June 26, 1951 G. B. PACE 2,558,692

COMBINED ROOTER AND TRENCH FORMING PLOW

Filed June 20, 1945 4 Sheets-Sheet 1

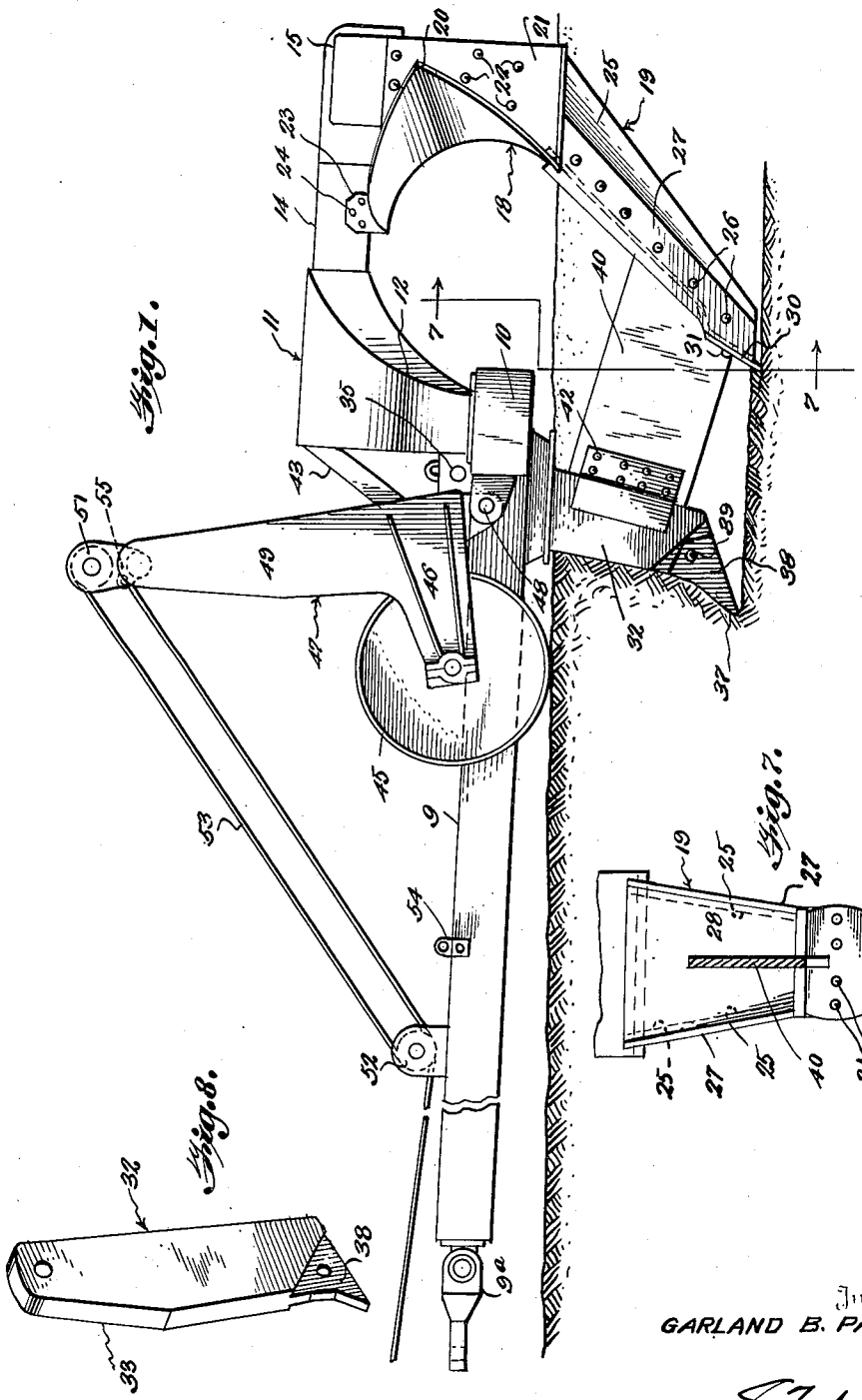


Fig. 1.

Fig. 7.

Fig. 8.

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COMBINED ROOTER AND TRENCH FORMING PLOW

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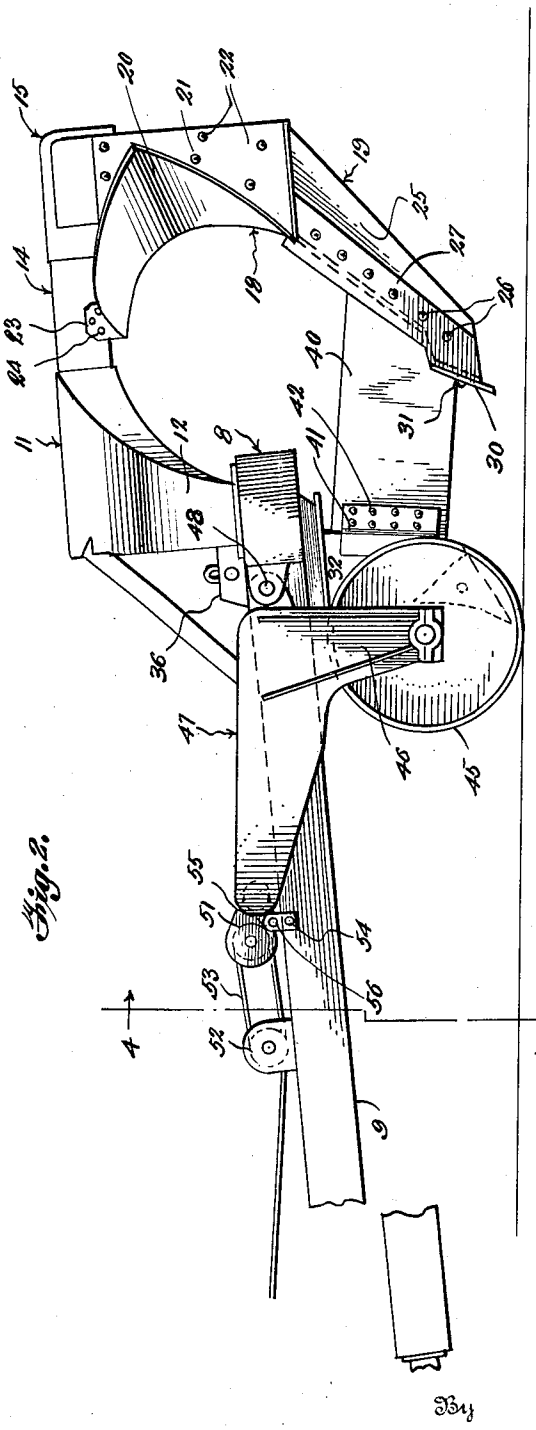


Fig. 2.

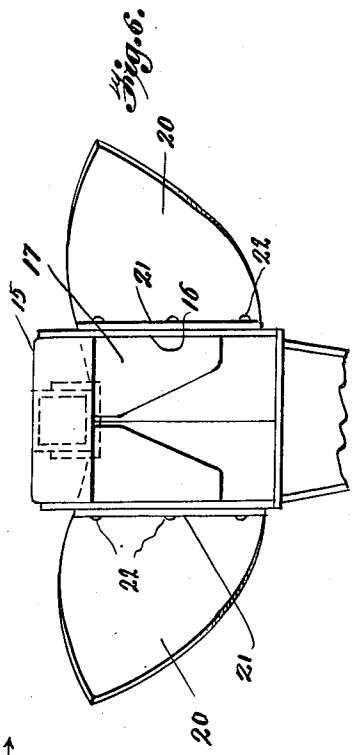


Fig. 6.

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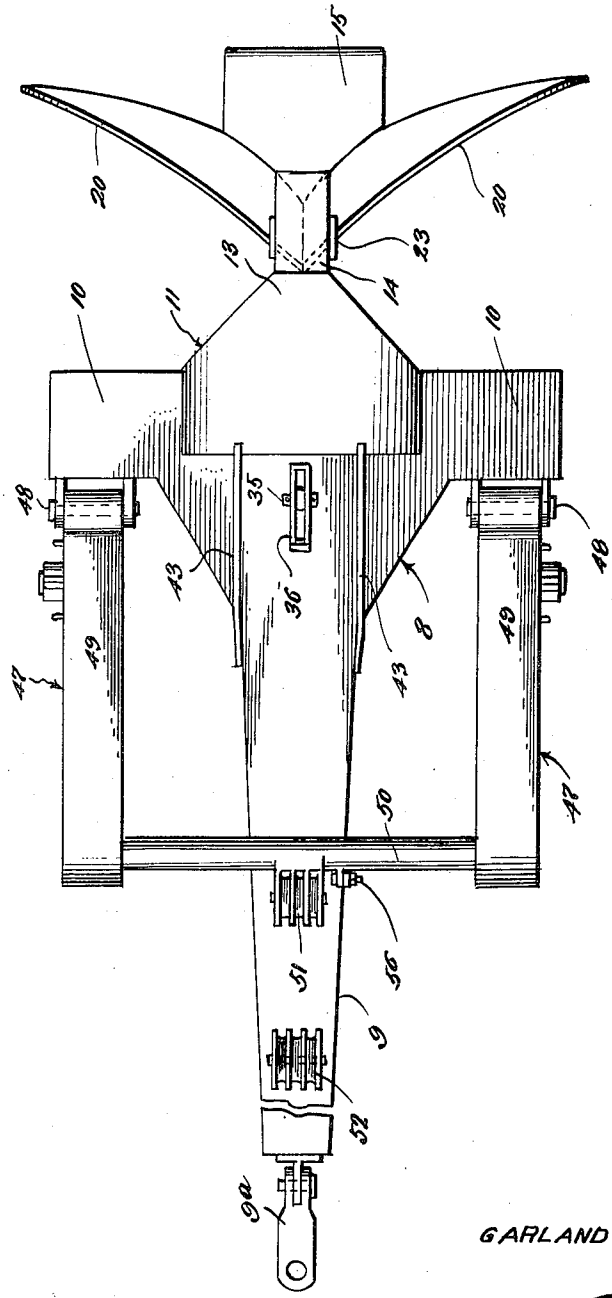
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Fig. 3.



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Fig. 4.

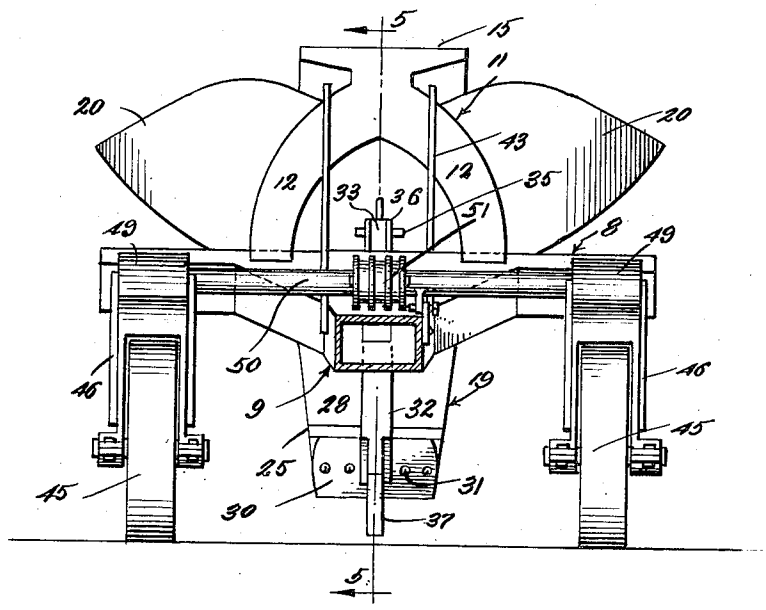
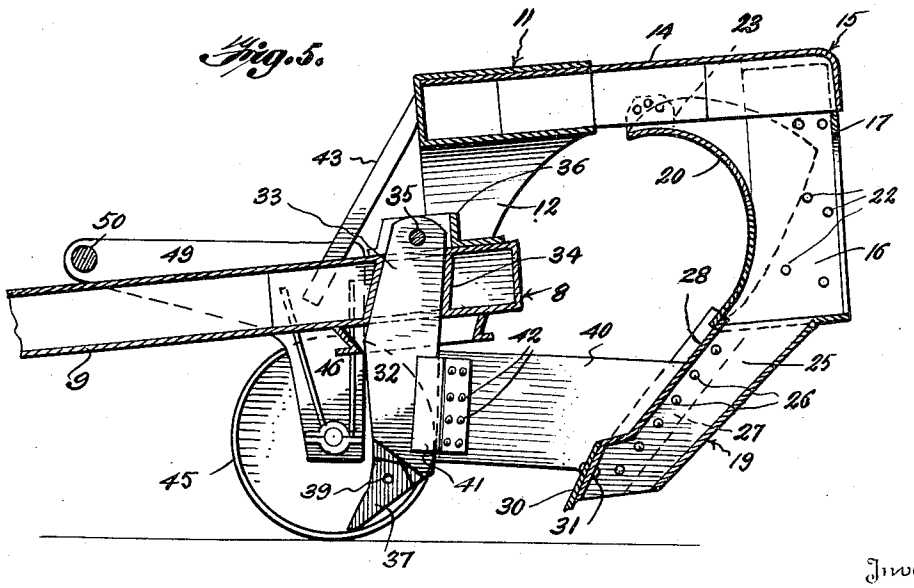


Fig. 5.



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COMBINED ROOTER AND TRENCH FORMING PLOW

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Application June 20, 1945, Serial No. 600,494

3 Claims. (Cl. 37—98)

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This invention relates to improvements in excavating apparatus and more particularly to an apparatus for forming relatively deep trenches to receive pipe lines or the like.

An important object of the invention is to provide a combined rooter and trench forming plow which in a single pass will form a trench of the desired width and depth in rocky or other soil, and at the same time elevate and deposit the excavated material to either side of and at a sufficient distance from the trench to provide operating space for a pipe-laying machine, thereby saving the use of several machines and much time, labor, and expense in forming the trench and the subsequent laying of the pipe.

Another object of the invention is to provide an apparatus of the character specified in which the ground excavating parts are so supported and arranged as to afford free or unobstructed elevation and discharge of the excavated material from the trench.

A further object of the invention is to provide an apparatus of the character indicated wherein the rooter and the trench forming plow may be readily detached from their supporting structures for replacement or reconditioning.

A still further object of the invention is to provide an apparatus of the character specified including a wheeled support which is adjustable to raise and lower the apparatus to inoperative and operative positions and to regulate the operating depths of the rooter and plow.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings which form a part of this specification and wherein a preferred embodiment of the invention is illustrated:

Figure 1 is a side elevation of the apparatus in operative trench forming position.

Figure 2 is a side elevation of the apparatus in inoperative or transporting position.

Figure 3 is a top plan view thereof.

Figure 4 is a transverse vertical section taken substantially on the line 4—4 of Figure 2, looking rearwardly in the direction of the arrows.

Figure 5 is a fragmentary longitudinal section taken substantially on the line 5—5 of Figure 4.

Figure 6 is a fragmentary rear elevation looking forwardly from immediately behind the moldboards.

Figure 7 is a transverse vertical section taken through the combined plow drawbar and distributing plate on the line 7—7 of Figure 1 and looking rearwardly in the direction of the arrows.

Figure 8 is a perspective view of the rooter tooth.

In the drawings, wherein like reference numerals denote like parts throughout, the numeral 8 generally designates the main frame of the apparatus having a forwardly projecting tongue 9 and a lateral extension 10 at each side thereof.

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The free end of the tongue is provided with suitable hitch means 9a adapted to be connected to a tractor or other power means.

A rigid, transversely disposed hollow arch 11 rises centrally from the rear end portion of the frame 8 to which it is permanently secured by welding or other suitable means. As best shown in Figures 1, 3 and 5, the legs 12 of the arch progressively increase in width upwardly and rearwardly and merge into the rearwardly enlarged crown portion 13 in which is anchored a rigid substantially horizontal plow supporting beam 14 that extends an appreciable distance rearwardly beyond the frame 8 and terminates in an enlarged rear end portion 15. The sides of the enlarged rear end portion 15 carry downwardly extending parallel apertured plates 16 joined by a gusset plate 17 and forming an anchoring means to which a trench forming plow generally designated by the numeral 18 is detachably secured in a manner to be presently described.

The plow 18 comprises principally a rearwardly inclined body 19 and rearwardly diverging moldboards 20 rigidly joined in any suitable manner, such as by welding, to the upper end portion of the body 19. The moldboards 20 carry at their rear sides vertically extending apertured attaching plates 21 which are bolted or otherwise detachably connected as at 22 to the side plates 16 depending from the plow beam 14. A U-shaped attaching clamp 23 on the upper forward ends of the moldboards is secured to the sides of the beam 14 by fastening elements 24 to provide additional means to firmly but detachably connect the plow to its supporting beam.

As clearly shown in Figures 4 and 7, the plow body 19 progressively increases in width from its lower end upwardly whereby the sides 25 thereof are downwardly tapered. To the tapering sides are removably secured by fastening elements 26 trench side wall cutter blades 27 whose front edges project forwardly beyond the rearwardly inclined earth elevating front face or surface 28 of the plow body as shown in Figures 1 and 5. A trench bottom cutter blade 30 is bolted as at 31 to the lower end of the plow body 19. Thus, it will be seen that the trench produced by the plow will have downwardly converging side walls and a flat bottom.

For breaking up or displacing rocks, cutting roots and loosening the soil in advance of the plow, there is provided a rooter tooth 32 disposed in longitudinal alignment with the plow. This tooth preferably is in the form of a solid elongated body having a tapered upper end 33 firmly seated in a snugly conforming socket 34 formed in the center of the rear end portion of the main frame 8. As shown in Figure 5, a removable pin 35 supported in a riser 36 and passing through an opening in the upper end of the tooth serves to detachably secure the tooth in place. The

lower end of the rooter tooth may be provided with a detachable tip or point 37 bifurcated to receive the reduced triangular lower terminal 38 of the tooth 32 and secured in place by a pin or bolt 39.

Extending between and connecting the rooter tooth 32 and the plow 18 is a combined drawbar and distributing member 40 in the form of a heavy plate arranged in a vertical plane and of sufficient width to act in conjunction with the rooter tooth and the plow to divide the excavated material into two substantially equal streams. The forward end of the member 40 is detachably connected to the rooter tooth 32 by means of plates 41 on the tooth and bolts 42 passing through the plates and the member 40, and the rear end of the member 40 is welded or otherwise rigidly secured to the center of the earth elevating face 28 of the plow.

The rigidity of the arch and beam structure is increased by diagonal braces 43 secured to the sides of the tongue 9 and the front of the arch 11; and the overall rigidity of the plow in action is assured by the drawbar connection between the plow and the rigidly mounted rooter tooth 32.

By reference to Figure 1, wherein the operative trench forming position of the apparatus is illustrated, it will be seen that the excavated material is first raised to the ground level by the inclined front elevating surface 28 of the plow and is then directed laterally by the unusually large size rearwardly diverging moldboards to be deposited on the ground at substantial distances from the trench so as to offer no interference to the subsequent pipe laying operation. The arrangement of the plow and its supporting means is such that a relatively long and high space is provided for the free or unobstructed movement of the excavated material.

The wheeled support for the apparatus includes ground engaging wheels 45 rotatably mounted in the short arms 46 of bell-crank levers 47 pivoted at 48 to the lateral extensions 10 of the main frame 8. The long arms 49 of the levers 47 are joined by a cross bar 50 which carries a multiple sheave 51 companion to a similar sheave 52 on the forward portion of the tongue 9. An operating cable 53 is trained over the sheaves 51 and 52 and extends forwardly to suitable operating means on the tractor or other power machine whereby the bell-crank levers and hence the ground engaging wheels may be swung to raise and lower the apparatus to inoperative and operative positions.

To secure the apparatus in its transport or inoperative position, the tongue 9 and the cross bar 50 are provided with lugs 54 and 55, respectively, having apertures adapted to be brought into registration for the reception of a locking pin or bolt 56, as shown in Figures 2 and 3.

I claim:

1. An excavating apparatus for forming a trench in a single pass comprising a frame adapted for connection to power means, a rooter tooth fixed to depend from said frame, plow supporting means carried by said frame and projecting rearwardly therefrom at an elevation considerably above said frame, a trench shaping plow suspended from said supporting means in widely spaced trailing relation to said rooter tooth to provide a relatively long and high space for the unobstructed movement of the excavated material, said plow including an inclined earth elevating portion having trench wall shaping cutters at its sides and a trench bottom cutter at its lower end, a wheeled support for said frame, and a rigid vertically disposed plate connected at one end to said rooter tooth and at its opposite end to the inclined earth elevating portion of said plow, said plate acting as a drawbar and also as means to divide the excavated material into two streams.

2. An excavating apparatus for forming a trench in a single pass comprising a substantially horizontal frame adapted for connection to power means, ground engaging wheels supporting said frame for movement along the ground, a rooter tooth fixed to depend from said frame, a substantially horizontal plow supporting beam carried by said frame and projecting rearwardly therefrom at an elevation considerably above said frame, a trench shaping and earth elevating plow suspended from said beam in widely spaced trailing relation to said rooter tooth and said frame to provide a relatively long and high space for the unobstructed movement of the earth loosened by said rooter tooth and operated on by said plow as the apparatus is moved forwardly in operative position, and means for adjusting said ground engaging wheels to regulate the operating depths of said rooter tooth and plow and to elevate said tooth and plow to inoperative positions above the surface of the ground, and a combined drawbar and distributing member extending between and connected to said rooter tooth and said plow.

3. An excavating apparatus for forming a trench in a single pass comprising a substantially horizontal frame adapted for connection to power means, ground engaging wheels supporting said frame for movement along the ground, a rooter tooth fixed to depend from said frame, a substantially horizontal plow supporting beam carried by said frame and projecting rearwardly therefrom at an elevation considerably above said frame, a trench shaping and earth elevating plow suspended from said beam in widely spaced trailing relation to said rooter tooth to provide a relatively long and high space for the unobstructed movement of the earth loosened by said rooter tooth and operated on by said plow as the apparatus is moved forwardly in operative position, said plow including an inclined elevating portion having trench wall shaping cutters at its sides and a trench bottom cutter at its lower end, a rigid vertically disposed plate connected at one end to said rooter tooth and at its opposite end to the inclined elevating portion of said plow, said plate acting as a drawbar and also as means to divide the excavated material into two streams, and rearwardly diverging moldboards on said plow between said inclined elevating portion and said beam for directing the two streams of excavated material laterally to fall clear onto the ground at opposite sides of and at substantial distances from the trench.

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