May 27, 1952 D. J. CARROLL 2,598,350

AUGER TYPE TRENCHING MACHINE

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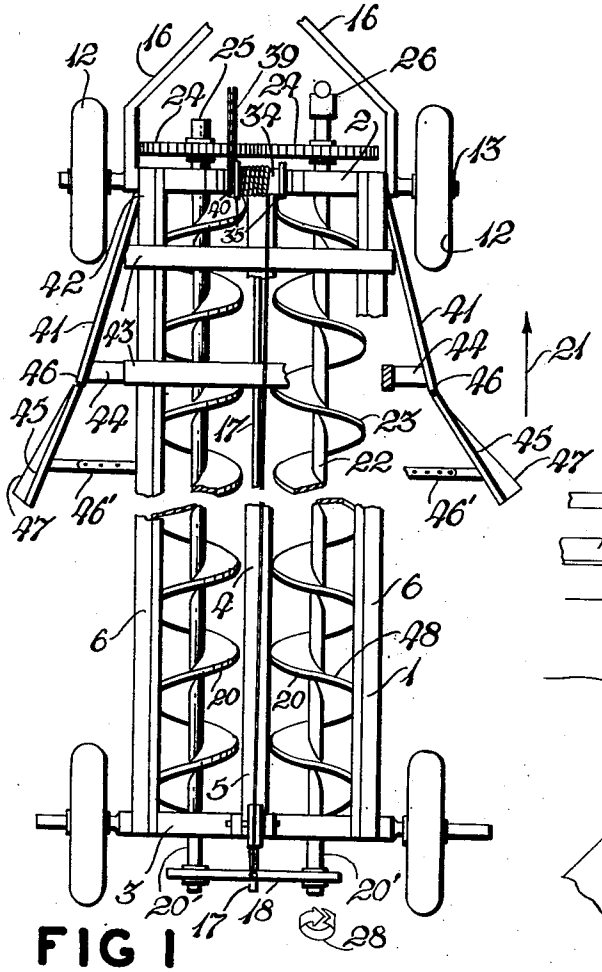


FIG 1

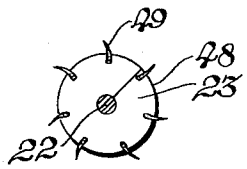


FIG 5

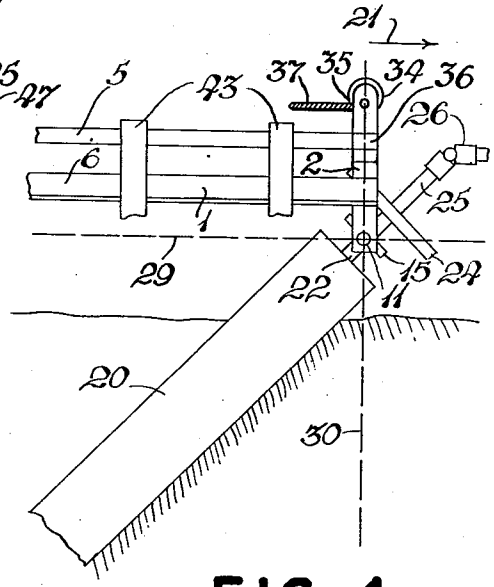


FIG 4

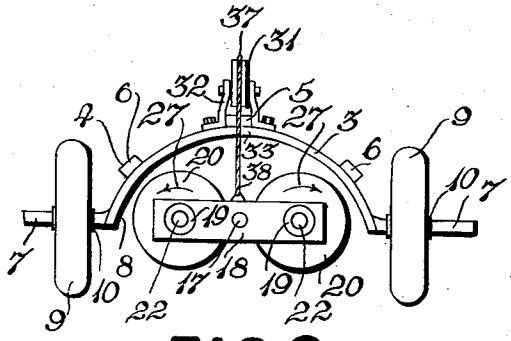


FIG 2

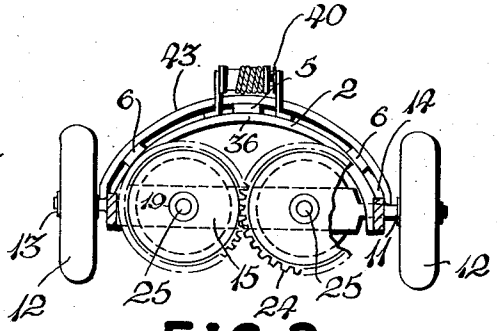


FIG 3

Inventor:
Daniel J. Carroll.
By: Sutherland Asbill & Co
his Atty's.

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# UNITED STATES PATENT OFFICE

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## AUGER TYPE TRENCHING MACHINE

Daniel J. Carroll, Saskatoon, Saskatchewan, Canada

Application May 19, 1949, Serial No. 94,078

1 Claim. (Cl. 37—81)

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My invention relates to new and useful improvements in trenching machines, an object of my invention being to provide a device of the character herewithin described whereby a continuous trench may be formed and the earth removed therefrom as the machine progresses in the direction of travel behind a conventional towing means.

A further object of my invention is to provide a device of the character herewithin described which incorporates a pair of augers rotating in opposite directions thereby eliminating side draft.

A still further object of my invention is to provide a device of the character herewithin described which incorporates means for removing soil to either side of the trench being formed, said means being adjustable as will hereinafter be described.

Another object of my invention is to provide a device of the character herewithin described which includes means whereby the depth of the trench may be varied by a relatively simple adjustment of the machine.

A still further object of my invention is to provide a device of the character herewithin described, the construction of which permits ready transportation of the machine behind a conventional towing means.

A yet further object of my invention is to provide a device of the character herewithin described in which the cutting qualities of the augers are increased by the addition of teeth around the perimeter thereof as will hereinafter be described.

A still further object of my invention is to provide a device of the character herewithin described in which the ground wheels are adjustable as to width depending upon the width of the trench being formed and other considerations.

Yet another object of my invention is to provide a device of the character herewithin described which is adapted to be driven from the power take-off of the towing means, and which is of sturdy construction and otherwise well suited for the purpose for which it is designed.

With the foregoing objects in view, and such other objects and advantages as will become apparent to those skilled in the art to which this invention relates as this specification proceeds, my invention consists essentially in the arrangement and construction of parts all as hereinafter more particularly described, reference being had to the accompanying drawings in which:

Figure 1 is a top plan view of my device fragmented in parts for clarity.

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Figure 2 is an end elevation of the rear portion of my device.

Figure 3 is an end elevation of the front portion of my device with the earth moving boards removed for clarity.

Figure 4 is a schematic representation of the machine shown in the operating position.

Figure 5 is an end elevation of one of the augers.

In the drawings like characters of reference indicate corresponding parts in the different figures.

Conventional soil moving machines normally used for trenching operations take the form of excavating buckets which operate with a dredging action and are therefore considerably bulky and expensive to manufacture. The trenching machine hereinafter to be described incorporates a pair of augers for the trench cutting operation, which augers cut the trench and remove the soil to the surface thereof in advance of the machine whereupon it may be moved to the sides of the machine well clear of the superstructure.

Proceeding therefore to describe my invention in detail it will be seen upon reference to the accompanying drawings that it comprises a mobile superstructure 1 which includes a front and rear semi-circular transverse member 2 and 3 respectively. Longitudinal frame members 4 are secured to the semi-circular members 2 and 3 and extend therebetween, there being in this embodiment, three such members, a centrally disposed member specifically designated 5 and a pair of flank members specifically designated 6.

The rear semi-circular member 3, which in the appended claims I define as an auger over-spanning member, is provided with a pair of stub axles 7 secured to and extending from the extremities 8 thereof upon which is mounted for rotation a pair of ground engaging wheels 9 which are retained between a pair of adjustable collars 10 as clearly shown in Figure 2.

The forward semi-circular member 2 is provided with a pair of rotatable stub axles 11 upon which is mounted for rotation a further pair of ground engaging wheels 12 being retained thereon between a pair of collars 13. Stub axles 11 extend through transverse drillings within the lower ends 14 of the semi-circular member and are connected to an auger shaft carrying plate 15.

A towing yoke 16 is attached as by welding to the aforementioned semi-circular forward member 2 and extends forwardly to be connected to a source of towing (not illustrated). In this connection I wish to point out that the towing yoke

16 should be substantially constructed so that it is capable of supporting the forward end of the superstructure when the front wheels 12 are removed as will hereinafter become apparent.

Extending rearwardly from the aforementioned auger shaft carrying plate 15 and centrally located therein, is a supporting rod or shaft 17 which is secured at the rear end thereof to a further auger shaft carrying plate 18. Bearings 19 are provided, in plates 15 and 18 on either side of the supporting shaft 17, which act as supports for a pair of axially rotatable parallel augers 20 extending from front to rear of the superstructure 1 and between the aforementioned pairs of wheels 9 and 12 which are disposed in spaced line abreast as clearly seen from Figure 1 of the accompanying drawings. In the accompanying claim I have defined the location of the pair of augers 20 as being disposed in parallel with respect to the direction of travel of the superstructure 1 which is indicated by means of the arrow 21.

The augers 20 comprising shafts 22 and auger flight 23 are rotated, when in operation, in opposite directions by means of a pair of spur gears 24 keyed to shafts 22 at the forward ends 25 thereof which extend forwardly through the aforementioned auger shaft carrying plate 15. One of the shafts 24, in this embodiment the right hand shaft with reference to Figure 1, is driven from power take-off of the towing means (not illustrated), a universal joint 26 of conventional construction being provided to permit the drive to be transmitted under varying degrees of misalignment. In at least one of the claims appended hereto I have described the opposite rotation of the augers 20 by stating that the right hand auger rotates clockwise and the left hand auger counter-clockwise when viewed from the rear of the machine. These directions are indicated by means of the arrows 27 in Figure 2 and the strap arrow 28 in Figure 1.

The aforementioned auger shaft carrying plate 15 is supported upon the inner ends of the stub axles 11 which pass through the extremities 14 of the semi-circular members 2 thereby permitting the pair of augers 20 to be lowered at the rear ends thereof pivoting upon stub axles 11. This permits the augers to take up the position shown schematically in Figure 4 of the accompanying drawings, the inclinations being determined by the depth of trench required. In the accompanying claims I have stated that the augers are pivotally connected at the forward ends thereof to the front end of the superstructure 1 for rotation in a vertical plane between the horizontal (indicated by the broken line 29) and adjacent the first inferior quadrant therefrom (which is bounded by the broken vertical line 30). I have provided means for effecting this rotation which takes the form of the aforementioned auger over-spanning member 3 in conjunction with a pulley 31 supported between a pair of brackets 32 secured to the crown 33 of the member 3. A cable drum 34 is journalled between a pair of brackets 35 situated upon the crown 36 of the front semi-circular member 2 and carries a cable 37 windable thereon, one end of which is anchored to the drum, the other end 38 being operatively connected to carrying plate 18 and passes over the aforementioned pulley 31. In this embodiment the end 38 of the cable is secured to the centre of the aforementioned auger shaft carrying plate 18.

The drum 34 is rotated via chain 39 extending between spur gear 40 secured to the drum, and a convenient source of power situated on the towing means. In this connection it should be pointed out that if desired, a conventional pawl and ratchet assembly may be incorporated within the cable drum 34 to prevent the weight of the pair of augers 20 being transferred to the chain 39 when the augers are in the raised position during transportation.

Figure 4 shows the operation of my device schematically in which the augers 20 have been lowered by means of the aforementioned drum 34 and cable 37 so that the rear end is inclined from the horizontal (indicated by the broken line 29). Movement of the assembly in the direction of arrow 21 together with rotation of the augers 20 in opposite directions as indicated by the arrow 27 causes soil to be excavated and elevated towards the front end of the superstructure 1 where it is deposited upon the ground and to each side thereof. In order to clear the soil out of the way of the assembly, I provide a pair of rearwardly diverging earth moving boards 41 one on each side of the superstructure 1 and substantially towards the forward end thereof. These boards are secured to the superstructure 1 as at 42 and are braced in the diverging position shown by a pair of semi-circular frame members 43 extending over the aforementioned longitudinal chassis members 5 and 6, there being anchoring brackets 44 secured to the boards 41. In order that the displacement of earth may be controlled I have provided a pair of hinged rear portions 45 hingedly secured to the rear end 46 of the boards 41 and being braced from the superstructure 1 by means of the adjustable strap 46. In this embodiment I have flared the lower edge 47 of the extension 45 in the form of a mould board to facilitate the movement of soil therepast.

In operation the superstructure is secured behind a tractor or similar towing means by means of the aforementioned towing yoke 16 whereupon the front wheels 12 are removed from the stub axles 11. The weight of the front end of the assembly is supported by means of this towing yoke 16 due to the rigid construction thereof and the attachment to the semi-circular member 2 as hereinbefore described. The rear ends 20' of the augers 20 are lowered to engage with the ground whereupon the augers are rotated in the direction of the arrow 27 as hereinbefore described. This causes the perimeters 48 of the auger flights 23 to commence excavating, the soil being moved forwardly along the flights to be deposited upon either side of the assembly. In this operation, the forward auger shaft carrying plate 15 pivots upon stub axles 11 as hereinbefore described.

The augers are permitted to excavate until the required depth is reached whereupon the augers will be in a position similar to that shown schematically in Figure 4. At this point the winch 34 is operated by means of chain 39 until any slack in cable 37 is taken up whereupon the rear end of the augers 20 is then supported by means of the cable. The superstructure is then moved forwardly by the towing means, the rear wheels 9 engaging with the ground upon each side of the trench. Earth is continually excavated by the augers 20 and deposited at the front of the superstructure and upon each side thereof whereupon it is further cleared from the path of the machine by the aforementioned earth moving boards 41, the rear portions 45 of which are adjusted by means of the straps 46 as hereinbe-

fore described. By this process a continuous trench is formed, the depth of which is maintained and controlled by the aforementioned cable 37 and drum 34.

In order to assist in the excavating of the soil by the auger flights 23 I have shown, in Figure 5, a series of spaced radially disposed teeth 49 upon the perimeters thereof which are curved forwardly in order to effect gouging contact with the ground. These teeth, which may be situated around the perimeter of the forward portions of the auger or throughout the entire length thereof, are preferably detachably secured to the perimeters 48 of the flights 23 by means of bolts, rivets or the like.

When it is desired to move the trenching machine to another location the rear ends of the augers 20 are raised by means of the cable 37 and drum 34 until it assumes the position shown in Figure 2, the front wheels 12 are replaced upon the stub axles 11, the hinged portions 45 of the earth moving boards 41 are closed inwardly towards the superstructure 1 whereupon the machine may be towed behind a truck or tractor as desired, the augers 20 being held clear of the ground or any obstructions thereon.

Since various modifications can be made in my invention as hereinabove described, and many apparently widely different embodiments of same made within the spirit and scope of the claim without departing from such spirit and scope, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

What I claim as my invention is:

A trenching machine including an associated source of power, comprising in combination a mobile superstructure having two pairs of wheels in spaced line abreast, one pair of wheels being at the front end of said superstructure, the other pair of wheels being at the rear end of said superstructure, a towing yoke rigidly secured to the front end of said superstructure and extending forwardly therefrom, an auger assembly pivotally connected by a front auger-shaft carrying plate in which two auger shafts are supported at the forward end thereof, to the front end of said superstructure for rotation in a vertical plane between operative and inoperative positions, stub axles on each end of said front carrying plate, said front pair of wheels being detachably mounted for rotation upon the outer ends of said stub axles, said stub axles being journalled for partial rotation within the side members of said superstructure, a rear auger-shaft carrying plate, said auger-shafts being supported in said rear carrying plate, a centrally located supporting rod mounted between said carrying plates, one of said auger-shafts being on one side of said supporting rod and one upon the other side of said supporting rod, spur gears secured to the front ends of each of said auger-shafts and meshing one with the other, drive means extending between said source of power and one of said auger-shafts, said spur gears constituting means for effecting opposite rotation of said augers, the right hand auger rotating clockwise and the left hand auger rotating counter-clockwise when viewed from the rear ends thereof, and a pair of rearwardly diverging earth moving boards secured to said superstructure, one of said pair of boards being located on each side of said superstructure and at the front end thereof, said boards including hinged rear portions for adjusting the deflecting characteristics thereof.



DANIEL J. CARROLL.


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