longitudinally toward the water until the hood 8 lies over the entrance to the hold. The cabin 20 is then advanced toward the water, by which means the cable 31 permits the descent of the vertical casing 16 until the lower mouth 17 thereof occupies a position within the hold of the vessel in contact with the goods to be removed therefrom. The apparatus having thus been placed in operative position, the chain-wheels 23 are rotated by means of the pulleys 42, and the chains 25, with their carriers 35, are caused to travel in cycle in the direction of the arrows 51. Starting at a position in the upper portion of the casing 6 it will be observed that the carriers hang loosely upon their axles 34, as shown in Figs. 1 and 7. As they pass around the pulleys 26 in the upper and outer extremity of the hood 8 the carriers are inverted and by their own weight slide along their slotted bearings until the nose 41 abuts against the tie-rods 36, by which the carriers are held in the inverted position. After passing around the pulleys 26 the chains run upon curved guides 52, which may be provided with antifriction-rolls and which serve to hold the carriers in an inverted position, having a channel 53, the object of which will be more fully described. As the carriers arrive in their inverted position at the mouth 17 of the vertical casing the chains pass around the drum 27 and cause the carriers to scoop up the cargo until they are full. In this operation each carrier slides in the opposite direction upon its bearing and takes an upward direction, swinging freely upon its axle 34. Reaching the hood the chains pass around the pulleys 26, the carriers swinging loosely, and take a horizontal direction away from the water with their load. Curved arms 54, arranged adjacent to the edge of a hopper 55, engage the lip of the carrier and cause it to discharge its contents into the hopper, from whence they fall into the chute 56. This chute may be provided with a removable bottom and the cargo weighed therein by any suitable well-known means. (Not shown.) Thence the cargo is discharged into the car 5 and is transported to any desired position. In order that the process

of weighing may not interfere with the continuous unloading of the cargo and in order that the same may be transferred to cars upon different tracks, other tripping-arms 57 are arranged adjacent to hoppers 58 and chutes 59, the different sets of discharging mechanism operating alternately, for which purpose the tripping-arms 54 and 57 are mounted upon shafts 60, provided with arms 61, which are adjustable by means of set-screws 62 upon the standards 63. By loosening and tightening the screws 62 the arms 54 may be raised and lowered into and out of an operative position. If instead of unloading the cargo into cars it is desired to transfer the same from one vessel to another, the tripping-arms 54 and 57 are both made inoperative and the carriers, with their load, pass from the hold of the vessel upward, then horizontally around the wheels 23 and outward toward the water along the upper portion of the casing until the carriers reach the pulleys 26, by which they are inverted and their load discharged into the channel 53, whence it is conducted by any desired means, such as a chute, into the hold of the other vessel,

While the operation of the apparatus has been described with particular reference to the unloading of ships, it will be obvious that the same is also adapted to the loading and unloading of bins or cars and other vehicles. Moreover, with slight modifications which would suggest themselves to one skilled in the art the apparatus could be used as a dredge or for excavating purposes.

The casings 6 and 16 are preferably tubular, but may be of any other convenient shape and need not necessarily be inclosed, but merely a skeleton framework, serving as ways for the transportation of the chain and carriers. The hood may also be of skeleton construction, having for its essential function the formation of a universal joint between the horizontal and longitudinal casings or ways by means of the pivots 11 and 15, arranged at right angles to each other.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an unloading apparatus, the combination, with substantially horizontal ways, and means for adjusting the same longitudinally and laterally, of substantially vertical ways, means for adjusting the second ways vertically, a universal joint between the two ways, wheels mounted on the ways, an endless chain carried by said wheels and carriers secured to the chain.

2. In an unloading apparatus, the combination, with a substantially horizontal casing, and means for adjusting the same longitudinally and laterally, of a substantially vertical casing communicating with the first casing, a hood forming a universal connection between the two casings, means for adjusting the second casing vertically, toothed wheels mounted within the casings and hood, an endless chain carried by the wheels, and carriers secured to the chain.

3. In an unloading apparatus, the combination, with a substantially horizontal casing and means for adjusting the same longitudinally and laterally, of a substantially vertical casing communicating with the first casing, a hood forming a universal connection between the two casings and provided with a discharge-chute, means for adjusting the second casing vertically, toothed wheels mounted within the casings and hood, an endless chain carried by the wheels, carriers secured to the chain, and means for inverting the carriers over the discharge-chute.

4. In an unloading apparatus, the combination, with a substantially horizontal casing, and means for adjusting the same longitudinally and laterally, of a substantially vertical casing communicating with the first casing, a hood forming a universal connection between the two casings, means for adjusting the second casing vertically, toothed wheels mounted within the casings and hood, an endless chain carried by the wheels, carriers secured to the chain, a receptacle adjacent to the horizontal casing, and tripping-arms arranged contiguous thereto for dumping the carriers.

5. In an unloading apparatus, the combination, with a substantially horizontal casing and means for adjusting the same longitudinally and laterally, of a substantially vertical casing communicating with the first casing, a hood forming a universal connection between the two casings and provided with a discharge-chute, means for adjusting the second casing vertically, toothed wheels mounted within the casings and hood, an endless chain carried by the wheels, carriers secured to the chain, means for inverting the carriers over the discharge-chute, a receptacle adjacent to the horizontal casing and tripping-arms arranged contiguous thereto for dumping the carriers.

6. In an unloading apparatus, the combination, with a substantially horizontal casing, and means for adjusting the same longitudinally and laterally, of a substantially vertical casing communicating with the first casing, means for adjusting the same vertically, a hood forming a universal joint between the two casings, a pair of toothed wheels driven by a suitable motor, pulleys arranged within the casings and the hood, a pair of endless chains driven by the toothed wheels and passing around the pulleys, tie-rods connecting the two chains at intervals, carriers provided with slots serving as bearings for the tie-rods, a nose projecting from the carriers adjacent to the slots, abutments carried by the chains adjacent to the tie-rods for engaging the nose of the respective carriers when suspended at one extremity of the slot, and means for dumping the carriers.

7. In an unloading apparatus, the combination, with a movable bridge, horizontal ways supported thereby, means for adjusting the ways longitudinally, and a motor mounted on the ways and movable longitudinally thereof, of vertical ways connected with the first ways by a universal joint and adjustable vertically relative thereto, a toothed wheel driven by the motor, pulleys arranged at the angle beyond the two ways, an endless chain driven by the toothed wheel and passing along the ways and over the pulleys, carriers pivotally secured to the chain, a cable connecting the lower portion of the vertical ways with the motor, and means for dumping the carriers.

8. In an unloading apparatus, the combination, with a movable bridge, of a horizontal casing supported thereby and antifriction members disposed between the casings and the bridge, of a vertical casing communicating with the first casing, an apertured plate arranged at the end of the horizontal casing, a hood arranged at the junction of the two casings and provided with an apertured plate, a pivotal connection between the two apertured plates, guides pivotally carried by the hood and serving to permit vertical adjustment of the second casing relative to the hood and the first casing, a pulley mounted upon the guide-pivot, a cable attached to the lower portion of the vertical casing and extending around the pulley in the hood and secured to the motor, toothed wheels driven by the motor, endless chains carried by the toothed wheels, pulleys arranged within the hood and serving to support the chains, a series of carriers pivotally connected with the chains whereby they are driven through the casings in cycle, a toothed rack fixed on the bridge, a pinion meshing with the rack and driven by the motor whereby the motor is displaced longitudinally of the horizontal casing and the vertical casing is raised and lowered, a second toothed rack fixed to the horizontal casing, and a pinion meshing with said rack and driven by the motor whereby the horizontal casing is displaced longitudinally.

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