A. S. HECKER.

LOADING AND UNLOADING APPARATUS.

APPLICATION FILED MAY 26, 1917.

1,327,324.

Patented Jan. 6, 1920.

3 SHEETS—SHEET 1.

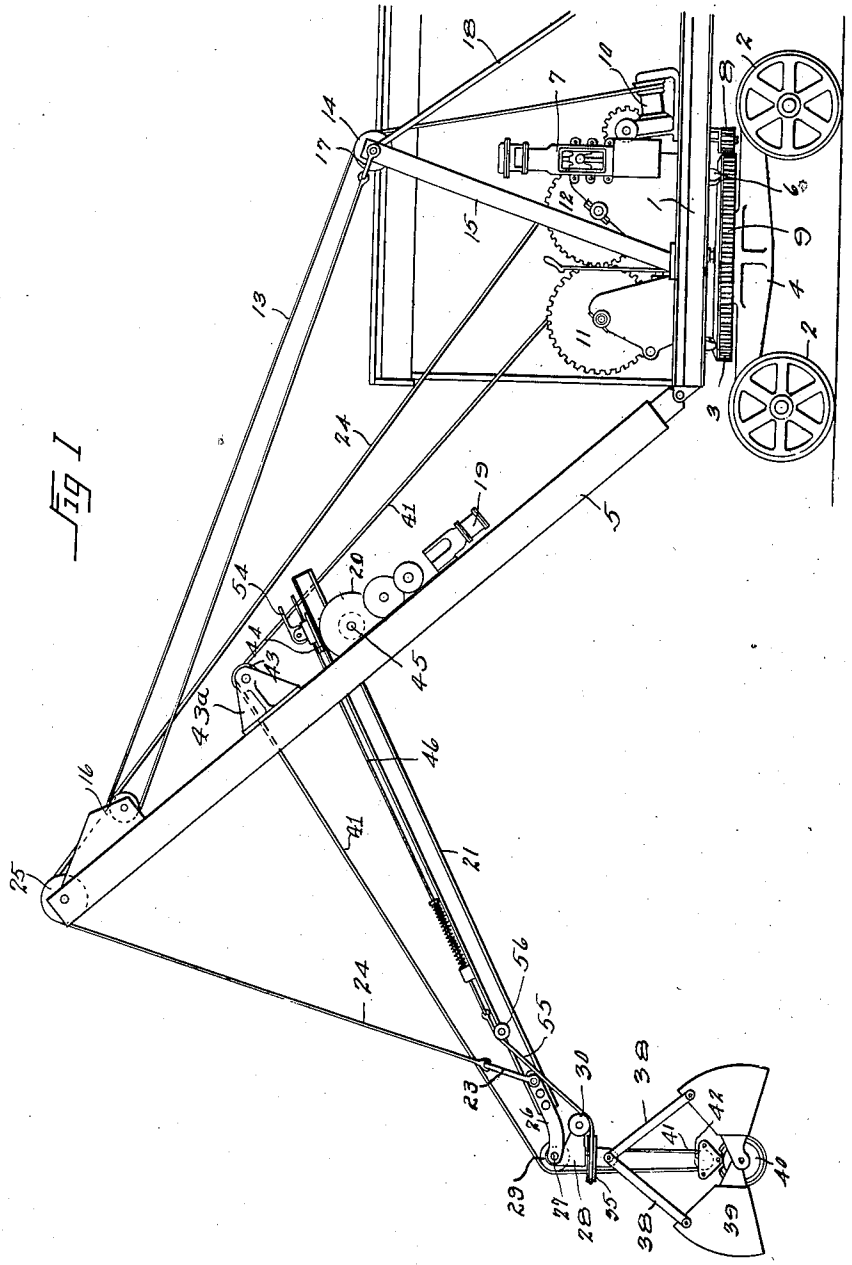


Fig 1

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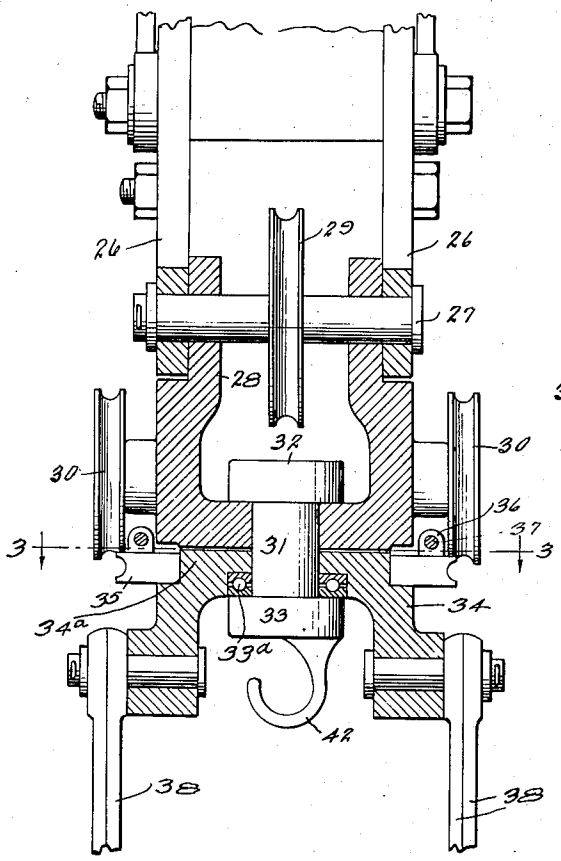


Fig 2

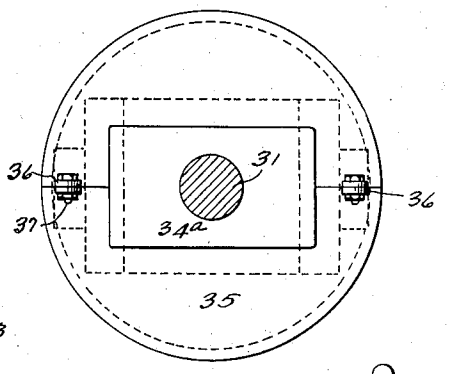


Fig 3

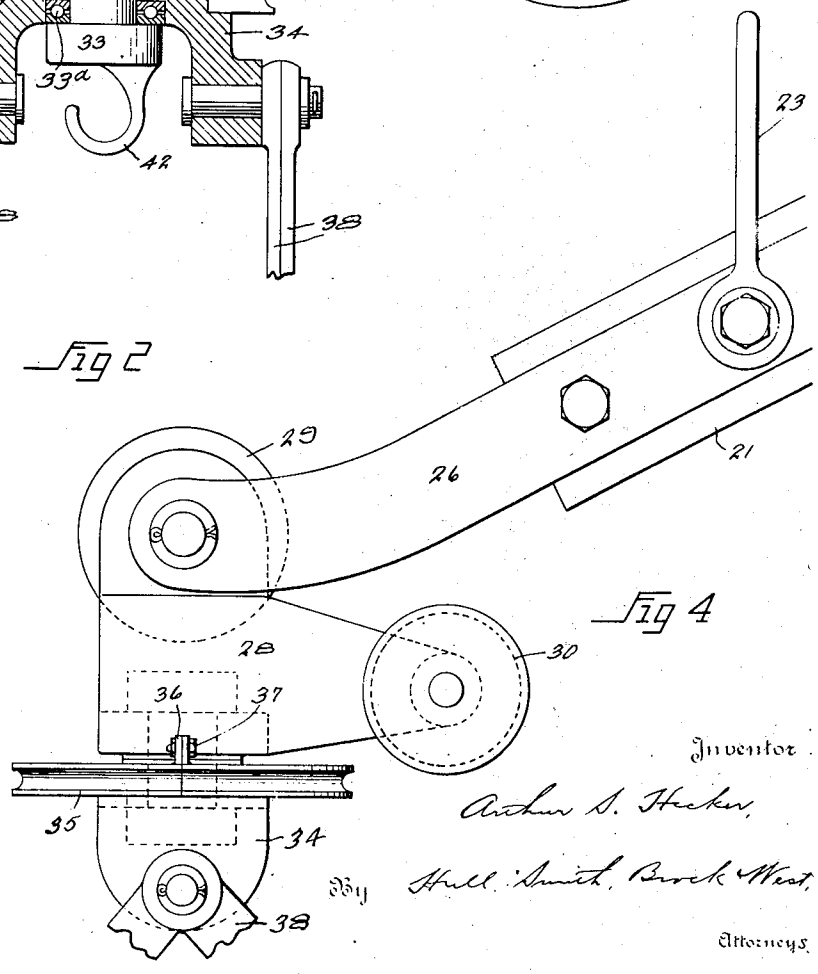


Fig 4

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3 SHEETS—SHEET 3.

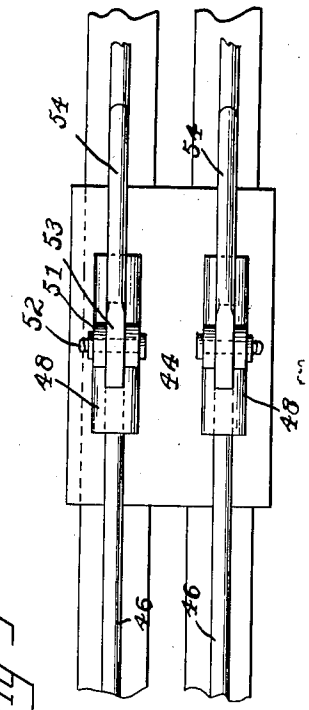


Fig 5

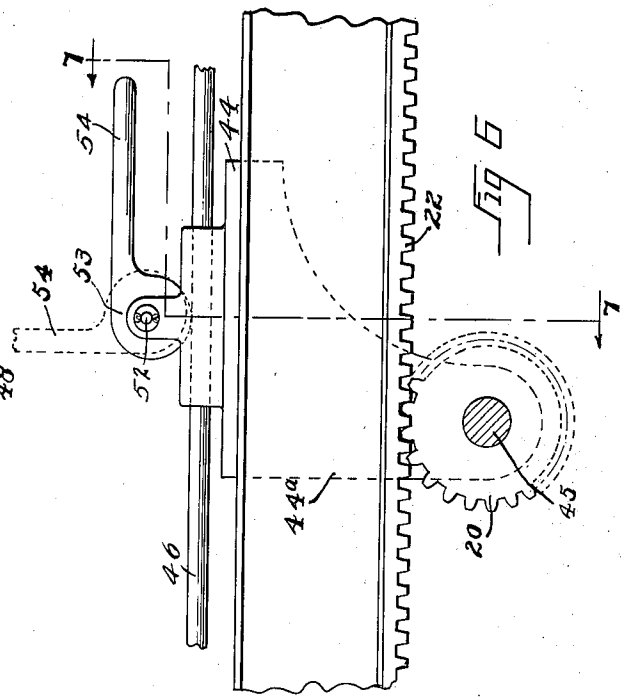
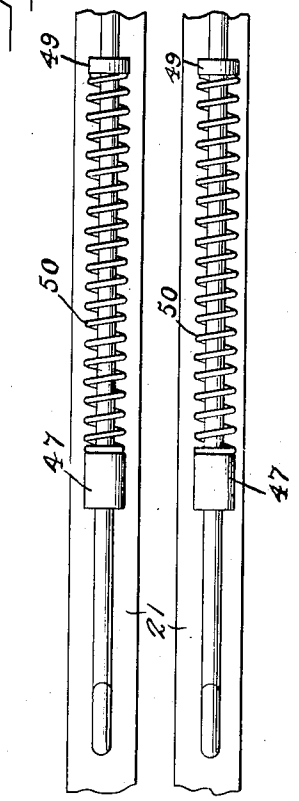


Fig 6



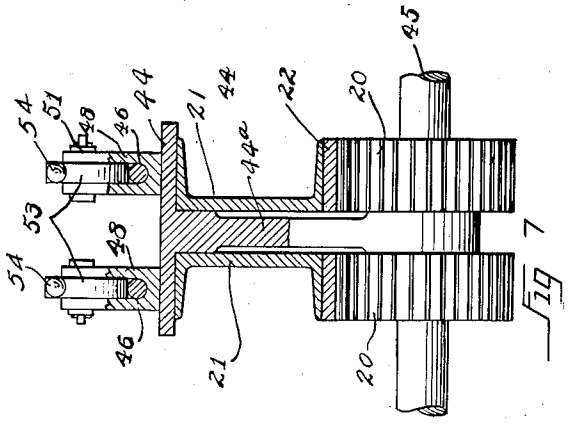


Fig 7

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UNITED STATES PATENT OFFICE.

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LOADING AND UNLOADING APPARATUS.

1,327,324. Specification of Letters Patent. Patented Jan. 6, 1920.

Application filed May 26, 1917. Serial No. 171,106.

To all whom it may concern:

Be it known that I, ARTHUR S. HECKER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Loading and Unloading Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to apparatus for loading and unloading, and has for its general object to provide an apparatus of this character having a wide range of operation and one which will render more positive and direct the control of the load carrying device, both in its load-receiving and in its discharging position. A further and more limited object of the invention is to secure the foregoing objects in connection with a load-carrying device of the clam-shell bucket type and to enable the said device to take its charge or load in a particularly efficient manner. Further and more limited objects of the invention will appear hereinafter and will be realized in and through the combinations of elements embodied in the claims hereto annexed.

In the drawings forming part hereof, Figure 1 represents a side elevation of my apparatus; Fig. 2 a sectional detail through the head by which the bucket is rotatably supported; Fig. 3 a sectional view corresponding substantially to the line 3—3 of Fig. 2; Fig. 4 a detail in elevation of the end of the rigid member or dipper-stick; Fig. 5 a detail in plan of the said member and parts of the means for rotating the bucket; Fig. 6 a side elevation, with certain parts shown in section, of the means for maintaining a pivotal connection between the rigid member and the boom while maintaining a driving connection between the said member and the means for moving the same in the direction of its length; and Fig. 7 a sectional detail corresponding substantially to the line 7—7 of Fig. 6.

Describing by reference characters the various parts illustrated herein, 1 denotes the deck or platform of a carriage of the steam-shovel type. This carriage is shown as provided with wheels 2 and a platform 3 mounted on a truck 4. 5 denotes a boom carried by the deck or platform 1, the deck or platform being rotatably mounted on the platform 3 by means of the wheels 6, in the usual manner. 7 denotes an engine which, through suitable standard connections (not illustrated) is adapted to rotate the pinion 8 meshing with the gear 9 on the platform 3, thereby to rotate the deck or platform 1. 10 denotes a drum on the platform 1 driven by the engine 7 in any suitable manner, and 11 and 12 denote the geared heads of two other drums mounted on said platform. 13 denotes a lifting line for the boom 5, said line being wound upon the drum 10 and extending thence around a sheave 14 on a strut 15, thence around a sheave 16 on said boom, the end of the line being connected by a bail 17 to the upper end of said strut and the strut being supported from the carriage by means of a guy 18.

19 denotes a crowding engine on the boom 5, said engine being adapted, by suitable standard driving connections (not illustrated) to operate pinions 20. The boom 5 is preferably of forked construction and is adapted to receive between the side members thereof a longitudinally adjustable rigid member 21, said member being constructed in substantially the same manner as the ordinary "dipper" stick of a steam-shovel, but being considerably longer than the ordinary dipper stick, for reasons to be explained hereinafter. The member 21 is provided with racks 22 adapted to mesh with the pinions 20. The outer end of the member 21 is provided with a bail 23 to which there is connected the lifting line 24, said line extending over a sheave 25 on the outer end of the boom 5 and thence to a drum on the platform, the line being shown as extending to the drum having the geared head 12. Secured to opposite sides of the member 21 are the straps 26, said straps forming a forked support for the bucket as well as for some of the operating parts therefor. 27 denotes a pin which extends through the ends of the straps 26 and through the sides of a metal frame 28 by which the bucket is rotatably supported. Mounted on the pin 27 is the sheave 29 for the loading or bucket-closing line. The frame 28 is provided on each side thereof with a rearward extension carrying a sheave 30. The bottom of the frame 28 is provided with an aperture through which there extends a double-headed bolt, the body of the bolt being indicated at 31 and the upper head

32 resting upon the bottom of the frame 28. The lower head 33 of said bolt forms a rotatable support for the bucket-head frame 34. This head is provided with a horizontal sheave 35, preferably made in two sections connected by means of lugs 36 and bolts 37 and applied to a rectangular neck 34[a] on the frame 34. The sheave 35 is located immediately beneath and forward of the sheaves 30. If desirable or necessary, balls or other antifriction devices 33[a] may be interposed between the bolt head 33 and the adjacent surface of the bucket-head frame.

Pivoted to opposite sides of the head frame 34 are the links 38 which are connected to the opposite members 39 of a clam shell bucket, said members being pivoted in the usual manner to the support 40. 41 denotes the closing line, which may be secured at one end to the head frame 34 in any convenient manner, as by means of a hook 42 (see Fig. 2), said line extending around a sheave 42 connected to the supporting frame 40 and thence over the sheave 29, over a sheave 43 carried by a bracket 44[b] above the space between the side members of the boom 5 adjacent to the pivot for the member 21 and thence to a winding drum on the deck or platform 1, the drum shown being that provided with the geared head 11.

In order to maintain the racks 22 in mesh with the pinions 20 and to permit the member 21 to pivot about the shaft of said pinions as an axis in all longitudinal adjustments of the said member, I provide a saddle block having a central projection 44[a] extending between the sides of the member 21 and pivoted upon a pin or shaft 45 which supports the pinions 20.

As it is desirable, if not absolutely necessary, to position the opposite members 39 of the bucket so that they may operate to the best advantage in taking and discharging a load, I provide means whereby the bucket may be automatically rotated through the longitudinal movements of the member 21, locating the means for imparting this rotary movement in convenient relation to the operator of the crowding engine. The construction whereby this result is secured comprises the sheaves 30 and 35 and means for rotating the latter sheave and thereby the bucket-head frame 34. The means shown herein comprises a pair of rods 46 which are slidably mounted upon the side members of the dipper stick 21, being guided thereupon by tubular projections 47 and 48. The tubular projections 48 are preferably formed upon the top of the saddle block 44 which maintains the member 21 in operative relation to the pinions 20. Each rod 46 is provided with a head or abutment 49, between which and the projections 47 helical springs 50 are inserted, these springs being normally under considerable compression. Each of the tubular projections 48 is provided with a slot in the top thereof, and from opposite sides of each slot there project lugs 51 supporting a pin 52. Pivoted to each of these pins is a cam 53 having an operating handle 54. By depressing either of the handles 54, the corresponding cam may be brought into locking engagement with its coöperating rod 46. The outer or forward ends of the rods 46 are connected to a line or other suitable pliable connection 55 which extends over sheaves 56 on the member 21, under the sheaves 30 and around the sheaves 35.

With the parts constructed and arranged as described, the operation will be as follows:—Ordinarily, there will be no occasion for adjusting the boom 5 in a vertical plane after the initial adjustment, as the wide range of operation secured through the use of the long member 21 will ordinarily be sufficient to enable the latter to take its load either at a point considerably removed from the platform 1 or in immediate proximity thereto. Should occasion require the vertical adjustment of the boom 5, this adjustment may be obtained in the usual manner. The crowding engine operator is enabled, by the rigid member 21, to quickly and conveniently place the bucket in operative relation to the work, the positioning of the bucket without swinging or oscillation thereof being secured by reason of its close connection with the end of said rigid member. This adaptability for quick and positive location is advantageous when the bucket is in both its load-taking and its load-discharging positions. Furthermore, when a bucket is taking its load, the member 21 will operate as a rigid strut, thereby holding the bucket down during the closing movement thereof and resisting and preventing any lifting movement of the bucket due to the closing action. It will be observed that the bucket-closing line 41 extends substantially parallel to the rigid member 21. Leading the line 41 substantially parallel to the member 21 prevents the said line from forming an angle with said member, whereby there is no tendency to break or buckle the said member. It will be observed that, as the sheave 43 is located near the axis about which the member 21 pivots, this parallel relation will be preserved in all operating positions of the bucket.

Reference has been made hereinbefore to the desirability of rotating the bucket. By the construction described herein, the crowding engine operator is enabled to impart such rotation to the bucket by merely clamping one or the other of the rods 46 as the member 21 approaches the end of its stroke (either inward or outward). Assume that the member 21 is being moved outwardly and that the bucket is in close proximity to its load-taking position. If

it is desirable to impart a rotary movement to the bucket in order to enable it to operate efficiently on the material, the operator clamps one or the other of the rods 46 by throwing down the handle 54 of the cam thereabove. Further outward movement of the member 21 pulls the other rod outwardly through its guide projections 47 and 48, compressing the spring 50 and rotating the bucket through the sheave 35. When the bucket has taken its load and the member 21 is being run inwardly, the operator can then release the cam grip, and the springs will cause the rods to assume the positions shown in the drawings. As the bucket reaches its discharging position, if desirable to impart rotation thereto, one of the rods 46 may be clamped. In case the further movement of the member 21 is an outward movement, the bucket will be rotated in the manner described before. In the event that the member 21 is moved inwardly, the spring on the rod which is clamped will be compressed between the head 49 and the tubular guide 47 while the spring on the opposite rod will expand, thereby taking up the pliable connection 55 and rotating the sheave 35 and the bucket.

Having thus described my invention, what I claim is:

1. In an apparatus of the character described, the combination, with a swinging boom, of a rigid member pivotally supported by said boom, means for moving said member in the direction of its length, a load-carrying device carried by said member, loading means for said device, means for moving said member about its pivotal support, means for operating said loading means, and means operable by the adjustment of said member for imparting a rotary movement to said device.

2. In an apparatus of the character described, the combination, with a swinging boom, of a rigid member pivotally supported by said boom, means for moving said member in the direction of its length, a clam-shell bucket carried by said member, a closing line for said bucket extending substantially parallel with said member and guided by said boom, a lifting line for said member also guided by said boom, means for operating said lines, and means operable by the movement of said member in the direction of its length for imparting a rotary movement to said bucket.

3. In an apparatus of the character described, the combination, with a swinging boom, of a rigid member pivotally supported by said boom, means for moving said member in the direction of its length, a load-carrying device carried by said member, a loading line for said device extending substantially parallel with said member and guided by said boom, means for moving said member about its pivotal support, means for operating said line, and means operable by the movement of said member in the direction of its length for imparting a rotary movement to said device.

4. The combination with a rigid supporting arm, of a bucket provided with a head frame, a vertical pivot bolt supporting and directly connecting said head frame to the arm, and means to rotate the head frame and bucket on said pivot.

In testimony whereof, I hereunto affix my signature.

ARTHUR S. HECKER.