May 29, 1928. 1,671,939

O. W. SMITH

DITCHING AND LEVEE BUILDING MACHINE

Filed March 8, 1926 5 Sheets-Sheet 1

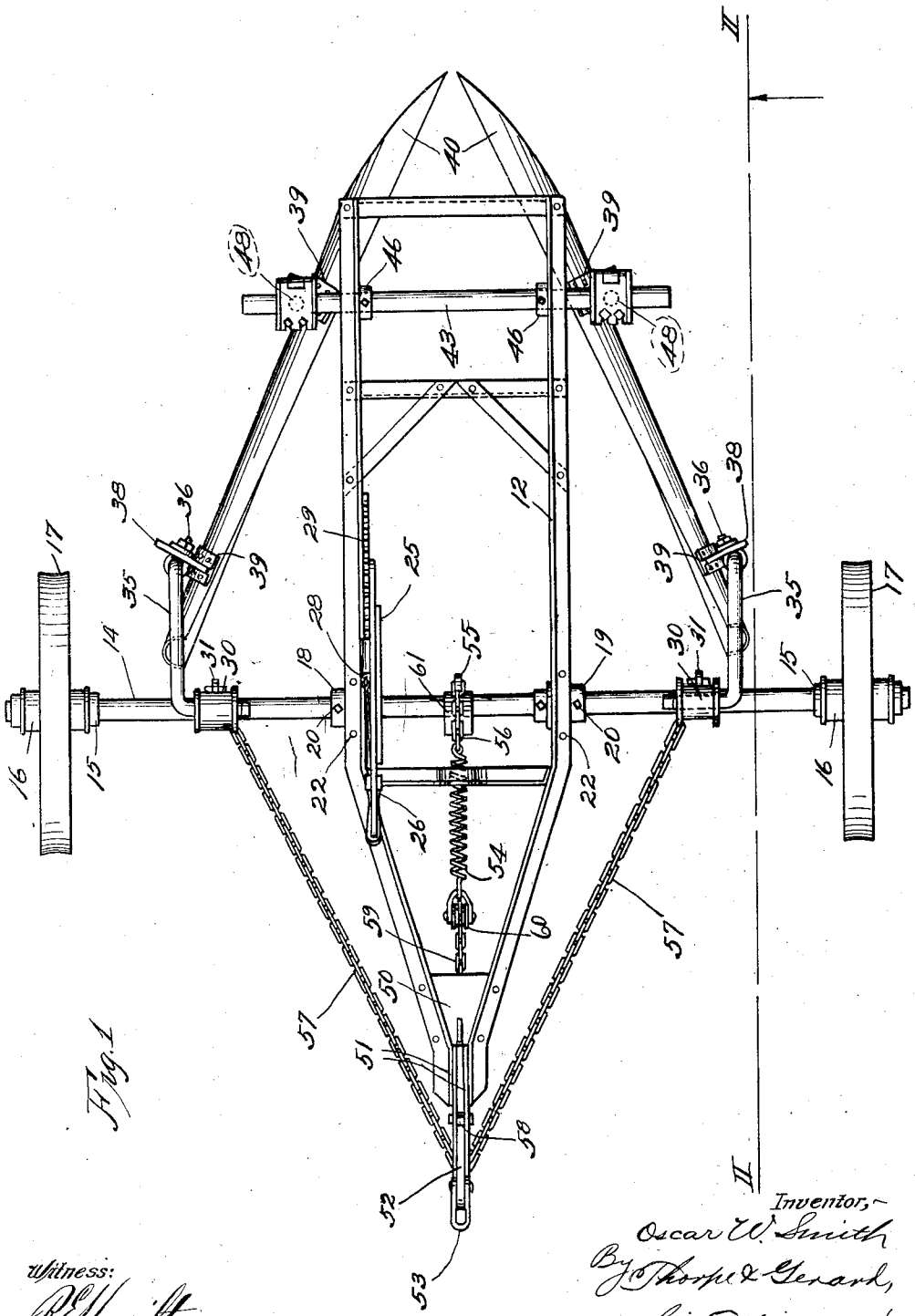


Fig. 1

Witness:
R. C. Hamilton

Inventor,
Oscar W. Smith
By Thorpe & Gerard,
His Attorneys.

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Filed March 8, 1926 5 Sheets-Sheet 2

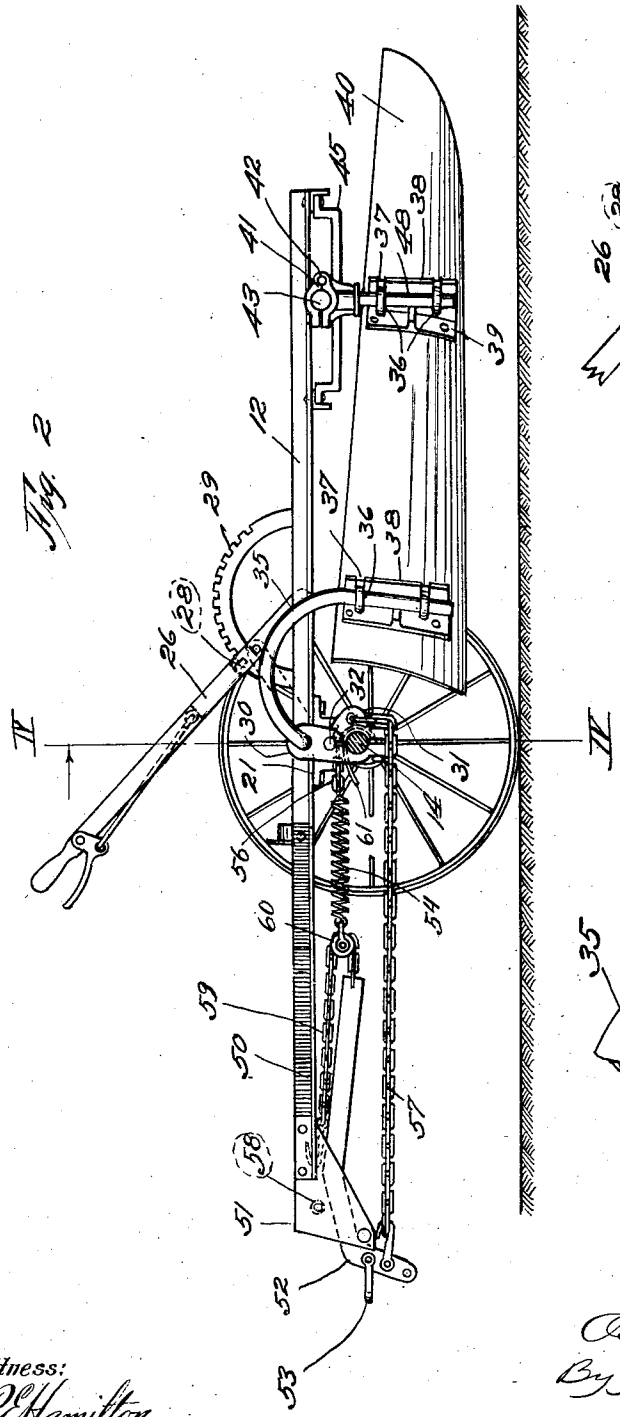


Fig. 2

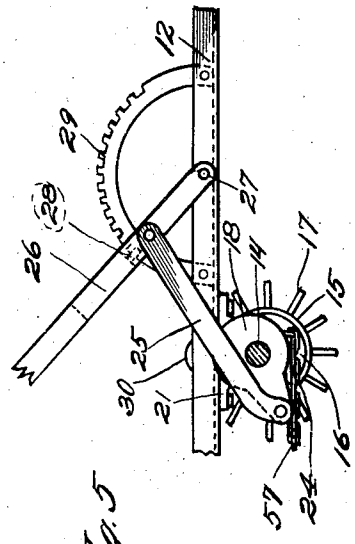


Fig. 3

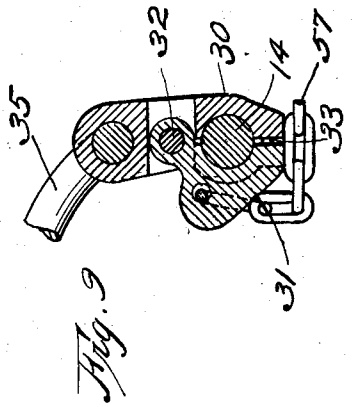


Fig. 4

Witness:
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Filed March 8, 1926 5 Sheets-Sheet 3

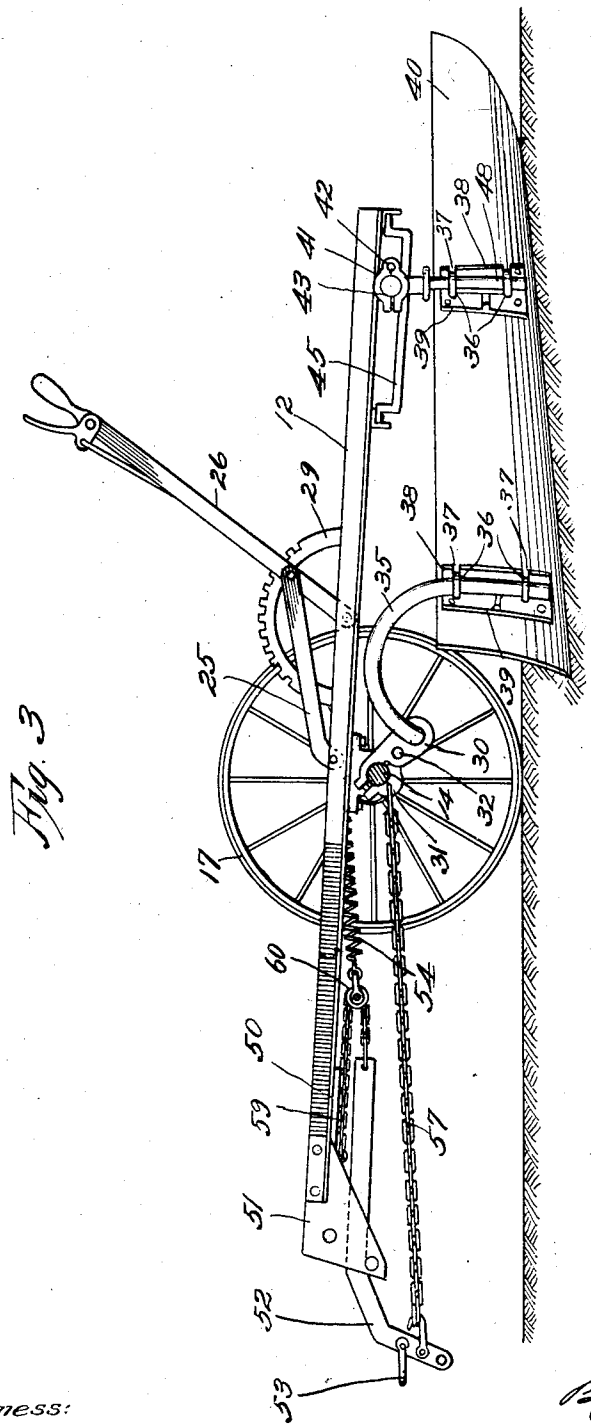


Fig. 3

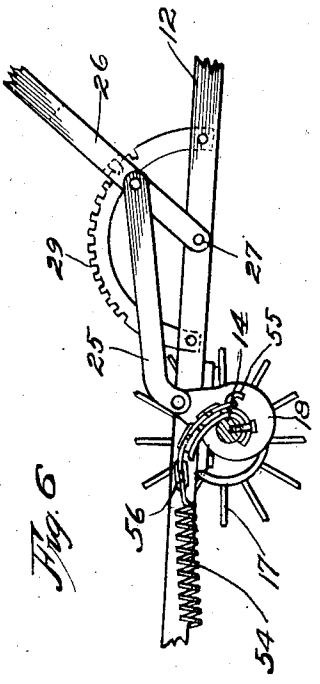


Fig. 6

Witness:
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May 29, 1928. 1,671,939

O. W. SMITH

DITCHING AND LEVEE BUILDING MACHINE

Filed March 8, 1926 5 Sheets-Sheet 4

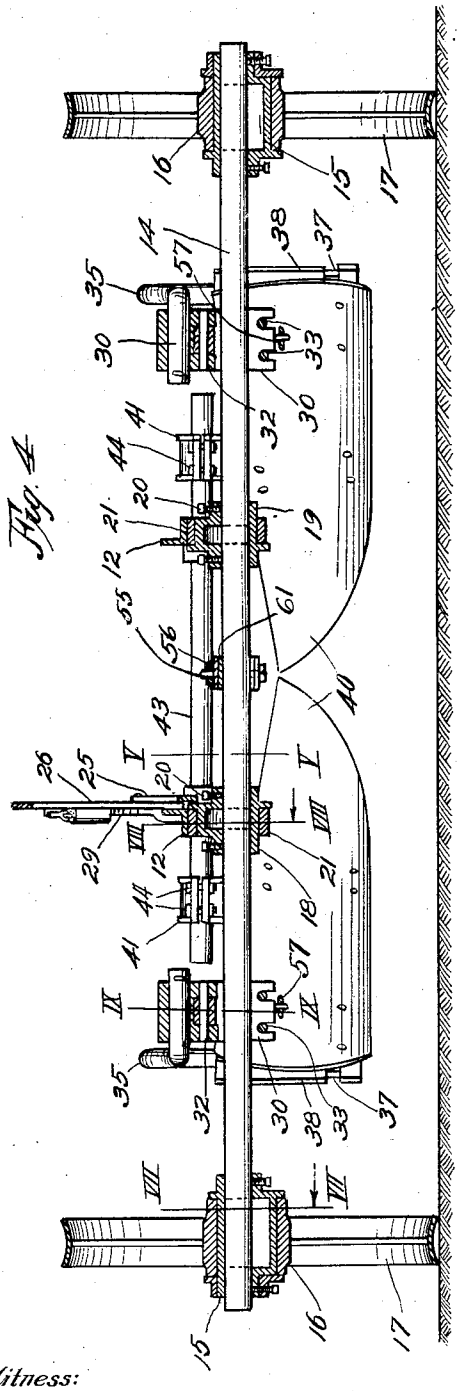


Fig. 4

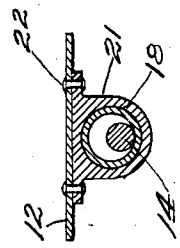


Fig. 8

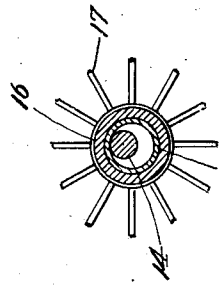


Fig. 7

Witness:
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May 29, 1928. 1,671,939

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DITCHING AND LEVEE BUILDING MACHINE

Filed March 8, 1926 5 Sheets-Sheet 5

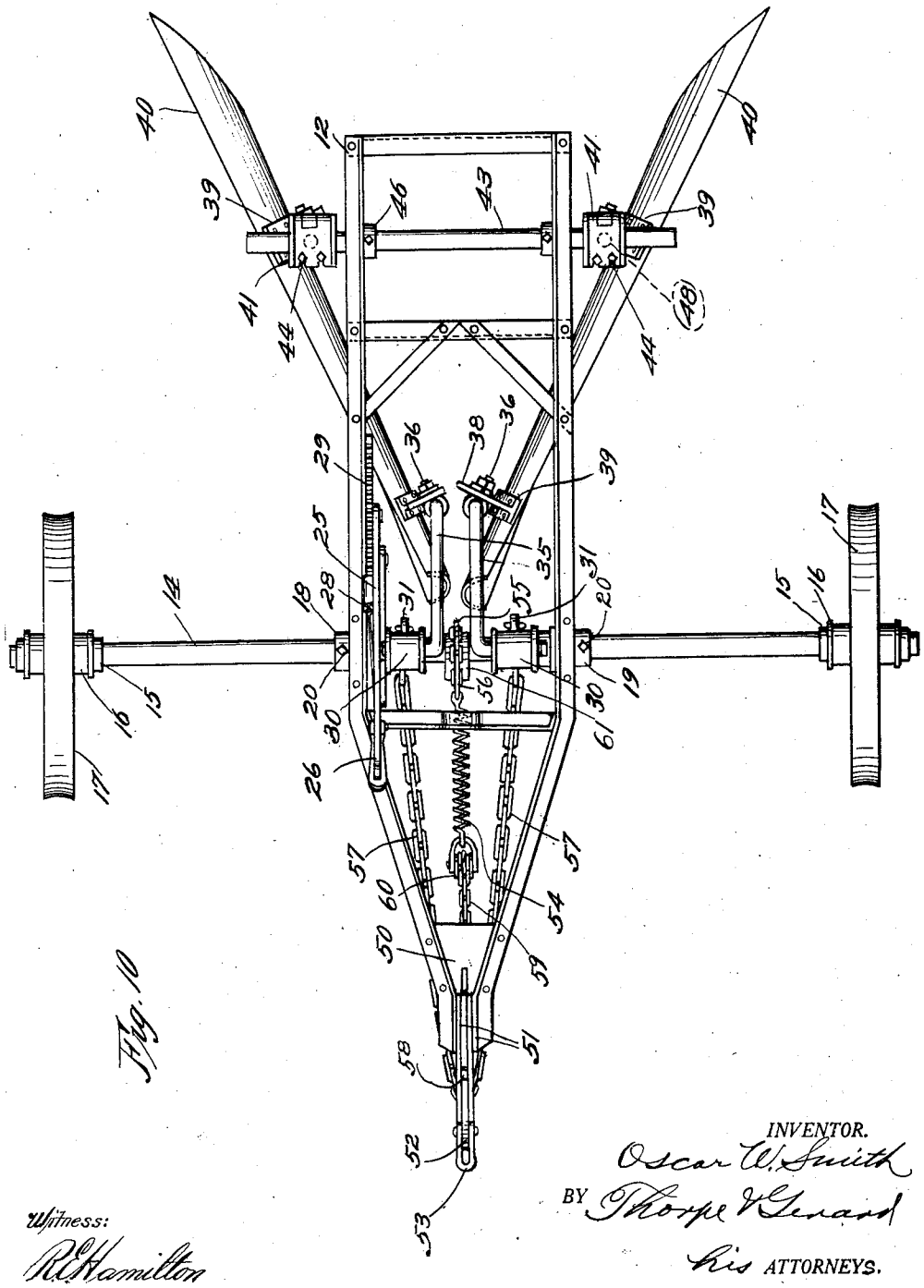


Fig. 10

INVENTOR.
Oscar W. Smith
BY Thorpe & Gerard
His ATTORNEYS.

Witness:
R. D. Hamilton

Patented May 29, 1928. 1,671,939

UNITED STATES PATENT OFFICE.

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

DITCHING AND LEVEE-BUILDING MACHINE.

Application filed March 8, 1926. Serial No. 93,117.

The present invention relates to ditching and levee building apparatus, with special reference to devices designed for use either in ditching operations or in the construction of levees for irrigation purposes, as where the lay of the ground is such as to require not only the building of levees but also the construction of a network of ditches for drainage at stated intervals.

Accordingly, I have devised an improved construction which comprises an apparatus making use of a pair of wheels for supporting a frame carrying a pair of grading members adapted to be adjusted for either collecting the earth along the line of travel of the machine into the form of a levee and depositing it firmly and compactly in this levee form, or to operate in such a manner as to effect a ditching operation along the line of travel instead of the levee building operation by simply adjusting the position of the grading members to correspond.

The proposed improved construction is embodied in an apparatus in which the frame and the axle carrying the grading members are provided with means operating about the wheel axis to vary the elevation of the frame, and also for producing a supplemental raising and lowering movement of the grading members relative to the frame. In this connection, means is also provided, in the form of a yielding draft connection, for assisting in the movement of the frame and grading members into elevated or inoperative position, and also for reinforcing or assisting in the movement of the grading members into operative position, and hence rendering more effective the action of the grading members in their levee building operation.

In connection with the framework, provision is also made for readily and conveniently adjusting the elevation of said framework and also maintaining the same in any desired position of adjustment. Likewise, provision is made for varying the relative position of the grading members, so that these may be arranged in various positions in either forwardly or rearwardly converging relation, and at different distances apart, and secured in such positions according to whether the levee building or ditching operation is to be performed.

It is also an object of the invention to provide a comparatively simple and yet very efficient form of construction, having a minimum number of parts for effecting the required operations, with very simple means of adjustments, and having practically no parts that are likely to get out of order. In relation to the draft connection to the apparatus, this also includes a yielding appliance operative to relieve the draft connection of any sudden or excessive tensions or strains that might otherwise occur.

With these 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 improvements, after which those features and combinations deemed to be novel will be particularly set forth and claimed.

In the drawings—

Figure 1 is a plan view illustrating a combined ditching and levee building apparatus constructed in accordance with the present invention;

Figure 2 is a side elevation, shown partly in section as indicated by the section line II—II of Figure 1;

Figure 3 is a similar view, but illustrating the frame and grading members lowered, as required for the levee building operation;

Figure 4 is a transverse sectional view, representing a vertical section on the line IV—IV of Figure 2, but on a larger scale;

Figure 5 is an enlarged detail view, representing a section on the line V—V of Figure 4;

Figure 6 is a similar detail view, but illustrating the parts in the position assumed thereby in the relation illustrated in Figure 3;

Figures 7, 8 and 9 are detail sectional views taken on the section lines VII—VII, VIII—VIII and IX—IX, respectively, of Figure 4; and

Figure 10 is a plan view similar to Figure 1, but showing the grading members adjusted into position for effecting the ditching operation.

Referring now to the drawings in detail, these illustrate the improved apparatus as comprising a supporting framework 12 of suitably braced angle iron construction adapted to be mounted upon and carried by a transverse axle 14, the ends of which are

provided with eccentric members 15 upon which are mounted the hubs 16 of a pair of wheels 17 (see Figure 4). The midportion of the axle 14 is also provided with a pair of spaced eccentric members 18 and 19 rigidly secured, as by clamp screws 20, to the axle, these eccentric members 18 and 19 operating in bearing blocks 21 secured by rivets 22 to the underside of the supporting frame 12 (see Figures 4 and 8). The eccentric member 18 is provided with a projecting arm 24, to which is connected a link 25, this being in turn connected to a lever 26 fulcrumed at 27 to the frame 12 and provided with a hand-operated pawl 28 adapted to be engaged at different points along the curved rack member 29, according to the position of adjustment of the lever 26, as will be later explained.

Between each of the bearing blocks 21 and adjacent wheel 17, the axle 14 carries a sectional bearing block composed of sections 30, 31, connected by a hinge pin 32 and adapted to be secured at various points along the axle 14 by means of clamping screws or bolts 33 (see Figure 9). In the top portion of each bearing block section 30 is pivotally mounted the forward end of a hanger arm 35, which is of curved form as illustrated in Figures 2 and 3. The rear and lower ends of the hanger arms 35 are received in eye bolts 36, the shanks of which are carried in slots 37 provided in the outwardly projecting flanges or webs 38 of the bearing brackets 39, of which brackets 39 a pair is secured to the outer faces of each of a pair of grading members 40 as illustrated in Figures 1 and 2. The slots 37 are wide enough to allow the eye portions of the bolts 36 to be drawn into said slots as the bolts are tightened, and thereby clamp the arms 35 rigidly against said flange portions 38 of the brackets 39. The rear bracket plate 39 of each grading member 40 is similarly fitted with eye bolts 36 for receiving a vertical bolt or post 48 depending from a split clamp bearing 41 formed of sections hinged together as indicated at 42 and adapted to be clamped in various positions of adjustment along a transverse supporting rod or bar 43, the clamping action of each bearing 43 being effected by means of screws 44. The opposite end portions of the rod or bar 43 are slidingly supported by means of hanger members 45 rigidly secured to the underside of the rear end portion of the frame 12, and at the opposite sides thereof, endwise movement of the bar 43 being prevented by means of set collars 46.

Between the forward converging ends of the framework 12 is secured a horizontal bearing plate 50 and also a pair of spaced vertical plates 51 forming a guideway provided with rollers 58 for slidingly accommodating an irregularly shaped draw bar 52 to which a suitable draft connection may be made by means of the clevis 53 at its forward end. To the rear end of the bar 52 is attached one end of a chain 59, the other end of which is fixedly secured to the plate 50. The chain 59 operates around a pulley 60 attached to the forward end of a strong coil expansion spring 54, which in turn is adapted to be adjustably connected, as by means of the hook 55 and chain links 56, to the midpoint of the axle 14, said connection being made so as to maintain a tension in the spring in all positions of the bar 52, including the retracted position thereof illustrated in Figure 2. The flexible connection provided by the links 56 is engaged by a spring steel finger 61 which is attached to the axle by the same fastening which holds the hook 55, this finger 61 serving to provide a leverage action for the spring 54 in helping to lift the grading members to inoperative position. The forward end of the draw bar 52 is connected by means of a pair of draft chains 57 to the bearing sections 31, as illustrated in Figures 2 and 9.

The nature of the work to be performed by the improved machine is similar to that for which the machine in my former Patent No. 1,413,803, issued April 25, 1922, is adapted, and the character and shape of the grading members 40, and their mode of operation, are similar to those illustrated in said patent, with the upper portion of the grading members or blades extending in overhanging relation in order to facilitate the packing of the material being graded when used to effect the levee building operation, with the blades arranged in forwardly converging relation as illustrated in Figure 1. Referring to Figures 2 and 5, these views show the machine in its inoperative position, that is, with the frame and the grading members elevated, and the lever 26 latched in forward position. With this adjustment of the parts, it will be noted that the eccentrics 15, 18 and 19 are all turned to bring their centers above the centers or axis of the wheels 17, and from the method of connecting the spring 54 it will be noted that the line of action of this spring, being at this time above the axis of the wheels, is such that the spring's action will tend to accentuate the movement of the parts into the position illustrated in Figure 2, and thereafter help to retain the parts in this position, with the weight of the forward portion of the apparatus (that is, in front of the wheel axis) supported upon the draw bar 52 and its connections. Now when it is desired to operate the lever 26 to place the apparatus in an operative position, the lever is moved backward, as illustrated in Figures 3 and 6, which movement of the lever will, of course, be in opposition to the action of the spring 54, but as soon as the axis of the

eccentrics passes to the rear of the wheel axis the weight of the grading members and their connections, as well as any pull being exerted through the draft chains 57, will automatically lower the same into operative position. In this lowered position, illustrated in Figure 3, it will be seen that the line of draft is now appreciably below the wheel axis, and the draft pull therefore simply serves to increase the biting or digging action of the graders, or, in the levee building operation, this arrangement of the draft materially assists in the packing of the levee, as will be readily understood.

In swinging the lever 26 forward again to lift the grading members to the position illustrated in Figure 2, the spring 54 assists in this movement, by tending to rotate the axle in the proper direction for lifting the graders, which action of the spring is aided by the finger member 61, as above explained.

The provision of the chain 59 and pulley 60 between the draft bar 52 reduces the extent of expansion movement required of the spring. The use of this spring in combination with the flexible draft connections 57 has the further advantage of relieving the draft of any sudden or excessive shocks or strains, to which a fixed and unyielding draft connection would otherwise be subjected. The angular form of the draft bar enables it to accommodate the rocking movement of the machine from the position shown in Figure 2 to that illustrated in Figure 3, and at the same time keep the line of draft through the chains 57 practically unchanged.

The use of the two sets of eccentric members provides for the movement of the grading members 40 in unison with the frame 12 to a greater extent than would be provided for by but one set of eccentrics, and in addition the provision of the bracket arms 30 and hanger arms 35 affords a still further degree of movement of the grading members 40 relatively to the frame 12; this enables the grading members to be set for operation to any depth that may ordinarily be required, and also enables the grading members to be elevated to any extent that may ordinarily be required in the levee building operation, and with a sufficient clearance above the ground when in inoperative position as shown in Figure 2. Of course, it is obvious that the parts may be kept in any desired adjusted position, according to the range of adjustment provided by the curved segment 29.

Whatever adjustments of the grading members 40 may be required are provided by the method of connecting the same to the bearing members attached to the axle 14 and the transverse rod or bar 43. That is to say, since the bearing elements to which the hanger arms 35 are attached may be shifted along the axle 14, and the bearings supporting the posts or rods 48 may be similarly shifted along the rod or bar 43, it is apparent that the grading members 40 may be adjusted to permit of a relatively approaching or separating movement of either their forward or rear ends to suit any particular conditions of operation. The method of attaching the grading members also enables them to be readily detached and reassembled in forwardly converging relation, as shown in Figure 10, for the ditching operation, the bearing connections for the hanger elements of the graders being shifted along the axle and the rod 43 as above explained.

It is thus apparent that I have provided a practical and efficient apparatus for fulfilling the desired objects of the invention, and that all the necessary operations are provided for in a construction requiring but two supporting wheels and a single axle connecting said wheels, it being apparent, that the rear end portion of the supporting frame is free to rock up and down about the axis of the wheels in response to the varying amount of material encountered by the grading members. It is thus seen that the apparatus is reduced to a very simple form of construction and yet one which fulfills all operating requirements, both as a ditching and levee building machine, and while I have illustrated what is now thought to be the preferred form of construction, I desire to reserve the right to make all such changes or modifications as may fairly fall within the scope of the appended claims.

What I claim is:

1. An apparatus of the character described comprising a frame, a pair of grading members connected to said frame, a pair of wheels supporting said frame, eccentric means operating about the axis of said wheels to vary the elevation of said frame, and means actuated by said first means for imparting to the forward ends of said grading members a still greater extent of raising and lowering movement than that imparted to said frame.

2. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, eccentric members associated with said axle and operable, on turning of the axle, to raise and lower said frame, and means also actuated, on turning of the axle, to impart to the forward ends of said grading members a still greater extent of raising and lowering movement than that imparted to said frame.

3. An apparatus of the character described comprising a frame, a pair of grading members connected to said frame, a pair of wheels supporting said frame, adjusting

means including eccentric elements mounted within the hub portions of the wheels and operating about the axis of said wheels to vary the elevation of said frame, and yielding means cooperating with said eccentric elements in effecting the raising movements of the frame.

4. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, eccentric members associated with said axle and operable, on turning of the axle, to raise and lower said frame, and a spring member connected to said axle and operating to assist in the raising movements of said frame.

5. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, eccentric members associated with said axle and operable, on turning of the axle, to raise and lower said frame, and a draft device provided with a spring connected to said axle and arranged to assist in the raising movements of said frame.

6. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, adjusting means operable, on turning of the axle, to raise and lower said frame, and a draft device provided with flexible connections to said axle and also with a spring connected to said axle and arranged to assist in the raising movements of said frame.

7. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, and adjusting means operative to raise and lower said frame and simultaneously impart raising and lowering movements of still greater extent to said grading members.

8. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, means for turning said axle to adjust the grading members, and connections between said grading members and axle including arms also actuated, on turning of the axle, to raise and lower said grading members relatively to said frame.

9. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, means slidingly connecting the rear ends of said grading members to said frame, and means associated with said axle for raising and lowering the frame and also raising and lowering the forward ends of the grading members relative to the frame.

10. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, means for connecting said grading members to said frame and axle and including crank elements operative to raise and lower the forward ends of the grading members relatively to the frame, said crank elements being adjustable along said axle for varying the distance between said forward ends of the grading members.

11. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, means for connecting said grading members to said frame and axle and including crank elements operative on turning the axle to raise and lower the grading members, and a draft device provided with connections to said axle tending to turn the latter in a direction to lower said grading members.

12. An apparatus of the character described comprising a pair of supporting wheels, a frame provided with a pair of grading members, an axle connecting the said wheels and supporting said frame, and adjusting means including eccentric elements operating within the hub portions of the wheels for raising and lowering the frame and also crank elements connected to said grading members for raising and lowering the latter relatively to the frame.

In witness whereof I hereunto affix my signature.

OSCAR W. SMITH.