May 4, 1943. L. BERNER 2,318,190

EARTH MOVING EQUIPMENT

Filed Nov. 3, 1941 4 Sheets-Sheet 1

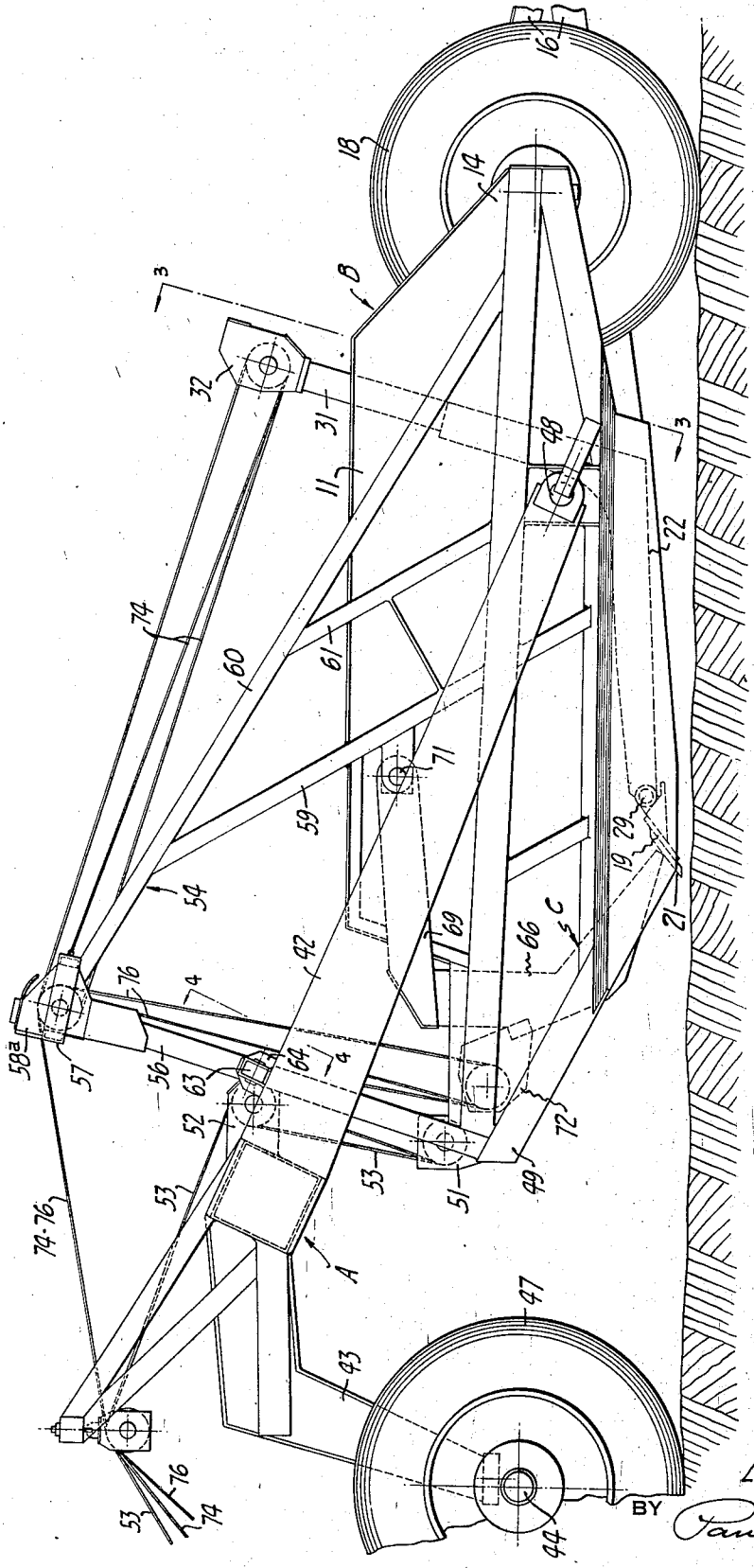


FIG. 1

INVENTOR
Leo Berner
BY Paul D. Fuchs
ATTORNEY

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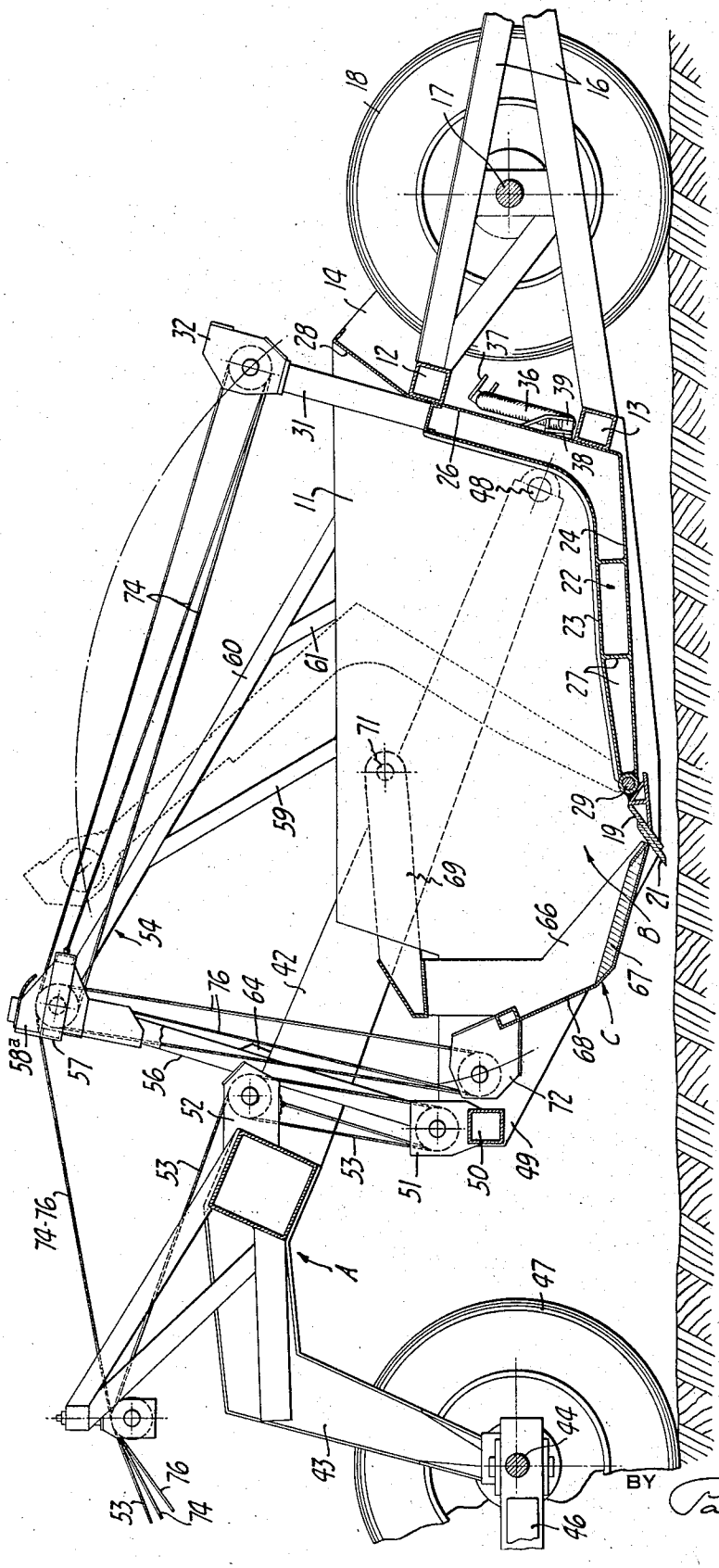


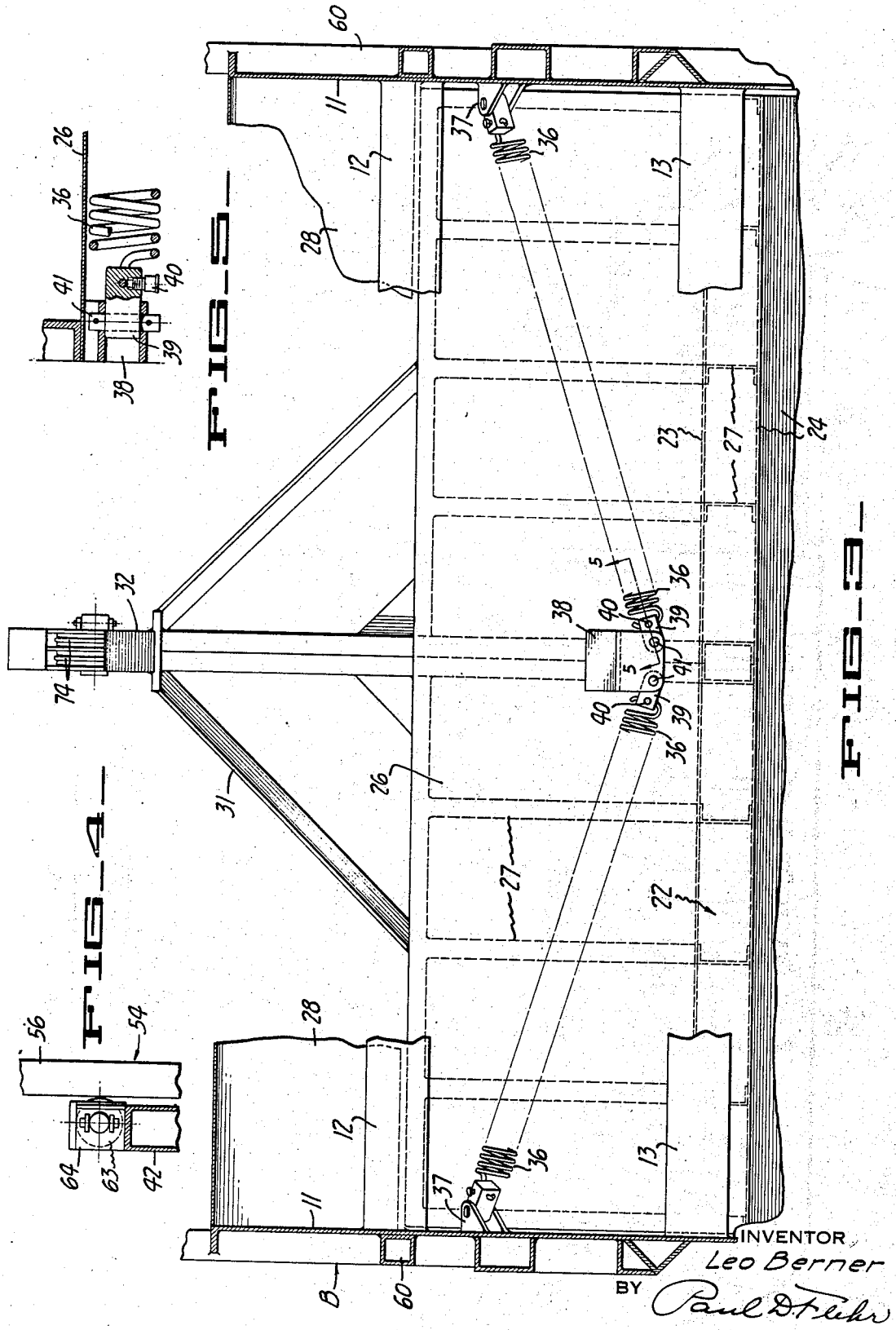
FIG. 2.

INVENTOR
Leo Berner
BY
Paul D. Fitch
ATTORNEY

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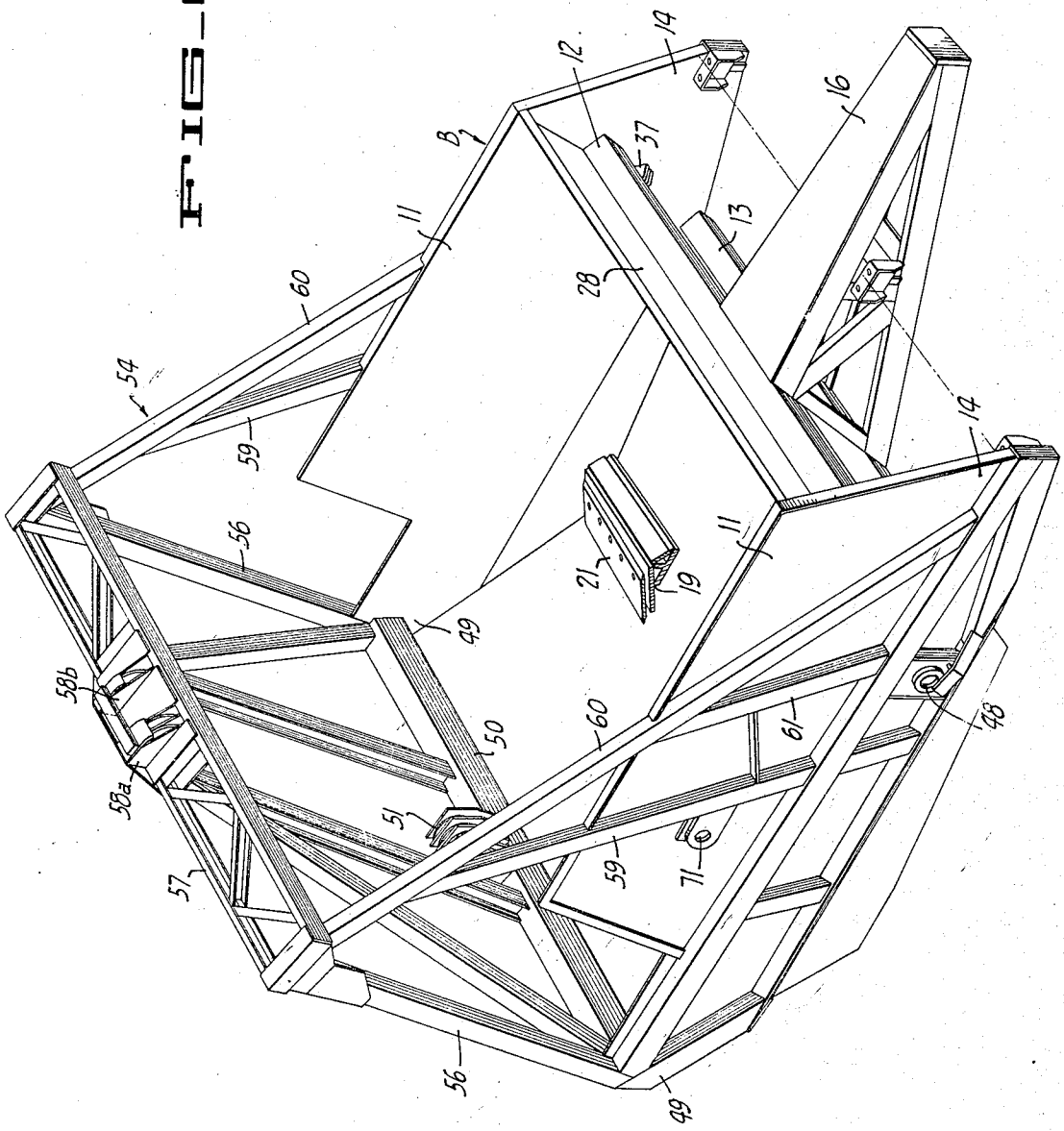


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FIG. 6.



INVENTOR
Leo Berner
BY Paul D. Fuhr
ATTORNEY

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EARTH MOVING EQUIPMENT

Leo Berner, San Jose, Calif., assignor to Wooldridge Manufacturing Company, Sunnyvale, Calif., a corporation of Nevada

Application November 3, 1941, Serial No. 417,637

4 Claims. (Cl. 37—126)

This invention relates generally to earth moving equipment or scrapers of the type utilizing an earth cutting or scraping blade, together with a bowl or like structure for receiving and carrying a load to a point of discharge.

It is an object of the invention to provide improved equipment of the above character, particularly with respect to features serving to simplify and facilitate manufacture and improve operation and general performance. More specifically, the present invention is characterized by an improved and simplified arrangement for insuring proper return of the expeller member for the main bowl, after the expeller has been moved to a discharge operation. The invention also affords an arrangement for guiding the main bowl with respect to the main frame or yoke of the machine, thus preventing severe rubbing contact between certain parts of the machine. In addition, the machine is characterized by an improved reinforced expeller or hinged bottom for the main bowl, which is made in such a manner as to avoid objectionable clinging of earth.

Additional objects and features of the invention will appear from the following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawings:

Figure 1 is a side elevational view illustrating a machine incorporating the present invention;

Figure 2 is a view similar to Figure 1, but in cross section;

Figure 3 is a cross sectional view taken along the line 3—3 of Figure 1;

Figure 4 is a cross sectional detail on an enlarged scale, taken along the line 4—4 of Figure 1;

Figure 5 is a cross sectional detail, showing a suitable attachment for the ends of the springs; and

Figure 6 is a perspective view of the main bowl structure.

The machine illustrated in the drawings includes a main frame A, a main bowl structure B, and a front apron C. The main bowl structure B consists of reinforced steel side walls 11, which are cross connected by the horizontal beams 12 and 13. Also, rear extensions 14 are provided, which in conjunction with the rearwardly extending frames 16, serve to connect to the axle 17 of the rear wheels 18. The side walls of the bowl are also connected by the forward reinforced strut 19 which forms a mounting for the horizontal ground cutting blade 21.

The expelling means for the main bowl consists of a hinged bottom 22, which is adapted to swing upwardly and forwardly to discharge earth over the cutting blade 21. It is formed from steel plates 23, 24 and 26, which are connected together and braced by stiffening ribs 27. Wall 23 forms the bottom of the bowl to carry the load, and when in normal position (Figure 2), it also extends upwardly to form a rear wall for the bowl. A supplemental stationary rear wall 28 extends between the side walls 11, above the beam 12. The forward edge of the hinged bottom or expeller member is provided with a pivotal or hinged connection 29 to the blade mounting 19. The upper edge of the expeller member is provided with a bracket 31, which carries a sheave block 32. As will be presently explained, an operating cable engages the sheave block 32 for swinging the expeller member upwardly and forwardly from load carrying to discharge position.

When the expeller member has moved upwardly and forwardly to its limiting discharge position, shown in dotted lines in Figure 2, it is past dead center position with respect to the axis of the pivotal connection 29. Therefore, it is necessary to provide means for returning the expeller member back past dead center position, when the operator slacks off on the operating cable. In the past, spring arrangements for this purpose have employed a relatively expensive mounting for one or more compression springs, in conjunction with a cable which is pulled to compress the spring. The cable has been connected to the expeller so that the spring is compressed throughout movement of the expeller from the normal load carrying position, to full discharge position. In the present instance, springs are provided which act directly without the use of a pull cable, and the springs are tensioned only as the expeller approaches dead center position.

Referring to Figure 3, my spring arrangement consists of two springs 36 which extend between the reinforced side walls 11, to the rear of the expeller member 22, and between the cross beams 12 and 13. The outer ends of the springs are anchored to brackets 37, mounted on the side walls, and their inner ends are anchored to a bracket 38, mounted centrally upon the upstanding portion of the expeller member 22. The anchorage for the ends of the springs may vary in detail, and as shown in Figure 5, the end of each spring is loosely hooked through an anchor block 39, and can be lubricated by fitting 40. Each of the anchor blocks 39 is in turn carried by a pivot pin 41. The axis of the pivotal connections to brackets 37 on the side walls 11 are preferably in-

clined at an angle of about 45° as shown in Figure 2, to avoid undue twisting of the springs.

With the expeller member 22 in normal load carrying position, springs 36 are either slack or tensioned only a slight amount, so that they offer no resistance to initial upward movement of the expeller. Thus, assuming that the expeller member is being swung from normal to full load discharge position, during the initial major part of such movement there is no substantial back pull exerted by springs 36. However, before the expeller member reaches dead center position, the springs commence to be tensioned, and thereafter the springs continue to be tensioned as the expeller member passes over dead center to its limiting position. This tension suffices to return the expeller member back through dead center position, when the operator slacks off on the cable engaging the sheave block 32.

The main frame A is in the form of a yoke, which includes the side arms 42, and the forward extension 43 which has a ball and socket connection with the front axle 44. This axle also carries a draft bar 46 for attachment to a tractor, and is supported by the front wheels 47. The rear ends of the side arms 42 have pivotal connections 48 with the side walls 11 of the main bowl.

To provide means for raising and lowering the main bowl and the cutting blade, an arrangement of sheaves is provided in conjunction with an operating cable, which applies forces between the main frame and the forward part of the main bowl. Thus, the side walls of the main bowl are provided with forward extensions 49 which are cross connected by the beam 50. Beam 50 carries a sheave block 51, which is located generally below a sheave block 52 mounted upon the main frame A. An operating cable 53 engages the sheaves of blocks 51 and 52, and has its dead end anchored to the frame A. Thus, by pulling or slacking off on cable 53, the height of the cutting blade 21 can be varied, or the bowl may be lifted free of the ground surface.

As a means for guiding the main bowl between the side arms 42 of the frame A, to avoid severe rubbing together of adjacent parts, a supplemental frame 54 is mounted upon the main bowl (Figure 6). This frame 54 includes structural members 56, which have their lower ends secured to the extensions 49, and which extend upwardly in vertical planes. The upper ends of these members are connected by the fabricated cross beam 57, which carries a sheave block 58a and 58b. Bracing members 59, 60 and 61 connect between the cross beam 57 and the side walls 11 of the main bowl.

Normally each structural element 56 is spaced from but relatively close to the inner wall of the adjacent side arm 42, as shown in Figure 4. This spaced relationship is maintained by the use of a guide roller 63, journaled within a housing or box 64, which in turn is mounted upon the adjacent side arm 42. Since the frame 54 is relatively rigid with respect to the main bowl, the main bowl is held in proper alignment between the side arms of the main frame, and therefore springing of the main bowl or the main frame cannot cause rubbing contact between the side walls and the arms of the main frame.

The front apron C is shown formed of side walls 66, attached to the load supporting walls 67 and 68. The side walls are connected to the rearwardly extending arms 69, which in turn have pivotal connections 71 with the reinforced side walls 11 of the main bowl. This front apron also carries a sheave block 72 for engagement with an operating cable.

To briefly describe the arrangement of operating cables, one may either use two operating cables substantially as disclosed in Wooldridge application Serial No. 210,671, filed May 28, 1938, or three operating cables as shown in Clark application Serial No. 300,729, filed October 23, 1939. In this instance three operating cables are shown. One operating cable 53, previously mentioned, connects to a winch drum upon the tractor, whereby it can be pulled or played out to raise or lower the ground cutting blade 21. Another operating cable 74 is reeved through blocks 58a and 32, and is anchored at some convenient point on the secondary frame 54. The third cable 76 is reeved through blocks 58b and 72, and is likewise anchored at a convenient point on the secondary frame 54. Both cables 74 and 76 also extend to winch drums upon the tractor, so that these cables can be independently pulled or played out to either operate the expeller 22, or raise and lower the front apron C. Block 72 is offset to clear block 52.

In general the machine is operated in a manner similar to prior machines of this type. During the taking of a cut, the machine is being pulled forwardly by a tractor, the front apron C is elevated, and the cutting blade 21 is lowered to a position below the ground surface. After considerable dirt has entered the main bowl B, it spills forwardly and is supported partly by the front apron C. After completion of the cut, the front apron C is lowered to its closed position. The load can now be carried to a point of discharge by elevating the main bowl clear of the ground surface. To discharge the load, the operator pulls upon cable 76 to elevate the front apron C, and pull is applied to cable 74 to swing the expeller 22 upwardly and forwardly. As the expeller member 22 approaches dead center position, springs 36 are tensioned so that after complete discharge of a load, the expeller member is pulled back through dead center position and then returns by gravity to its normal load carrying position. Various stresses which may be applied to the machine during operation cannot displace alinement of the bowl with respect to the main frame, because of the guiding action of rollers 63. As previously pointed out, this avoids severe and detrimental rubbing contact which otherwise might occur between certain parts.

The construction of the expeller member 22 makes for a high degree of inherent strength, while at the same time side webs connecting the horizontal and vertical portions of the expeller (as in prior machines) are completely eliminated. Such type webs have been found objectionable in that they cause earth to cling to the expeller, thus decreasing the effective capacity of the machine, and necessitating frequent interruptions of operation for cleaning the expeller.

I claim:

1. In an earth moving machine, a main bowl structure comprising spaced side walls and a forward earth cutting blade extending between the side walls, an expeller member forming a bottom wall for the main bowl structure, means forming a pivotal connection between the forward end of the expeller and the main bowl structure at a point adjacent to but rearwardly of the ground cutting blade, whereby the expeller can be swung upwardly and forwardly from a

normal load carrying position to a full discharge position beyond dead center, a pair of tension springs, and means serving to anchor one end of each spring to a point on the side of the bowl structure and the other end to a point on the expeller adjacent the center of the same, whereby said springs are tensioned when the expeller member is swung upwardly and forwardly.

2. In an earth moving machine, a main bowl structure comprising spaced side walls and a forward ground cutting blade, an expeller for the main bowl structure, said expeller forming a bottom wall for the bowl structure and also an upwardly extending rear wall portion, means forming a pivotal connection between the forward end of the expeller and the main bowl structure, whereby the expeller member can be swung upwardly and forwardly from a load carrying position to a full discharge position, a pair of tension springs located between the side walls and behind said upstanding portion of the expeller member, when the expeller member is in normal load carrying position, and means serving to anchor one end of each spring to a side wall of the main bowl structure, and to a central portion of the expeller, said springs extending downwardly toward the central portion of the expeller when the expeller is in normal load carrying position, whereby no substantial tension is placed upon said springs when the expeller is swung upwardly and forwardly, until the expeller member approaches dead center position with respect to its pivotal axis.

3. In an earth mover, a main yoke-like frame provided with rearwardly extending side arms, wheels serving to support the forward end of the main frame, a main bowl structure provided with spaced side walls, rear wheels serving to support the rear end of the main bowl structure, means forming pivotal connections between the rear ends of the side arms and the side walls of the main bowl structure, a rigid secondary frame carried by the main bowl structure, the secondary frame including structural members extending upwardly in vertical planes from the forward ends of the side walls, and guide rollers mounted upon the side arms and engaging the outer faces of said structural members, whereby said structural members and the entire bowl structure are held in alignment with respect to the main frame.

4. In an earth mover, a main yoke-like frame having side arms, wheels serving to support the forward end of the frame, a main bowl structure comprising upstanding side walls and a forward cutting blade, wheels attached to the rear end of the main bowl structure, means forming pivotal connections between the rear ends of the side arms and the side walls of the bowl structure, forward extensions formed on the side walls of the bowl structure, a secondary frame carried by the bowl structure, the secondary frame including structural elements having their lower ends attached to said extensions and extending upwardly in spaced vertical planes, and guide rollers mounted upon the side arms and engaging the outer faces of said structural members to retain the main bowl structure properly aligned with respect to the main frame.

LEO BERNER.