No. 619,128. Patented Feb. 7, 1899.

S. H. BRADFORD.

APPARATUS FOR LOADING VESSELS.

(No Model.) (Application filed May 4, 1898.) 4 Sheets—Sheet 1.

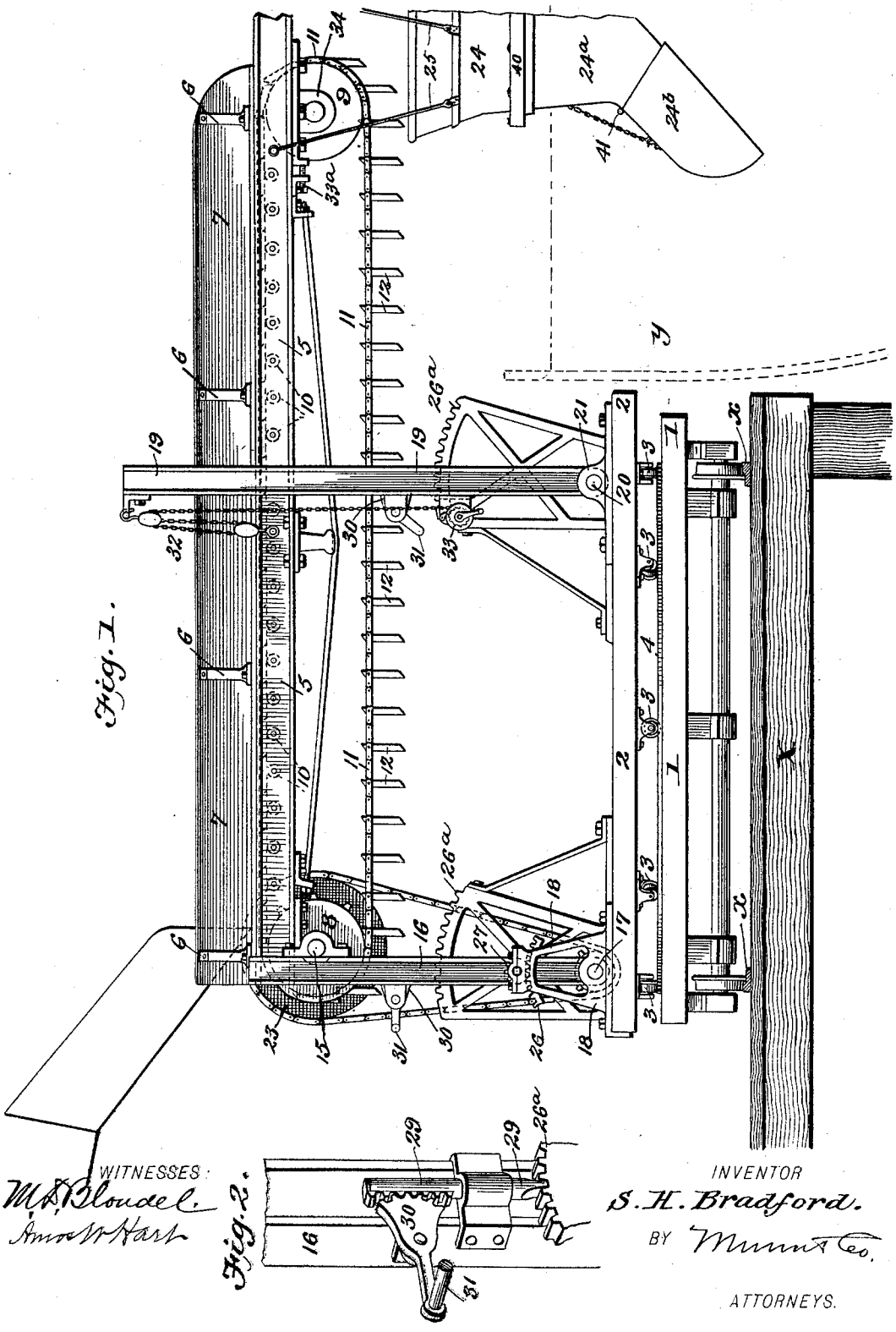


Fig. 1.

Fig. 2.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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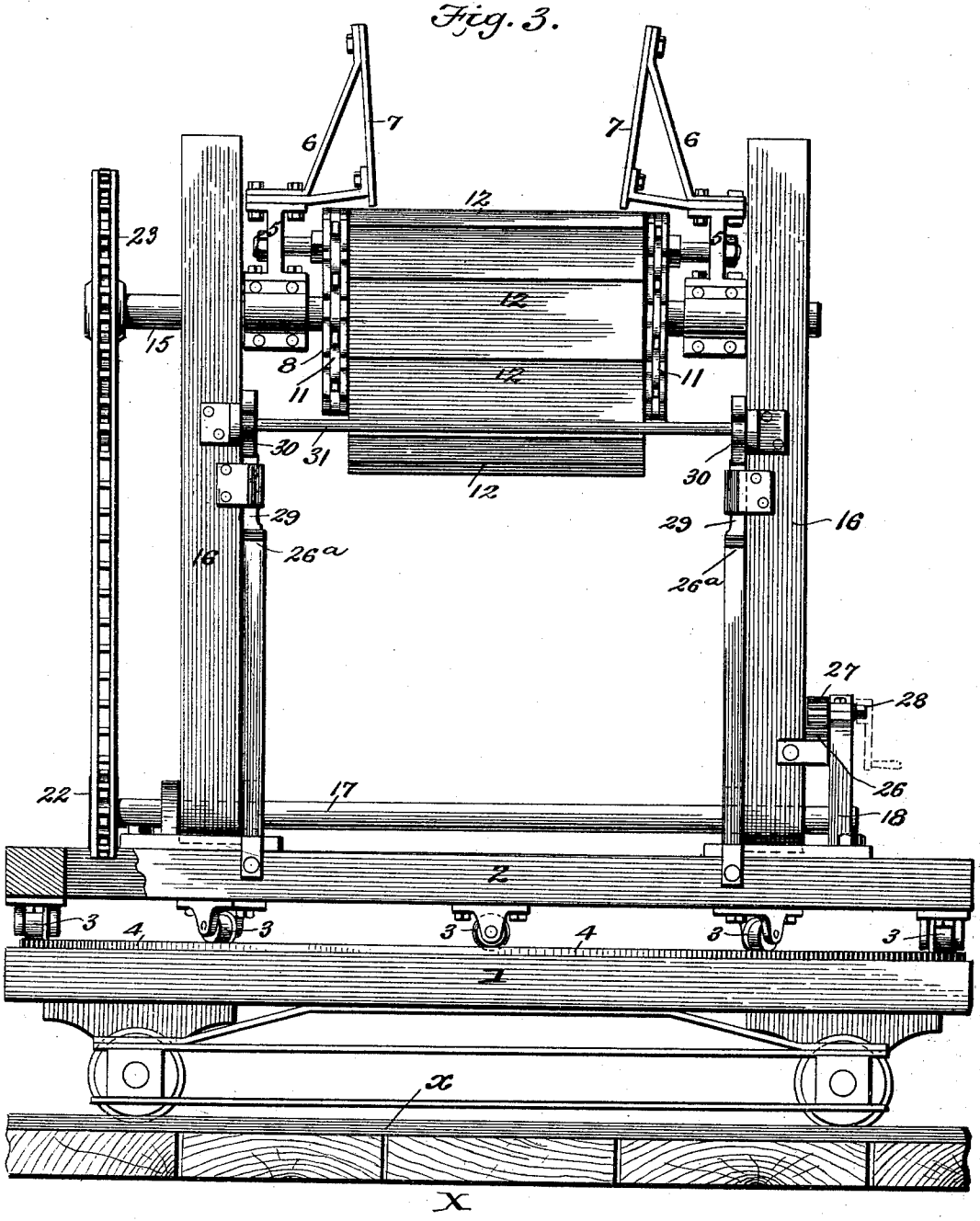
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(No Model.) (Application filed May 4, 1898.)

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Fig. 3.



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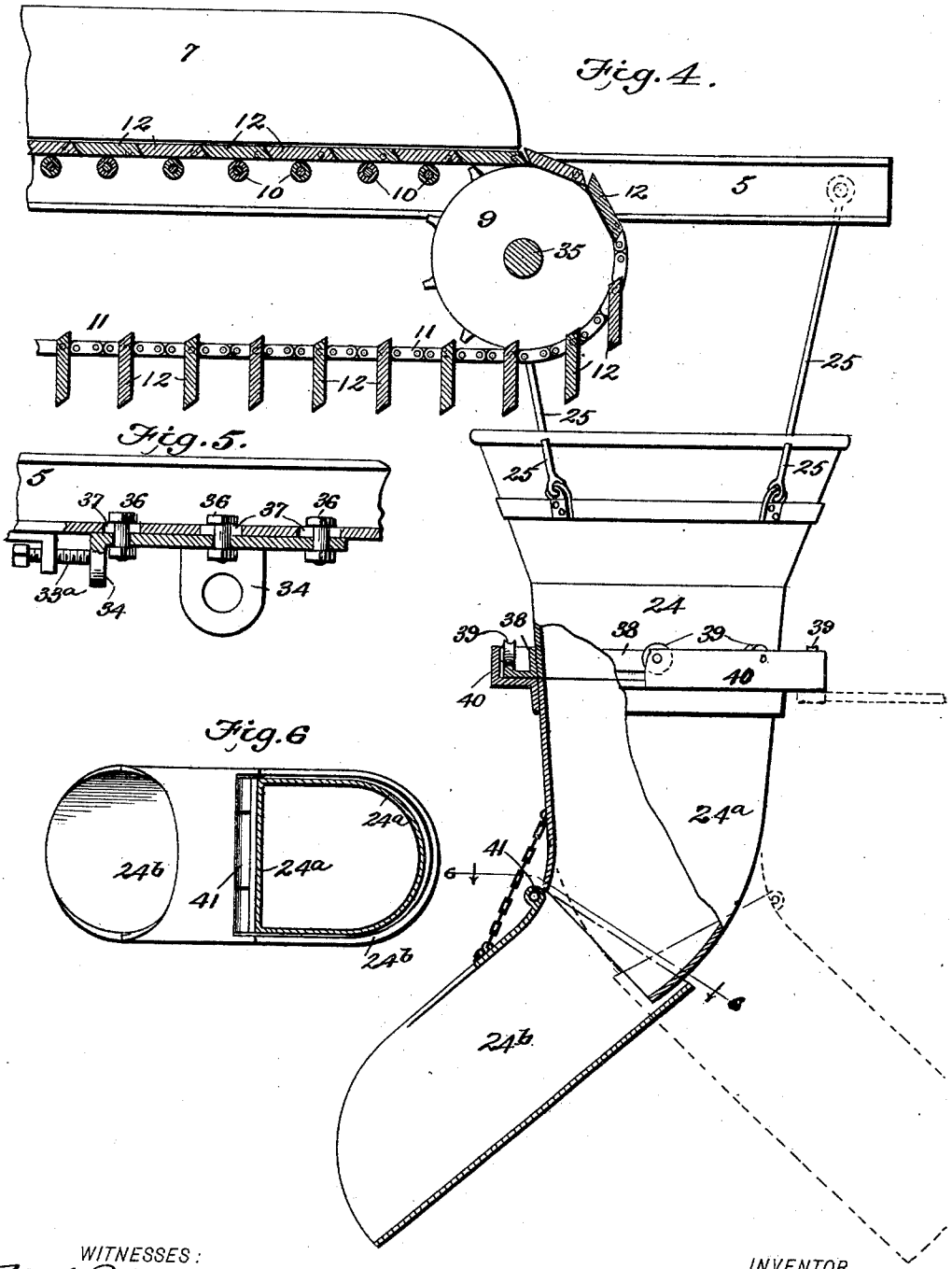
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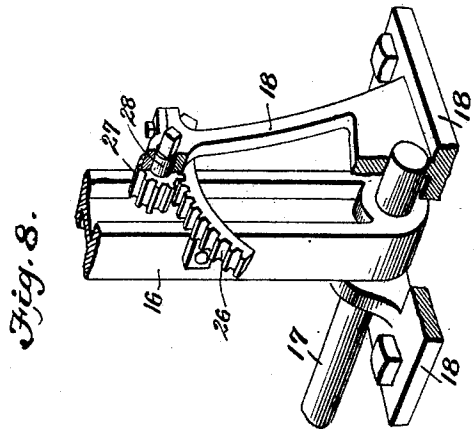


Fig. 8.

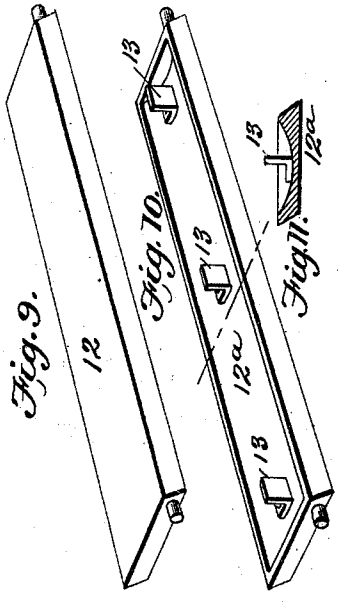


Fig. 9.

Fig. 10.

Fig. 11.



Fig. 12.

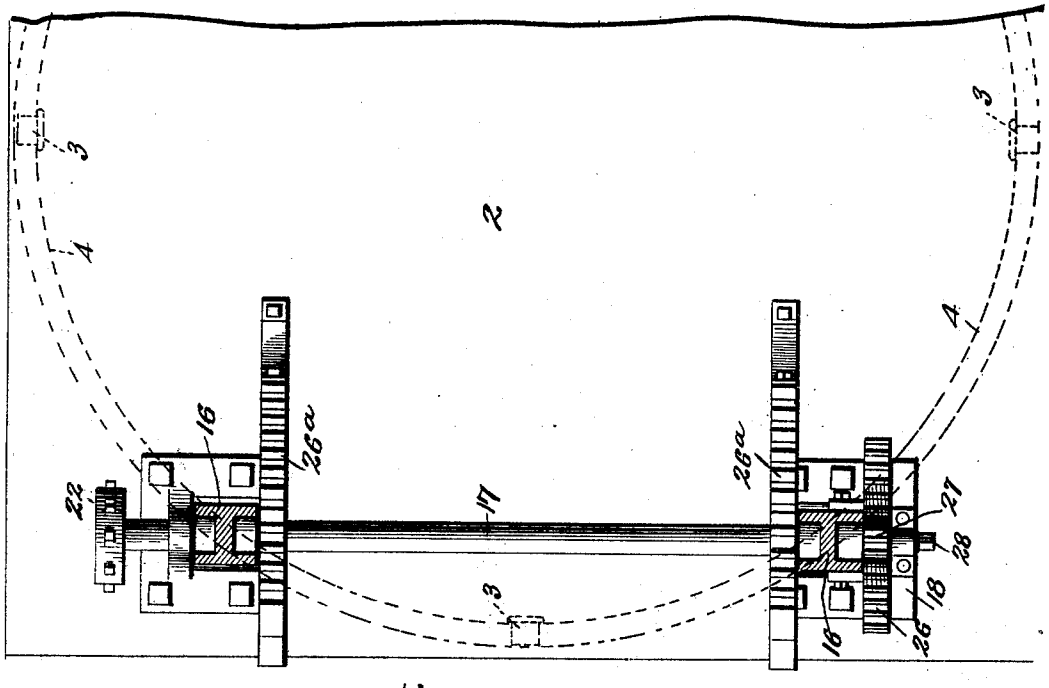


Fig. 7.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR LOADING VESSELS.

SPECIFICATION forming part of Letters Patent No. 619,128, dated February 7, 1899.

Application filed May 4, 1898. Serial No. 679,676. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL H. BRADFORD, residing in Sandusky, in the county of Erie and State of Ohio, have invented an Improved Apparatus for Loading Vessels, of which the following is a full specification.

My improved apparatus is designed for delivering coal, ore, grain, or other commodities of like character into the holds of vessels or into other receptacles. The main portion of the apparatus comprises a frame arranged horizontally, or approximately so, and hinged and supported on a suitable base-frame and an endless traveling carrier arranged in such horizontal frame and running on drums and rollers. Such carrier transfers the coal, ore, or grain from a chute or other means of delivery into a hopper, which delivers at any point on an arc or circle as required for trimming the vessel. The carrier-frame is hinged to and supported by vertical standards, which are in turn hinged to the base-frame in such manner that they may be adjusted—that is, lowered or raised in a vertical plane—for the purpose parallel to each other of adjusting the carrier to accommodate it to different elevations of the vessel alongside the dock or according to the depth of the hold thereof or according to the height of the cargo as delivered into the latter. The delivery apparatus proper is mounted upon a rotatable base-frame, so that the same may be swung horizontally at any angle required to enable the delivery to be conveniently effected. Such rotatable base-frame is itself mounted upon a truck or wheeled frame, which is adapted to run on rails laid along the edge or parallel to the dock or wharf, so that the entire apparatus may be easily and quickly shifted from one point to another along the dock to enable it to be used for delivering coal, &c., from a chute or other point of discharge into a vessel moored opposite.

In the accompanying drawings, Figure 1 is a side elevation of my improved apparatus. Fig. 2 is a perspective view of the means for locking the adjustable standard of the carrier-frame. Fig. 3 is an end view, part being in section, of the apparatus. Fig. 4 is in part a vertical section and in part a side view of a portion of the apparatus which includes the hopper. Fig. 5 is a detail section illustrating the means for adjusting the tension of the endless carrier. Fig. 6 is a cross-section on the line 6 6 of Fig. 4. Fig. 7 is a horizontal section of a portion of the apparatus. Fig. 8 is a detail perspective view illustrating the means for adjusting the standards to the carrier-frame at different angles. Figs. 9, 10, 11, and 12 are different views of buckets or hinged sections forming part of the endless carrier, which views will be hereinafter more specifically referred to.

Referring now particularly to Figs. 1 and 7, a wheeled truck 1 is shown arranged and adapted to run on rails x laid upon a wharf or dock X, and upon the same is mounted a square frame 2, provided with flanged wheels 3, which run upon a circular track 4, secured upon the aforesaid truck 1. Such base-frame 2 supports the delivery apparatus proper, which will now be described.

The body or main portion of the carrier is constructed of a rigid iron frame, whose chief components are two parallel I-beams 5, (see Fig. 3,) which are suitably trussed, as shown in Fig. 1, and upon said beams 5 are secured brackets 6, Fig. 3, which support side guides 7, whose lower edges lie close to the upper run or surface of the endless carrier. The latter is mounted on two drums 8 and 9, which are arranged horizontally at the respective ends of the beams or frame 5, and the upper run or surface of the carrier is supported and travels upon a series of rollers 10, which are journaled in the beams 5 and arranged parallel therein, as will be readily understood. The carrier proper is composed of chains 11, or a series of links jointed together, (see Fig. 4,) and of a series of buckets or sections 12, which are pivoted to and between the said chains 11 and are adapted to swing from their pivots, so as to assume a vertical or pendent position, as shown in Figs. 1 and 4, whereby they are adapted to pass around the drums and to discharge into the hopper in the required manner. My preferred form of bucket or hinged section 12 is provided with scarfed or beveled side edges, as shown best in Fig. 9, whereby they are adapted to form a smooth

lap-joint when in working position on the upper side or run of the carrier. (See Fig. 4.) This form of joint allows no space for entry of particles of coal or ore or kernels of grain, since the sections 12 form at all times a close joint while the coal or other commodity is being carried thereby. The form of section shown in Fig. 9 has a plane or flat upper surface which particularly adapts it for use in delivering certain articles or commodities; but I may employ the form of section 12^a, (shown in Figs. 10 and 11,) whose upper surface is concaved or dished. This form is particularly adapted for carrying fine coal, and I provide the section with a series of projections 13, which I term "clearance-teeth." The said teeth are right-angular in form and riveted to the section 12^a along the middle longitudinal line. They serve to prevent the fine coal from becoming packed or practically immovable on the carrier between the side guides 7.

I show in Fig. 12 a modified form of bucket or hinged section 14, the same having rabbeted edges instead of scarfed or beveled ones, as before described. This form of section is pivoted and arranged between the chains 11 of the carrier in the same manner as the sections 12, already described.

The entire carrier-frame is hinged on a shaft 15, (see Figs. 1 and 3,) which is supported in suitable bearings horizontally, said bearings being suitable attachments of two standards 16, which are arranged opposite and parallel to each other and stand normally vertical, as shown in Fig. 1. The said standards are constructed of rolled I-beams or of other form of angle-iron combining strength and lightness in the required degree. They are pivoted and supported at their lower ends upon a transverse shaft 17, which is journaled in brackets 18, secured upon the rotatable base-frame 2. Another set of similar standards 19 are pivoted upon the same base-frame 2 and preferably by short or stub shafts 20, having their bearings in brackets 21. It will thus be understood that there are four standards 16 16 and 19 19, the two sets being arranged at opposite points on the circle of the aforesaid base-frame 2. The carrier-frame is pivoted upon and swings from the standards 16, while the other standards 19 serve as means of support for the body or free end of the carrier, there being suitable means of connection between the carrier-frame and said standards, as will be presently described, for the purpose of adjusting it at different elevations. The shaft 17, to which the standards 16 are pivoted, serves as a drive-shaft for the endless carrier. For this purpose it is provided on one of its outer ends with a small sprocket-wheel 22. (See Fig. 3.) A larger sprocket-wheel 23 is mounted on the corresponding end of the counter-shaft 15, whose drum 8 drives the carrier. Rotation is imparted to the shaft 17 by means of a suitable motor, (not shown,) which will in practice be arranged between the standards 16 and 19 on the frame 2. It is apparent that the drive-shaft 17 will rotate the counter-shaft 15 and its drum 8 at a slower speed in direction of the arrow, Fig. 1, and that thereby the carrier proper will be caused to travel, so as to deliver coal or ore received from the chute at its free end into the hopper 24, which is suspended from the extended ends of the beams 5 by means of rods 25, as shown best in Fig. 4.

For the purpose of adjusting the standards 16 and 19 in vertical planes, as required to support the carrier proper at different elevations, I employ the following-described means: Referring to Figs. 1 and 8, it will be seen that the standard 16 is provided with a segment-rack 26 and that a pinion 27 meshes therewith and is fixed on a stub-shaft 28, which is journaled in the bracket 18, secured on the frame 2 and adapted for application of a crank-lever for rotating it. By this means the standards 16 and 19 may be adjusted as required. The means for locking the standards in any adjustment are shown best in Figs. 1 and 3, and consist of vertically-slidable pawls 29, movable in guides on said standard 16 and adapted to engage the rack 26^a and toothed segmental levers 30, which engage racks on brackets secured to the frame 2, formed on the pawls 29, and are pivoted to the adjacent standards. One of such locking-pawls 29 is provided for each standard, and each pair of pawls is connected by a transverse bar 31, so that both pawls may be operated simultaneously. As shown, such bar connects the outer ends of said levers, and in the case of the levers applied to the standards 19 their arms are arranged at an obtuse angle to avoid contact of the bar 31 with the carrier-sections. It will be perceived that by pulling downward on the rods 31 the levers 30 will raise the pawls 29, and thereby unlock the standards, so that they may be shifted from one position to another. Upon releasing said rods 31 the pawls 29 drop by gravity and reëngage the racks 26. To operate the carrier for depressing or elevating it by means of the pivoted standards, three men are required, one for rotating the crank-shaft 28 and one for operating each set of pawls 29.

The means for elevating or lowering the free end of the carrier proper consist of a block and tackle 32 and a windlass 33, as shown in Fig. 1. One of the pulley-blocks is suspended from the upper end of the standard 19 and the other is connected with a carrier-beam 5, while the windlass-shaft is arranged in bearings on the lower portions of the standard. One such block and tackle is arranged on each side of the carrier proper. The operation is obvious, and it is apparent that a suitable locking device—say a pawl—will be applied to the windlass in the usual way.

As a means for preserving the tension of the endless carrier, and thus compensating for wear, &c., I employ an adjusting-screw 33^a, (see Fig. 5,) which acts against the bracket 34, in which the shaft 35 of the drum 9 has its bearings. Such bracket 34 is slidably connected with the base-flanges of the I-beams 5 by means of screw-bolts 36, which pass through slots 37. By rotating the screw 33 the bracket 34 will be adjusted as required.

The lower portion of the hopper is composed of two parts 24^a and 24^b. The upper section 24^a is connected with the body or hopper proper 24^a, so as to rotate thereon. For this purpose the part 24 is provided with a circular flange 38, whose outer edge has a raised rim which constitutes a track whereon grooved rollers 39 are supported and run, as shown in Fig. 4. The said rollers are journaled on shafts projecting inward from angular brackets 40, attached to the upper hopper-section 24^a. The lower section 24^b is hinged at 41 to the section 24^a and is thus adapted to be swung laterally at different angles, as shown by dotted lines, Fig. 4. It will be seen that the funnel portion of the hopper is suspended directly beneath the outer end of the endless carrier, so that coal, ore, &c., will be delivered directly into it when discharged from the carrier, and it will be further seen that by rotating the section 24^a of the hopper upon the fixed section 24 the nozzle or spout 24^b may be directed, as required, to deposit the coal at any point within the radius of discharge, as is required for trimming ship. The means for rotating the lower section 24^a may be a lever or bar or other means suitable for the purpose, the same being detachably connected with the section—say in the manner of a lever with a ship's capstan. The point of rotatable connection between the sections 24 and 24^a is in practice somewhat above the deck of the vessel to be loaded, and the parts 24^a and 24^b project down through the hatch, as indicated in Fig. 1.

From the foregoing description it will be seen that the entire apparatus may be transported on the rails x to any point along the wharf or dock where delivery into a vessel lying alongside the latter may be required and that by rotating the base-frame 2 upon the truck 1 the carrier proper may be adjusted at any angle required to enable the hopper to be projected into a particular hatch. It is further apparent that the carrier proper may be lowered bodily by inclining the standards 16 and 19, as before described, so that the hopper may be adjusted higher or lower, as required by the elevation of the deck of the vessel or other conditions. It will be also seen that by means of the block and tackle and windlass connected with the standards 19 the carrier proper may be swung on the counter-shaft 15, and thus further adjusted according to conditions. In other words, the carrier proper may be adjusted in such manner as to remain horizontally, as shown in Fig. 1, or it may be adjusted at an inclination relatively to the point 15, as will be readily understood.

The apparatus forms a means for delivering coal, ore, &c., rapidly and economically and enables a cargo to be supplied in a very short time.

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

1. An apparatus for delivering coal &c. comprising the horizontal rotatable base, two pairs or sets of straight posts pivoted at the corners of said base, to swing together in vertical planes, said pairs being capable of separate adjustment, and adapted to be held parallel to each other, the endless carrier-frame hinged between one set of such uprights, means attached to the other set for adjustably supporting the free end of the carrier-frame, and means secured rigidly on the aforesaid base, adjacent to each set of uprights, and coacting with the latter for holding each set fixed in any adjustment, as shown and described.

2. An improved apparatus for delivering coal &c. comprising standards pivoted to a base-frame, a carrier-frame hinged to and supported upon said standards and means for adjusting and locking the standards in different inclinations substantially as shown and described.

3. An improved apparatus for delivering coal, &c. comprising standards which are pivoted upon a base-frame, brackets having segmental racks, pinions journaled on the standards and adapted to engage said racks, means for rotating said pinions, a carrier-frame attached to the standards and an endless carrier arranged therein substantially as shown and described.

4. An improved apparatus for delivering coal, &c. comprising standards hinged to a base-frame, a carrier-frame hinged to said standards, fixed brackets having segmental racks slidable pawls adapted to engage such racks and means for disengaging said pawls simultaneously, also means for rotating the said pinions substantially as shown and described.

5. An improved apparatus for delivering coal, &c. comprising a horizontal base, two sets of adjustable standards or uprights pivoted to said base, the carrier-frame pivoted on the rear set of standards near their upper ends, and a block and tackle connecting the free end of the carrier-frame with the other or front set of standards, and a windlass arranged on the latter for use in adjusting the carrier vertically, and means for locking and holding the members of each set of standards in the same position, parallel to the corresponding members of the other set, as shown and described.

6. In an apparatus of the character described an endless carrier composed of paral-

lel chains and a series of buckets or sections which are pivoted to opposite links of the chains and thus adapted to swing free in the manner described and provided with beveled side edges as shown and described.

7. In an apparatus of the character described, the endless carrier having buckets which are dished or concaved on their working surface and provided with clearance-teeth substantially as shown and described.

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