O. W. SMITH.

DITCHING AND LEVEE BUILDING APPARATUS.

APPLICATION FILED APR. 13, 1920.

1,413,803.

Patented Apr. 25, 1922.

5 SHEETS—SHEET 1.

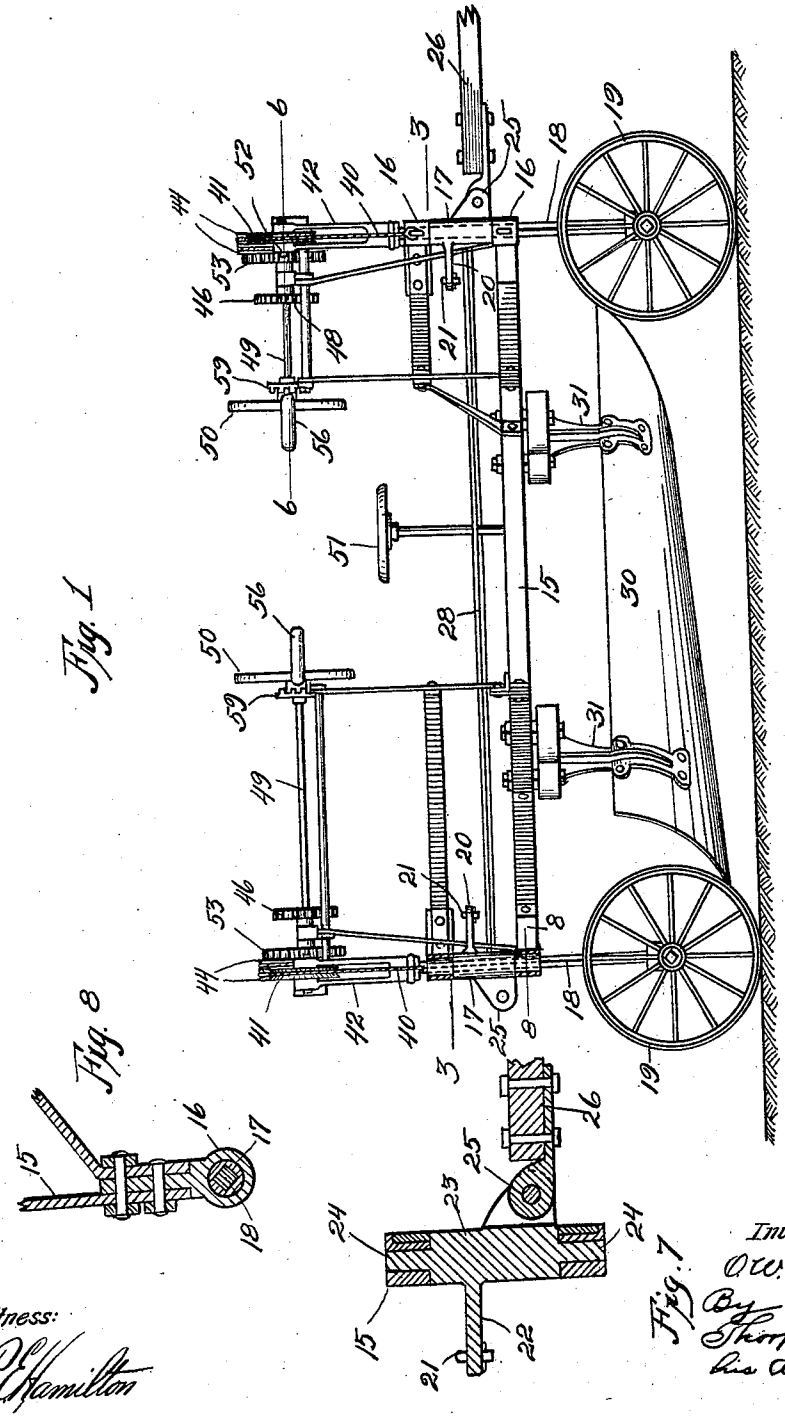


Fig. 1

Fig. 8

Fig. 7

Witness:

R. E. Hamilton

Inventor,

O. W. Smith,

By Thorpe & Edwards

his Attorneys.

O. W. SMITH.

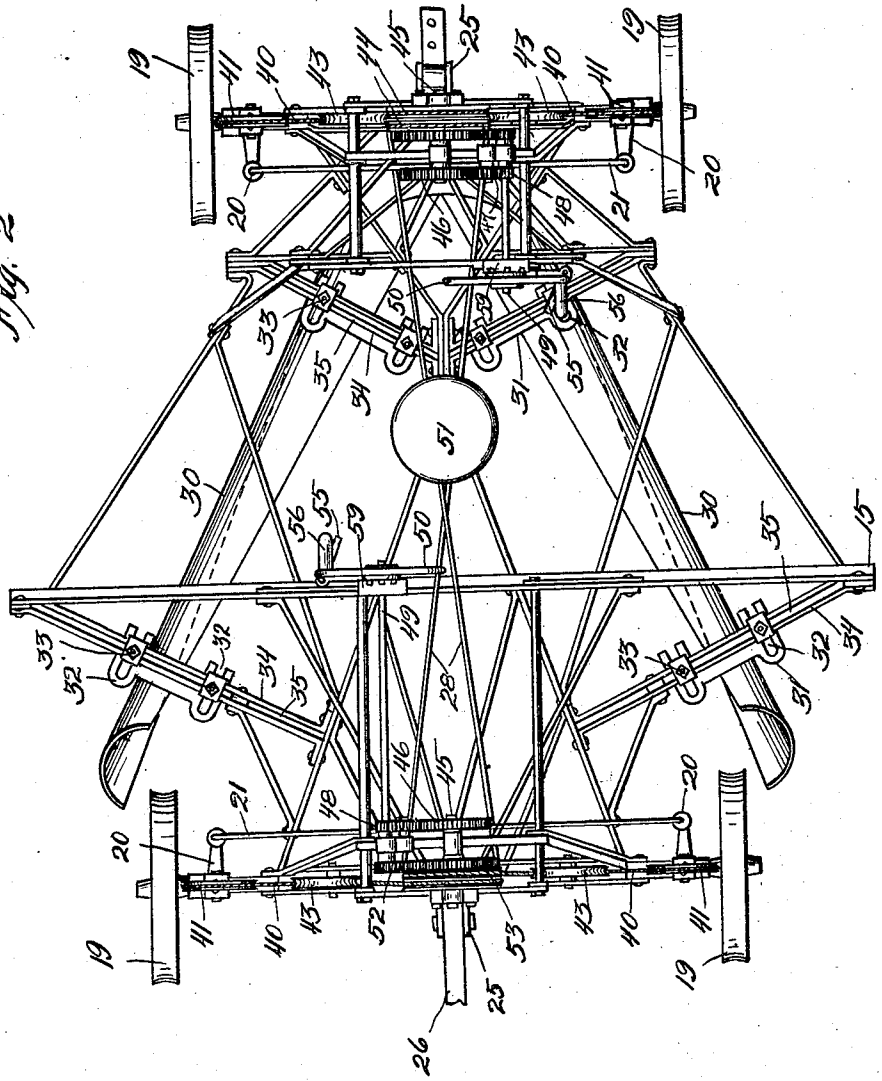
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5 SHEETS—SHEET 2.

Fig. 2



Witness:

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DITCHING AND LEVEE BUILDING APPARATUS.

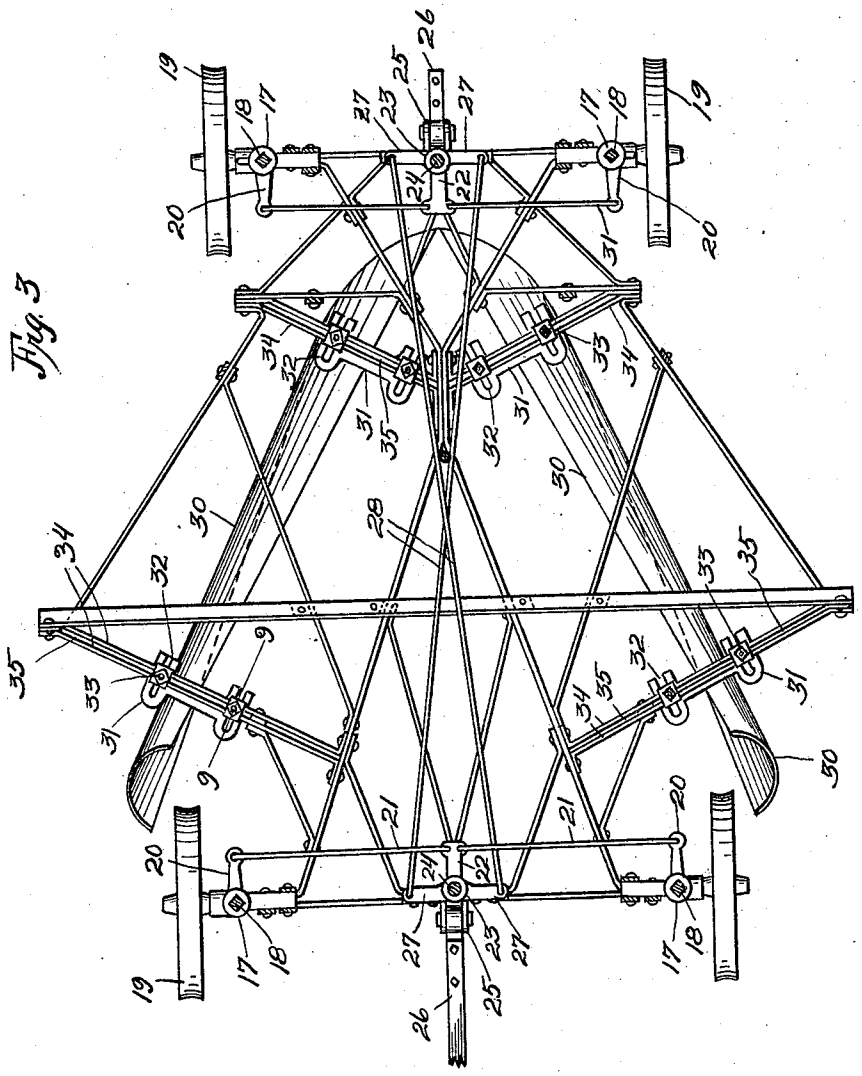
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5 SHEETS—SHEET 3.

Fig. 3



Witness:

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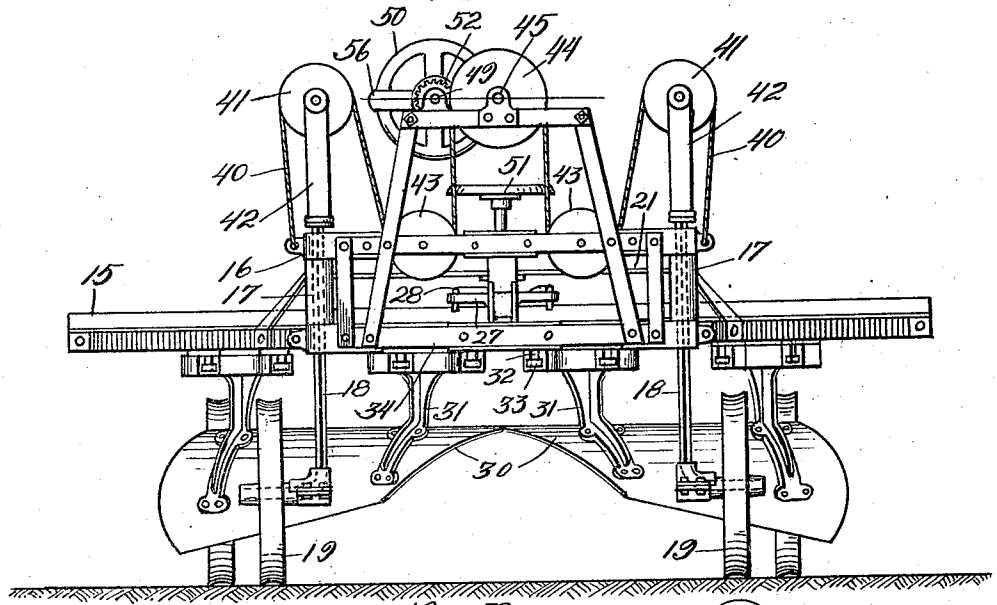
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5 SHEETS—SHEET 4.

Fig. 4



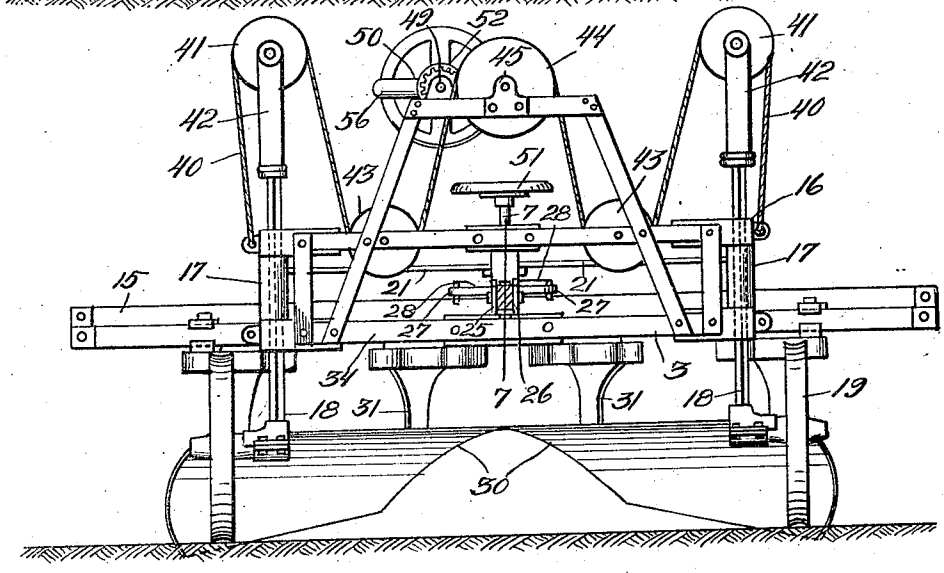


Fig. 5

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DITCHING AND LEVEE BUILDING APPARATUS.

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5 SHEETS—SHEET 5.

Fig. 6

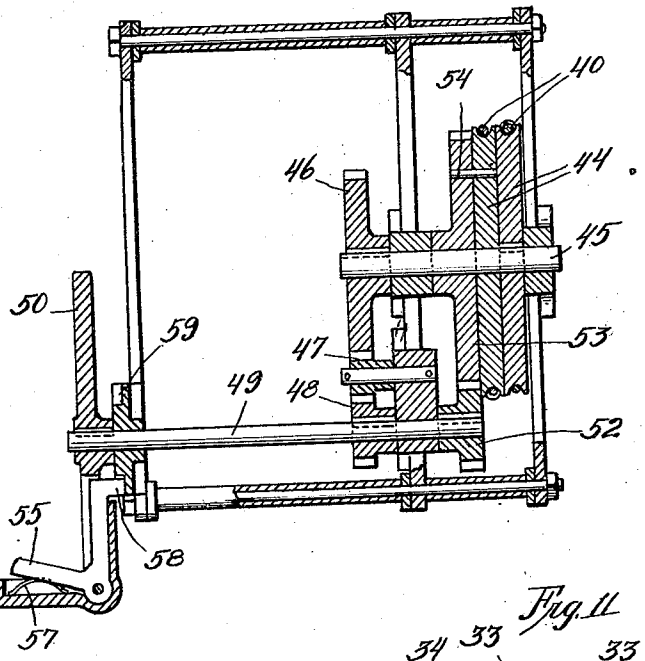


Fig. 9

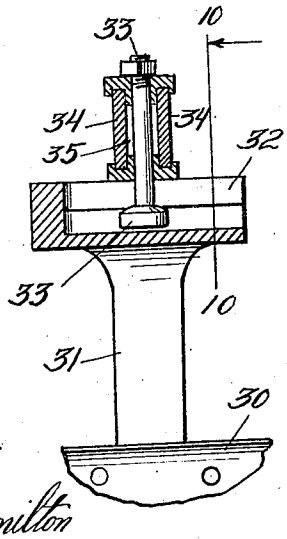


Fig. 10

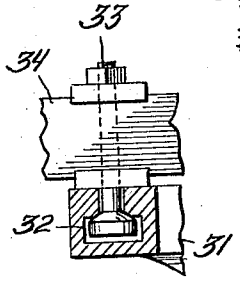
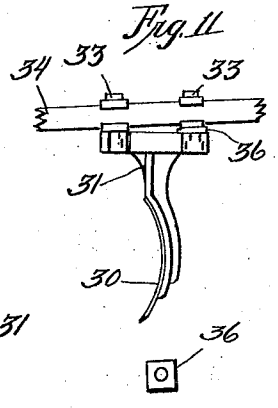


Fig. 11



Witness:
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Inventor,
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UNITED STATES PATENT OFFICE.

OSCAR W. SMITH, OF CARLISLE, ARKANSAS, ASSIGNOR TO EDNA R. SMITH, OF CARLISLE, ARKANSAS.

DITCHING AND LEVEE-BUILDING APPARATUS.

1,413,803. Specification of Letters Patent. Patented Apr. 25, 1922.

Application filed April 13, 1920. Serial No. 373,473.

To all whom it may concern:

Be it known that I, OSCAR W. SMITH, a citizen of the United States, and resident of Carlisle, Lonoke County, Arkansas, have invented a certain new and useful Improvement in Ditching and Levee-Building Apparatus, of which the following is a complete specification.

The present invention relates to apparatus for use in ditching operations and also for use in the construction of levees and aims to provide an improved machine adapted for use either as a ditching device or as a machine for building levees, the construction being particularly useful in rice plantations occupying ground having a more or less slope and requiring from time to time the building of levees for irrigation purposes and also necessitating the construction of a network of ditches for draining the fields at stated intervals.

Accordingly, I have devised an improved apparatus comprising a pair of blades or grading members adapted to be so mounted as to collect the earth along the line of travel of the machine into the form of a levee in which the earth is deposited firmly and compactly by the action of the grading members.

It is also an object of the invention to provide a machine of this character in which the grading members are so mounted and arranged as to be conveniently adjustable both longitudinally and transversely, as well as angularly about either a longitudinal or transverse axis. Provision is also made for varying the height of the said grading members with reference to the ground surface, so that the depth of the grading members' operation may be suitably varied, or said members disengaged entirely from engagement with the ground surface and lifted into inoperative position.

It is a further object of the invention to provide a machine in which the grading members that are used for levee building purposes may, by appropriate reversal thereof, be caused to effect a ditching operation instead of a levee building operation.

It is also sought to devise a machine of this character in which the wheeled supporting structure comprises a full set of wheels each of which is a steering wheel and so connected with the remaining wheels of the set that the whole supporting structure is obliged automatically to follow along with the line of draft of the machine.

With the foregoing general objects in view, the invention will now be described by reference to the accompanying drawings illustrating one form of arrangement and construction which I have devised for embodying the proposed improvement, after which the novel features therein will be particularly set forth and claimed.

In the drawings:

Figure 1 is a side elevation showing a combined ditching and levee building apparatus constructed in accordance with the present invention;

Figure 2 is a plan view of the same;

Figure 3 is a sectional plan view, representing a section taken on the line 3—3 of Figure 1;

Figures 4 and 5 are elevations showing end views of the opposite ends of the machine, respectively, some of the parts in each of said views being omitted for the purpose of clearness;

Figure 6 is an enlarged sectional detail view taken on the line 6—6 of Figure 1;

Figure 7 is an enlarged sectional view, taken on the line 7—7 of Figure 5;

Figure 8 is an enlarged section taken on the line 8—8 of Figure 1;

Figure 9 is an enlarged sectional view taken on the line 9—9 of Figure 3;

Figure 10 is a section taken on the line 10—10 of Figure 9; and

Figure 11 is a fragmentary detail view illustrating means adapted to be employed in effecting a transverse angular adjustment of the grading blades or member.

Referring to the said drawings in detail, these illustrate the improved construction as comprising a suitably braced skeleton framework designated generally by the reference numeral 15, provided at the front and rear corners thereof with bearing brackets 16 for journaling a set of steering knuckles 17 which are mounted slidingly upon the square upright shafts 18 (see Figure 8) having the lower ends thereof connected rigidly to the axles of the several supporting wheels 19 of the machine. The steering arms 20 of the knuckles 17 at each end of the machine are connected by tie rods 21 (see Figure 3) with a central arm 22 on a hitch member 23 having the trunnions 24 journaled in the frame

work 15 of the machine. Each of the hitch members 23 is provided with a pivot pin 25 to which any desired form of draft connection, such as represented by the tongue 26, may be applied. Each of the hitch members 23 is also provided with laterally projecting arms 27, the opposite arms 27 of each draft member being connected by crossed tie rods 28, as clearly illustrated in Figure 3. By means of this arrangement of the connections between the supporting wheels 19, it is obvious that the same are movable always in unison and are obliged to follow automatically along with the direction of the draft as applied through either of the connections to the hitch member 23.

The devices which are employed in the ditching and levee building operations comprise a pair of blade or grading members 30 which are of transversely curved form, each provided with a pair of hanger elements 31 for suspending the same from the framework 15 of the machine. The connection between the hangers 31 and the framework of the machine is such as to permit certain adjustments of the blade or grade members to conform with the character of the operation required to be performed. For this purpose the upper portion of each hanger 31 is formed with a slot 32 (see Figures 9 and 10), said slot being of T-form for accommodating the head and shank of a pair of bolts 33, whereby said hangers are adjustably secured to the framework of the machine. This part of said frame work comprises a pair of spaced frame members 34 providing a guide slot 35 between them for the passage of said bolt 33 thus permitting adjustment of said bolts along said slot 35 for varying the position of the blades 30 laterally of the machine. Preferably, as shown in Figure 3, a pair of the slots 32 and bolts 33 are provided for the ends of the grading blade or member 30 for the purpose of firmly and rigidly supporting the same, and the provision of the slots 32 obviously permits of a longitudinal adjustment of the members 30 with reference to the bolts 33 to a limited extent represented by the length of the slots 32, but sufficient to meet all requirements necessitating such a longitudinal adjustment of the grading members. The slots 35 at each side of the machine are arranged parallel to each other but at an angle with reference to the longitudinal line of the machine and in such a manner that the grading members 30 occupy a rearwardly converging relation when used for levee building purposes, having the concave faces of said members 30 facing each other, as clearly shown in Figures 2 and 3.

It may also be desirable at times to provide for a transverse tilting adjustment of the grading members 30, and accordingly I provide suitable washers 36 adapted to be fitted to either of the bolts 33 at either or both ends of the grading member 30 intermediate the top of the hanger and the bottom of the frame pieces 34. This enables the top of each hanger to be spaced more or less away from the pieces 34, and operates to tilt the member 30 in a corresponding direction, the heads of the bolts 33 being tapered adjacent to their shanks for accommodating this rocking or tilting of the hangers (see Figures 9 to 11).

Provision is also made for bodily elevating or lowering either or both of the opposite ends of the framework of the machine, for the purpose of varying the depth at which the grading members are operated or for elevating them entirely into inoperative position. As the means for effecting this raising or lowering movement of the frame comprises the same operating structure at both ends of the machine, but one such structure will be described in detail. Referring now more particularly to Figures 1 to 4 and 6, a cable 40 is connected to one of the bearing brackets 16 at each corner of the framework, each of said cables being carried over a sheave wheel 41 journaled in a bearing frame 42 mounted upon the upper end of the corresponding vertical shaft 18, each cable 40 being also led around a sheave wheel 43 journaled in the frame work 15 on approximately a level with the upper brackets 16. After passing around the sheave wheels 43, the pair of cables 40 at each end of the machine are led over and secured to a pair of sheave wheels 44 which are mounted upon a common shaft 45, one of said wheels 44 being keyed to said shaft while the other is journaled loosely thereon (see Figure 6). The shaft 45 is provided with a gear 46 which meshes with a pinion 47, which, in turn, is driven from a pinion 48 mounted on a shaft 49 provided with a hand wheel 50 located in convenient position for operation from the driver's seat 51 at approximately the center of the machine. The shaft 49 is also provided with a second pinion 52 meshing with a gear 53 which is fixed, by means of a pin 54 to that sheave wheel 44 which is loose upon the shaft 45. By this means opposite rotative movement is imparted by means of the hand wheel 50 to the pair of sheave wheels 44 for the purpose of simultaneously taking in or paying out the pair of cables 40 corresponding to that end of the machine. A suitable pawl 55 is mounted within the handle portion 56 of each wheel 50, each pawl being actuated by means of a spring element 57 within said handle portion for engaging the tooth 58 of the pawl with a ratchet device 59 mounted adjacent and co-axially of the wheel 50; this enables the said wheel 50 to be released readily at any time by engagement of the operator with the handle portion 56 and its pawl 55, and also to maintain the wheel 50 and the

mechanism connected therewith set at any point after the desired raised or lowered position has been obtained with reference to the frame work 15.

The operation of the apparatus is designed primarily for use in the construction of levees, such as are required for irrigation purposes on large plantations such as plantations growing rice, for example, and especially where the rice fields are located on a slope of considerable extent. The levees as constructed by the machine assume the form of terraces arranged in spaced and parallel horizontal lines extending transversely of the slope above referred to. In the levee building operation, the blades or grading members 30 are arranged in rearwardly converging relation with reference to the hitch connection, as illustrated in Figures 2 and 3. The forward ends of the grading members or blades 30, when used in the levee building operation, exert a digging action, and since the blades are arranged in rearwardly converging relation, they serve to deflect the soil gathered between the blades toward the middle longitudinal line of the machine, where the soil is further subjected to a packing action by the rear end portions of the blades, where the curvature of said blades is more pronounced, resulting in overhanging projections which ride over the terrace thus built and pack it into as compact a form as is practicable with a machine of the general size and weight illustrated. Thus a single operation effects both the ditching and the collecting of the dirt necessary to construct the levee and the packing thereof in terrace form by the trailing of the improved machine along the line where the levee is desired to be constructed. All the necessary adjustments of the members 30 are provided for in the mode of mounting the same upon the framework. By appropriate adjustment of the bolts 33 along the slots 35 the members 30 may be spread apart or moved relatively closer, to any extent desired, according to form and size of the levee being built; and by adjusting the hangers through the medium of the slots 32, a longitudinal adjustment of the members 30 is afforded, which also enables the spread of the rear ends of the members to be varied with a corresponding variation of the distance between the front ends thereof. The provision of means for enabling the members 30 to be adjusted angularly in a transverse direction for more or less tilting the blades is of importance since by this means the packing action of the blades may be suitably varied according to the requirements. The character of the raising and lowering means has already been indicated in practically full detail, the said means operating to lift the whole framework of the machine, although it is apparent that the front and rear ends of said framework may be lifted or lowered to different levels thereby resulting in the blades 30 being positioned in longitudinally tilted relation, the angular extent of which tilt may be regulated by the proper manipulation of the raising and lowering means for the two ends of the frame. Whenever it is desired to raise the blades 30 into entirely inoperative position, out of engagement with the ground, both ends of the framework are simply elevated the necessary distance for completely disengaging the blades 30 from the ground.

In the operation of digging or ditching, as is required for drainage purposes (as when furrows or ditches are constructed following the slope and intersecting the levees above described), the blades 30 are simply reversed in position, end for end, and with the concave faces thereof presented outwardly; moreover, when used for ditching, the draft connection is made to the opposite end of the machine, for example, to the right hand end of the machine as illustrated in Figure 3. It is then apparent that the forward ends of the blades 30 as now presented will enter the soil in the well known ditching manner, the soil being deflected outwardly by the concaved faces thereof and thereby producing a furrow the width of which will correspond with the maximum spread of the members 30. The same adjustments of the blade members when used in this manner, may be made in all respects as before and will be found to possess the same advantages as already pointed out.

It will be understood of course that in certain conditions, as in grading, it may be desirable or expedient to use but one of the members 30, and this may of course be done by simply omitting one of said members 30 and positioning the other member in such a manner as will best meet the requirements of the operation to be performed.

The efficiency of the apparatus is increased by the described steering connections between the supporting wheels by virtue of the fact that the said wheels are obliged to constantly and uniformly follow along with the line of draft, thereby stabilizing the movements of the machine as well as causing the same to follow a more even and regular path.

While I have illustrated and described what I now regard as the preferred form of construction, I desire to reserve the right to make such changes as may fairly fall within the scope of the following claims.

What I claim is:

1. An apparatus of the character described comprising a pair of grading members arranged in rearwardly converging relation, the sides of said members facing each other being of concave outline, and the upper portions of said members extending in continuously overhanging relation from their front ends entirely to the rear ends

thereof for packing the material being graded as said members pass over said material.

2. An apparatus of the character described comprising a pair of grading members arranged in rearwardly converging relation, the sides of said members facing each other being of concave outline, and the upper portions of said members extending in continuously overhanging relation from their front ends entirely to the rear ends thereof for packing the material being graded as said members pass over said material, and means for independently raising and lowering the opposite ends of said grading members.

3. An apparatus of the character described comprising a pair of grading members arranged in rearwardly converging relation, the sides of said members facing each other being of concave outline, and the upper portions of said members extending in continuously overhanging relation from their front ends entirely to the rear ends thereof for packing the material being graded as said members pass over said material, means for simultaneously raising and lowering the forward ends of said grading members, and separate means for simultaneously raising and lowering the rear ends of said grading members.

4. An apparatus of the character described comprising a pair of grading members arranged in rearwardly converging relation, the sides of said members facing each other being of concave outline, and the upper portions of said members extending in continuously overhanging relation from their front ends entirely to the rear ends thereof for packing the material being graded as said members pass over said material, and means permitting separate longitudinal adjustment of each of said grading members.

5. An apparatus of the character described comprising a pair of grading members arranged in rearwardly converging relation, the sides of said members facing each other being of concave outline, and the upper portions of said members extending in continuously overhanging relation from their front ends entirely to the rear ends thereof for packing the material being graded as said members pass over said material, and means permitting angular adjustment of each of said grading members about a vertical axis.

6. An apparatus of the character described comprising a pair of grading members arranged in rearwardly converging relation, the sides of said members facing each other being of concave outline, and the upper portions of said members extending in continuously overhanging relation from their front ends entirely to the rear ends thereof for packing the material being graded as said members pass over said material, and means permitting transverse tilting adjustment of each of said grading members.

7. An apparatus of the character described comprising a pair of grading members having concave side faces, and a frame provided with hangers carrying said grading members, said hangers adapted to be connected with said frame with said grading members in converging relation and their concave faces facing each other for effecting a combined ditching and levee building operation, or with said members reversely positioned for effecting a ditching operation.

8. An apparatus of the character described comprising a pair of grading members, a framework provided with hangers carrying said grading members, a pair of supporting wheels at the opposite ends of said framework, a draft member connected to the middle portion of one end of said framework, and steering connections between said draft member and all said supporting wheels for causing said wheels to follow uniformly along with the line of draft.

9. An apparatus of the character described comprising a pair of grading members, a framework provided with hangers carrying said grading members, a pair of supporting wheels at the opposite ends of said framework, a draft member centrally connected to one end of said framework and provided with steering connections to all said supporting wheels for causing said wheels to follow uniformly along with the line of draft, and means for raising and lowering either of the opposite ends of said framework relatively to said supporting wheels.

10. An apparatus of the character described comprising a pair of grading members, a framework provided with hangers carrying said grading members, a pair of supporting wheels at the opposite ends of said framework, and lifting mechanism at each end of said framework and comprising sheave wheels and a separate cable connected with each of the adjacent corners of the framework, and means for simultaneously operating each pair of cables for raising and lowering said framework.

In witness whereof I hereto affix my signature.

OSCAR W. SMITH