Jan. 3, 1967 N. P. OGLESBY ETAL 3,295,232

SPIRAL EARTH REMOVING BLADES AND ROTARY CUTTERS THEREFOR

Filed Nov. 14, 1963

Fig. 1.

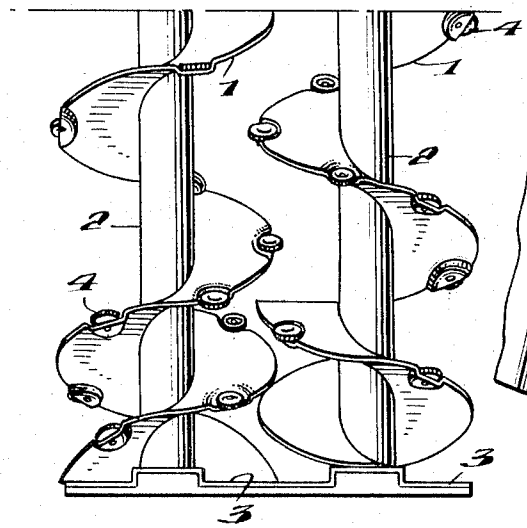



Fig. 2.

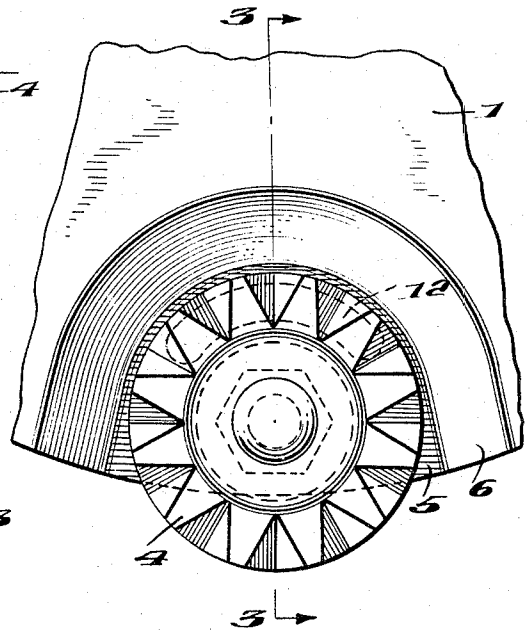



Fig. 3.

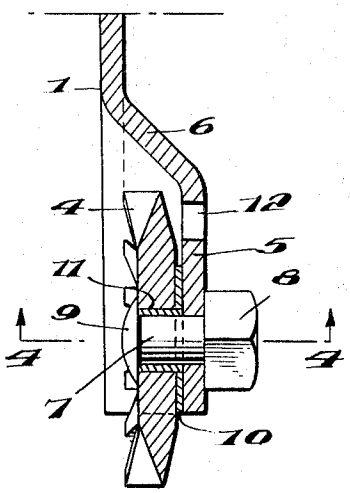
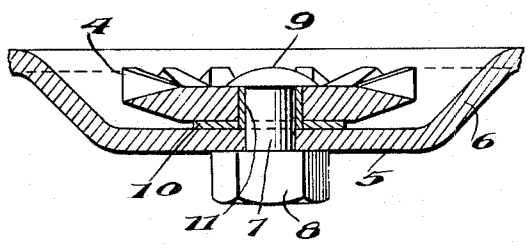



Fig. 4.




INVENTORS

NICHOLAS P. OGLESBY,
HENDERSON LEE TURPIN, JR.,
ROBERT E. FOWLKES,

BY Stone + Mack.

ATTORNEYS

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3,295,232

# SPIRAL EARTH REMOVING BLADES AND ROTARY CUTTERS THEREFOR

Nicholas P. Oglesby, 906 Chalfonte Drive, Alexandria, Va. 22305; and Henderson Lee Turpin, Jr., and Robert E. Fowlkes, both % Wythe County Motors, Inc., Wytheville, Va. 24382

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4 Claims. (Cl. 37—81)

This invention relates to trench digging and earth excavating machinery.

The invention is more particularly concerned with an improved type of cutters and their location on the periphery of a spiral conveyor which is adapted to move loosened earth from excavations in the earth. This improved type of cutter and its mounting is peculiarly adapted to be used in conjunction with the general type of trench digger disclosed in Patent 3,039,208, issued June 19, 1962, to patentees Nicholas P. Oglesby, Henderson Lee Turpin, Jr., and Robert E. Fowlkes.

In the apparatus shown in that patent, there is provided a tractor controlled digging head including a frame and a pair of laterally disposed spiral digger conveyors rotatably supported on said frame. One of the features of the invention of that patent includes sturdy bearing means in the frame for supporting rotatably the upper and lower ends of the spiral digging conveyors, wherein the lower bearing means functions to clean the bottom of the trench. One of the features of the invention of that patent is the provision of simple and dependable tractor operated drive means for imparting opposite direction rotation to the conveyors. A further feature of the invention of that patent is the provision of improved cutting members disposed adjacent the edges of the conveyor flights and which, in operation, move bodily with the flights and simultaneously therewith rotate about their axes.

This present invention relates to an improved mounting for the cutters such as described in said Patent 3,039,208 and the details of the improvement pertain particularly to the mounting of the cutter members in position along the outer marginal surface of the spiral dirt removing blade or conveyor. The specific mounting of the cutters is in countersunk portions of the spiral blade, the result of such positioning below the general surface of the spiral blade resulting in an improvement in the ease in which earthy material is moved upwardly and thus the cutter member dose not block or obstruct the upward movement of the earthy material to be withdrawn from the cutting opening. Thus the mounting of the cutters not only avoids obstruction in the path of the earthy material to be removed, but also the mounting tends to lengthen the life of the cutters and the cutter blades and their teeth.

The foregoing and additional features and advantages of this improvement are described and claimed in the following specification and claims which are illustrated in the accompanying drawings in which:

FIG. 1 is a view in vertical section of a pair of spiral flights adapted to turn in opposite directions and showing the cutter elements along the peripheral edge of each flight similar to the arrangement shown in FIG. 3 of the above Patent 3,039,208. FIG. 1 also shows that the lower end of the flights and their axial supporting elements are positioned on raised portions of a bottom frame;

FIG. 2 is a fragmentary and enlarged view of a portion of one of the spiral conveyor blades showing a cutter extending beyond the edge of the blade and in a countersunk area depressed from the general surface of the blade;

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 2 looking in the direction of the arrows; and

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 3 looking in the direction of the arrows.



Referring in detail to the several figures of the drawing, 1 indicates the spiral blades of the excavating mechanism, the blades on the opposite sides of FIG. 1 being adapted to rotate in opposite directions. 2 are the central shafts for the respective blades, the shafts having power means located above them and not illustrated. 3 is the base plate adapted to be located at the bottom of a trench for the mounting of the lower end of the shafts 2.

4 are the cutter elements mounted on the peripheral edge of the respective conveyor blades 1 and which cutter elements project beyond the peripheral edge. The cutter elements 4 are positioned in countersunk portions of the blades so that the blade surface extends partially across the bottom of each cutter but the cutter projects beyond the peripheral edge of the blade. As shown in FIGS. 2, 3 and 4, the cutters 4 are located so that the bottom 5 of the depressed area in the blade extends over an area substantially the equivalent of the width of the blade.

That portion of the surface of the helical blade extending from the main surface to the depressed portion 5 is indicated at 6 as a diagonal area leading to the base of the depressed portion 5.

The cutters 4 are mounted in the respective depressed portions by means of bolts 7 which extend through the thickness of the cutter and the depressed portions 5 and serve as axes on which the cutters may rotate. Each bolt 7 has a nut immediately beneath the depressed surface 5 and at its upper end each bolt is provided with a suitable rounded head 9, the edge portions of which engage the upper and central surface of the cutter members.

Between the under surface of the cutters 4 and the upper surface of the portions 5 there is a suitable washer 10 serving as a flat bushing. Likewise a sleeve bushing 11 is provided between the shank of the bolt 7 and the adjacent inner wall of each of the cutters 4.

An opening 12 is provided through the wall of the conveyor and beneath the cutter whereby to relieve the soil build up which might otherwise tend to collect beneath the cutter. This opening 12 is in the nature of an arcuate slot lying beneath the cutter teeth and extending for approximately one-third of the travel of the cutter as will be seen by reference to FIG. 2 in which the edge of the slot is indicated.

From the foregoing description, it will be noted that the cutters and their mounting by means of bolts passing through the thickness of the spiral blades 1 provides a construction in which the cutter is entirely below the blades 1. Heretofore the cutter elements have been located above the upper surface of the blades 1 and also cutters have been provided lying in the same spiral plane with the blades 1. This present improvement differs from such prior arrangements in that the mounting of the cutter knives is located in zones which are depressed downwardly from the upper surface of the spiral blades and yet the space above the cutter elements 4 is unobstructed and the movement of earthy material is not inhibited.

We claim:

1. In an earth digging machine, a shaft adapted to be turned on its longitudinal axis and having an earth moving spiral blade extending lengthwise thereof and laterally outwardly, a plurality of cutter elements mounted on the peripheral edge of said spiral blade, said cutter elements being countersunk in the surface of said spiral blade and each being rotatably mounted on an axial pin, the full height of each cuter element being below the uppermost edge of the wall of the spiral blade whereby the entire cutter element is countersunk, said blade being provided with a depressed area beneath each cutter element and is unobstructed above each said cutter element.

2. In an earth digging machine, a shaft adapted to be turned on its longitudinal axis and having an earth moving spiral blade extending lengthwise thereof and laterally

outwardly, a plurality of cutter elements mounted on the peripheral edge of said spiral blade, said cutter elements being countersunk in the surface of said spiral blade and each being rotatably mounted on an axial pin, said blade being provided with a depressed area beneath each cutter element and is unobstructed above each said cutter element, the full height of each cutter element being below the uppermost edge of the wall of the spiral blade whereby the entire cutter element is countersunk, said axial pin for each cutter element being secured at one end to said blade in the countersunk area thereof and projecting upwardly therefrom susbtantially parallel to and lengthwise of the axis of said spiral blade.

**3.** In an earth digging machine, a shaft adapted to be turned on its longitudinal axis and having an earth moving spiral blade extending lengthwise thereof and laterally outwardly, a plurality of cutter elements mounted on the peripheral edge of said spiral blade, said cutter elements being countersunk in the surface of said spiral blade and each being rotatably mounted on an axial pin, said blade being provided with a depressed area beneath each cutter element and is unobstructed above each said cutter element, the full height of each cutter element being below the uppermost edge of the wall of the spiral blade whereby the entire cutter element is countersunk, said blade being provided with openings therethrough from top to bottom beneath each of said cutter elements whereby soil is permitted to escape through said blade.

**4.** In an earth digging machine, a shaft adapted to be turned on its longitudinal axis and having an earth moving spiral blade extending lengthwise thereof and laterally outwardly, a plurality of cutter elements mounted on the peripheral edge of said spiral blade, said cutter elements being countersunk in the surface of said spiral blade and each being rotatably mounted on an axial pin, said blade being provided with a depressed area beneath each cutter element and is unobstructed above each said cutter element, said axial pin for each cutter element being secured at one end to said blade in the countersunk area thereof and projecting upwardly therefrom substantially parallel to and lengthwise of the axis of said spiral blade, the full height of each cutter element being below the uppermost edge of the wall of the spiral blade whereby the entire cutter element is countersunk, said blade being provided with arcuate openings therethrough from top to bottom beneath each of said cutter elements whereby soil is permitted to escape through said blade.




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ABRAHAM G. STONE, *Primary Examiner.*

WILLIAM A. SMITH III, *Examiner.*