Aug. 15, 1950 F. J. SCHMIDT 2,519,076

TRENCH DIGGER BLADE CONSTRUCTION

Original Filed June 20, 1947 2 Sheets-Sheet 1

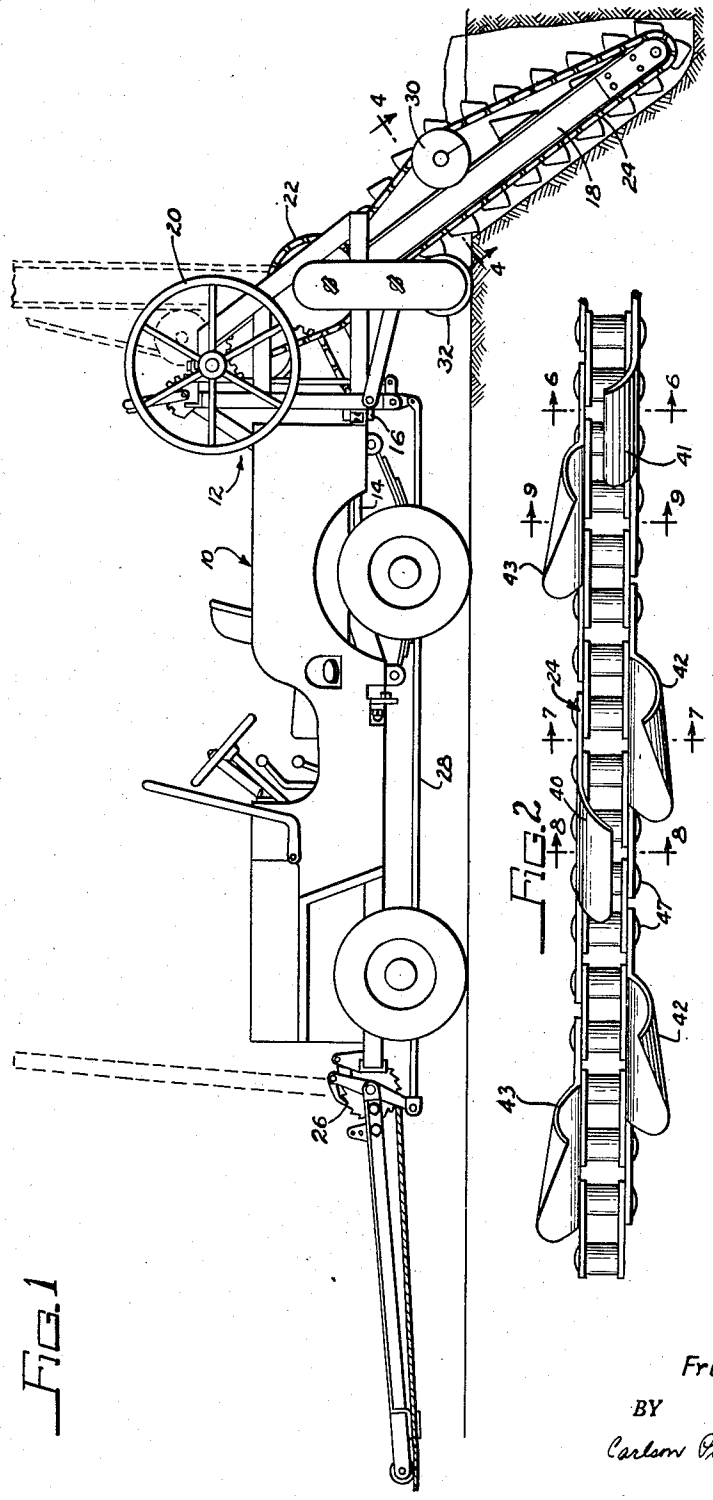


FIG. 1

FIG. 2

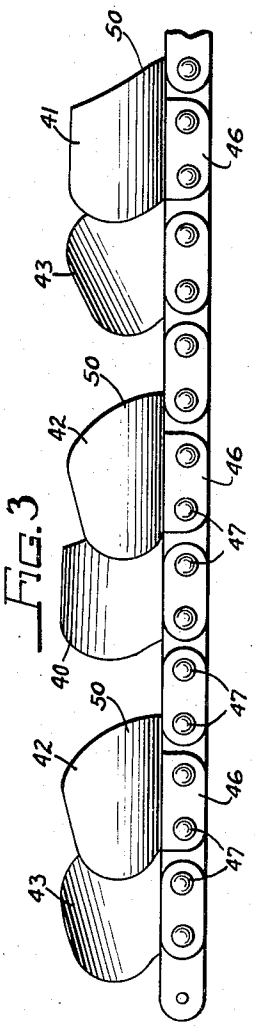


FIG. 3

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FIG. 1a

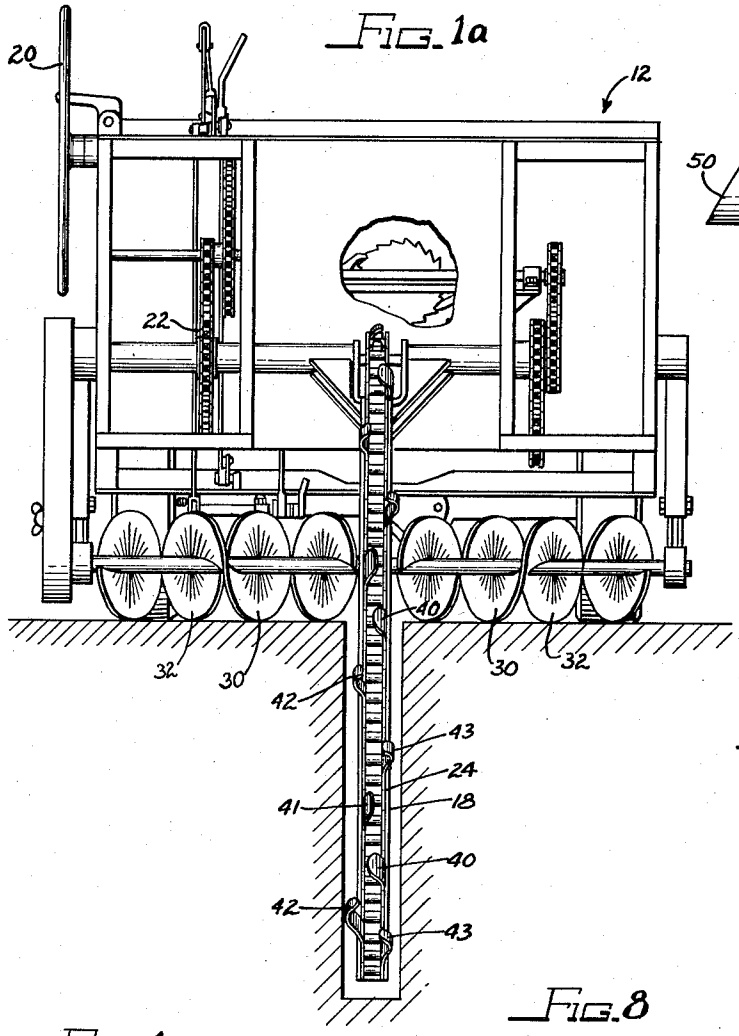


FIG. 5

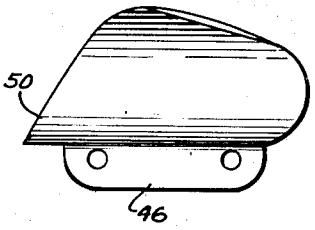


FIG. 6

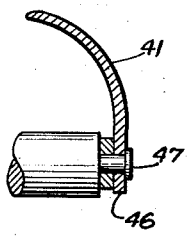


FIG. 7

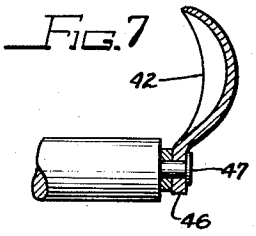


FIG. 4

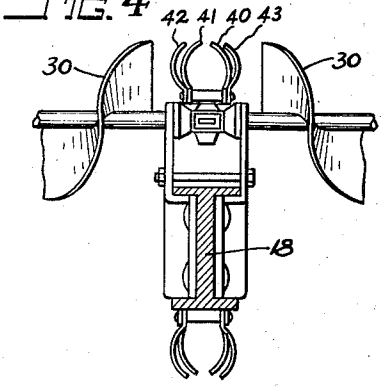


FIG. 8

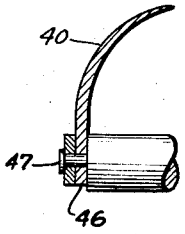
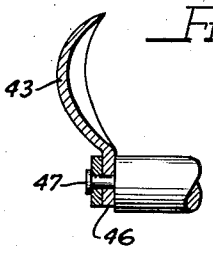


FIG. 9



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TRENCH DIGGER BLADE CONSTRUCTION

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Original application June 20, 1947, Serial No. 755,825. Divided and this application October 28, 1949, Serial No. 124,047

1 Claim. (Cl. 37—191)

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This invention pertains to trench diggers and more particularly to an improved construction and arrangement of digger blades.

An object of this invention is to provide improved digger blades mounted on an endless driven chain and so constructed and arranged that successive blades have different amounts of lateral bite causing earth to be removed progressively and efficiently. It is an allied object to provide blades which are constructed and mounted in a novel manner not only causing the cutting operation to be smooth and relatively free of shock and vibration under a wide variety of earth conditions but also causing the loosened earth to be quickly and efficiently discharged at the surface.

Further objects and features of novelty will become apparent to those skilled in the art in the following description of the preferred embodiment of the present invention illustrated in the accompanying drawings wherein:

Figure 1 is a general view in elevation of a trencher having an endless digging chain to which the present invention is applicable.

Fig. 1a is a rear view of the trencher of Fig. 1.

Fig. 2 is a detailed view of a length of digger chain incorporating the improved blade construction.

Fig. 3 is a side view of the chain shown in Fig. 2.

Fig. 4 is a sectional view of the chain and supporting beam taken along the line 4—4 of Fig. 1.

Fig. 5 is an elevational side view of one of the cutter blades.

Figs. 6, 7, 8 and 9 are transverse sectional views taken in Fig. 2 along the lines 6—6, 7—7, 8—8 and 9—9 respectively.

Referring now in detail to the illustrated preferred embodiment of the present invention, like reference characters are used throughout to illustrate similar elements. This invention has been conceived and developed to fill the need for trench digger blades for use in trenchers of relatively light construction having limited power capacity and which may be sold at a fraction of the cost of conventional blades.

The illustrated embodiment of the invention is most advantageously applied where a trench of given cross section must be dug in a minimum of time with smooth accurately formed side walls. The present construction is eminently suited for power digging of trenches, for underground feeder lines required for gas, water and electricity. The present device is also well suited for the digging of accurately formed trenches into which

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concrete may be poured directly for constructing building foundations, thereby eliminating the use of forms generally required in the work.

In completing the design of the present machine, a new cutting and elevating principle has been devised. It has been found that by curving and sharpening a series of steel cutting blades in the manner to be presently disclosed and mounting them for edgewise movement on an endless conveyor chain, the blades not only cut the ground but also elevate the excavated material to the surface, completely eliminating the use of scoops, buckets and the like. As an additional feature the blades are so designed that the heel thereof, which is the side of the said blade opposite the cutting edge, rests on the chain link immediately adjacent. This provides a bearing surface for the blade in addition to its actual mounting on the chain.

Referring now to the drawings, a small conventional vehicle 10, immediately recognizable as a conventional "jeep" from an inspection of Fig. 1, is utilized as a power source. A frame or support is provided on the rear portion of the vehicle and generally indicated by the reference numeral 12. A power take-off shaft 14 extends from the transmission rearwardly into a power take-off gear box 16 conventionally known as a belt pulley drive.

Pivotally mounted on the frame 12 for fore-aft swinging movement is a beam 18. The latter may be lowered into the illustrated digging position by means of a hand wheel 20 which serves to rotate a sprocket wheel 22 coupled rigidly to the beam. An endless loop of digger chain 24 is trained about the beam on suitable sprocket wheels journaled at each end thereof. For a detailed description of the beam and its associated supporting and positioning elements reference is made to my copending application Serial No. 755,825 filed June 20, 1947, of which this case is a division. It will suffice to say that a step-down driving connection is provided between the belt pulley drive 16 and the chain 24. This causes upward movement of the digger blade along the front edge of the beam 18 as the latter is moved slowly broadwise into engagement with the earth.

The movement of the vehicle may be produced either by the vehicle wheels or by a cable and ratcheted winch powered by the vehicle engine. As shown in Fig. 1, the winch 26 is located at the forward end of the vehicle and power is supplied thereto by means of a reciprocating rod 28 which extends along the vehicle's underside. Since both the vehicle drive and the drive for

the digger blades are effected by the same power source, it will be apparent that the cutting speed of the blades against the earth is coordinated with the forward speed of the vehicle. The earth which is drawn to the surface as the result of the action of the digger blades is spread laterally away from the trench by the augers **30**, **32**.

In accordance with the invention, the chain **24** is provided with alternate right and left-hand cutter blades arranged to extend both radially and laterally outward from the loop of chain **24** as shown in Figs. 1*a*, 2, 3 and 4. The blades are formed of metal plates each having a base which is fastened to the side wall of the chain and a body portion which curves smoothly inwardly toward the axis of the chain. In practicing the invention the curved blades each have a sharpened leading edge and a trailing edge in general alinement with the leading edge, the portion between the edges being smooth and uninterrupted by earth-catching pockets or the like. Further in accordance with the invention the cutting edges of the successive right and left-hand blades are located at different distances laterally with respect to the chain so that the pairs of blades have a different lateral width or span.

The blades used in the present embodiment fall into two general categories. Thus one pair of cutter blades **40**, **41** have an over-all width which is substantially equal to that of the chain with the free or leading edges thereof reaching substantially to the center of the chain and even overlapping slightly. It will be apparent that these blades acting alone would be capable of producing a channel in the earth which is sufficiently wide for the admission of the chain. These may for purposes of convenience be termed center cutters.

Another pair of right and left-hand cutter blades **42**, **43**, although of the same general shape, have a greater width or span and tend to broaden the channel cut by the blades of lesser span. Because of the fact that the blades project laterally from the chain **24** by differing amounts, the action on the earth is obviously quite analogous to that of broaching in machine tool practice. Since the bite of each successive blade is limited, a trench of considerable width may be cut without any undue loading on the individual blades.

Referring now to the means used for mounting the blades, it will be noted that each blade has a base **46** which lies flatly against the sides of the chain and has suitable apertures formed therein through which the conventional roller bearing pins **47** extend. Each blade has in addition a rearwardly extending heel portion **50** as shown in Fig. 3 which overlaps the subsequential link in the chain to rigidify the mounting and prevent skewing of the blade as the leading edge portion thereof is engaged by the earth.

In operation, it is found that loosened earth is efficiently lifted as well as cut. One might well wonder how the cutter blades, being arranged in non-opposing relation on a chain free of scoops, buckets and the like, can be effective to clear the trench of earth. Although a large proportion of the loosened earth will obviously fall free of the cutter blades, it must eventually reach the surface for the device to operate. The fact that it does, with substantially no delay, can only be explained by the repeated urging or impact imparted to the earth by the successive blades and the drag of the chain itself. The fact that the channel cut by the blades is considerably inclined undoubtedly aids this process. A further clue to the successful operation appears in Fig. 4 where it will be noted that the upwardly projected area of the blades of unlike width is much greater than that which would obtain if all the blades were in perfect alinement along the chain.

It will be apparent that with no pockets in the blades to fill up with the loosened earth, the jamming and clogging associated with bucket type cutters, particularly under wet and clayey conditions, cannot occur. Further, in conventional buckets the earth must be carried to the top of the loop of chain before the bucket is inverted and the earth allowed to spill out. Here, in the absence of buckets, the earth must be freed at the point of exit, in other words, at or only slightly above the surface of the earth in position to be immediately removed by the auger conveyors.

In the following claim the term "successive links" when referring to the sprocket chain, shall be taken to mean links that follow one another but are not necessarily adjacent to one another.

I claim as my invention:

For use in a trencher having a beam arranged to extend rearwardly and downwardly therefrom into the earth and having an endless driven loop of sprocket chain surrounding the same and trained about the ends thereof, a first pair of right and left-hand digger blades, each having a base providing a mounting surface for mounting the blades alternately and on the side walls of successive links of said sprocket chain, said digger blades each having a cutting portion in the form of a plate of metal sharpened at the leading edge and smoothly curved inwardly toward the center line of said sprocket chain, the blades having a span which is up to a small amount wider than the width of said chain, a second pair of right and left-hand digger blades having bases for alternate mounting of the blades on successive links of said chain similarly to the blades of said first pair, said second pair of digger blades each having a body in the form of a curved plate of metal sharpened at the leading edge and concaved inwardly toward the center line of said sprocket chain but having a greater lateral span so as to broach out the channel cut by said first pair of digger blades.

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