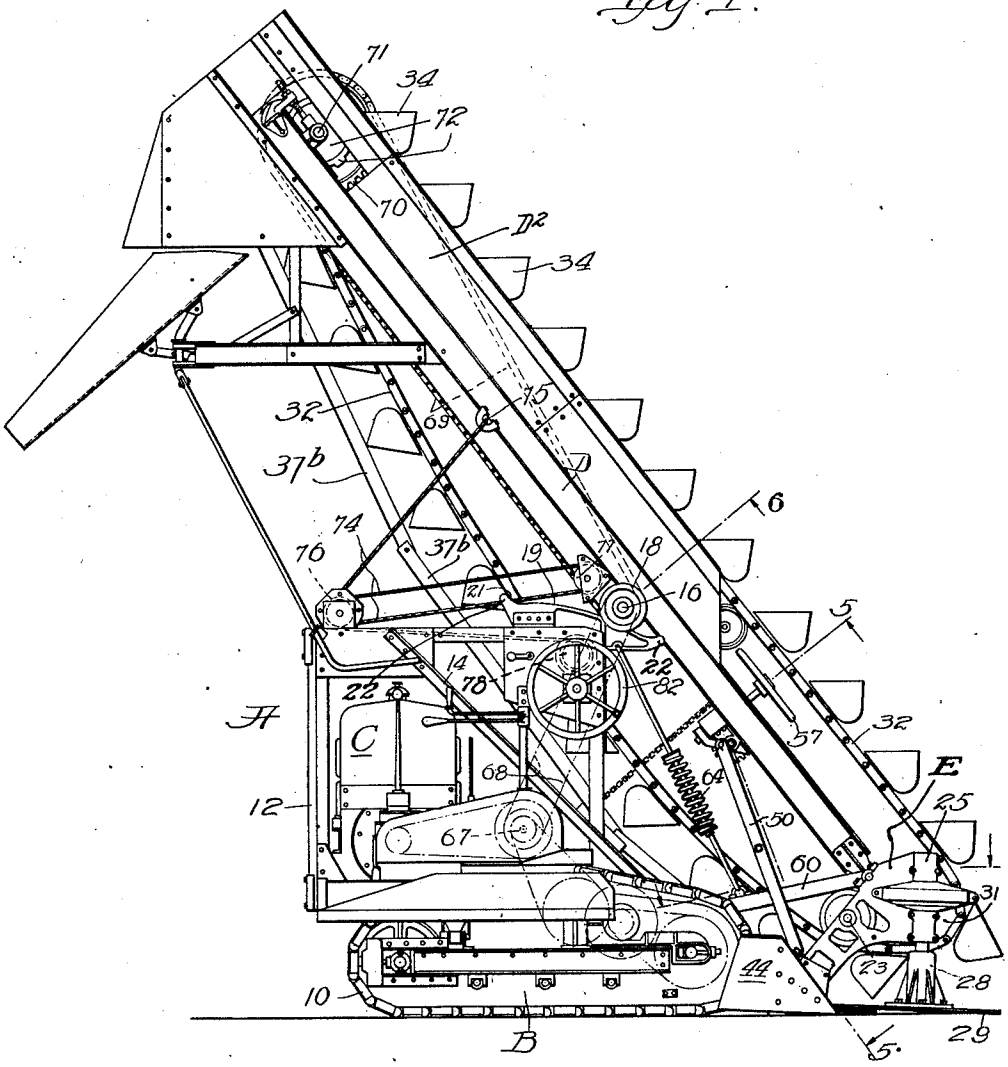
May 31, 1927. 1,630,598

H. H. BARBER

LOADER

Original Filed July 30, 1923 6 Sheets-Sheet 1

Fig. 1.



Witness:

Inventor:
Harry H. Barber
by Burton & Burton
his Attys.

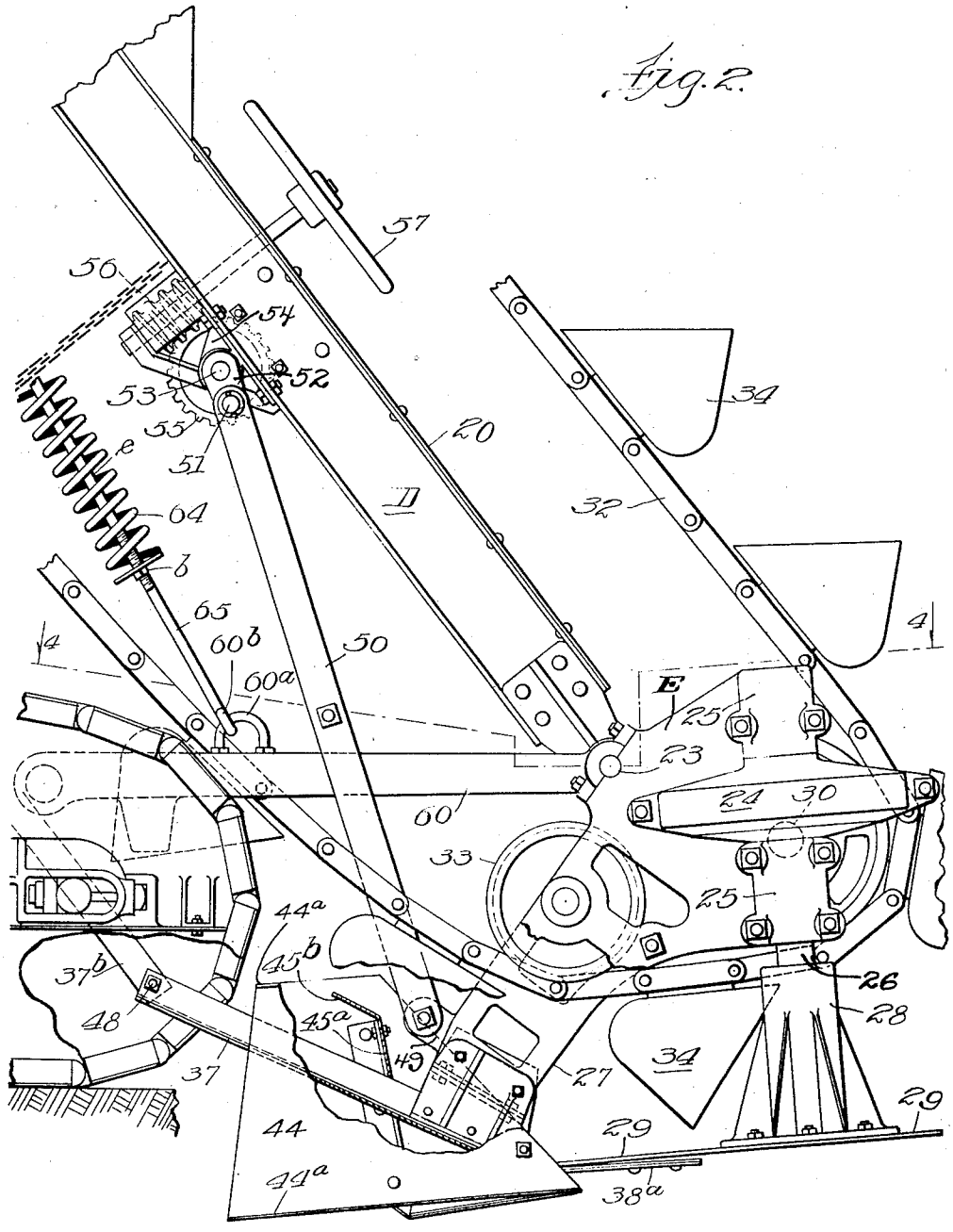
May 31, 1927. 1,630,598

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Original Filed July 30, 1923 6 Sheets-Sheet 2

Fig. 2.



Witness:
C. E. Rumbo

Inventor:
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May 31, 1927. 1,630,598

H. H. BARBER

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Original Filed July 30, 1923 6 Sheets-Sheet 3

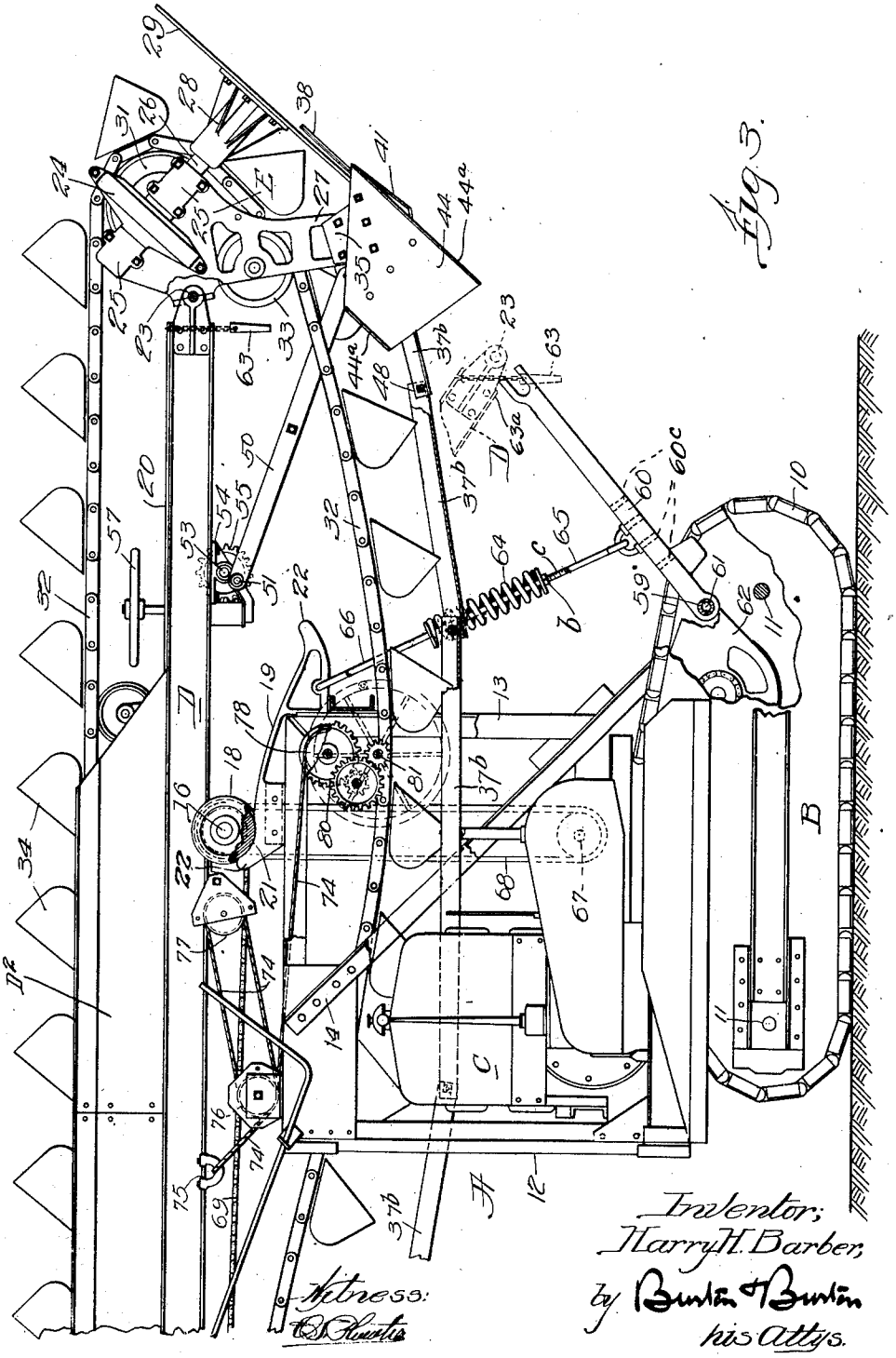


Fig 3.

Witness:

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May 31, 1927. 1,630,598

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Original Filed July 30, 1923 6 Sheets-Sheet 4

Fig. 4.

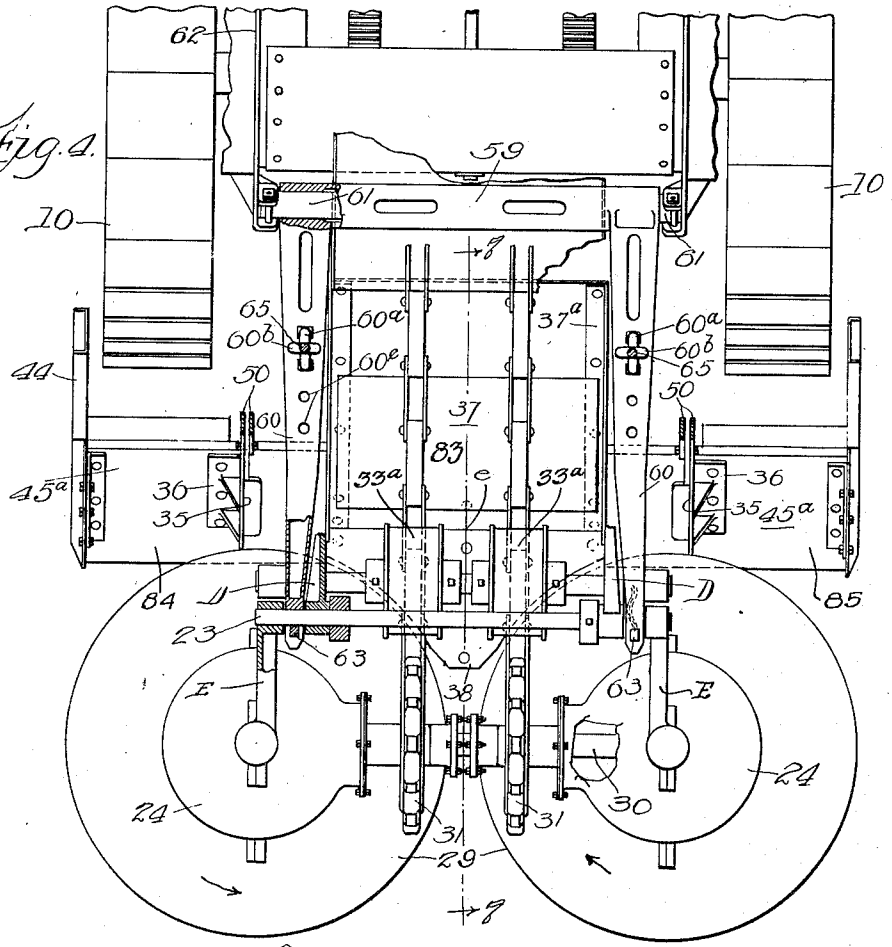
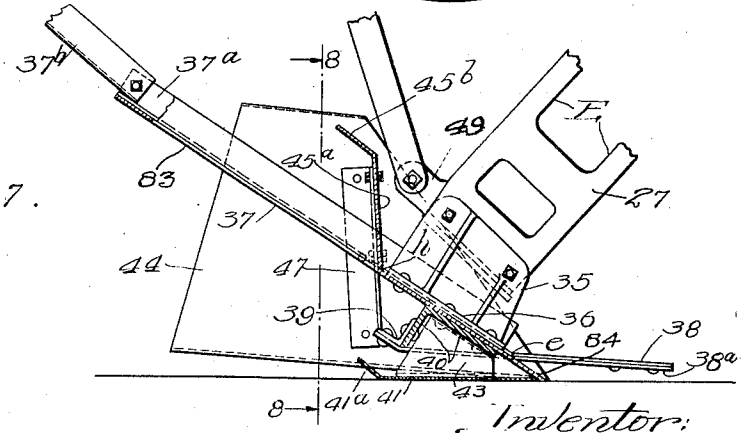


Fig. 7.



Witness:

Inventor:
Harry H. Barber;
by Burton & Burton
his Attys.

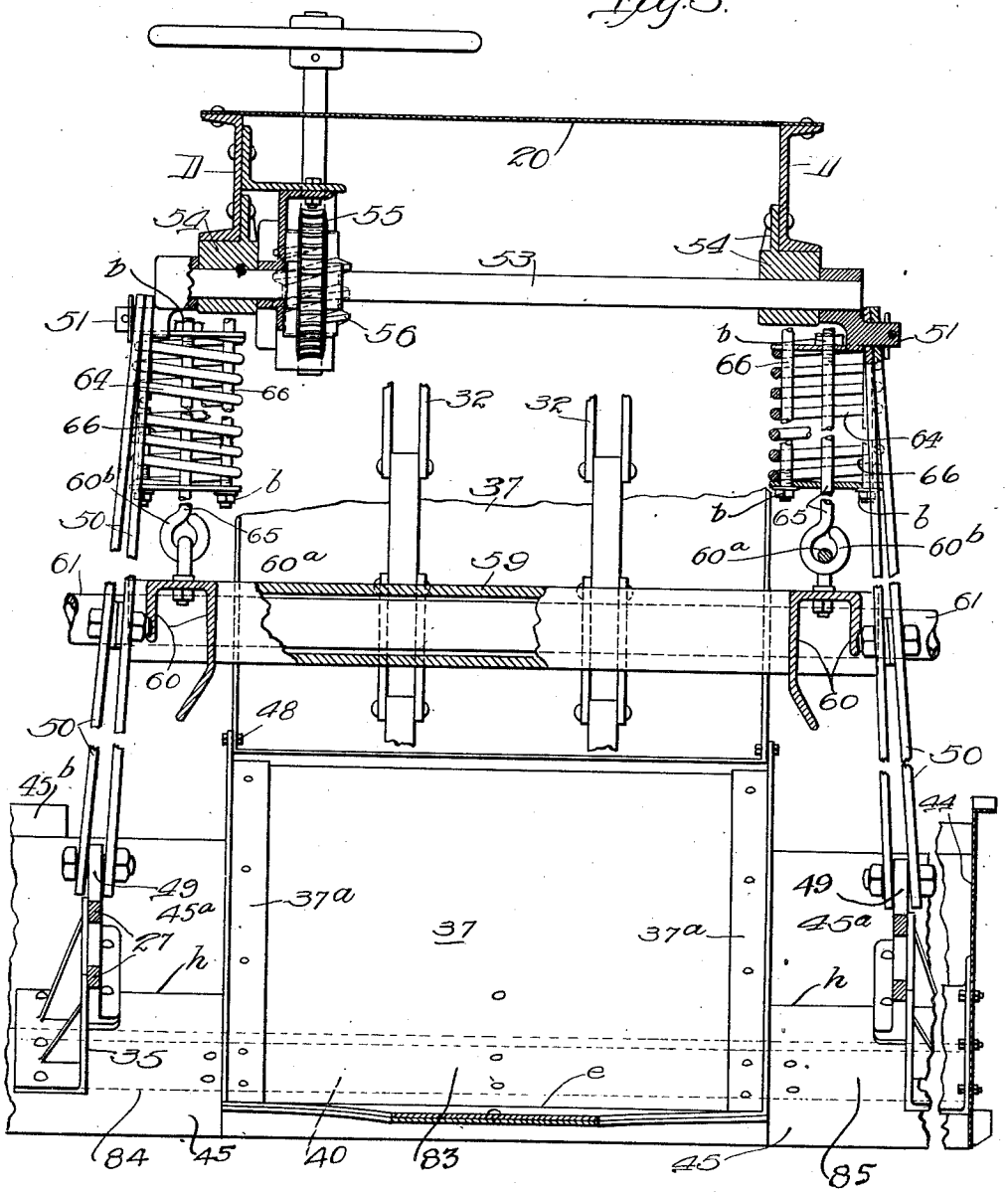
May 31, 1927. 1,630,598

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Original Filed July 30, 1923 6 Sheets-Sheet 5

Fig. 5.



Witness:

Inventor:
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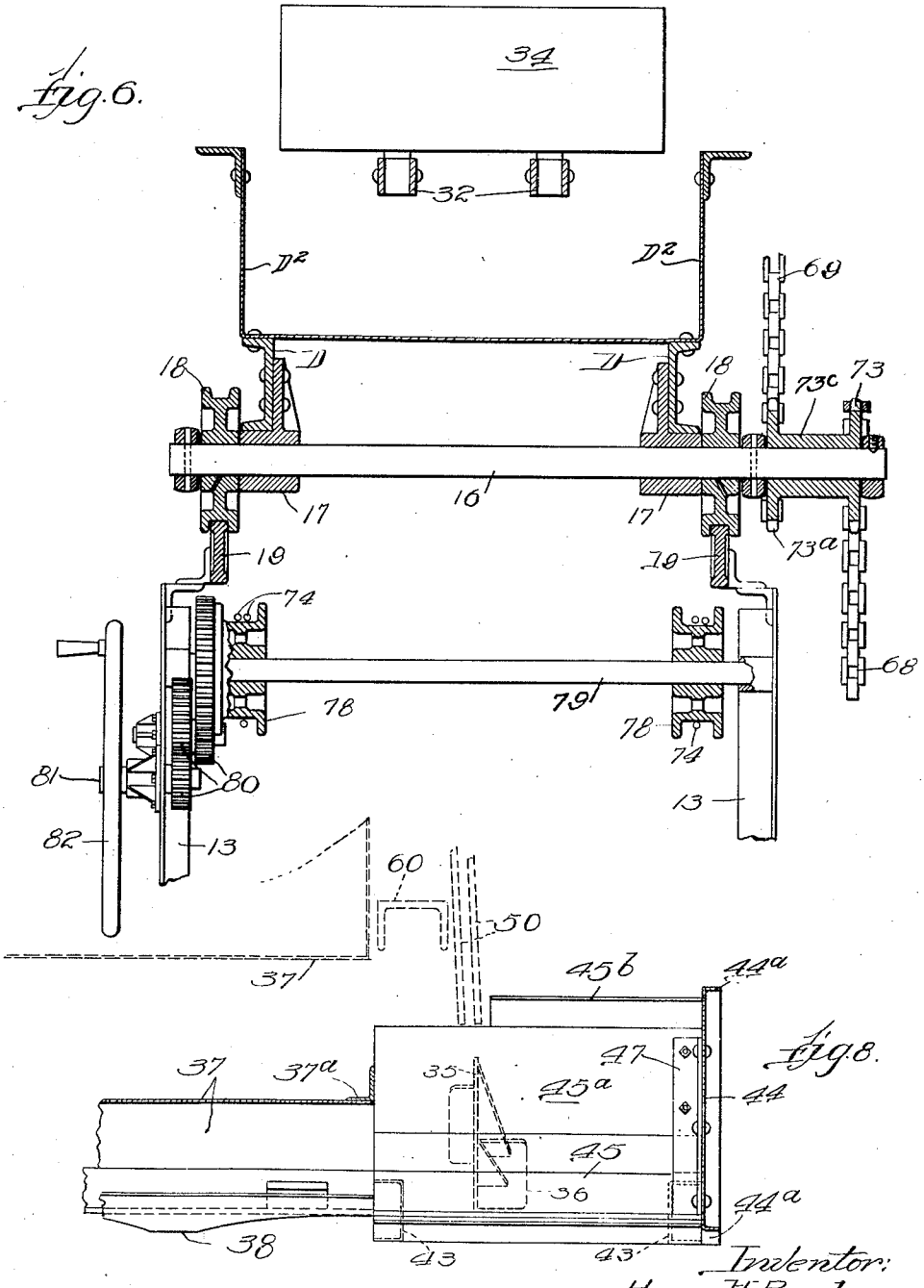
May 31, 1927. 1,630,598

H. H. BARBER

LOADER

Original Filed July 30, 1923 6 Sheets-Sheet 6

Fig. 6.



Inventor:
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Witness:

Patented May 31, 1927. 1,630,598

UNITED STATES PATENT OFFICE.

HARRY H. BARBER, OF AURORA, ILLINOIS, ASSIGNOR TO BARBER-GREENE COMPANY, OF AURORA, ILLINOIS, A CORPORATION OF ILLINOIS.

LOADER.

Application filed July 30, 1923, Serial No. 654,534. Renewed February 21, 1927.

The purpose of this invention is to provide certain improvements in and upon a loading machine construction covered by United States Letters Patent No. 1,256,642, of February 19, 1918, for digging disc feeder. Said patent and the present invention relate to power-driven, portable machines designed for transferring loose material from a pile to a truck or car, or from the pile to another location on the surface of the ground.

In the past, loaders of this class have been more or less unwieldy and cumbersome and not susceptible of general use upon narrow streets or in places of limited area due to the wheel base and the manner of supporting the boom. Besides such cumbersome and unwieldy machines had a tendency to block the traffic on the streets and for this reason, they were also objectionable. Moreover, most of the loaders of the prior art would tilt upwardly when the nose of the boom encountered a predetermined resistance, such, for example, as might arise when the nose struck a bump or obstruction, or was driven too forcibly into a pile of gravel or the like, especially those in which the boom was rigidly supported, and in such cases, parts were likely to be displaced or distorted or broken.

This invention is designed to overcome the above noted defects and objections in the provision of a loader which is comparatively short and compact, and in which the boom is susceptible of a steep inclination whereby the loader is easily susceptible for use upon narrow streets or in places of limited area and in which the boom is mounted to freely float relative to its support in case the nose of the boom encounters a predetermined resistance, and in which the movements of the boom can be easily controlled.

The invention also seeks to provide a simple and readily operable machine in which the parts are either so designed or may be so adjusted, without impairing the efficiency of the machine, that the machine can easily pass under ordinary bridges or viaducts or the like, in transit from one place to another, but which nevertheless provides a sufficiently high lift for all loading purposes.

It is also an important object to provide means whereby the feeder disks may be angularly adjusted to suit varying conditions.

While some of the more salient features and characteristics of a machine embodying this invention have been above pointed out, others will become apparent from the following disclosures.

The invention includes these and other features of construction and combinations of parts hereinafter described and shown in a preferred form in the drawings as more particularly indicated by the claims.

In the drawings:—

Figure 1 is a side elevation of a loader embodying the features of invention, the receiving end being shown at a height intermediate its highest and lowest possible levels.

Figure 2 is a detail side view, partly in section, of said receiving end of the loader as depressed below the surface on which the traction belts rest, and with the discs and scraper inclined upwardly at the forward side.

Figure 3 is a side elevation of the loader as arranged for travel, the rearmost portion being broken away and a portion of the tractor or crawler being in section.

Figure 4 is a top plan view of the parts shown in Figure 2, being partly in section on line 4 of Figure 2.

Figure 5 is a detail section, taken as indicated at line 5 of Figure 1, the figure being condensed vertically.

Figure 6 is a detail section, taken as indicated at line 6 of Figure 1, omitting certain parts not involved.

Figure 7 is a detail section, taken as indicated at line 7 of Figure 4, omitting the discs and mountings. This figure illustrates one of the combined shoes and scoops.

Figure 8 is a vertical section of one shoe and a portion of the adjacent apron taken as indicated at line 8, on Figure 7.

As disclosed in the drawings this machine comprises a relatively short and low frame A which is mounted upon a crawler B consisting of a short truck preferably provided with two endless link belts 10 which are suitably geared to a power plant C carried by the truck of the crawler as diagrammatically shown in Figure 1 This power plant is preferably in the form of an internal com-

bustion engine and its driving connection with the crawler includes a clutch and reverse drive (not shown) arranged in substantially the same relation to the motor as is common in motor trucks or automobiles.

The main frame A which comprises the uprights 12 and 13, the braces 14 and suitable transverse members forms the support for a boom D which is freely adjustable or movable to operative position as shown in Figure 1, and in which position it has a steep inclination with its nose closely adjacent the front end of the crawler. As the crawler B and frame A are relatively short it is apparent that the operative position of the boom with its nose closely adjacent the front end of the crawler, and its steep inclination provides a relatively short machine which is very mobile and which will not seriously obstruct traffic on ordinary narrow streets and which can be easily operated in limited areas. From its operative position, the boom may be readily adjusted to substantially horizontal position, in which position it may readily pass under low bridges, viaducts, or the like when traveling from place to place. It is apparent, however, that it is not necessary to move the boom into horizontal position in every instance where it is desired to move from one location to another. Where the distance to be traveled is reasonably short and no overhead obstructions are present, it is only necessary to move the boom rearwardly on tracks 19, thus elevating the nose sufficiently to avoid all ordinary obstructions, although upon long hauls, it is desirable, and in case of low viaducts, it is necessary to adjust the boom to substantially horizontal position.

In order to obtain the aforementioned advantages, it is, of course, necessary to support the boom sufficiently forward on the frame and at a point forward of the longitudinal center of the boom in order to obtain the desired elevation for the discharge end thereof when in use. It is also desirable to have the boom supported in its inoperative position at a point rearwardly of the front end of the frame to better distribute its weight. To this end, the boom is mounted to float upon its supporting frame by a roller mounting. The roller mounting preferably comprises a track consisting of a pair of parallel rails 19 which are preferably provided with terminal stops 22 and which are mounted upon the forward end of the frame A. Each rail preferably has a roller reposing portion adjacent its rear stop 22 for supporting the boom in its horizontal or reposing position. These reposing portions of the track should be sufficiently flat, horizontal, or of such a design to decrease or eliminate the tendency of the boom to move forwardly. If desirable, these reposing portions may be slightly depressed or concave, as indicated at 21 in Figure 3, to more effectively retain the rollers against accidental forward movement. The rails 19 extend forward from their reposing portions in order that the boom may be moved forwardly to its operative position in which position it can be given a steep inclination without interfering with the crawler. The forwardly extending parts of the rails 19, that is the parts forward of the reposing portions, are preferably also downwardly inclined whereby it becomes possible to allow the boom to travel to its operative position by gravity as will later more fully appear. Further, as the boom should be supported forward of its longitudinal center on account of the increased weight of the forward end (due to the feeder element and the supporting shoes) it becomes possible to place the pivot of the boom nearer to the forward end than heretofore.

The aforementioned roller mounting also comprises a pair of parallel rolling elements 18 which are supported upon a shaft 16 which is secured to the boom D forward of the longitudinal center thereof, and preferably between the longitudinal center and the center of gravity thereof. Said shaft is journaled in bearings 17—17 secured to the side members D′D′ of its boom. Means are also provided for preventing the boom from moving or shifting laterally on the rails 19. In the present instances, these means are provided in connection with the rollers 18 and rails 19 which have interfitting parts that prevent such lateral movement. As shown on the drawings, each roller 18 is provided with a peripheral groove to fit its rail 19.

It should be noted that the boom D is bodily or solely supported upon the rails 19 when in substantially horizontal position and said rails or track constitute the sole downward thrust resisting support for said boom in predetermined positions such as when the nose of the boom is not in contact with the ground and is elevated thereabove or when said boom is in horizontal position. The boom also fulcrums or pivots and moves upon the rails from its operative position shown in Figure 1 to its horizontal position, as shown in Figure 3. It might be said that the boom bodily travels over the rails 19 in moving from its operative to its reposing or horizontal position. In its operative position, the front end or nose of the boom is substantially supported upon the ground and the reclining weight thereof is movably supported upon the rollers 18 and rails 19. Consequently, in addition to the advantages already pointed out, the boom may move relatively to the frame A when the front part thereof encounters a predetermined resistance in its work, on account

of the movement permitted by the roller mounting.

The structure of the boom, of course, may be readily modified for different classes of work. As shown, however, the sides preferably consist of channel bars D'D' which are transversely connected by a longitudinally extending plate 20 forming a chute or bed plate for the upper reach of the endless conveyer and returns any droppings from the conveyer buckets 34 to the feeding elements at the front end of the boom. As shown, side plates D^2 are provided one on each side of the boom and extend from near the upper end of the boom sufficiently forward thereon to prevent material falling elsewhere than forward to the feeding elements.

The forward end of the boom carries the material feeding elements 29 which are pivoted thereto for angular adjustment for regulating the feed to the conveyer buckets. These feeding elements 29 consist of a pair of flat disks which rotate substantially horizontally and upon or closely adjacent the ground. Suitable hubs 28 extend from the flat upper sides of the disks 29, each hub 28 having a shaft 26 projecting therefrom. Each shaft 26 projects into a bearing 25 integral with a dust proof gear housing 24 comprising part of a casting E which is pivoted to a shaft 23 carried by the forward end of the boom. The upper ends of the shafts 26 are suitably geared to a transverse tail shaft 30 (Fig. 4) the ends of which are journaled in the gear housings 24 and connect the same for conjoint movement. The shaft 30 is so geared to the shafts 26 that the latter will rotate toward each other, as indicated by arrows in Figure 4, so that the disks 29 will feed the material inwardly to the conveyer buckets 32. It might be here mentioned that shaft 30 is slowly rotated by the endless conveyer on the boom through the instrumentality of a pair of sprocket wheels 31 secured thereto and around which the conveyer chains 32 are trained.

A plurality of scoops or scrapers 83, 84 and 85 are provided in connection with the feeding disks 29 and they are situated rearwardly thereof. In the present instances, three scrapers are illustrated, a relatively large central one 83 just behind the feeder disks and two smaller ones 84 and 85, one upon each side of the central one and just in advance of the crawler belts 10 so as to serve as guards therefor.

These scrapers are mainly supported from the head castings, E, E, each of which is provided with a suitable tail piece 27, best shown in Figures 2 and 3, to which the flange 35 of an angular bracket is secured. A transverse angle 40 is secured to the flanges 36 of the bracket and it extends under the bottom 37 of the central scraper which is secured thereto. It will be noted that the central scraper is supported in inclined position beneath the forward part of the conveyer. The sides of this central scraper are formed by the upstanding flanges of spaced angle bars 37^a secured to the lateral margins of the bottom thereof which is in the form of a metal plate.

The width of the bottom 37 of the scraper 83 is preferably somewhat greater than that of the buckets 34 of the conveyer. The bottom of the scraper 83 is also bent at an angle as indicated at C in Figure 7. Rearwardly of this line, the bottom has an upward inclination, as shown in Figure 7, while forward of this line, it has a very gradual downward slope. This forward portion has incurved edges to accommodate the disks 29 and a central nose 38 which extends between the disks 29 as shown in Figure 4. The nose portion of the central scraper is reinforced with a similarly front profiled sheet metal plate 38^a which is secured thereto and which extends rearwardly for attachment to the angle bar 40 by means of an angle clip 39.

The two lateral scrapers above mentioned are combined with ground shoes in a manner best shown in Figures 2, 5, 7, and 8. In referring to these figures, it will be noted that each lateral scraper comprises a bottom sheet metal plate 45 bent at an angle at the line *h* to form a substantially vertical rear wall 45^a which has an upper rearwardly sloping lip 45^b. The bottom 45 of each lateral scraper is secured to the transverse bar 40 and the flange 36 of bracket 35, the other flange of this angle bar being secured to an upright side wall 44 of sheet metal which extends both fore and aft of the scraper back 45^a and to a height slightly above the lip 45^b. With reference to Figure 4, it will be noted that the side walls 44 extend rearwardly beyond the front ends of the crawler chains, and in connection with the rear walls 45^a of the scrapers forms an effective guard for the rotating parts of the crawler. The upper and lower edges of each wall 44 are preferably provided with stiffening flanges 44^a.

Beneath each of the lateral scrapers just described, there is secured a shoe consisting of a horizontal plate 41 having lateral upwardly extending attaching flanges 43 which are secured to the angle bar 40. The front edge of each plate 41 meets the front edge of the scraper 45 at an acute angle, as shown in Figure 7. The rear edge of each shoe has an upwardly inclined marginal lip 41^a to allow the shoe to ride over obstructions when the machine is being backed.

As the disks 29, scrapers and shoes are all suspended from the head castings E—E which are pivoted upon shaft 23, it is obvious that the same may be angularly ad-

justed about the axis of shaft 23 as a center. The mechanism for effecting this adjustment consists, as shown in the drawings, of a hand wheel 57 which is journaled upon the boom and provided with a worm 56 at its lower end which meshes with a gear 55, keyed upon a cross shaft 53 journaled in lugs 54 on the boom. The shaft 53 is provided with a wrist pin 51 at each end. Each wrist pin 51 is connected by a pair of links 50 to a lug 49 extending from the tail piece 27 of each head casting. Obviously rotation of the hand wheel 57 will effect a pivotal movement of the disks 29 and associated parts with respect to the axis of shaft 23 whereby the angular adjustment of the disks 29 to the ground and the contact of the shoes 41 with the ground may be regulated. It will be appreciated that this pivotal movement will tilt the disks with respect to a horizontal plane whereby the front portions may be tilted upwardly or downwardly.

In order to transmit the thrust of the front end of the boom when at work to the crawler, there is provided a thrust member which pivotally and releasably connects the frame with the forward end of the boom. This thrust member consists of a transverse sleeve 59 (Fig. 5) which is journaled upon a shaft 61 supported by frame members 62 of the crawler. This sleeve has a pair of integral arms 60 which are shown as channel bars. The forward ends of these arms 60 are releasably secured to the pivot shaft 23. To this end, the forward end of each arm 60 is bifurcated or forked, as indicated at 63^a, to rotatably fit and receive a portion of the pivot shaft 23. These forked ends are preferably connected to said pivot shaft by means of keeper pins or bolts 63, extending through apertures in the forward ends.

It will be appreciated that this thrust member will properly space the front end of the boom from the crawler, as well as transmit the thrust directly from the crawler in substantially a straight line or direction, the thrust member being preferably slightly inclined upwardly toward the front end and just beyond the dead center line as shown. For as the boom is raised or lowered, the arms 60 of the thrust member act as radius rods within certain limits, and cause the lower end of the boom to travel in the arc of a circle having its center coincident with the axis of shaft 61. This arcuate movement will cause the front end of the boom to clear the front end of the crawler during its movements from operative to inoperative position or vice versa. And if an obstruction should be encountered by the front end of the boom when at work, the boom will yield or move relatively on the track due to the floating character of the mounting of the boom and the arcuate movement necessitated by the thrust arms 60 which will swing slightly upwardly under excessive resistance due to the slight upward inclination. This is an important feature in that it prevents breakage, distortion, or injury to the machine.

As the front end of the boom in its operative position is spaced only a short distance from the front end of the crawler, the thrust arms 60 are not sufficiently long to allow the boom to be tilted to horizontal position, as shown in Figure 3. For this reason they are made releasable. When the boom has been adjusted to substantially the position shown in dotted lines in Figure 3, the thrust rods 60 may be released or attached to the shaft 23. It might, however, be mentioned that the parts are so designed that the thrust arms are releasable when the rollers on the boom are near or upon the reposing portions of the track as will later more fully appear.

If desired, adjustable and yieldable connections may be interposed between the lower or front end of the boom and the crawler frame. In the illustrated embodiment of this invention such yieldable connections are illustrated, one upon each side of the booms. Each yieldable connection consists of a spiral spring 64, a central rod 65 adjustably anchored to the upper part of the spring and connected by an eye 60^a and an eye 60^b to a thrust arm 60 and a pair of rods 66 adjustably anchored to the lower part of the spring and connected to the adjacent track 19, as shown in Figure 1, said rods 66, being integrally united at their upper ends. With reference to Figure 4, it will be noted that the thrust arms 60 are each provided with a plurality of holes 60^c for adjusting the eyes 60^b for further varying the tension of the spring. This adjustment is in addition to that which arises from adjusting the nuts b on the ends of the rods 65 and 66. When the thrust arms 60 are disengaged from the shaft 23, they will be supported by the springs as shown in Figure 3.

While these springs are not essential, they nevertheless are desirable in sustaining a part of the weight of the boom when resting upon the ground in its operative position, and they also serve to relieve the shoes 41 and scrapers, of part of the weight, they would otherwise carry. It is evident that these springs may be adjusted to sustain as much of the weight of the boom as desirable, or may be adjusted to sustain no weight at all.

The conveyer comprises a pair of endless chains 32 to which the buckets 34 are attached. These chains extend over the sprocket wheels 31 upon the shaft 30 at the lower end of the boom as previously set forth, over suitable guide pulleys 33 on the head casting E, and over guide rolls 33^a on

the boom and over the sprockets 72 upon the head shaft 71 at the discharge end of the boom. It will be noted that the lower reach of the conveyer is somewhat slack, and that the buckets 34 are inverted or in discharging position. In order to intercept material that may still cling to the buckets after being dumped, from dropping upon the machinery on the crawler, a flexible apron or the like has been provided for returning such material to the central scraper. This apron consists of a plurality of pivotally connected dust pans or sections 37^b, the lowermost of which is connected to the central scraper and the upper one of which is connected to suitable supports on the discharge end of the boom. This apron on account of its flexible character provides for the bulges occasioned by the slack in the lower reach of the conveyer and allows the feeding elements on the front end of the boom to be angularly adjusted. At the same time, the apron can readily adjust itself to the path it must travel during the tilting of the boom and at the same time, conform to the desired position of the bulges or slack of the conveyer.

The main portions of the aforementioned tracks 19 are preferably in the arc of a circle whose center lies in the axis 67 of a sprocket drive which is connected to the power plant C as diagrammatically shown in Figure 1. The driving sprocket on axis 67 is geared by suitable sprocket gearing to the head shaft 71 which carries the conveyer sprocket 72. In the present instance, this sprocket gearing consists of the sprocket chain 68, a double sprocket wheel 73^c (Fig. 6), which is journaled upon the shaft 16 and which consists of the sprocket parts 73 and 73^a and a sprocket chain 69 which extends from the double sprocket to a sprocket wheel 70 on the head shaft 71. Obviously during the shifting of the boom, the sprocket gearing will be unaffected by changes in the position of the rollers 18 upon the tracks 19.

In many of the prior art machines, a conveyer hoisting frame was constructed that would extend above the boom, and a cable was attached to the front end of the boom and trained over suitable guide pulleys upon the hoisting frame. In other instances, it has been attempted to put elevating mechanism under the front end of the boom. Such hoisting frames were objectionable for many reasons, among which may be mentioned the raising of the height of the loader so that it would not readily pass under viaducts or the like, and the elevating mechanism under the front end of the boom was unsatisfactory, among other things, in that the boom became dislocated therefrom. To obviate these objections, the means for controlling the movements of the boom is located below the horizontal plane of the boom, and this means is so arranged and connected with the boom as to produce a rolling or shifting effort at one point of the boom, preferably adjacent to its pivoted support, and a tilting effort at another point of the boom, preferably above its pivotal support, and the arrangement is such that the rolling or shifting effort is preferably greater than the tilting effort. To this end, a cable 74 is anchored to the boom at the point 75 above the pivot shaft 16 for mainly exerting a tilting effort on the boom. This cable passes around a pulley 76 mounted upon the frame A, thence through a pulley block 77 secured to the boom closely adjacent the pivot shaft for exerting mainly a rolling or shifting effort with respect to the boom, thence back to pulley 76 and then forwardly to spool 78 fixed upon a shaft 79 journaled upon the main frame A. There are two cables 74, one on each side of the boom and similar pulleys and spools for each cable. A double-reduction gearing 80 connects the shaft 79 with a shaft 81 to which a hand wheel 82 is affixed. A brake or pawl and ratchet may be provided in connection with the hand wheel shaft.

It is obvious with this arrangement that the force exerted at the pulley block is substantially twice as great as the force applied at the anchor 75 due to the laws of the pulley. Consequently, when the hand wheel 82 is turned for elevating the boom, the first part of the operation will cause the boom to travel upwardly or rearwardly upon its track due to the rolling or shifting effort exerted at the pivoted support of the boom by the cable. Of course, the front end of the boom will be constrained to follow the arch defined by the thrust arms 60 and some tilting will occur. After the rollers reach the reposing portions of the track, the pulley 77 becomes substantially fixed and continued operation of the hand wheel will then cause the boom to tilt to horizontal position due to the tilting effort exerted at the point 75 by the cable 74.

The operation involved in shifting and tilting the boom to operative or inoperative position will now be described. Assume that the boom is in tilted or operative position as shown in Figure 1 and that it is desired to adjust the same to horizontal position as shown in Figure 3. In accomplishing this, the operator will turn the hand wheel 82 in the proper direction for winding the cables 74 upon their drums. As these cables are wound upon the drums, the boom D will first be elevated from the ground on account of the greater effort exerted at the block 77, as above explained, and will be rolled rearwardly along the track, the nose of the boom describing an arc which is defined by the radius of the thrust arms 60. Continued operation of the hand

wheel will bring the rollers 18 upon the reposing portions of the track at which time the relation between the thrust arms 60 and their supporting shaft 23 will be such that the thrust arms may be released by withdrawing the pins 63, as shown in Figure 3. As soon as the thrust arms are released, the nose of the boom becomes free for further tilting movement and further rotation of the hand wheel 82 will tilt the boom to horizontal position, as shown in Figure 3.

In moving the boom from the horizontal to operative position, the operator will gradually unwind the cables 74 from their drums by means of the hand wheel 82, allowing the forward end of the boom to automatically tilt downwardly by gravity. The boom will continue to tilt until the shaft 23 reaches the arc defined by the thrust members 60 at which time the tilting movement of the boom may be momentarily stopped. During this period, there will be no appreciable travel of the boom upon the track. The operator may then readily connect the thrust members with the shaft 23. Should the rollers overcome their inertia too quickly and start forwardly, the boom can, of course, be maintained in proper position for connecting the thrust members by means of the cables 74. After the thrust bars 60 are connected to shaft 23 the forward movement of the boom will, of course, be controlled by the hand wheel 82. If for some reasons the rollers should stick in their reposing positions, due to their inertia or friction or the like, so that the boom will not automatically move forward and downward, said rollers may be started by shaking the parts or starting the crawler rearwardly. As soon as the boom starts its forward traveling movements the operator will manipulate the hand wheel 82 and regulate and control the speed so that the boom may gradually move to its operative position.

When the machine is in operation, the feeding disks 29 will revolve and feed the material to the conveyer buckets. Since the material can readily slip on these disks, it is obvious that they automatically regulate the amount of material that can be handled by the conveyer and there will be no tendency of overfeeding which is likely to block the operation of the conveyer.

From the foregoing, it will be obvious that a very simple and compact loader has been provided which is extremely mobile and susceptible for use upon narrow streets or in a limited area and which will allow traffic to pass on ordinary streets, and which obviates the defects of prior devices. It will be appreciated that the boom in its horizontal position is sufficiently low to pass under bridges and viaducts, and under trolley wires or the like. At the same time, the boom is securely supported by the rollers 18 which rest upon the reposing portions of the track and substantially the only strain to be overcome by the cables 74 arises from the tendency of the boom to tilt forward.

It will be further noted that this arrangement permits the boom to be rolled or shifted to the forward extremity of the frame where it may be tilted to a greater angle than would be possible were the tilting to be done on a fixed pivot at the rear end of the track. This permits the use of a comparatively short boom to secure comparatively high elevation of the material.

This same arrangement enables the boom to be moved rearwardly when it is to be carried in horizontal position, thus better distribution of the weight of the boom upon the frame is effected.

I claim:—

1. In a machine of the class described, a supporting structure, a track upon said structure, a conveyor boom having a forward loading end, a pair of parallel rollers upon said boom and being so located as to cause an overbalance of said loading end and to engage said track, said boom being adapted to travel and tilt upon said track and said track forming the sole downward thrust resisting support for said boom in predetermined positions.

2. In a machine of the class described, a track having forwardly and downwardly inclined portions, a conveyor boom having a forward loading end, a pair of parallel rolling elements upon said boom and being so located as to cause an overbalance of said loading end and to engage said track, said boom being adapted to travel and tilt upon said track and said track forming the sole downward thrust resisting support for said boom in predetermined positions.

3. In a loader, a pair of parallel inclined rails having terminal stops, a conveyor boom having a forward loading end, rolling elements upon said boom and located for causing an overbalancing of said loading end, said rollers supporting said boom upon said rails and forming the sole downward thrust resisting support thereof in predetermined positions, said boom being in an inoperative position when positioned upon the upper portions of said rails and in an operative position when positioned upon the lower portions thereof and means for controlling the movement of the boom between said positions.

4. In a loader, a pair of parallel rails, a conveyor boom having a feeding element at its forward end, and ground-engaging means rearwardly of said feeding element and rolling elements between said boom and rails and so located as to overbalance the forward end of said boom, and forming the sole

downward thrust resisting support therefor in predetermined positions whereby said boom may move relatively to said rails when said feeding element or means encounters a predetermined resistance.

5. In a loader comprising an automotive vehicle having a frame, a track upon said frame, a conveyor boom having a feeding element at its forward end and ground-engaging means rearwardly of said feeding element, thrust means pivotally connecting said vehicle and the forward end of said boom, and rolling elements between said boom and track and so located as to overbalance said forward end and forming the sole downward thrust resisting support therefor in predetermined positions whereby said boom may shift relatively to said track when said feeding element or means encounters a predetermined resistance.

6. In a loader comprising a pair of downwardly inclined rails, a conveyor boom having a loading end, a pair of rolling elements secured to said boom and so located as to overbalance said loading end for bodily supporting said boom upon said rails for tilting and rolling movement, said rails forming the sole downward thrust resisting support for said boom, and means for elevating the boom upon said inclined rails and tilting the same to horizontal position upon the upper portion of said rails.

7. In a machine of the class described, a support, a track upon said support, rolling elements upon said track, a conveyor boom having a forward loading end and so supported upon said elements as to cause an overbalance of said loading end, said rolling elements forming the sole downward thrust resisting support for said boom in predetermined positions and a thrust bar pivotally connecting said support with the nose of the conveyor boom, said thrust bar and rolling elements allowing relative movement between said boom and support when said loading end encounters a predetermined resistance.

8. In a machine of the class described, a track, a conveyor boom having rolling elements engaging said track, said elements being located rearward of the center of gravity of said boom for overbalancing the forward end thereof, said rolling elements supporting said boom for rolling and tilting movement and forming the sole downward thrust resisting support therefor in predetermined positions, said tracks having a portion for supporting the boom in operative position and a portion for supporting said boom in its inoperative position, and means for moving and tilting the boom between said portions of the track.

9. In a loader, a pair of parallel rails having downwardly inclined portions, a conveyor boom having a ground-engaging end, rollers upon said rails and connected to said boom rearward of the center of gravity and forward of the longitudinal center thereof for causing an over-balance of said ground-engaging end, said rollers sustaining said boom for rolling and tilting movement and forming the sole downward thrust resisting support therefor in predetermined positions, said ground-engaging end of said boom being above the ground when said boom is positioned upon the upper portions of said rails and being in contact with said ground when said boom is positioned upon the lower portions of said rails, and means for moving said boom from its lower to its higher position.

10. In a loader, a track, a conveyor boom having a feeding element at its forward end and ground-engaging means rearwardly of said feeding element, rolling elements between said boom and track and located between the center of gravity and longitudinal center of said boom and forming the sole downward thrust resisting support for said boom in predetermined positions.

11. In a loader, a support, a track upon said support, a conveyor boom having a ground-engaging end, and rollers for bodily supporting the same upon said track for tilting and rolling movements, said rollers being so positioned upon said boom as to cause an overbalance of said ground-engaging end and forming the sole downward thrust resisting support for said boom in predetermined positions, a thrust member pivotally connecting said support and ground-engaging end of said boom, said thrust member being adapted to swing upwardly and allow relative movement between said support and boom when the latter encounters a predetermined resistance.

12. In a loader comprising an automotive vehicle including a frame, a pair of rails upon said frame, a conveyor boom having rolling elements engaging said rails for bodily, pivotally and movably supporting the same in overbalanced position, and forming the sole downward thrust resisting support therefor in predetermined positions, and a releasable thrust bar between said frame and boom.

13. In a loader comprising an automotive vehicle including a frame, a pair of rails upon said frame, a conveyor boom having rolling elements engaging said rails for bodily, pivotally and movably supporting the same in unbalanced position for rolling and tilting movement and forming the sole downward thrust resisting support therefor in a predetermined position, said boom being above the ground when positioned upon the rear part of said rails and in engagement with the ground when positioned upon

the forward part thereof, and a thrust bar pivotally connecting said boom and frame and being releasable to allow said boom to be tilted to horizontal position upon the rear portions of said rails.

14. In a loader comprising an automotive vehicle including a frame, a conveyor boom, a roller mounting between said frame and boom for bodily sustaining the latter with its forward end overbalanced for rolling and tilting movement, and forming the sole downward thrust resisting support for said boom in predetermined positions, said boom having a ground-engaging end adapted to be moved downwardly and closely in front of said vehicle, a freely upward swingable thrust member pivotally connecting said vehicle and said ground-engaging end of said boom when the latter is in its lowered position, whereby said boom may move relatively to said frame when said ground-engaging end encounters a predetermined resistance.

15. In a machine of the class described, a frame, a conveyor boom, a roller mounting between said frame and boom for bodily sustaining the latter for rolling and tilting movement and forming the sole downward thrust resisting support therefor in predetermined positions, said roller mounting being so located with respect to said boom as to overbalance its forward end, a control cable connected to said boom above said roller mounting, and means for guiding and operating said cable for bodily shifting and tilting said boom.

16. A loader comprising an automotive vehicle including a frame, a conveyer boom having a forward ground engaging end, a roller mounting between said frame and boom, and forward of the longitudinal center of said boom for floatingly, pivotally and bodily supporting the same, means in connection with said mounting for limiting the floating movements of said boom and means for preventing lateral movement of said boom on said roller mounting.

17. A loader comprising an automotive vehicle including a frame device, a conveyer device, a pair of rails having terminal stops upon one of said devices, a pair of rollers upon the other device adapted for traveling movements upon said rails between said stops, said rollers and rails bodily supporting said conveyer device forward of its longitudinal center and having interfitting parts for preventing lateral movement of the conveyer device, and means for causing a rolling and tilting movement of said conveyer device when the same is moved from operative to inoperative position.

18. A loader comprising an automotive vehicle including a frame, a pair of rails having terminal stops mounted upon said frame, a conveyer boom having grooved rollers fitting said rails, the sides of the grooves engaging the edges of the rails for preventing lateral movement of said boom, said rollers being mounted forward of the longitudinal center of the boom to provide a steep inclination, and said rails having a roller reposing portion adjacent the rear stops and means for rolling said boom upon said rails and tilting the same to horizontal position when said rollers contact the reposing portions of the rails.

19. A loader comprising an automotive vehicle including a frame, a pair of inclined parallel rails having terminal stops upon said frame, a conveyer boom, a pair of parallel rollers on said boom for traveling movements upon said rails for bodily and pivotally supporting said boom, said rails having roller reposing portions adjacent the upper stops and means for elevating said boom and tilting the same to horizontal position when said rollers rest upon the reposing portions of said rails.

20. In a loader comprising an automotive vehicle including a frame, a boom, a roller bearing between said frame and boom for pivotally, bodily and movably supporting said boom in unbalanced position, a thrust member releasably pivoted between said frame and boom and controlling means for moving and tilting said boom, said thrust member allowing a predetermined rearward and tilting movement of the boom.

21. In a loader comprising an automotive vehicle including a frame, an inclined track having terminal stops upon said frame, a conveyer boom having rollers forward of the longitudinal center thereof for engaging said track for floatingly, pivotally and bodily supporting said boom, a thrust member pivoted to said vehicle and pivotally and releasably connected to the forward end of said boom, said track having roller reposing portions adjacent their upper stops, and means for elevating and tilting said boom upon said track, said thrust member allowing said boom to be elevated to the reposing portions of said track, and said thrust member being releasable when said rollers contact said reposing portion whereby said boom may be tilted to horizontal position.

22. In a loader comprising an automotive vehicle including a frame, a pair of parallel inclined rails upon said frame, a boom, a pair of parallel rollers upon said boom for bodily and pivotally supporting said boom upon said rails, said rollers being positioned forward of the longitudinal center of the boom to allow a steep inclination to the boom, a thrust bar pivoted to the vehicle and releasably pivoted to said boom, and means for elevating and tilting said boom, said thrust member being releasable in a predetermined elevated and tilted position of the boom.

23. In a loader comprising an automotive vehicle including a frame, a conveyer boom floatingly, bodily and pivotally supported upon said frame, a thrust bar pivoted to said vehicle and releasably pivoted to said boom, said boom being supported forward of its longitudinal center to provide a steep inclination, means for elevating and tilting said boom with respect to said frame, said thrust bar being releasable during the elevating and tilting movement of the boom.

24. In a loader, a pair of parallel, inclined rails having terminal stops with roller reposing portions adjacent the upper stops, a boom, a pair of parallel rollers on said boom for floatingly, pivotally and bodily supporting said boom upon said rails, said boom being adapted to be horizontally supported when said rollers are upon the reposing portions of said rails, a thrust member pivoted to said vehicle and means for allowing said boom to tilt in reposed position for connecting said thrust member therewith, said means serving to control the traveling movements of said boom to operative position.

25. In a loader comprising an automotive vehicle including a frame, a pair of parallel rails upon the forward end of said frame, said rails having terminal stops, roller reposing portions and inclined portions below said reposing portions, a conveyer boom, a pair of grooved rollers attached to said boom forward of the longitudinal center thereof to provide a steep inclination, said rollers fitting and engaging said rails for pivotally and bodily supporting said boom, a cable anchored to said boom above the roller fulcrum and connected thereto at said roller fulcrum and means below said boom for guiding and operating said cable for lowering and elevating said boom upon said rails and for tilting said boom to horizontal position upon the reposing portions of said rails.

26. In a loader comprising an automotive vehicle including a rigid frame, a pair of rails having forwardy and downwardly inclined portions mounted upon the forward end of said frame, said rails having terminal stops, a conveyer boom having rolling elements engaging said rails, said rolling elements being located between the center of gravity and the longitudinal center of said boom to provide a steep inclination and said rollers bodily supporting said boom for rolling and tilting movement, and said rails and rollers having interfitting parts for preventing lateral movement of said boom, and means for controlling the rolling and tilting movement of said boom.

27. In a machine of the class described, a frame, a boom, means for bodily supporting said boom upon said frame for tilting and bodily shiftable movements, and control means acting upon said boom at spaced points and operable for producing a shifting effort at one point and a tilting effort at the other point.

28. In a machine of the class described, a frame, a boom, means for bodily supporting said boom forwardly of its longitudinal center upon said frame for tilting and longitudinal shifting movements, and control means acting upon said boom at spaced points and operable for effecting a tilting effort at one point and a shifting effort at the other point.

29. In a machine of the class described, a frame, a boom, means for bodily supporting said boom upon said frame for longitudinal shifting and tilting movements, cable means for controlling said longitudinal shifting and tilting movement, said cable means being attached to said boom at spaced points for exerting a longitudinal shifting effort at one point and a tilting effort at the other point.

30. In a machine of the class described, a frame, a boom bodily mounted upon said frame for longitudinal shifting and tilting movements, a cable anchored to said boom above its mounting and movably attached thereto at its mounting, a stationary guide pulley around which the cable passes to and from its movable attachment and means for operating said cable.

31. In a machine of the class described, a frame, a boom bodily mounted upon said frame for tilting and longitudinal shifting movements, a cable means attached to said boom upon opposite sides at points above the mounting and at points adjacent the mounting, and a device for operating said cable means for exerting a tilting effort above said mounting and a shifting effort at said mounting.

32. In a loader comprising a frame, a boom bodily supported upon said frame for rolling and tilting movement, and means including a cable attached to said boom, for controlling its rolling and tilting movements, said cable being attached to said boom at spaced points for exerting a rolling effort at one point and a tilting effort at the other point.

33. In a loader comprising a frame, a boom, means for supporting said boom upon said frame for rolling and tilting movement, and means for controlling the rolling and tilting movement of said boom comprising a pair of members connected to said boom at spaced points and means for operating said members for exerting a rolling effort at the lower point and a pivotal effort at the upper point.

34. In a loader comprising a frame, a boom mounted upon said frame for rolling and tilting movement, a cable anchored to said boom above its mounting, and movably attached thereto adjacent its mounting and

means for guiding and operating said cable whereby a rolling effort is produced at the mounting and a tilting effort above said mounting.

35. In a loader comprising a frame, a boom, a roller mounting between said boom and frame for supporting the former for rolling and tilting movement, a pulley on said boom at said roller mounting, a stationary guide pulley on said frame, a cable anchored to said boom above said roller mounting, said cable passing over said stationary pulley to and from said first mentioned pulley, and means for operating said cable for controlling said boom.

36. In a loader comprising a frame, a boom, means for bodily supporting said boom on said frame for pivotal and shifting movements, cable means attached to said boom at spaced points, and means for guiding and operating said cable whereby a greater effort is exerted at one of said spaced points than at the other.

37. In a loader comprising an automotive vehicle including a frame, a boom mounted upon said frame for tilting and bodily movement, an endless conveyer carried by said boom, and a flexible apron beneath said conveyer for intercepting material and conveying it to the forward end of said boom.

38. In a loader comprising an automotive vehicle including a frame, a boom mounted upon said frame for tilting and bodily movement, an endless conveyer carried by said boom and a plurality of pivotally connected dust collecting and conveying sections beneath said conveyer and extending from end to end of said boom.

39. In a loader comprising a frame, a conveyer boom bodily mounted upon said frame for rolling and tilting movement, an endless conveyer upon said boom having an upper and lower reach, a return chute beneath the upper reach, and a flexible return chute beneath the lower reach.

40. In a loader comprising a support, a boom mounted upon said support for pivotal and bodily movement, said boom being adapted to have its front end upon the ground during operation, and a pair of adjustable yieldable elements between said support and the forward end of said boom in its operative position.

41. In a loader, an automotive vehicle, an elevated frame mounted on the vehicle, a short inclined track carried by the frame, a carrier mounted to move along the track, a boom having a pivotal bearing on the carrier, means for shifting the carrier along the inclined track for moving the ends of the boom vertically, feeding mechanism supported by the lower end of the boom, and an endless conveyer mounted on the boom with drive connections from a motor on the frame to said conveyer and feeder manitained in operative relation throughout the range of adjustment of the carrier on said track.

42. In the structure defined in claim 41, the inclination of the track being downward toward the feeder end of the machine.

43. In the structure defined in claim 41, the drive connections including a countershaft co-axial with the pivotal bearing of the boom, a toothed wheel on said shaft and a driving member arranged to mesh with said wheel throughout the range of adjustment of the pivot axis.

44. In a loader, an automotive vehicle, an inclined boom pivotally mounted thereon, a head casting pendent from the lower end of said boom and a thrust member extending directly from the frame of the vehicle to the head casting, the thrust member being pivoted to the vehicle frame for up-and-down swing, a horizontal shaft by which the head casting is pivoted on the boom, the forward end of the thrust member being recessed to receive the shaft, and a keeper for retaining said end of the member in engagement with the shaft.

45. In a loader, an automotive vehicle, an inclined boom pivotally mounted thereon, a head casting pendent from the lower end of said boom and a thrust member extending directly from the frame of the vehicle to the head casting, the thrust member being pivoted to the vehicle frame for up-and-down swing, and its forward end being disengageably attached to the head casting, and a spring connected with the vehicle frame and with the thrust member for supporting the latter when the head is disengaged therefrom.

46. In a loader, an automotive vehicle, an inclined boom pivotally mounted thereon, a head casting pendent from the lower end of said boom and a thrust member extending directly from the frame of the vehicle to the head casting, the thrust member comprising a pair of arms pivotally mounted on a cross-shaft in the vehicle frame.

47. In a loader, an automotive vehicle, an inclined boom pivotally mounted thereon, a head casting pendent from the lower end of said boom and a thrust member extending directly from the frame of the vehicle to the head casting, the thrust member comprising a pair of arms pivotally mounted on a cross-shaft in the vehicle frame, the forward ends of said arms being readily engageable with, and releasable from a member on which the head casting is mounted.

48. In a loader, a vehicle, a boom, a head casting tiltably depending from a pivot on one end of the boom, a rotary disc feeder mounted on said casting, a link pivotally connected to said casting at a distance from the pivot of the casting, and mechanism for

shifting the link to vary the tilt of the casting, said mechanism including means for locking said casting in adjusted positions.

49. In the structure defined in claim 48, said means being mounted on the boom for shifting the link, and locking means for holding the head casting.

50. In a loader, a vertically movable boom, normally inclined by gravity down and forward from a pivotal support, a head casting pendent from the lower end of the boom, a shoe carried at the bottom of the casting and adapted to slide upon the ground, being pressed thereto by gravity, and means for varying such pressure upon the shoe.

51. In the structure defined in claim 50, the means for varying the pressure upon the shoe comprising a spring arranged to oppose said pressure, and means for varying the tension of the spring.

52. In combination with the structure defined in claim 50, a rotary disc feeder mounted on the head casting, comprising discs located in the approximate plane of the bottom of the shoe.

53. In the structure defined in claim 50, the pressure-varying means comprising a movable arm, means connected with the head casting for engagement with one end of the arm, in combination with a vehicle frame to which the other end of said arm is attached, an elevated bracket mounted on the frame, a spring with tension-rods attached to the bracket and the arm respectively, and means for varying the tension of the spring which tension opposes the downward pressure on the casting and shoe.

54. In a loading machine, a self-propelled vehicle having treads, a boom carried on an elevated support on the vehicle, a pair of head frames pendently mounted on the lower end of the boom, a pair of rotary feeder discs, and means for driving them, mounted in and on said frames, respectively, a rigid transverse bar connecting said frames, and a series of three scoops supported close to the ground by said bar, two thereof being in track with the respective treads, the third being between them.

55. In the construction defined in claim 54, said third scoop being provided with a central, forwardly extended nose which projects in advance of the side scoops and terminates at a higher level.

56. In a vehicular loading machine, a combined side scoop and ground-shoe, the scoop having an integral bottom and back and a single side wall, the bottom portion of the scoop being inclined at an angle of about 30 degrees from the horizontal, and the shoe underlying said portion and being secured thereto.

57. In the structure defined in claim 56, the side wall of the scoop being extended rearwardly beyond the back wall of the scoop.

58. In a loading machine, in combination, a pair of co-acting feeder-discs arranged side by side for operation in substantially horizontal planes, a pair of scoops carried behind the respective discs at about the disc level, the side walls of the scoops being set on lines tangent to the peripheries of the discs, and a carrying tractor comprising treads whose outer faces are within the lines of said scoop side walls.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 23rd day of July, A. D. 1923.

HARRY H. BARBER.