Feb. 17, 1942. A. EILERSGAARD 2,273,029

EXCAVATING AND LOADING MACHINE

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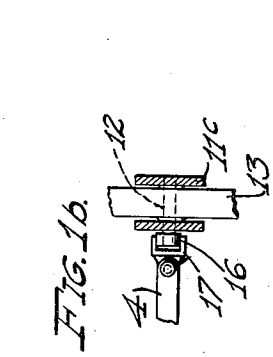
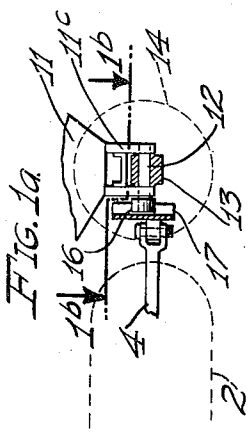


FIG. 1a.



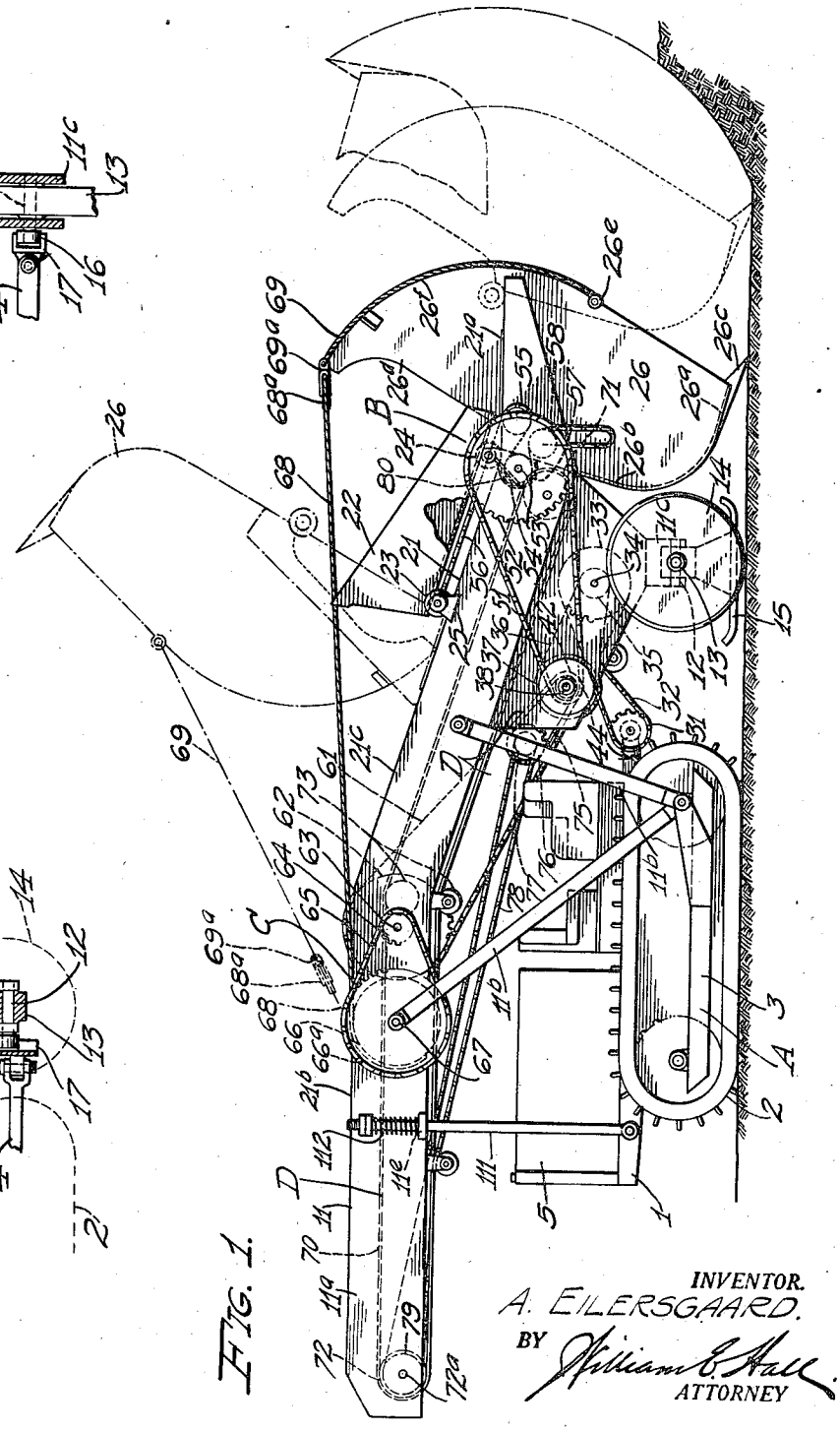


FIG. 1.

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FIG. 2.

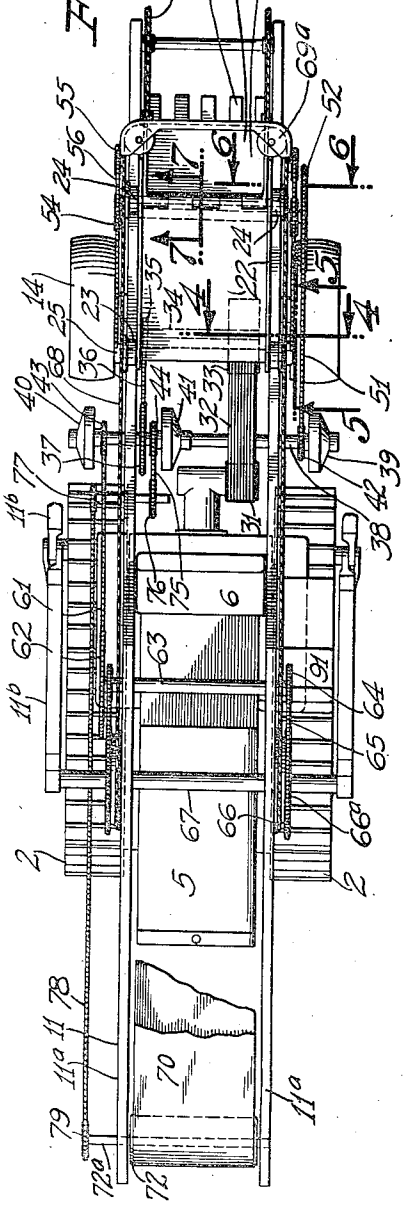


FIG. 3.

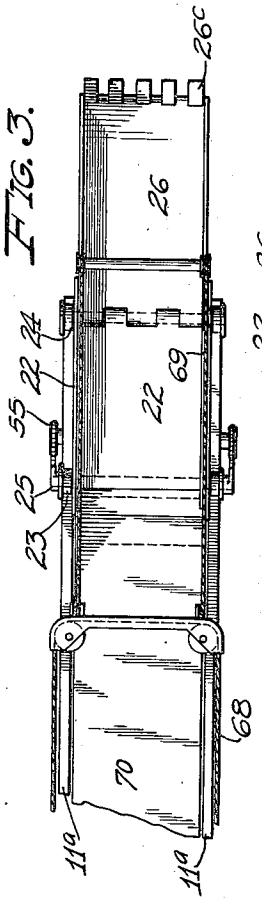


FIG. 6.

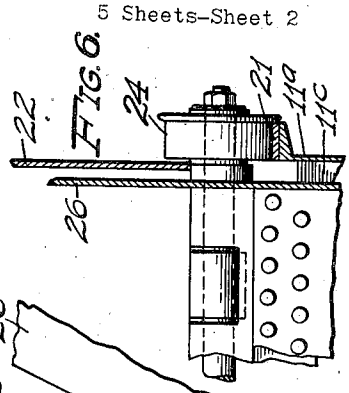


FIG. 7.

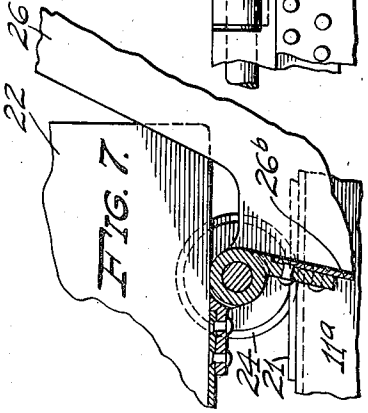


FIG. 4.

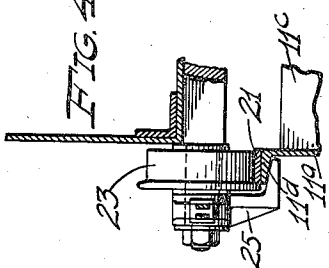
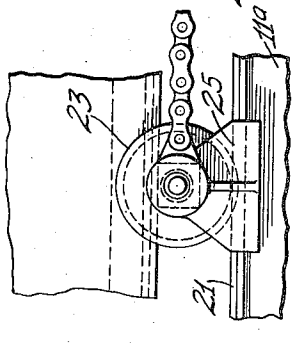


FIG. 5.



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FIG. 8.

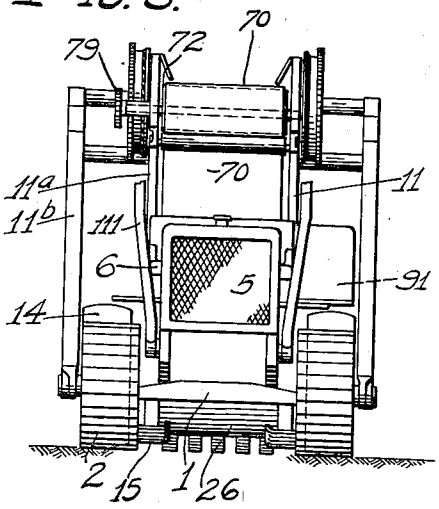
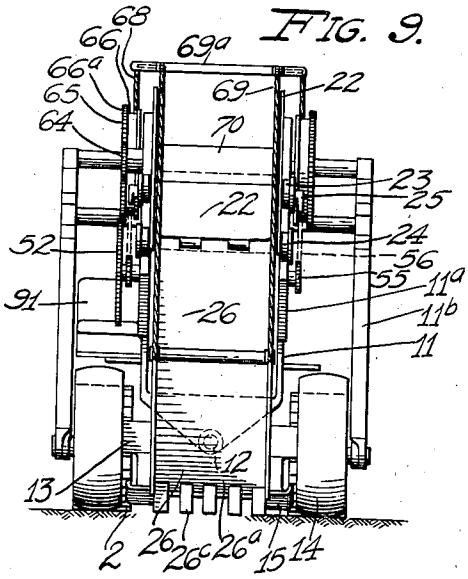


FIG. 9.



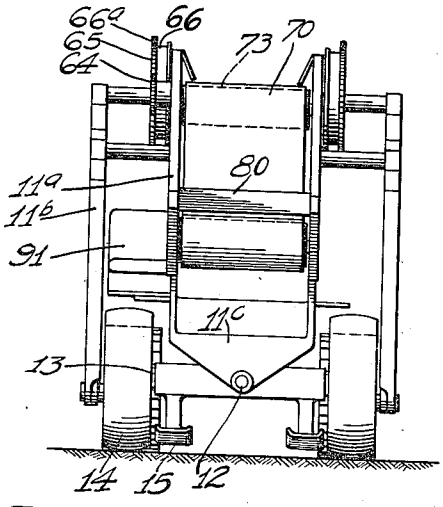


FIG. 10.

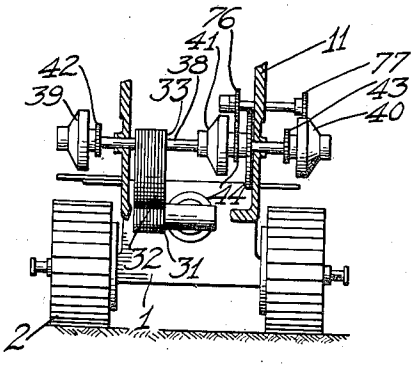


FIG. 11.

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EXCAVATING AND LOADING MACHINE

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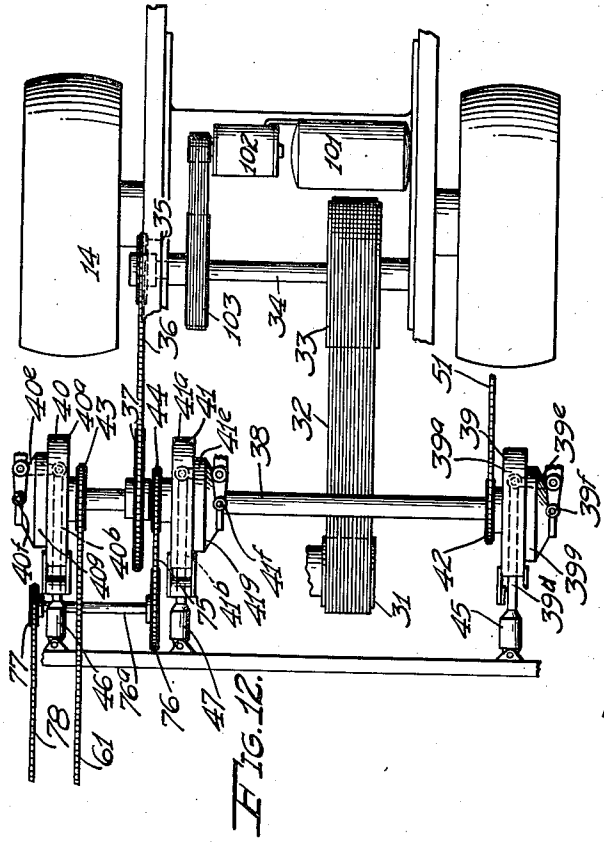


FIG. 12.

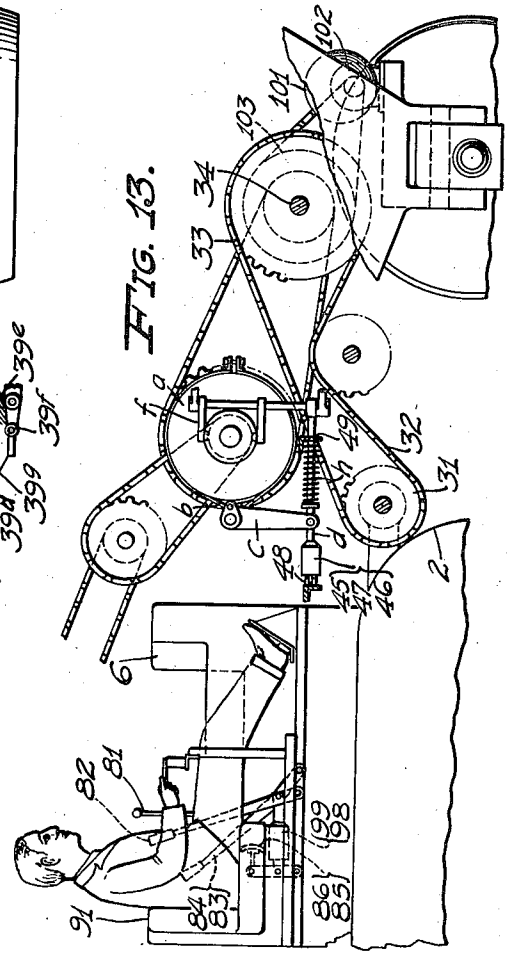


FIG. 13.

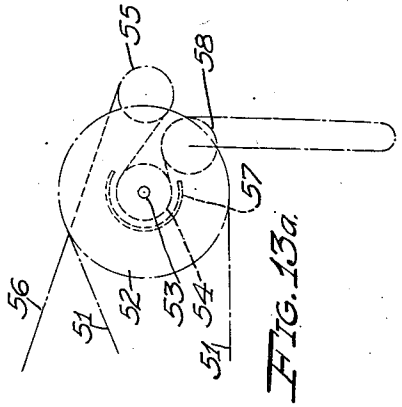


FIG. 13a.

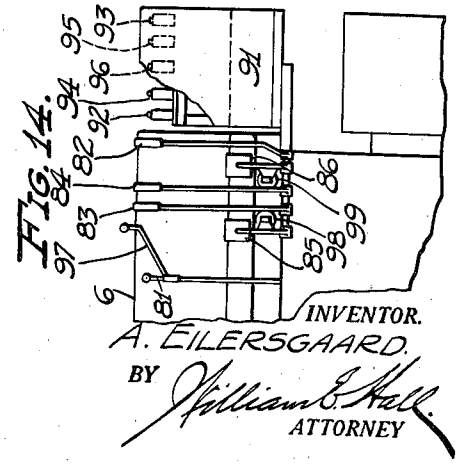


FIG. 14.

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EXCAVATING AND LOADING MACHINE

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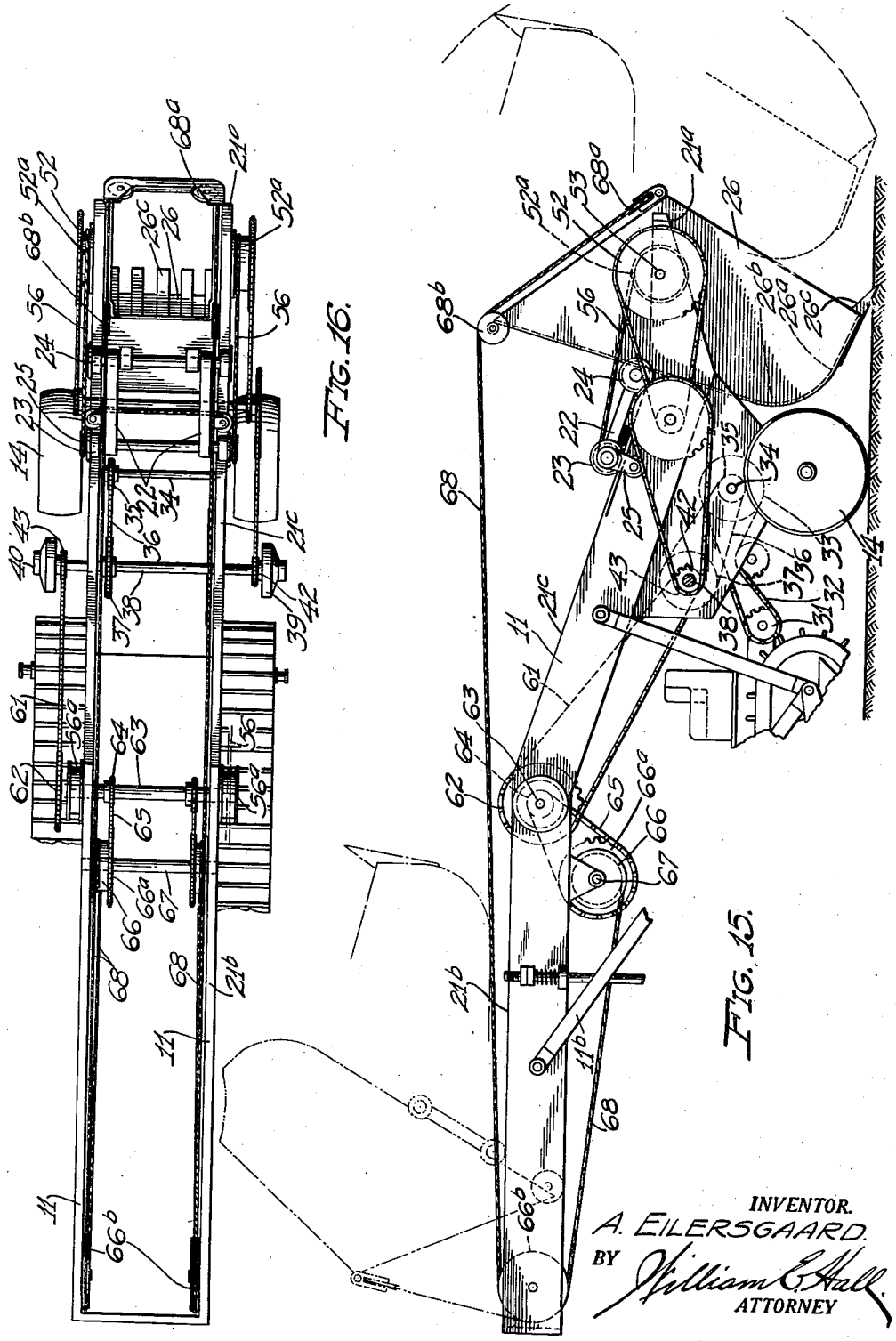


FIG. 16.

FIG. 15.

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Patented Feb. 17, 1942 2,273,029

UNITED STATES PATENT OFFICE

2,273,029

EXCAVATING AND LOADING MACHINE

Asger Eilersgaard, Los Angeles, Calif.

Application July 24, 1939, Serial No. 286,066

20 Claims. (Cl. 214—90)

My invention relates to improvements in excavating and loading machinery.

One of the principal objects of this invention is to provide a new and improved type of a power shovel or excavating machine or attachment, or a new and improved type of excavating and loading machine or attachment, which can be readily attached or connected to and readily dismantled from the present conventional or standard makes of vehicles, such as trucks and tractors, and such a machine or attachment which is operated by or receives its motive power from that of said vehicle to which it is attached or connected.

Another very important object of this invention is to provide a novel machine or attachment of this class, which, in combination with a conventional self-propelled vehicle, provides a large-capacity shovel, or shovel and loader, having only a fractional part of the weight of a regular shovel, or shovel and loader, now used for such purpose, and which can be readily transported from place to place at relatively high speed.

An important object also of this invention is to provide a machine or attachment of this class which of itself may be readily transported from place to place for attachment to different vehicles, and which is so connected to the vehicle that the attachment or attached machine may, for the most part, rest directly upon the ground, and thereby readily accommodate the combined machine or apparatus to uneven ground surface.

A further important object of this invention is the provision of means of projecting or crowding the digging bucket forwardly without forward movement of the machine or propelling vehicle, and further to provide novel, simple, and efficient means of projecting or crowding the digging bucket forwardly.

A still further important object of this invention is the provision of novel and efficient arrangement of connecting the shovel or shovel and loading machine or attachment to the rear end of a self propelled vehicle, and novel and efficient means, whereby the operator may operate the vehicle for normal forward propulsion when he is in a normal position, and also whereby he may conveniently, operate both the vehicle and the shovel or shovel and loading machine or attachment, for excavating purposes, when he is in the reverse or backward position.

An object also of this invention is to provide an attachment of this class for conventional or standard tractors, or other vehicles, in which the weight of the latter is utilized to counterbalance the operating load applied on the machine or attachment by or during the excavating or digging operation.

A further object of this invention is to provide simple and novel means of guiding the vertical movement of the excavator with respect to the truck, tractor, or supporting vehicle, and simultaneously relieving the strain and twisting or distorting action upon the excavator frame when turning or passing over uneven ground.

With these and other objects in view, as will appear hereinafter, I have devised an excavating or excavating and loading machine, having certain novel features of construction, combination, and arrangement of parts and portions, as will be hereinafter described in detail, and particularly set forth in the appended claims, reference being had to the accompanying drawings, and to characters of reference thereon, which form a part of this application, in which:

Fig. 1 is a side elevation of my combination of a tractor and my excavating and loading attachment, in its preferred embodiment, the dotted, broken, and dot-and-dash lines showing various positions of the digging bucket.

Fig. 1^a is a fragmentary view showing a modified form of my structure in which the excavator is also connected to the tractor hitch in addition to the connections shown in Fig. 1;

Fig. 1^b is a fragmentary sectional view thereof in plan taken through 1^b—1^b of Fig. 1^a;

Fig. 2 is a fragmentary plan view thereof;

Fig. 3 is a fragmentary plan view of the digging end of my machine, showing the digging bucket in a raised position;

Fig. 4 is an enlarged fragmentary sectional elevation showing the mounting of the rear end of the digging bucket supporting carriage, with the section taken at 4—4 of Fig. 2;

Fig. 5 is an enlarged fragmentary side view thereof, taken at 5—5 in Fig. 2;

Fig. 6 is an enlarged fragmentary longitudinal section, showing the mounting of the front end of the supporting carriage and the mounting of the digging bucket thereon, the section being taken through 6—6 of Fig. 2;

Fig. 7 is an enlarged fragmentary transverse section thereof, taken through 7—7 of Fig. 2;

Fig. 8 is an elevation showing the front end of the tractor and the rear end of the excavating and loading means;

Fig. 9 is a front elevation of the excavating and loading means of my machine, with the bucket in a digging position;

Fig. 10 is a view similar to Fig. 9 with the digging bucket removed.

Fig. 11 is a rear elevation of the tractor showing fragmentarily the drive mechanism thereon for the excavator and loader;

Fig. 12 is an enlarged fragmentary plan view showing primarily only the drive connection between the tractor and the excavator and tractor;

Fig. 13 is an enlarged side elevation thereof showing also the arrangement of the control mechanism on the tractor for controlling the operation of the excavator and loader;

Fig. 13a is an enlarged diagrammatic elevation showing the drive means for the digging bucket crowding mechanism;

Fig. 14 is an enlarged fragmentary transverse diagrammatic elevation of the control mechanism;

Fig. 15 is an elevational view similar to Fig. 1, of a modified construction, showing the longitudinal conveyor omitted; and

Fig. 16 is a plan view of the modified construction.

An important and preferred embodiment of my invention is the combination of my attachment with a standard or conventional self-propelled vehicle. In the drawings, this vehicle is shown as a tractor A, of the endless track type, and commonly known as the "caterpillar" tractor. This tractor is shown as having a body 1 and tracks 2 at the opposite sides. These tracks are mounted on frames 3.

My attachment, in a preferred form, is supported mainly upon a frame 11 consisting essentially of frame members 11a at the opposite sides of the tractor. These frame members are parallel, positioned on opposite sides of the median line, and extend beyond both ends of the tractor body. The frame members have intermediate their ends, downwardly converging struts 11b which pivotally support, at their lower converging ends, the frame members 11 on the frames 3 at the opposite sides of the tractor. The digging end of the frame 11 extends beyond the rear end of the tractor, and this end shall be referred to as the front end or front of the excavator. The frame members are secured together beyond this rear end of the tractor by transverse members 11c. At the lower portions of these transverse members, and intermediate the ends thereof, is provided a longitudinal spindle 12 upon which the axle 13 is pivoted intermediate its ends. At the opposite ends of the axle are mounted wheels 14. In this manner, the rear end of the frame 11 is supported on the ground, and also upon wheels which may tilt readily in a transverse direction to take care of unevenness of the ground. Thus, the frame 11 has a three-point support.

At the opposite ends of the axle are depending skids or shoes 15 which are relatively long in a forward and aft direction and are positioned near the wheels, but raised slightly above the low or traction portions of the wheels. These skids are arranged to prevent the lower portions of the wheels from sinking too deep in soft ground.

At the inner end of the spindle 12 is rotatably mounted a guide roller 16 which is adapted to ride freely in a vertical guide 17 secured to the rear end of the fixed tractor draw bar 4. With this construction, the wheels 14 may be readily raised and lowered with the frame 11 about the pivots of the struts 11b, and the axle may rock freely about the horizontal and longitudinal spindle 12 without causing any lateral or twisting strain upon the pivotal supports of the struts 11b.

At the upper portion of the frame 11 is a track 21, the upper edges of the frame members 11a providing the rails. The track is made in three sections, namely, a short horizontal section 21a at the front end, a long rear horizontal section 21b, and an inclined section 21c connecting the lower forward section 21a to the higher rear section 21b.

On this track is mounted a carriage 22, provided with wheels 23 at its rear end and wheels 24 at its forward end, both resting on the rails at the upper edge of the frame members. The axis of the wheels 23 also serves as a pivotal axis about which the carriage may swing upwardly at its forward end. The rear wheels are held in engagement with the rails by yokes 25 at the outer sides of the wheels, which yokes extend below guide ledges 11d below the rails.

The digging bucket or shovel 26 is relatively long and narrow with the front end 26a and also the forward portion 26b of the bottom closed. This bucket is pivoted intermediate its ends, that is, immediately behind the bottom portion 26b, and near the bottom edges of its opposite sides, on the axis of the forward rollers 24. The carriage 22 has a longitudinal opening into which the rear portion of the bucket fits, the carriage 22 providing the bottom for the rear portion of the bucket when the latter is tilted backwardly and rests in the carriage. The closed forward end of the bucket has digging teeth 26c for digging materials adapted to enter the bucket from said end. The opposite end 26d of the bucket is open for discharging the material in the bucket when the bucket is raised to the dot-and-dash line position, that is, when the bucket is tilted with the carriage about its rear axis or the axis of the rear wheels 23, as described above.

The power for operating the tractor and the various devices on my attachment, is derived from the power unit 5 on the tractor. By suitable mechanism, the power from the engine 5 is transmitted to a power-take-off pulley 31 at the rear end of the tractor. It will be here again noted that the rear end of the tractor becomes the front end of the excavating and loading machine. The pulley 31 drives, through a belt 32, a pulley 33 mounted at one end of a shaft 34, carried on and between the frame members 11a. On the opposite end of the shaft 34 is a sprocket 35 which drives, through a chain 36, a sprocket 37 mounted intermediate the ends of a main power take-off or power distributing shaft 38, carried by the frame 11 and located substantially between the tractor and the supporting wheels 14 of my attachment.

On the power take-off shaft 38 are mounted three separate clutch-brake units 39, 40, and 41. These clutch-brake units are adapted, respectively, to operate and control the digging bucket forcing or crowding mechanism B, the hoist and moving mechanism C for the digging bucket, and the conveyor mechanism D, and are adapted to connect the power take-off shaft 38, through said clutch-brake units, to sprockets 42, 43, and 44. The clutch-brake units 39, 40, and 41 may be operated, respectively, by pneumatic cylinders 45, 46, and 47, all of which are connected to a unitary transverse support 48 carried by one of the frame members 11a.

Since all of the clutch-brake units are identical, an explanation of the construction and operation of one will suffice for all of them, and the reference letter of the parts may be combined with the reference numerals 39, 40, and 41 of

the several units to designate the respective parts thereof.

To the sprockets 42, 43, and 44 are coaxially connected drums *a*, the interiors of which are clutch portions and the exterior surfaces are brake drums. Around each drum *a* is a brake band *b* which may be drawn tightly around the drum by a lever *c*, the free end of which is pivotally connected to the plunger rod *d* operated by the respective pneumatic cylinders. These rods *d* extend through a transverse supporting member 49, and each rod is pivotally connected to the free ends of a clutch arm *e* which is adapted to shift clutch fingers *f* for shifting a longitudinally shiftable clutch member *g*, which is splined (not shown) to the shaft 38, into or against the loose clutch member *a*. As the rod *d* is forced outwardly from the respective pneumatic cylinders, as by compressed air, the brake lever *c* loosens the brake band *b* and shifts the clutch member *g* into engagement with the member *a*, and thereby connects the respective sprocket with the shaft 38. If the air is released from the cylinder, or if the air connection to the cylinder is broken, a spring *h* around the rod *d* forces the arms *e* and the levers *c* into such positions that the clutch is disconnected and the brake applied.

It will be here noted that all of the brake and clutch actuating cylinders are so constructed and arranged that they can be so controlled as to hold either the brake or the clutch mechanism, of any desired unit, in a neutral position while operating the other mechanism of the corresponding unit.

The digging bucket forcing or crowding sprocket 42 is connected by a chain 51 to a sprocket 52 at one end of the shaft 53, which is provided at its ends with two sprockets 54 located at the outer sides of the frame members 11ª. Around these sprockets 54, and around closely positioned idler sprockets 55, extend chains 56, one end of which extend backwardly and are secured to the retaining yokes 25, and the other ends of which may depend freely from the sprockets 54. Around, the sprockets 54 are guards or cages 57 for holding the chains 56 in tight engagement with the sprockets. If desired the free ends of the chains 56 may extend loosely over a second idler sprocket or roller 58. With this construction, as the sprocket 52 is rotated counter-clockwise, the chain 56 is drawn inwardly and the carriage 22 forced or crowded outwardly along the track 21 toward the outer or forward end of the frame 11. In this manner, the digging bucket 26 is forced or crowded into the material desired to be taken up by the digging bucket.

The digging bucket, when loaded with material or when desired to be drawn backwardly, is rotated about the pivotal axis of the rollers 24, into a substantially horizontal position, and then drawn inwardly or backwardly. At the desired position the carriage 22 is rotated about the axis of the wheels 23, by means of the hoist mechanism C, referred to above. This is operated by the sprocket 43, which drives through a chain 61, a sprocket 62 secured to the end of a shaft 63. On this shaft are mounted small sprockets 64 which are connected, by chains 65, to sprockets 66ª at the outer sides of drums 66 which are mounted on a shaft 67. To peripheral portion of each drum is secured one end of a hoist cable 68. This cable extends, intermediate its ends, around two sheaves 68ª, which are separated by a rod 69ª and are connected, by cables 69, to the normally upper portion and intermediate the forward and rear ends of the digging bucket 26, as indicated by 26ᶜ. These cables 69, when the digging bucket is in a digging position, ride upon rounded ledges or in correspondingly shaped grooves (not shown) at the rear portion 26ᶠ of the upper edge of the opposite sides 26ᵈ of the bucket. As the power take-off shaft 38 is rotated in a counter-clockwise direction, the cables 68 are wound on the drums 66, causing, when the carriage 22 is held stationary, the digging bucket 26 to rock about the pivotal axis of the wheels 24, until it rests in the cradle or carriage 22. The bucket and carriage are then swung backwardly about the axis of the wheels 23 as a pivot. When the carriage, is released, after the bucket is tilted backwardly until it rests or lies in the carriage, both will be drawn backwardly by the cables 68. When the carriage is again brought to a stop and the cables 68 continued to be wound on the drums 66, the bucket and carriage will be tilted about the axis of the wheels 23, to the dot-and-dash line position.

The last mentioned position of the digging bucket allows the material therein to be discharged from the normally inner end through the open rear end thereof. For this reason, there is provided a conveyor mechanism D below the discharge end of the digging bucket, this mechanism consisting of a conveyor 70, which, in this instance is a flexible belt conveyor. The conveyor 70 extends, at its forward end, around a drum 71, and, at its rear end, around a drum 72. Intermediate the ends of the conveyor are drums 73 for changing the angle of the conveyor so that one portion is parallel to the track 21ᶜ while the other portion is parallel to the track portion 21ᵇ.

The conveyor is operated by the aforementioned sprocket 44 which drives, through a chain 75, a sprocket 76 mounted on a shaft 76ª. At the outer end of said shaft is a sprocket 77 which drives, through a chain 78, a sprocket 79 secured to the outer end of the shaft 72ª on which the drum 72 is mounted.

In this manner, the material discharged on the belt may be carried to the rear end of the frame 11, and discharged directly into the bin or receptacle of a waiting truck or other vehicle.

It will be here noted that successive bucketfuls of material may be discharged onto the conveyor 70, which may be moved backwardly at intervals a sufficient distance only to receive the contents of the next bucket. In this manner, several bucketfuls of material may be discharged onto and retained on the conveyor belt while waiting for an empty receptacle, empty dump truck, or the like.

It will also be here noted that the forward end of the conveyor 70 is located a considerable distance backwardly from the forward end of the frame 11, but the construction of the bucket and carriage is such that when the carriage is forced forwardly to its limit and then tilted about its rear wheels, the inner end of the carriage or bucket falls substantially over the forward end of the conveyor. However, a deflecting plate 80 extends upwardly from the forward end of the conveyor so that the material from the digging bucket is directed onto the conveyor.

In Figs. 15 and 16 of the drawings, I have shown the conveyor 71 eliminated. In this case, the drums 66 may be located near the rear end of

the frame 11, so that the carriage 22 may be drawn to substantially the rear end of the frame and the contents of the digging bucket thereby discharged directly into the waiting dump truck. It is preferable, however, that the drums 66 be located at about the middle portions of the frame and that idler sheaves 66b be provided near the rear end of the frame, as shown. It is obvious, however, that with such construction more time is consumed in carrying the excavated material rearwardly, and thereby the capacity of the machine is materially decreased. In this instance, I have shown the bottom wall 26b over the whole length of the bucket, and the carriage 22 as consisting only of a rectangular frame supported at the four corners by wheels 23 and 24, as in the structure first described. In this instance also, I have shown the sheaves 68a as pivoted directly on the bucket, namely, at the middle portions of the upper edges of the opposite sides. The rear ends of the opposite side walls of the bucket are also provided with idler sheaves 68b over which the opposite ends of the cable extend when the bucket is in a digging position.

In the modified construction, the flexible connector 56 is a cable, one being provided on each side. These cables are wound on drums 52a coaxial with and rotated by the sprockets 52. As the digging bucket is drawn back on the tracks 21a, 21c, and 21b, of the frame 11, the cables 56 are drawn with the bucket 26 and carriage 22. As the carriage 22 moves from the track 21c to the track 21b, the cables 56 rest upon or in the trough or groove of the sheaves 56a, which may be mounted on the ends of the shaft 63.

A very important part of my invention consists in the operation of the foregoing mechanisms. The usual operating levers, pedals, or other devices of a conventional tractor, consists of a gear-shift lever 81, an engine clutch lever 82, steering clutch levers 83 and 84, and steering brake pedals 85 and 86. All these are controlled from the conventional driver's seat 6, for operating the tractor, or other vehicle, in its normal forward movement.

In the employment of my attachment for such vehicles, I have provided an auxiliary seat 91, which is located beyond one end of the seat 6 and turned backwardly with respect to the seat 6, so that the occupant of the seat 91 may see clearly to direct the excavating operations. For convenience, this seat may be referred to as the excavator's seat or the shovel operator's seat. Immediately in front of the excavator's seat are provided a plurality of hand operated control valves 92, 93, 94, 95, and 96. The gear-shift lever 81 may have an extension 97 so that this lever may be reached from the excavator's seat 91. The engine clutch lever 82 may also be arranged so that it may be conveniently reached from the seat 91. The hand control valves 92 and 93 may control the flow of air under pressure to cylinders 98 and 99. The latter cylinders are respectively so arranged that the steering clutch levers 83 and 84 are operated to apply the clutches when the brakes, controlled by the respective pedals 85 and 86, are released, or so that the brakes are applied when the clutches are withdrawn. Thereby, unitary valves 92 and 93 may operate conveniently the respective steering clutches and brakes. The hand control valves 94, 95, and 96 are arranged for controlling the air or other fluid pressure in or to the cylinders 45, 46, and 47, aforementioned.

On the frame 11, and, for convenience, above the wheels 14, I have provided an air pressure tank 101, in which is stored the air from the compressor 102, which is operated from the sprocket 103 mounted on the shaft 34, aforementioned.

In this manner, all of the controls of the vehicle, and all of the necessary controls for operating the excavator and loading mechanisms, are readily accessible and easily controllable when operating the machine as an excavator.

It will be here noted that during the digging operation, a great load is applied to the digging or bucket end of the frame 11, and consequently a considerable tilting or rocking tendency about the wheels 14. To prevent the rear end of the frame 11 from being raised excessively at such times, the rear end is anchored to the tractor or other vehicle by rods, or other members, 111. These rods are shown as pivotally connected at the lower ends to the opposite sides of the vehicle or tractor frame 1, and with their upper ends extended thru eyes 11e at the outer sides of the frame 11. On the rods, and between these eyes and the upper ends of the rods, are compression springs 112. Thus, when the digging operation begins and the frame 111 begins to tilt, the springs 112 are compressed and take up the tilting tendency of the frame 11.

Though I have shown and described a particular construction, combination, and arrangement of parts and portions, and certain modifications thereof, I do not wish to be limited to the same, but desire to include in the scope of my invention the construction, combination, and arrangement, substantially as set forth in the appended claims.

I claim:

1. In an attachment of the class described for self-propelled vehicles, a frame so connectable to the opposite sides of the vehicle as to extend beyond one end thereof, means for supporting the extended end portion of said frame on the ground beyond said end of the vehicle and said end portion of the frame being also movably connected to said end of the vehicle, a digging bucket, open at the front and rear ends, pivoted on the extended end portion of the frame, and means connectable to the propelling mechanism of the vehicle for tilting the bucket so as to discharge from the rear end thereof the material entering the front end.

2. In an attachment of the class described for self-propelled vehicles, a frame so connectable to the opposite sides of the vehicle as to extend beyond one end thereof, a carriage longitudinally movable on the frame inwardly from the extended end thereof, a digging bucket, open at the front and rear ends, pivoted on the outer end of the carriage, and means connectable to the propelling mechanism of the vehicle for moving the carriage inwardly and tilting the bucket so as to discharge material from the rear of the bucket.

3. In an attachment of the class described for self-propelled vehicles, a frame so connectable to the opposite sides of the vehicle as to extend beyond one end thereof, a carriage longitudinally movable on the frame inwardly from the extended end thereof, a digging bucket pivoted on the outer end of the carriage, and means connectable to the propelling mechanism of the vehicle for tilting the carriage and bucket about the inner end of the former so as to discharge material from the bucket.

4. In an attachment of the class described for self-propelled vehicles, a frame so connectable to the opposite sides of the vehicle as to extend

beyond one end thereof, a carriage longitudinally movable on the frame inwardly from the extended end thereof, a digging bucket pivoted on the outer end of the carriage, a conveyor mounted on the opposite end of the frame, and means connectable to the propelling mechanism of the vehicle for tilting the carriage and bucket about the inner end of the former so as to discharge material onto the conveyor from the bucket.

5. In a machine of the class described, a vehicle frame, a carriage mounted to move longitudinally on and to be pivoted relative to the frame about the normally inner portion of the carriage, the outer portion of the carriage being raised above the frame, a digging bucket pivoted intermediate its ends on the outer end of the carriage, said bucket having digging means at its forward end and open at its rear end, the bucket being tiltable to a horizontal position to rest on the carriage, and means for causing the bucket to tilt on the carriage and the carriage to be pivoted about the frame, and means for controlling the movement of the carriage on the frame.

6. In a machine of the class described, a supporting vehicle, a frame pivotally mounted thereon on a transverse axis and extending over the top and beyond one end thereof, means for guiding said extended end of the frame vertically at the latter end of the vehicle, means for supporting the latter end of the frame on the ground, said supporting means being connected to the frame on a pivotal axis extending longitudinally with respect to the vehicle to accommodate the frame to uneven ground, and a digging bucket movably mounted on the extended end of the frame.

7. In a machine of the class described, a supporting vehicle, a frame pivotally mounted thereon on a transverse axis and extending over the top and beyond one end thereof, means for guiding said extended end of the frame vertically at the latter end of the vehicle, wheels for movably supporting the latter end of the frame on the ground, longitudinal skids adjacent the wheels for limiting the depth of penetration of the wheels in the ground, and a digging bucket pivotally mounted above and movable along the frame.

8. In a machine of the class described, a supporting vehicle, a frame pivotally mounted thereon on a transverse axis and extending over the top and beyond one end thereof, means for guiding said extended end of the frame vertically at the latter end of the vehicle, wheels for movably supporting the latter end of the frame on the ground, said wheels being connected to the frame on a pivotal axis extending longitudinally with respect to the vehicle to accommodate the frame to uneven ground, longitudinal skids adjacent the wheels for limiting the depth of penetration of the wheels in the ground, and a digging bucket pivotally mounted above and movable along the frame.

9. In a machine of the class described, a supporting vehicle, a track at the top and extending longitudinally of the vehicle and beyond one end thereof, the latter extended portion of the track being substantially horizontal and the portion backwardly therefrom extending upwardly at an angle, over, and beyond the opposite end of the vehicle, a carriage mounted on the track, a digging bucket pivotally mounted on the outer end of the carriage, and means for tilting the bucket about the carriage and for moving the carriage on the track.

10. The combination with a self-propelled vehicle having a control seat and manual steering and power controls, of an excavating apparatus connected to the rear end thereof and having various operating mechanisms, and a control compartment, separate from said control seat, having a plurality of controls, connected to said steering and power controls and to said operating mechanisms.

11. The combination with a self-propelled vehicle having manual steering and power controls, of an excavating apparatus connected to the rear end thereof and having various operating mechanisms, a rearwardly directed seat on the vehicle, and a plurality of controls, accessible from said seat, connected to said steering and power controls and to said operating mechanisms.

12. The combination with a self-propelled vehicle having manual steering and power controls, of an excavating apparatus connected to the rear end thereof and having various operating mechanisms, a rearwardly directed seat on the vehicle, a plurality of fluid operated cylinders, separate cylinders connected to the steering controls, the power controls, and the operating mechanisms, and a plurality of control valves, accessible from said seat, for separately and manually controlling said cylinders.

13. The combination with a tractor having a power means, separate tracks, a steering clutch and brake for each track, and a power clutch, of an excavating apparatus connected to the rear end of the tractor and having various operating mechanisms, a rearwardly directed seat at the side of the tractor, a plurality of fluid operated cylinders, one cylinder for each associated steering clutch and brake, one cylinder for said power clutch, and one for each of said operating mechanisms, and a plurality of control valves, accessible from said seat, for separately and manually controlling said cylinders.

14. In an attachment of the class described, for self-propelled vehicles, a frame pivotally connectable to the vehicle so as to extend beyond one end thereof, means for supporting the extended end portion of said frame on the ground beyond one end of the vehicle, a digging bucket, open at the front and rear ends, mounted to rock on the extended end portion of the frame, and means connectable to the propelling mechanism of the vehicle for tilting the bucket so as to discharge from the rear end thereof the material entering the front end.

15. In an attachment of the class described, for self-propelled vehicles, a frame pivotally connectable to the vehicle so as to extend beyond one end thereof, a carriage longitudinally movable on the frame from the extended end and inwardly therefrom, a digging bucket pivoted on the carriage, and means connectable to the propelling mechanism of the vehicle for tilting the carriage and bucket about the inner end of the former so as to discharge the material from the bucket.

16. In a machine of the class described, a vehicle, a frame pivoted on the vehicle and extending beyond one end thereof, a carriage longitudinally movable on the frame inwardly from the extended end thereof, a digging bucket pivoted on the outer end of the carriage, and means on the vehicle for moving the carriage inwardly and tilting the bucket so as to discharge material from the bucket.

17. In a machine of the class described, a vehicle, a frame pivoted on the vehicle and extending beyond one end thereof, a carriage longitudinally movable on the frame inwardly from the extended end thereof, a digging bucket pivoted on the carriage, a conveyor mounted to extend to the opposite end of the frame, and means on the vehicle for tilting the bucket so as to discharge onto the conveyor, from the rear end of the carriage, the material entering the front end of the bucket.

18. In a machine of the class described, a vehicle, a frame pivoted on the vehicle and extending beyond one end thereof, a carriage longitudinally movable on the frame inwardly from the extended end thereof, a digging bucket pivoted on the outer end of the carriage, a conveyor mounted to extend to the opposite end of the frame, means on the vehicle for tilting the carriage and the bucket about the inner end of the former so as to discharge material onto the conveyor from the bucket.

19. In a machine of the class described, a supporting vehicle, a frame extending longitudinally with respect to and over the top of the vehicle, said frame movable in a vertical direction, and extending beyond both ends thereof, means for supporting one extended end of the frame on the ground, and a digging bucket mounted to rock about a transverse axis on the latter end of the frame.

20. In an attachment of the class described, for a self-propelled vehicle having a control seat and manual steering and power controls, an excavating apparatus connected thereto and extending beyond one end thereof, said apparatus having digging and conveying means movable from said one end toward the opposite end of the vehicle, said apparatus having various operating mechanisms, and a control compartment, separate from said control seat, having a plurality of controls, connected to said steering and power controls and to said operating mechanisms, said control compartment being located clear of the path of the digging and conveying means.

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