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FOUNDATION TRENCHING ATTACHMENT FOR A TRENCHING MACHINE

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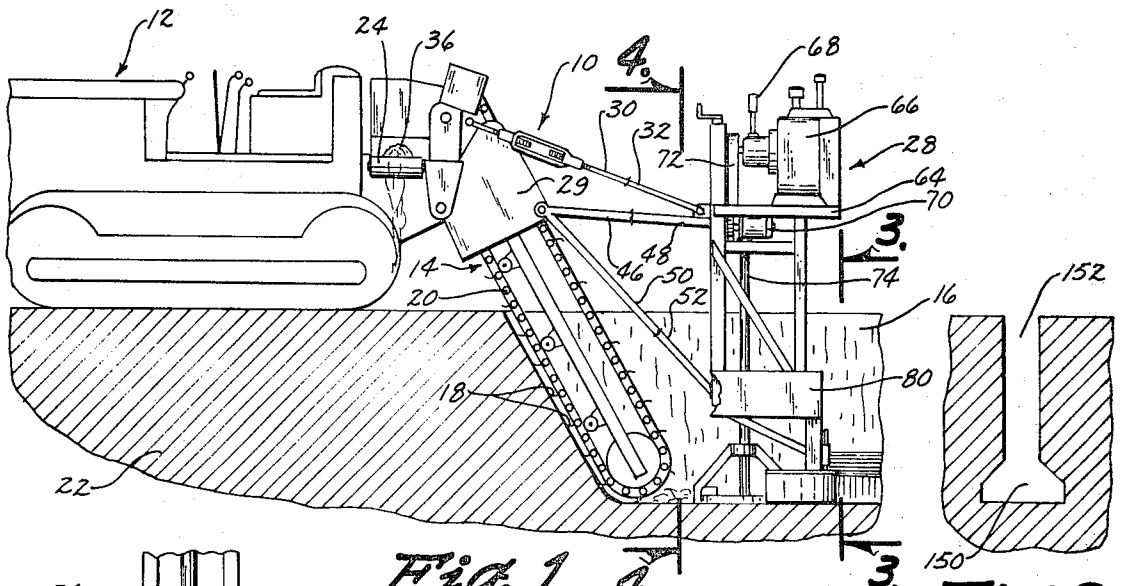


Fig. 1

Fig. 2

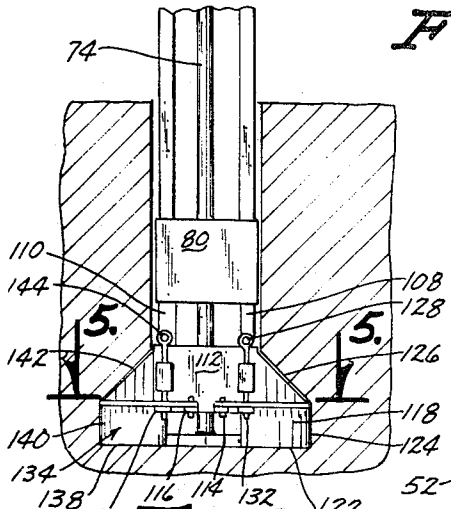


Fig. 3

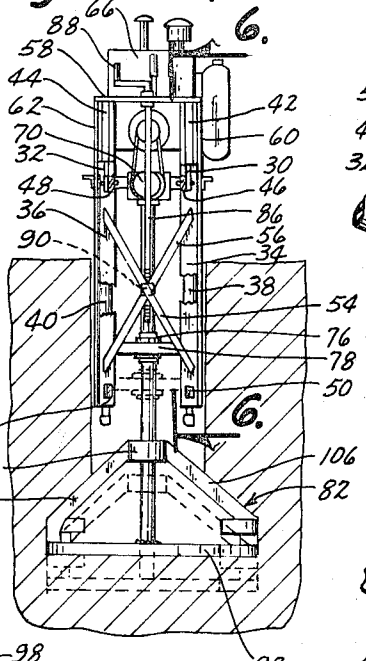


Fig. 4

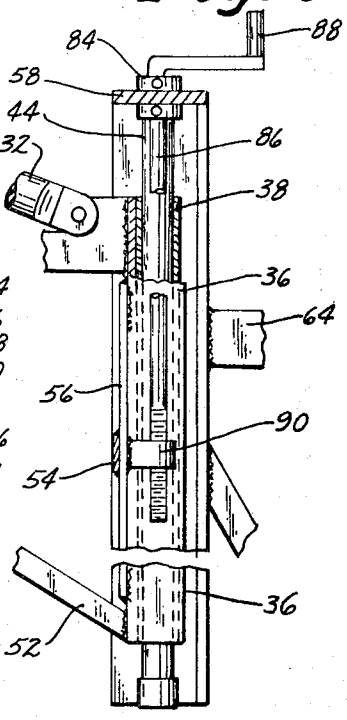


Fig. 6

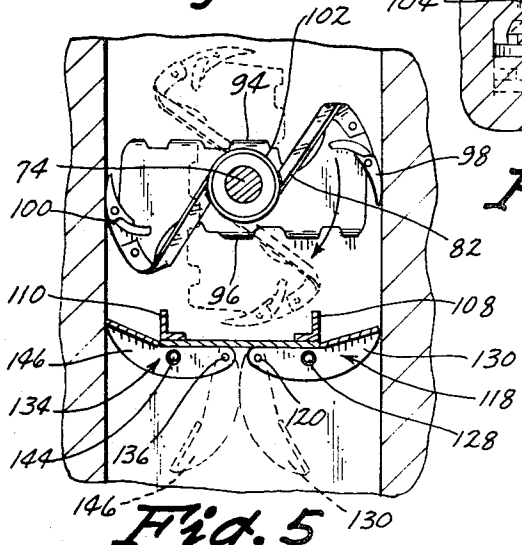


Fig. 5

INVENTORS
KENNETH W. GETHMANN
RUSSELL J. DYE
By
Zarley, McKee & Thomte
ATTORNEYS

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FOUNDATION TRENCHING ATTACHMENT FOR A TRENCHING MACHINE

Kenneth W. Gethmann and Russell J. Dye, Gladbrook, Iowa, assignors to Gethmann Construction Company, Inc., Gladbrook, Iowa, a corporation of Iowa

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U.S. Cl. 37—87 5 Claims

ABSTRACT OF THE DISCLOSURE

A foundation trenching attachment for a trenching machine adapted to widen the bottom of a trench for foundation work. The attachment is mounted on the rearward end of a conventional trenching machine and follows the trenching machine excavator apparatus in the trench formed thereby. The attachment is vertically adjustably movable with respect to the trenching machine and includes a vertically disposed drive shaft having a cutting blade assembly mounted on the lower end thereof. The drive shaft is rotatably powered by an engine means thereby causing the cutting blade assembly to widen the bottom of the trench as the trenching machine moves along its predetermined route. A pivotal gate means is also secured to the attachment rearwardly of the cutting blade assembly and is designed to clear the loose dirt from the widened trench bottom. The cutting blade assembly and the pivotal gate means are movable in the trench from an operative position to an inoperative position so that the attachment may be raised from the trench with the trenching machine excavating apparatus.

Foundation wall trenches normally include a base portion which is wider than the main wall portion of the foundation. Conventional trenching machines are sometimes used to dig the foundation wall trenches but the entire trench must be dug the width of the base. After the footing portion of the foundation wall is poured in the base portion of the trench, a form is installed in the trench which corresponds to the required width of the foundation wall and the concrete is then poured thereinto. After the concrete has hardened, the wall forms are removed and the dirt is filled into the trench at either side of the vertical wall portion of the foundation wall. The operation just described results in separate pouring operations of the footing and the wall portion and also requires that the dirt be back-filled around the vertical wall portion of the foundation.

Some attempts have been made at providing machinery which can dig a trench having a widened bottom portion for foundation walls but these machines have been unsatisfactory due to the complex mechanical nature thereof.

Therefore, it is a principal object of this invention to provide a foundation trenching attachment for a trenching machine.

A further object of this invention is to provide a foundation trenching attachment for a trenching machine which is adapted to widen the bottom of the trench for foundation work.

A further object of this invention is to provide a foundation trenching attachment for a trenching machine which is vertically adjustably movable with respect to the trenching machine.

A further object of this invention is to provide a foundation trenching attachment for a trenching machine which includes means for easily removing the same from the trench.

A further object of this invention is to provide a foundation trenching attachment for a trenching machine which permits the footing and the foundation wall to be poured as an integral unit.

A further object of this invention is to provide a foundation trenching attachment which is easily attached to a conventional trenching machine.

A further object of this invention is to provide a foundation trenching attachment for a trenching machine which cleans the dirt from the widened bottom portion of trench.

A further object of this invention is to provide a foundation trenching attachment for a trenching machine which is refined in appearance, durable in use and economical of manufacture.

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

This invention consists in the construction, arrangements, 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 the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a side view of the attachment secured to the rearward end of a conventional trenching machine, the ground being shown in section;

FIG. 2 is an end view illustrating the configuration of the trench formed by the attachment;

FIG. 3 is an enlarged sectional view as seen along lines 3—3 of FIG. 1;

FIG. 4 is a sectional view as seen along lines 4—4 of FIG. 1, the broken lines indicating the vertical adjustment of the cutting blade assembly;

FIG. 5 is an enlarged sectional view as seen along lines 5—5 of FIG. 3; and

FIG. 6 is an enlarged fragmentary sectional view as seen along lines 6—6 of FIG. 4.

The numerical **10** generally designates a conventional trenching machine or ditch digger which is attached to the rearward end of a vehicle **12** which in this case is a tractor of the crawler type. Machine **10** includes an excavation apparatus **14** which is pivotally connected at its upper end so that the apparatus **14** may be pivoted upwardly out of the trench **16**. Excavation apparatus **14** is of the "endless" type and has a plurality of teeth **18** mounted on a chain means **20**. As viewed in FIG. 1, the chain **20** is rotated in a clockwise direction by a suitable power means such as available on the tractor **12** so that the teeth **18** dig a rectangular trench in the ground **22** and convey the dirt upwardly from the trench to a conveyor means **24** which carries the dirt **26** laterally of the trench. Thus, the tractor **12** moves along its predetermined path and the rotating chain **12** with its teeth **18** mounted thereon digs the trench.

The foundation trenching attachment of this invention is generally designated by the reference numeral **28** and the attachment **28** is pivotally connected to the frame means **29** of machine **10**. A pair of turnbuckle arms **30** and **32** are pivotally connected at their forward ends to machine **10** and are pivotally connected to a pair of vertically disposed angle members **34** and **36** respectively. A pair of pipe bushings **38** and **40** are welded to the rearward side of angle members **34** and **36** respectively and slidably receive shafts **42** and **44** extending therethrough. A pair of braces **46** and **48** are pivotally connected to frame means **29** of machine **10** and are rigidly secured at their rearward ends to angles **34** and **36** respectively, such as by welding or the like. A pair of braces **50** and **52** are also pivotally connected to frame means **29** of machine **10** and are rigidly secured at their lower rearward ends to the lower ends of angle members **34** and **36** respectively by welding or the like. A pair of diagonal braces **54** and **56** are secured to angle members

34 and 36 and extended therebetween as illustrated in FIG. 4 to add stability and rigidity to the device.

A bar 58 is welded to the upper end of shafts 42 and 44 and extends therebetween as illustrated in FIG. 4. A pair of angle members 60 and 62 are welded to the opposite ends of bar 58 and extend downwardly therefrom in a manner so as to receive angle members 34 and 36 respectively. A platform 64 is secured to angle members 60 and 62 and extends rearwardly therefrom and has a power means 66 mounted thereon which may be a gasoline engine or the like. Power means 66 is provided with a clutch lever 68 and drives a gear box 70 by means of a belt 72. Gear box 70 has a drive shaft 74 extending vertically downwardly therefrom as illustrated in FIGS. 1 and 4. Drive shaft 74 rotatably extends through a bearing means 76 which is secured to a brace 78 which is operatively secured at its opposite ends to angle members 60 and 62. The numeral 80 generally designates a shield means which is secured at its forward ends to the lower ends of angle members 60 and 62 and extends therebetween as illustrated in FIGS. 1 and 3. A cutting blade means 82 is secured to the lower end of shaft 74 and is rotated upon the rotation of shaft 74 by the power means 66.

A bearing means 84 is secured to bar 58 and rotatably receives a crank rod 86 extending downwardly therethrough as illustrated in FIG. 6. The upper end of crank rod 86 has a handle means 88 secured thereto for rotation thereof. The lower end of crank rod 86 is threaded and is threadably received by a nut means 90 which is secured to the rearward side of diagonal braces 54 and 56. Thus the rotation of crank rod 86 in one direction will cause crank rod 86 to threadably move in nut 90 thereby causing bar 58, angle members 60 and 62, platform 64 and the structure mounted thereon, gear box 70, drive shaft 74 and cutting blade means 82 to be raised with respect to angle members 34 and 36. In other words, the crank rod 86 can be rotatably moved to raise or lower the cutting blade means 82 with respect to the trenching machine 10. The drive shaft 74 should be vertically disposed and this relationship can be accomplished by rotating the turnbuckles on the turnbuckle rods 30 and 32 in the proper direction thereby causing the pivotal movement of the attachment 28 with respect to the machine 10.

A flat cutting blade 92 is secured to the lower end of drive shaft 74 by welding or the like and is generally rectangular in shape as viewed in FIG. 5. Cutting blade 92 is provided with opposing cutting edges 94 and 96 as viewed in FIG. 5. A pair of cutting teeth 98 and 100 are secured to cutting blade 92 at opposite ends thereof as illustrated in FIG. 5. A collar 102 embraces drive shaft 74 above cutting blade 92 and has a pair of cutting arms 104 and 106 extending downwardly and outwardly therefrom as viewed in FIGS. 4 and 5. The lower ends of cutting arms 104 and 106 are secured to the opposite ends of cutting blade 92 as viewed in FIG. 5.

A pair of angles 108 and 110 are secured to shield 80 and extend downwardly therefrom as illustrated in FIGS. 3 and 5. A plate 112 is secured to angles 108 and 110 and extends therebetween as also illustrated in FIGS. 3 and 5. Plate 112 has a pair of ears 114 and 116 secured to its rearward side which extend rearwardly therefrom as illustrated in FIG. 3. A gate member 118 is pivotally connected to ear member 114 by means of pin 120 and is movable from the position seen in solid lines in FIG. 5 to the position seen in broken lines in FIG. 5. Gate 118 includes a bottom edge 122, a side edge 124 and an inclined edge 126 extending upwardly and inwardly from the upper end of side edge 124 as illustrated in FIG. 3. Gate 118 may be locked in its laterally extending position by means of a pin means 128 which extends through a rearwardly extending portion 130 of gate 118 and through an ear 132 secured to the rearward end of plate 112. A gate 134 is also pivotally connected to plate 132 by means of a pin 136 and may be moved from the position shown in solid lines in FIG. 5 to the position shown by broken lines in FIG. 5. Gate 134 includes a bottom edge 138 side edge 140 and an inclined edge 142 extending inwardly and upwardly from the upper end of side edge 140. Gate 134 may be locked in its laterally extending position by means of a pin means 144 extending through a rearwardly extending portion 146 of gate 134 and through an ear 148 secured to the rearward end of plate 132. The edges 126 and 142 of gates 118 and 134 follow the tapered cutting path of cutting arms 104 and 106.

In operation, the attachment 28 would be lowered into the trench so as to follow the machine 10 in the manner illustrated in FIG. 1. The attachment 28 is adjusted so that drive shaft 74 is vertically disposed by means of the turnbuckle rods 30 and 32 as previously discussed. The crank rod 86 would be rotated in the proper direction to cause the cutting blade means 82 to be positioned in the proper vertical plane. It should be noted that the cutting blade 92 would be manually rotated to the position indicated by broken lines in FIG. 5 at the time the attachment 28 was lowered into the trench. This is necessary since the length of cutting bar 92 is greater than the width of the trench at the upper end thereof. Likewise, the gate 118 and 134 would be pivoted from the position illustrated by solid lines in FIG. 5 to the position illustrated by broken lines in FIG. 5 to facilitate the gate means being received within the trench. This is necessary since the distance between the outer ends of the gates 118 and 134, when extended in a lateral direction, is greater than the width of the trench at the upper end thereof. When the attachment 28 has been positioned in the trench, the power means 66 would be activated to cause the rotation of the cutting blade mechanism 82. After the cutting blade mechanism 82 has been operated for a short time and the machine 10 has been moved a small distance down the trench, the gates 118 and 134 would be moved to the position shown by solid lines in FIG. 5 and would be locked in place by means of the pin means 128 and 144.

The rotation of the cutting blade mechanism 82 causes the bottom of the trench to be widened in the manner illustrated in FIG. 2. The plate 112 and the gates 128 and 134 clean the dirt from the widened bottom portion of the trench and cause the dirt to be pushed forwardly therefrom and to be moved upwardly out of the trench by means of the blades 18. When the trench has been completed, the cutting bar 92 is rotated so that it is positioned in the position illustrated by broken lines in FIG. 5. The gates 118 and 134 are pivoted to their rearwardly extending positions which are shown by broken lines in FIG. 5. The attachment 28 can then be pivotally moved out of the trench simultaneously with the machine 10. The trench which is illustrated in FIG. 2 permits the trench to be used for foundation work and it can be appreciated that the footing portion of the foundation will occupy the space in the trench generally designated by the reference numeral 150 while the wall portion of the foundation will occupy the portion of the trench generally designated by the reference numeral 152. It can also be appreciated that it is not necessary to use concrete forms to form the foundation wall and it can also be appreciated that the instant invention also eliminates the troublesome operation of back-filling dirt around the foundation.

Thus it can be seen from the foregoing that the device accomplishes at least all of its stated objectives.

Some changes may be made in the construction and arrangement of our foundation trenching attachment for a trenching 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 combination,

a powered trenching machine including a trench excavation apparatus thereon for excavating a vertical trench

in the ground having a substantially equal width from its lower to upper ends,

a powered foundation trenching attachment operatively secured to said trenching machine adapted to follow said machine in said trench and adapted to widen the lower end of the trench,

said trenching attachment comprising a frame means which is operatively secured to the excavation apparatus, a vertically disposed drive shaft extending downwardly into the trench, an elongated, rectangular cutting blade means secured at its center to said drive shaft for rotation therewith, the rotation of said drive shaft causing said cutting blade means to widen the lower end of the trench, said cutting blade means being movable by said drive shaft to an inoperative position wherein the longitudinal axis of said cutting blade means is substantially parallel to the trench, said cutting blade means having a horizontal width less than the width of the trench to permit said cutting blade means to be raised upwardly out of said trench when in its inoperative position.

2. The combination of claim 1 wherein a pair of cutting arms extend upwardly and inwardly from the opposite ends of said cutting blade means, the upper ends of said cutting arms being operatively secured to said drive shaft so that said cutting arms form a beveled trench portion extending upwardly and inwardly from the widened portion to said trench.

3. The combination of claim 1 wherein a support means is secured to said frame means behind said cutting blade means, said support means having a width less than the width of said trench, a pair of gates pivotally secured to opposite ends of said support means and being movable from inoperative positions to operative positions, said gates when positioned in their operative positions cooperating with said support means to define a configuration generally similar to the widened, beveled and lower end portion of the trench, said gates when positioned in their operative positions cooperating with said support means to engage and move the dirt from the widened, beveled and lower end portions of the trench, said gates being

pivotally movable to their inoperative positions to permit the support means and gates to be moved upwardly from said trench.

4. The combination of claim 3 wherein said cutting blade means, support means and gates are vertically adjustably movable with respect to said attachment and said machine.

5. The combination of claim 2 wherein said cutting blade means comprises a flat, rectangular blade which is secured at its center to said drive shaft, said blade including opposing cutting edges at its longitudinal sides, said blade having cutting teeth secured thereon at its opposite ends.

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ROBERT E. PULFREY, Primary Examiner

C. D. CROWDER, Assistant Examiner

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