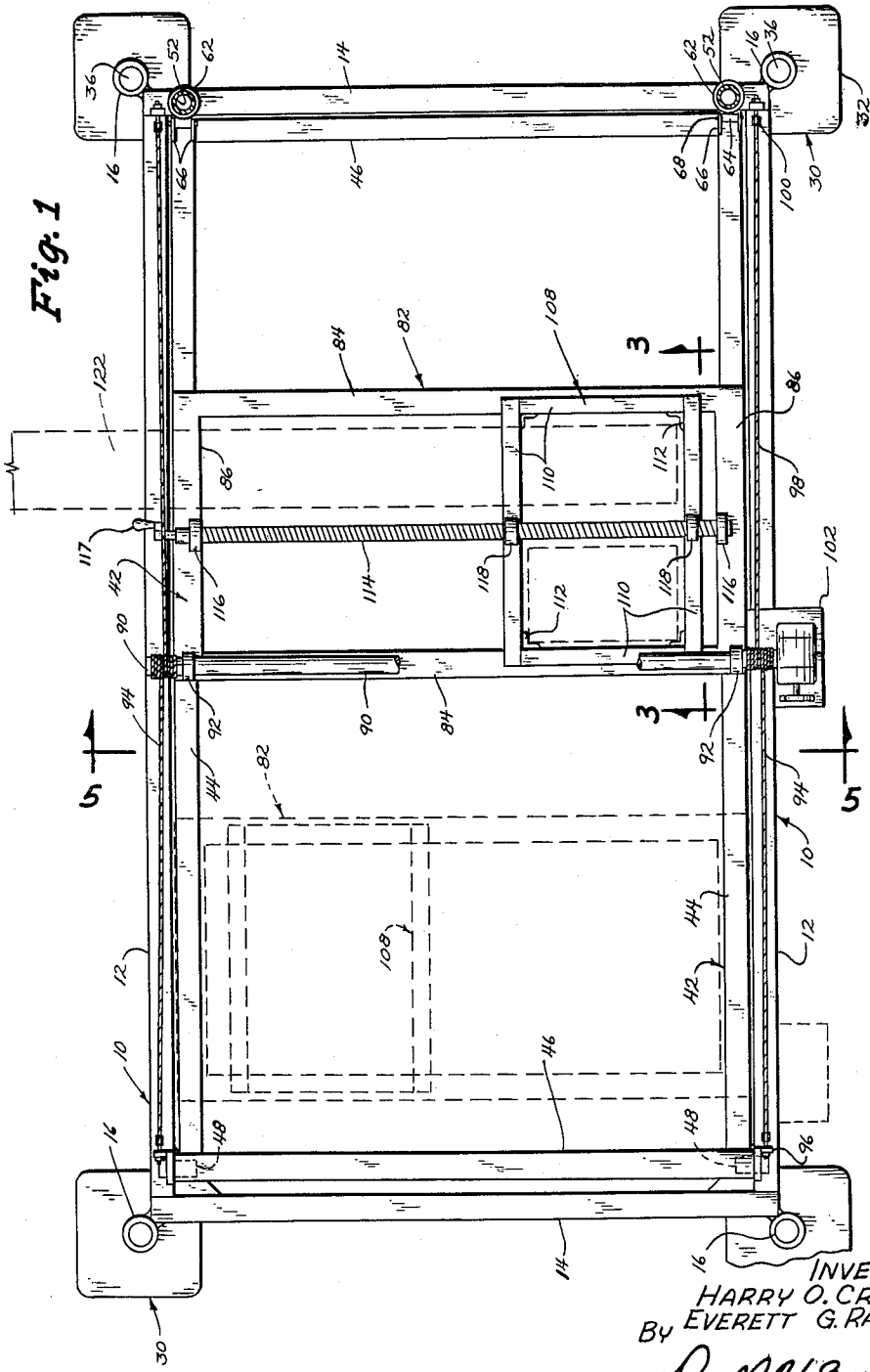
Oct. 22, 1963 H. O. CRUM ET AL 3,107,444

GRAVE DIGGING MACHINE

Filed Jan. 16, 1962 4 Sheets-Sheet 1

Fig. 1



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Fig. 2

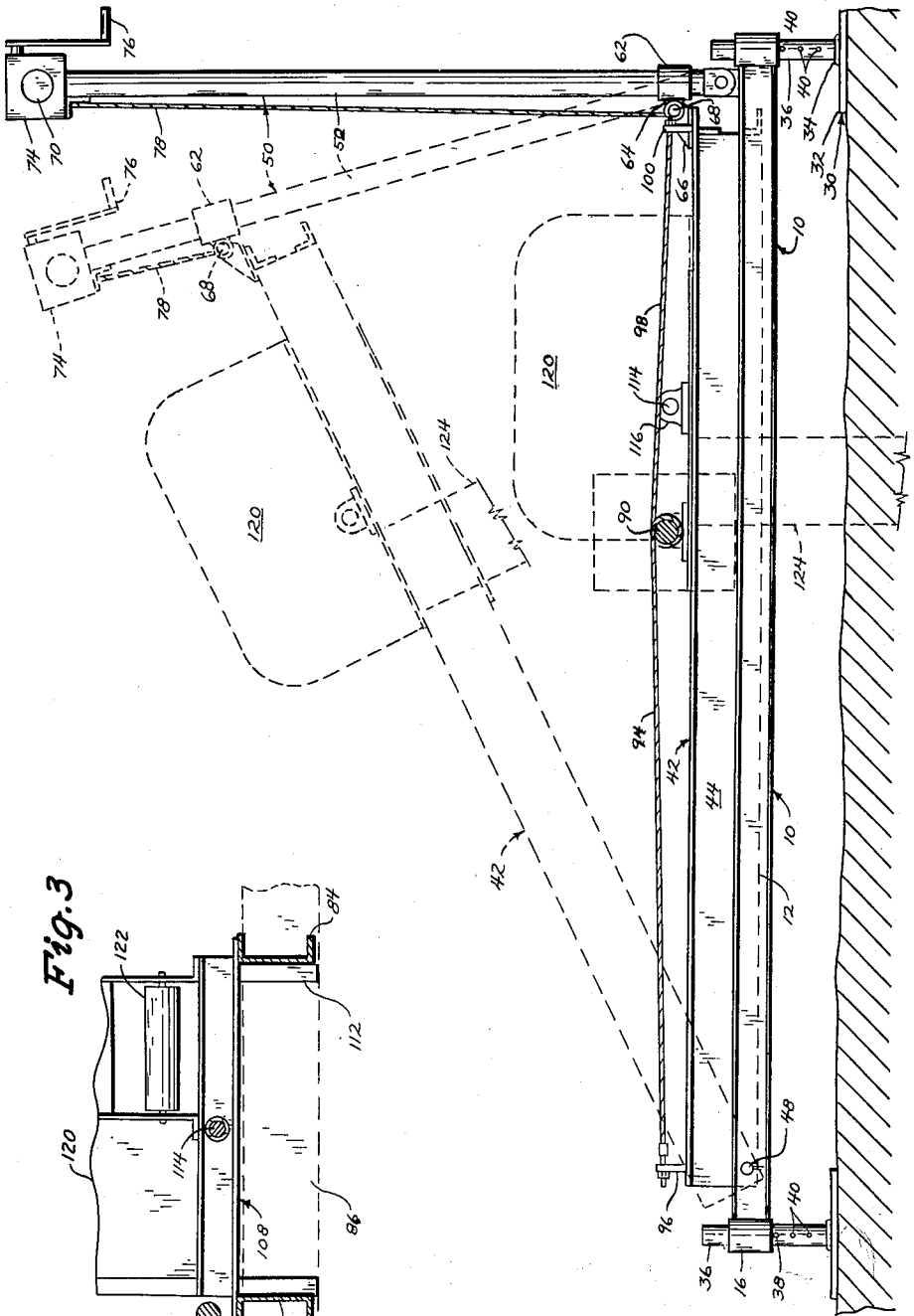


Fig. 3

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GRAVE DIGGING MACHINE

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Fig. 4

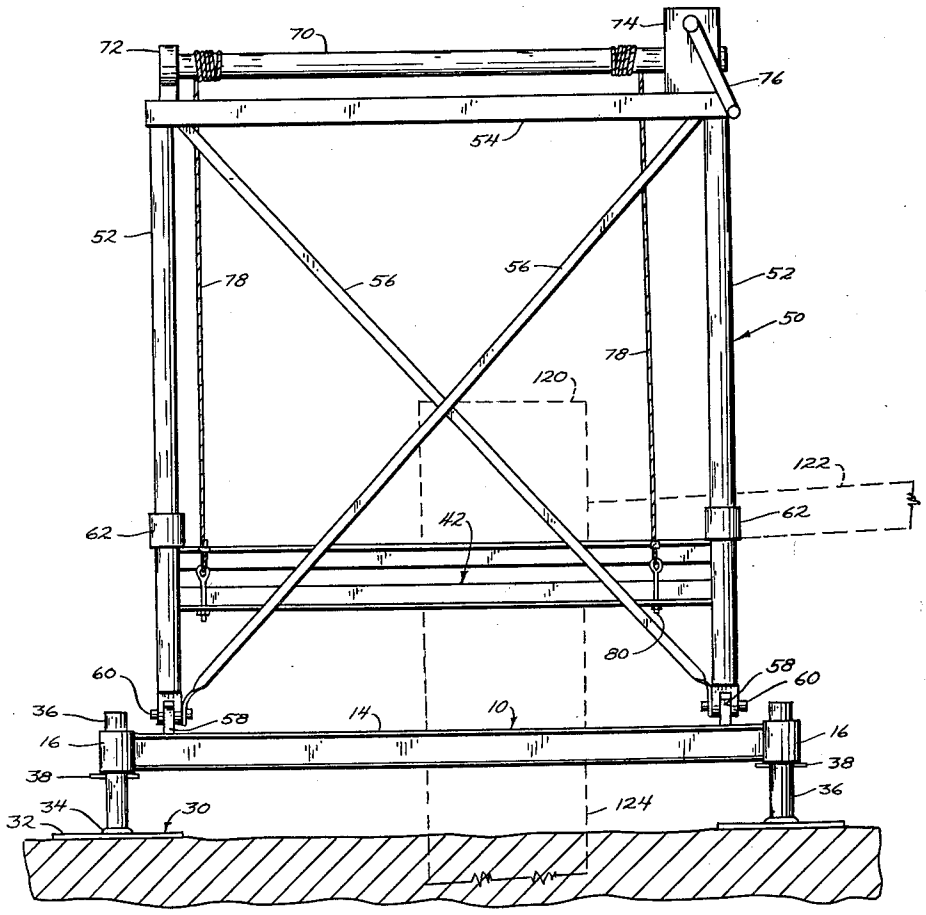
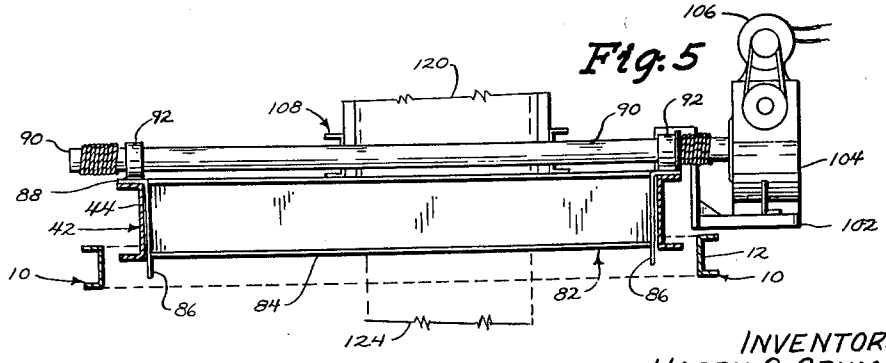


Fig. 5



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Fig. 6

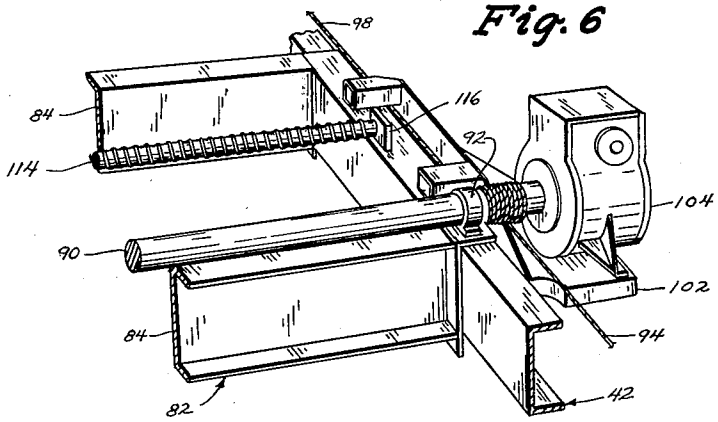


Fig. 7

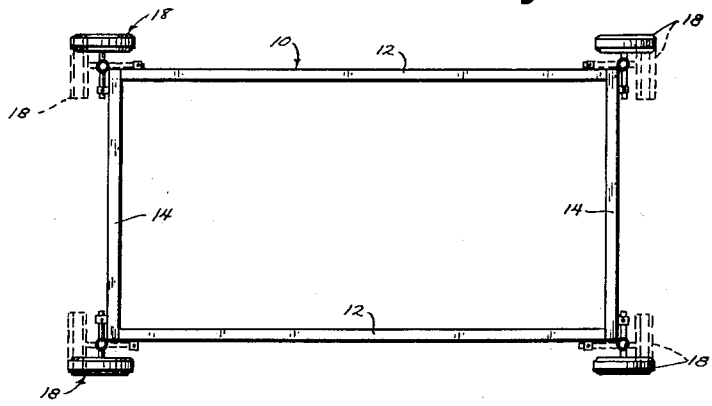


Fig. 8

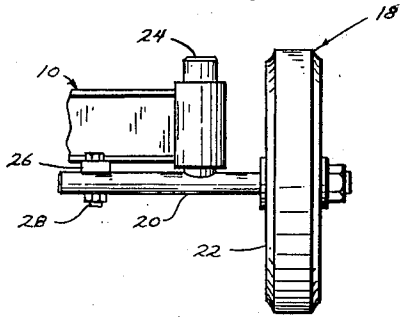
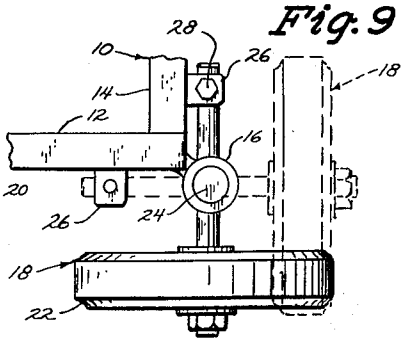


Fig. 9



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3,107,444
GRAVE DIGGING MACHINE

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Filed Jan. 16, 1962, Ser. No. 166,553
11 Claims. (Cl. 37—80)

Our invention relates to a grave digging machine that is particularly adaptable for operating in confined spaces among tombstones and the like in cemeteries.

A principal object of our invention is to provide a grave digging machine that can be easily positioned and leveled over the area where the grave is to be dug.

A further object of our invention is to provide a grave digging machine that can easily open a rectangular opening in the earth without having to remove excess earth adjacent the desired opening.

A still further object of our invention is to provide a grave digging machine that can easily be controlled to dig openings in the earth of varying sizes.

A still further object of our invention is to provide a grave digging machine that can create an opening in the earth with substantially vertical sides and with a substantially level bottom.

A still further object of our invention is to provide a grave digging machine that can easily be moved from place to place.

A still further object of our invention is to provide a grave digging machine that is economical of manufacture, durable in use, and refined in appearance.

These and other objects will be apparent to those skilled in the art.

Our invention consists in the construction, arrangement, and combination, of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in our claims, and illustrated in the accompanying drawings, in which:

FIG. 1 is a plan view of our device after it has been mounted in a level condition over the area where a grave is to be dug;

FIG. 2 is a side elevational view of our device;

FIG. 3 is a partial sectional view of our device taken on line 3—3 of FIG. 1;

FIG. 4 is an end view of our device as it is positioned in FIGS. 1 and 2;

FIG. 5 is a sectional view of our device taken on line 5—5 of FIG. 1;

FIG. 6 is a partial perspective view of our device showing the drive mechanism whereby the digging unit is moved from one end of our unit to the other;

FIG. 7 is a plan view of the outer frame of our device mounted on detachable wheel units;

FIG. 8 is a front elevational view of one of the detachable wheels of our device; and

FIG. 9 is a plan view of one of the detachable wheels of our device.

We have used the numeral 10 to generally designate an outer rectangular frame comprised of two parallel side channels 12 which are welded by their ends to two parallel end channels 14. Vertical sleeves 16 are welded or otherwise secured to the four corners of frame 10. As shown in FIGS. 8 and 9, wheel units 18 are comprised of a horizontal shaft 20 with a conventional wheel 22 rotatably secured to one end thereof. A vertical stud shaft 24 is welded or otherwise secured to the center of shaft 20 and extends upwardly to be detachably received within one of the vertical sleeves 16 on the corners of frame 10. A pair of flanges 26 extend outwardly from frame 10 adjacent each corner thereof. A nut and bolt assembly 28 is adapted to extend through registering apertures in one

of the flanges 26 and one end of horizontal shaft 20 to rigidly secure the wheel unit 18 to frame 10. As shown in FIG. 9, the position of wheel unit 18 can be changed 90 degrees by rotating stud shaft 24 within sleeve 16 so that the horizontal shaft 20 can be detachably secured to the other flange 26.

In FIGS. 1, 2, and 4, frame 10 is shown to be supported on supporting elements 30. Supporting elements 30 are comprised of horizontal metal plates 32 with a ring 34 welded or otherwise secured to the upper center portion thereof. A vertical post 36 has its lower end detachably positioned within ring 34 and extending upwardly through one of the vertical sleeves 16 on frame 10. Pin 38 extends through one of several horizontal apertures 40 in post 36 and the frame 10 is thereupon supported by virtue of the sleeve 16 resting directly on the pins 38. The frame 10 can be raised or lowered to a level position in spite of terrain variations by selecting an appropriate aperture 40 in the vertical post 36 in which pin 38 can support a given corner of the frame.

An inner rectangular frame 42 is comprised of side channels 44 which are welded by their ends to two parallel end channels 46. Frame 42 has a length and width which are both less than the length and width of frame 10. Frame 42 is pivotally secured within frame 10 by pins 48 which pivotally connect one end of frame 42 with the side channel 12 at a point just adjacent one of the end channels 14. Frames 10 and 42 will hereafter be referred to as being pivotally connected at their rearward ends.

An end frame 50 is mounted on the forward end of frame 10. End frame 50 is comprised of vertical posts 52 with a top horizontal cross member 54 welded to and connecting the upper ends of the vertical posts. Diagonal braces 56 extend between and connect opposite ends of the posts 52. The lower ends of posts 52 are split to movably receive ears 58 which are welded or otherwise secured to the channel 14 on the forward end of frame 10. Pins 60 extend through registering holes in the ears 58 and the lower ends of posts 52 to effect the pivotal connection between the end frame 50 and the rectangular frame 10.

A sleeve 62 slidably embraces each of the vertical posts 52 on end frame 50. A depending ear 64 extends away from each of the sleeves 62 and is received between pairs of ears 66 which are welded or otherwise secured to the forward end of inner frame 42. Pins 68 extend through registering apertures in ears 64 and pairs of ears 66 to pivotally connect the sleeve 62 to the frame 42. This connection also effects the pivotal connection between the inner frame 42 and the end frame 50.

A shaft 70 extends in spaced relation over the top of cross member 54 on end frame 50 and has one of its ends supported in bearing element 72. The other end of shaft 70 is rotatably supported within gear box 74 whereupon the shaft can be rotated about its longitudinal axis by the manual operation of crank 76. Cables 78 have one of their ends rigidly secured to the shaft 70 in any convenient manner and the lower ends of these cables are secured to hook elements 80 which are secured in any convenient fashion to the forward end of the inner frame 42. Frame 82 is slidably mounted upon the inner frame 42. Frame 82 is comprised of parallel channels 84 which extend transversely across frame 42. The ends of channels 84 are welded to the inverted L-shaped plates 86. The horizontal flange portions 88 of the inverted L-shaped plates 86 rest on and slidably engage the upper surface of the side channels 44 of the inner frame 42.

A drive shaft 90 extends laterally across the rear end of frame 82 and has its ends rotatably secured in bearing elements 92 which in turn are rigidly secured in any convenient manner to the upper end portions of the rearmost channel 84. Cables 94 have one of their ends

rigidly secured to the extreme ends of drive shaft 90. Several configurations of cables 94 extend around the ends of drive shaft 90 before each of the cables extend rearwardly whereupon they are rigidly secured to hook elements 96 which in turn are rigidly mounted in any convenient manner on the rearward end of inner frame 42. Similarly, one end of cable 98 is rigidly secured to the ends of drive shaft 90. Cables 98 extend around the ends of drive shaft 90 several times before extending forwardly whereupon they are rigidly secured to hook elements 100 which are in turn rigidly secured to the forward end of inner frame 42. A bracket 102 is welded or otherwise secured to one side of frame 82 and extends outwardly therefrom. Gear and clutch mechanism 104 is rigidly secured in any convenient manner to the bracket 102. One end of drive shaft 90 terminates within the gear and clutch mechanism 104 and is operatively secured thereto in conventional fashion. An electric motor 106 is mounted on top of the gear and clutch mechanism 104 and is adapted to provide operational power to the gear and clutch mechanism as well as the drive shaft 90.

An auxiliary frame 108 is mounted on frame 82 for lateral movement therewith. Auxiliary frame 108 is comprised of four flat bars 110 which are arranged in the shape of a rectangle and welded or otherwise secured together in that position. The forward and rearward bars 110 are adapted to be slidably supported on top of the parallel channels 84 of frame 82. Vertical angles 112 can be welded by their upper ends to the inner corners of frame 108 to stabilize the sliding movement of the auxiliary frame with respect to the frame 82. A screw rod 114 extends across auxiliary frame 108 in a lateral direction and is rotatably secured by its ends within bearing elements 116 which are rigidly secured in any convenient fashion to the opposite sides of frame 82. A crank 117 on one end of screw rod 114 enables the screw rod to be rotatably moved within the bearing elements 116. Screw rod 114 also extends through suitable threaded apertures in bearings 118 which are rigidly secured in any convenient fashion to auxiliary frame 108. The engagement of screw rod 114 within the bearings 118 permits the auxiliary frame 108 to be slidably movable on frame 82 whenever crank 117 is actuated to rotate the screw rod 114.

In FIG. 2, we have shown in dotted lines a power mechanism 120 secured in any convenient fashion to the auxiliary frame 108. Power mechanism 120 provides operational power to an elongated conveyor means 122 and to a vertical digging mechanism 124 which are also supported on auxiliary frame 108. We have not shown the details of the power mechanism, the conveyer means or the digging mechanism for the precise details thereof do not constitute a part of our invention. The conveyer means 122 can be of any conventional structure and its function is merely to carry the excavated dirt to a place adjacent the frame 10 away from the digging area. The digging mechanism 124 can be of the conventional elongated ditch digging type of bucket and chain construction, for example, and it is adapted to dig and retrieve the dirt and elevate it to a point where the dirt can be deposited on the conveyer means.

The normal operation of our device is as follows: The inner frame 42 is normally held in the elevated position shown by the dotted lines in FIG. 2 when our device is being moved from place to place. This is to permit the digging mechanism 124 to clear the ground surface. The inner frame 42 is held in this elevated position by the winch mechanism on top of end frame 50 which is represented by shaft 70, bearing element 72, gear box 74, crank 76, and the cables 78 which extend downwardly and are secured to the inner frame 42. The sleeve 62 and related structure complete the connection of end frame 50 and the inner frame 42.

The frame 10 is normally supported on the wheel unit 18 when the device is being positioned preparatory to the digging operation. Because the digging area is often confined by other tombstones and the like, it is often desirable to change at least some of the wheels from the position shown in the solid lines of FIG. 7 to the position shown by the dotted lines in this same figure. The position of the wheel units 18 is changed by removing the nut and bolt assembly 28 from the flanges 26 and the ends of the horizontal shaft 29 and rotating the horizontal shaft 90 degrees until the end thereof moves into a position underneath the other flange 26 on a given corner of frame 10. The nut and bolt assembly 28 are then reinstalled and the wheel unit 18 is then held in this adjusted position. The frame 10 then can be moved easily in a direction which is at right angles to the previous direction of travel. After the frame 10 has been so positioned over the digging area, temporary blocks can then be placed underneath the frame 10 and the wheel units 18 can be removed therefrom by releasing the nut and bolt assemblies 28 and allowing the wheel units to move downwardly out of their pivotal connection in the vertical sleeves 16. The vertical posts 36 of supporting elements 30 are then inserted in each of the sleeves 16 and the frame 10 is then placed in a level condition in the manner described heretofore.

The frame 82 is normally positioned forwardly on inner frame 42 and the auxiliary frame 108 is normally positioned at one extreme end of frame 82. After the frame 10 has been placed in a level condition on supporting elements 30, the crank 76 on end frame 50 is then actuated to lower the inner frame 42 into a level condition within frame 10. This action causes the inner frame 42 and the end frame 50 to move from the position shown by the dotted lines in FIG. 2 to the position shown by the solid lines in that same figure. The digging mechanism is then actuated by the power mechanism 120 as the frame 42 is being lowered so that the digging mechanism will dig itself into the ground as the frame 42 assumes its horizontal position. The electric motor 106 is then actuated as is the gear and clutch mechanism 104 to actuate the drive shaft 90. The rotation of drive shaft 90 in one direction will cause the shaft to wind up cables 94 and to unwind cables 98. This causes the frame 82 to slide in a rearward direction on top of the inner frame 42. With the auxiliary frame 108 positioned on one end of the frame 82 the digging mechanism 124 thereupon digs an opening in the earth substantially the width of the auxiliary frame 108 and substantially the length of the inner frame 42. After this initial cut has taken place, the direction of rotation of drive shaft 90 is reversed by means of gear and clutch mechanism 104 whereupon the frame 82 is returned to its forward position on the forward end of frame 42. The crank 76 on the top of end frame 50 is then actuated to elevate frame 42 back to its initial position with respect to the horizontal frame 10. While the inner frame 42 has once again been returned to its elevated position, the crank 117 on the end of screw rod 114 is then actuated to cause auxiliary frame 108 to slide laterally towards the center of frame 82. Auxiliary frame 108 is moved a sufficient distance towards the center of frame 82 that the digging mechanism 124 assumes a position adjacent the opening that has already been cut. The frame 42 is once again lowered in the manner described so that the digging mechanism will bury itself again. Gear and clutch mechanism 104 is then actuated to cause frame 82 to slide rearwardly on frame 42 and a second cut is thereupon made adjacent the first cut that was made. This operation is then repeated a third time so that a third cut can be made and three cuts normally create a grave opening of satisfactory width. Sometimes an auxiliary digging mechanism is secured to the lower end of digging mechanism 124 after the three cuts have been made and three additional cuts are made to increase the depth of the grave. This, however, does not constitute a part of our invention.

From the foregoing, it is seen that we have provided a grave digging machine that can be easily positioned

and leveled on the digging area. It has further been shown that we have provided means whereby the digging mechanism can easily be inserted into the ground, moved to the cutting area, and then returned to its initial position to permit an additional cut to be made. From the foregoing, it is seen that our device will accomplish at least all of its stated objectives.

Some changes may be made in the construction and arrangement of our grave digging machine without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim:

1. In a grave digging machine,
a lower rectangular frame normally disposed in a horizontal position,
support means on said frame for supporting said frame on a ground surface,
a second rectangular frame pivotally secured by one of its ends to one end of said lower frame,
an end frame pivotally secured by its lower end to the end of said lower frame at the end thereof opposite to the point of pivotal connection between said lower frame and said second frame,
said end frame being normally disposed in a substantially vertical position,
means movably connecting said end frame and said second frame whereby one end of said second frame can be elevated at times with respect to said lower frame,
an earth digging mechanism movably secured on said second frame and extending downwardly therefrom,
and means on said second frame for moving said earth digging mechanism longitudinally on said second frame in a direction either towards or away from said end frame.

2. In a grave digging machine,
a lower rectangular frame normally disposed in a horizontal position,
support means on said frame for supporting said frame on a ground surface,
a second rectangular frame pivotally secured by one of its ends to one end of said lower frame,
an end frame pivotally secured by its lower end to the end of said lower frame at the end thereof opposite to the point of pivotal connection between said lower frame and said second frame,
said end frame being normally disposed in a substantially vertical position,
ond frame whereby one end of said second frame can be elevated at times with respect to said lower frame,
an earth digging mechanism extending downwardly from said second frame,
a frame means on said second frame connecting said digging mechanism thereto,
and means on said second frame for moving said frame means longitudinally thereon in a direction either towards or away from said end frame.

3. The structure of claim 2 wherein the means movably connecting said end frame and said second frame includes means pivotally and slidably connecting said end frame and said second frame.

4. The structure of claim 2 wherein said support means is adjustably and detachably secured to said lower frame.

5. In a grave digging machine,

a lower rectangular frame having forward and rearward ends and normally being disposed in a horizontal position,
support means on said lower frame for supporting said frame on a ground surface,
a second rectangular frame,
means pivotally securing the rearward ends of said lower frame and second frame together,
an end frame normally disposed in a substantially vertical position and pivotally secured by its lower end to the forward end of said lower frame,
sleeve means slidably mounted for vertical movement on said end frame,
means pivotally connecting said sleeve means to the forward end of said second frame,
a winch mechanism on said end frame operatively connected to said second frame for pivoting said second frame with respect to said lower frame at times,
an earth digging mechanism movably secured to and extending downwardly from said second frame,
and means on said second frame for moving said earth digging mechanism longitudinally on said second frame in a direction either towards or away from said end frame.

6. The structure of claim 5 wherein frame means movably connects said digging mechanism and said second frame, and means on said second frame for moving said frame means laterally, forwardly or rearwardly on said second frame.

7. The structure of claim 5 wherein said support means includes wheel elements adjustably removably secured to said lower frame.

8. The structure of claim 5 wherein said support means includes means for leveling said lower frame on a ground surface.

9. The structure of claim 1 wherein said second frame includes parallel side members, and a laterally extending frame is movably supported by and extends between said side members; said earth digging mechanism being secured to said laterally extending frame.

10. The structure of claim 1 wherein said second frame includes parallel side members, and a laterally extending frame is movably supported by and extends between said side members; said earth digging mechanism being movably secured to said laterally extending frame and being adapted for movement thereon in a lateral direction with respect to said second frame.

11. The structure of claim 2 wherein means is secured to said frame means for moving said digging mechanism thereon in a lateral direction with respect to said second frame.

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