

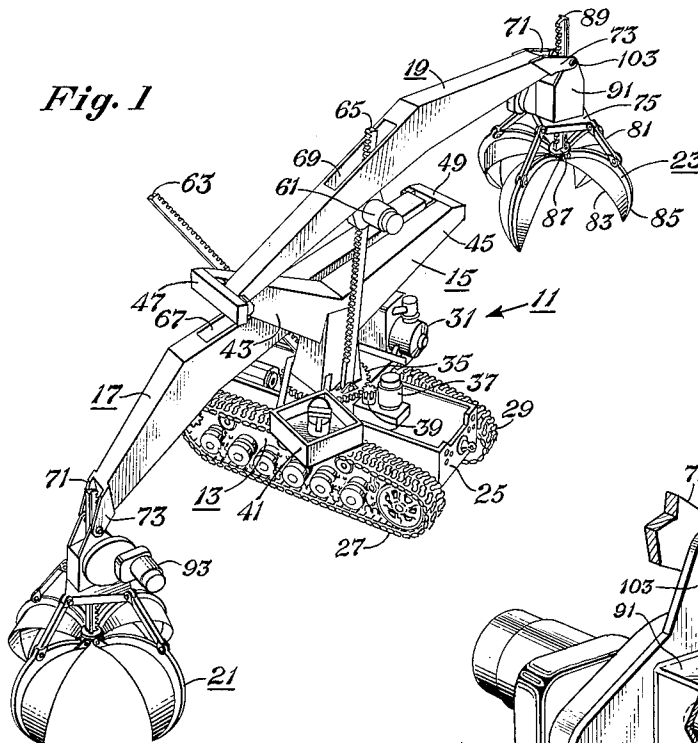
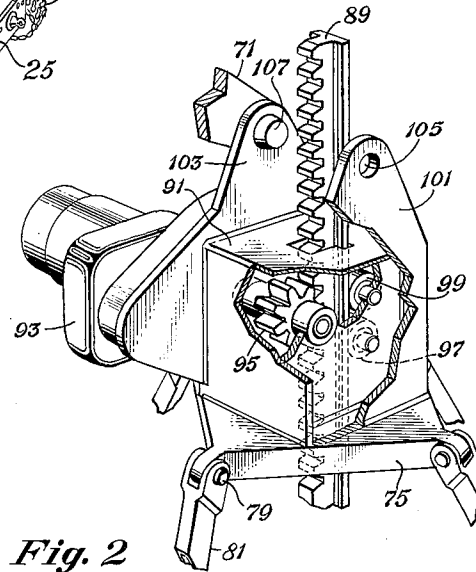
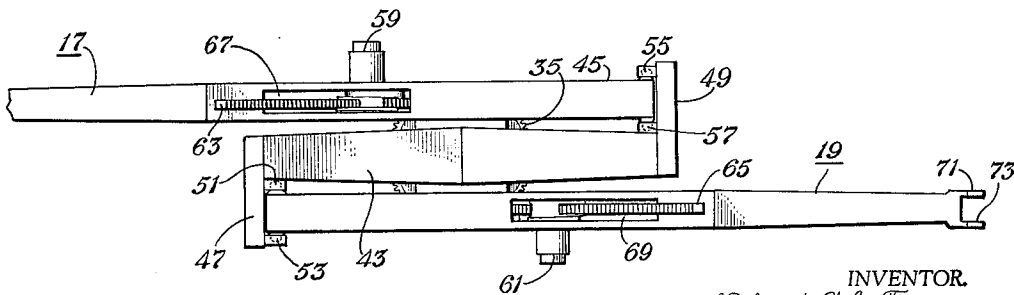
Jan. 25, 1966

R. G. LE TOURNEAU

3,231,114

EARTHWORKING MACHINE

Filed Nov. 26, 1963



INVENTOR.
Robert G. LeTourneau
BY Wm T. Wofford
Attorney

1

3,231,114

EARTHWORKING MACHINE

Robert G. LeTourneau, P.O. Box 2307, Longview, Tex.
Filed Nov. 26, 1963, Ser. No. 325,970
6 Claims. (Cl. 214-132)

My invention relates to earthworking machines and more particularly to such machines that have boom-supported bucket apparatus capable of digging and holding earth materials.

The general object of my invention is to provide an improved earthworking machine of the boom-supported bucket type.

Another object of my invention is to provide an improved earthworking machine of the boom-supported bucket type which shall have significantly increased operating efficiency and economy.

Another object of my invention is to provide improved drive and actuating mechanism for the so-called "orange-peel" bucket type of earth materials digging and holding apparatus.

These and other objects are effected by my invention as will be apparent from the following description taken in accordance with the accompanying drawings, forming a part of this application, in which:

FIG. 1 is a schematic perspective view of an improved earthworking machine in accordance with a preferred embodiment of the present invention;

FIG. 2 is a schematic perspective view, partially in section, of a portion of the operating mechanism of one earth-holding and digging apparatus; and

FIG. 3 is a schematic plan view of the top of the boom structure of the machine of FIG. 1.

Referring to FIG. 1, there is illustrated a self-propelled earthmoving machine 11, including a vehicle portion 13, a Y-type pedestal structure 15, a pair of digger booms 17, 19, and a pair of earth materials digging and holding apparatus 21, 23.

The self-propelled vehicle 13 includes an open, generally rectangular, body portion 25 which is suitably mounted on, and which travels over the ground upon two endless belt devices on tracks 27, 29, as shown in FIG. 1. The vehicle portion 13 supports a prime mover source of motive power 31, and also the Y-type pedestal structure 15. The pedestal structure 15 includes a central vertical tapered column 33 which is supported by the body portion 25 in such a manner that the column is rotatable through 360 degrees, if desired. A bull gear 35 is fixedly mounted to the lower end of the column structure 33 and an electric motor-driven gear motor 37, having an output pinion 39, is suitably mounted on the body portion 25 in such a location that the output pinion 39 drivingly engages the bull gear 35. An operator's control stand and console 41 is also mounted on the body portion 25 in a convenient location near the base of the column 33. A pair of arm structures 43, 45 extend upwardly and outwardly from the top portion of the central vertical column 33, with both arm structures lying in the same vertical plane. A rectangular shaped beam structure 47, 49 is fixed to the upper end of each respective arm structure 43, 45, with each beam structure 47, 49 projecting outwardly from its respective arm and with the beam structures disposed in a counter clockwise arrangement, as viewed in FIG. 3. That is to say, the beam structures 47, 49 project outwardly and generally perpendicularly to their respective arms, and, moreover, they extend outwardly from opposite sides of the central vertical plane of the arm structures, as may be noticed by referring to FIG. 3. One end of each of the digger booms 17, 19 is pivotally mounted on a respective beam structure 47, 49 by means of ball and socket arrangements 51, 53 and 55, 57, may also be noticed by referring to FIG. 3. An electric motor-

2

driven gear-motor and pinion arrangement 59, 61 is fixedly mounted to the underneath side of the digger booms 17, 19 respectively and a length of rack 63, 65, which engages the respective gear-motor and pinion arrangement 59, 61 on each boom, is pivotally connected at the lower end to the bull gear 35, as may be noticed by referring to FIG. 1. Each digger boom 17, 19 has an elongated vertical slot 67, 69 in it, through which the upper end portion of the respective rack 63, 65 so that the boom may freely move. The above gear motor, rack and boom arrangement comprises a means for positively powering each boom, both in the upward and downward directions about its respective pivot. The outer end of the booms 17, 19 is provided with a pair of spaced apart, parallel side or cheek plates 71, 73 in the outer end portion of each of which there is a hole (not shown) for a purpose to be presently explained.

Each of the earth materials digging and holding apparatus 21, 23 includes a head portion 75 (see FIG. 2) which has a generally rectangular shape and an ear-like member 77 formed integrally with and projecting from each corner of the head portion 75. To each ear-like member 77 there is pivotally connected, by means of a pivot pin 79, one end of a connecting rod 81; each connecting rod being pivotally connected at the other end to one of a plurality of blade members 83. Each blade member has the form and shape of a segment of the surface of a generally spherical body, and is very much like a segment of an orange peel. Of course, in one form, each apparatus 21, 23 includes a plurality of such orange-peel type segments blade members and when the apparatus is closed, the adjacent blade members tend to meet along their peripheral edges and form a load-carrying cavity within the apparatus. In another form, the blade members of the apparatus do not meet along their peripheral edges necessarily, but they are, nevertheless, shaped as segments of an orange peel. When this form of apparatus closes, there is a gap between adjacent peripheral blade edges. The back of each blade member is reinforced by a curved bar-like member 85 which may be attached thereto in any suitable manner. It is to the bar-like members 85 that the other end of each connecting rod 81 is pivotally connected, as mentioned before. The upper end of each blade member 83 is pivotally connected to a circular base plate 87 which is also connected to the lower end of a length of rack 89 projects upwardly through the head portion 75 and through a housing 91 to which is fixed an electric motor-driven gear-motor 93, having an output pinion 95 located within the housing 91 which drivingly engages the rack 89. A pair of back-up rollers 97, 99 are suitably journaled in the housing 91 and are disposed to engage the back surface of the rack 89. A pair of opposite side plates 101, 103 of the housing project upwardly between the cheek plates 71, 73 and each has an aperture 105, in the upper portion. The apparatus 21, 23 may be pivotally mounted between the cheek plates 71, 73 by inserting a suitable pivot pin 107 in the matching holes in both the cheek plate and the sides of the housing, as shown in FIG. 2.

Now, to understand the use of the machine 11 and the apparatus 21, 23 reference may be made initially to FIG. 1. In the situation shown therein, the vehicle 13 is in one operative position, and the earth materials digging and holding apparatus 21 is lowered (in a manner to be presently explained) to commence loading while the other similar apparatus 23 is raised and open, having just released the earth material which is held. Now then, to load the apparatus 21 the blade members 85 may be closed simultaneously by operating the gear-motor 93, and the output pinion 95 will then cause the rack 89 to move upward relative to the head portion 75. The blades,

being pivotally connected to the head portion by the connecting rods 81, will move toward each other and seize and hold the earth material. When loaded, the apparatus 21 may be elevated by actuating the gear-motor-pinion arrangement 59. This will cause the gear-motor-pinion arrangement 59, and the boom 17 to which it is fixed, to move relative to the rack 63. Now, since the boom is pivotable at the arm 49, it pivots upwardly about the ball and socket arrangement 55, while the rack 63 pivots about its bottom end and moves in the slot 67. It will be recognized that the boom 19 and apparatus 23 are in the unloaded position which is 180 degrees from the position of the boom 17 and apparatus 21. Now, the operator may actuate the gear-motor 37 and the pinion 39 to cause the bull gear 35 to rotate. In fact, the pedestal structure may be rotated through 180 degrees of arc and, during the rotation, the boom 19 and apparatus 23 may be lowered, by actuating the gear motor pinion arrangement 61, to the position of the boom 17 and apparatus 21, as is shown in FIG. 1. It should be understood, of course, that the load apparatus 21 may be readily emptied simply by reversing the direction of rotation of the gear-motor 93 and pinion 95. The rack 89 will, consequently, move downward and the blades, pivoting about the connecting rods 81, will open and release the earth material held by the apparatus. It should be mentioned that the sequence comprising the steps: closing the blades, elevating the boom and apparatus, rotating the boom and apparatus and opening the blades; may be performed in a smooth continuous cycle. The operation of the machine and these steps need not necessarily be performed as a series of separate maneuvers. It has, however, been convenient to describe the operation as separate steps simply for purposes of explanation.

It is, then, a feature of the present invention that the rack and pinion mechanism provides a positive operational means for opening and closing the blades of the apparatus. Consequently, it is possible to load the apparatus 21, 23 more fully each time, than other apparatus which rely to a large extent upon the force of gravity to close the blades.

Another feature of the present invention is that a pair of similar booms and apparatus are provided so as to load and unload earth material simultaneously. Much valuable time is lost in loading and unloading earth material when only one boom and apparatus is employed, as is customary. In the present invention there are two booms and two apparatus, each of which operates independently of the other. And so, it should be apparent that twice as much earth material may be loaded and unloaded by the machine 11 as by the usual single boom and apparatus type of machine.

Another feature of the present invention is the arrangement of the dual booms and earth materials holding apparatus. It should be apparent, by referring to FIG. 3, that the arrangement of the Y-type pedestal structure and the pivotally mounted booms 17, 19 which move in spaced apart adjacent vertical planes on opposite sides of the plane of the pedestal structure, is efficient and economical.

Another feature of the present invention is that the empty apparatus and its boom act, in some measure, as a counter-balance weight for the loaded apparatus and its boom. Because of this counter-balance feature, the pedestal structure is more easily maneuvered through its operative cycle.

While I have shown my invention in only one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

I claim:

1. A powered earthworking machine comprising:
 - (a) a body portion;
 - (b) a pedestal structure mounted on said body por-

- tion for rotation about a vertical axis, said structure comprising a central vertical column having a pair of arm members extending outwardly in opposite directions and from the upper end of said column;
- (c) a support member fixed to the free end of each said arm member and extending laterally outward therefrom;
- (d) a boom structure pivotally mounted on each said support member for swinging movement in a vertical plane, said boom structures extending in opposite directions;
- (e) means positively powering each said boom structure for movement about its respective pivot;
- (f) an earth materials digging and holding apparatus mounted at the free end of each said boom structure; and
- (g) powered means for rotating said pedestal structure about said vertical axis.
2. A powered earthworking machine comprising:
 - (a) a base portion;
 - (b) a pedestal structure mounted on said base portion for rotation about a vertical axis;
 - (c) a pair of boom structures pivotally mounted on said pedestal structure for swinging movement in a vertical plane, said boom structures, extending from said pedestal structure in opposite directions;
 - (d) means rotatable with said pedestal structure for positively powering each said boom structure for movement both in the upward and downward directions about its respective pivot;
 - (e) an earth materials digging and holding apparatus mounted at the free end of each said boom structure; and
 - (f) powered means for rotating said pedestal structure about said vertical axis.
3. The invention as set forth by claim 2, wherein said earth materials digging and holding apparatus is an orange peel type bucket.
4. The invention as set forth by claim 2, wherein said earth materials digging and holding apparatus is an orange peel type bucket which is positively powered to open and close positions.
5. A powered earthworking machine comprising:
 - (a) a base portion;
 - (b) a pedestal structure mounted on said base portion for rotation about a vertical axis;
 - (c) a plurality of boom structures pivotally mounted on said pedestal structure for swinging movement in a vertical plane, said boom structure extending symmetrically outwardly from said pedestal structure;
 - (d) means rotatable with said pedestal structure for positively powering each said boom structure for movement both in the upward and downward directions about its respective pivot;
 - (e) an earth materials digging and holding apparatus mounted at the free end of each said boom structure; and
 - (f) powered means for rotating said pedestal structure about said vertical axis.
6. A powered earthworking machine comprising:
 - (a) a body portion;
 - (b) a pedestal structure mounted on said body portion for rotation about a vertical axis, said structure including a central vertical column having a pair of arm members extending outwardly in opposite directions from the upper end of said column;
 - (c) a pair of booms, with one end of each boom being pivotally attached to a free end portion of a respective arm member such that said vertical axis is disposed between the ends of a respective boom with said booms being movable in vertical planes;
 - (d) means connected with each boom for powering each said boom structure for movement in its vertical plane;

5

- (e) digging and holding apparatus mounted at the free end of each said boom structure; and
- (f) powered means for rotating said pedestal structure about said vertical axis.

References Cited by the Examiner

UNITED STATES PATENTS

15,875	10/1856	Bourbin	214—132
514,788	2/1894	Symonds	37—186

6

1,170,654	2/1916	Martin	214—132
1,309,846	7/1919	Fotheringham	37—186
1,491,850	4/1924	Doll	214—132
1,603,573	10/1926	Baker	214—147
2,787,390	4/1957	Lloyd	214—147
2,840,254	6/1958	Bevan	214—147
3,023,044	2/1962	Drain et al.	294—88

HUGO O. SCHULZ, *Primary Examiner.*