Jan. 7, 1969 F. M. REISING 3,419,976

DITCHING WHEELS AND MOUNTINGS THEREFOR

Filed Jan. 19, 1966 Sheet 1 of 2

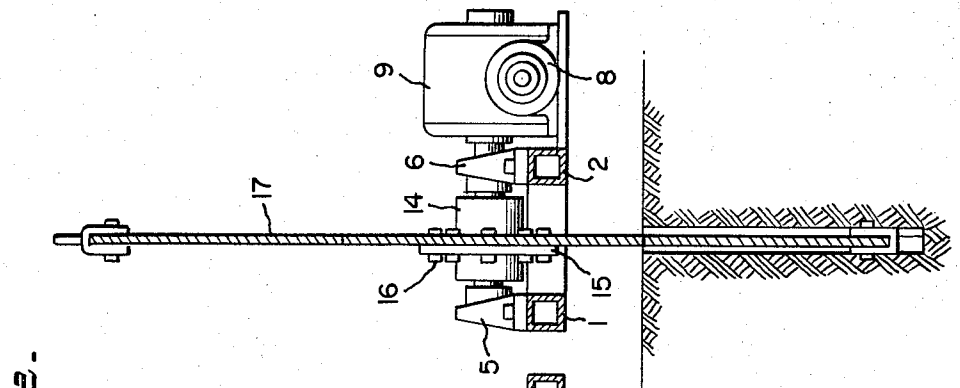


Fig 2.

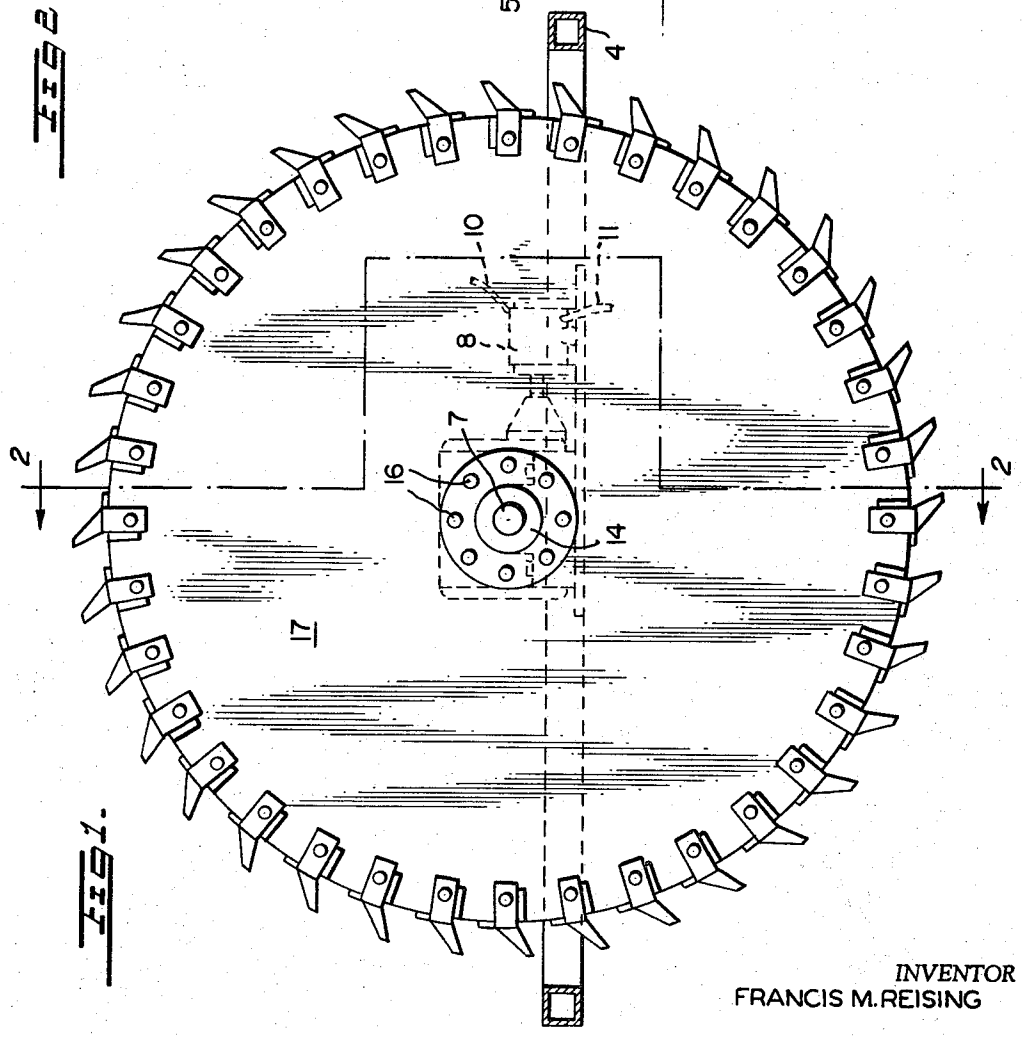


Fig 1.

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Fig 3

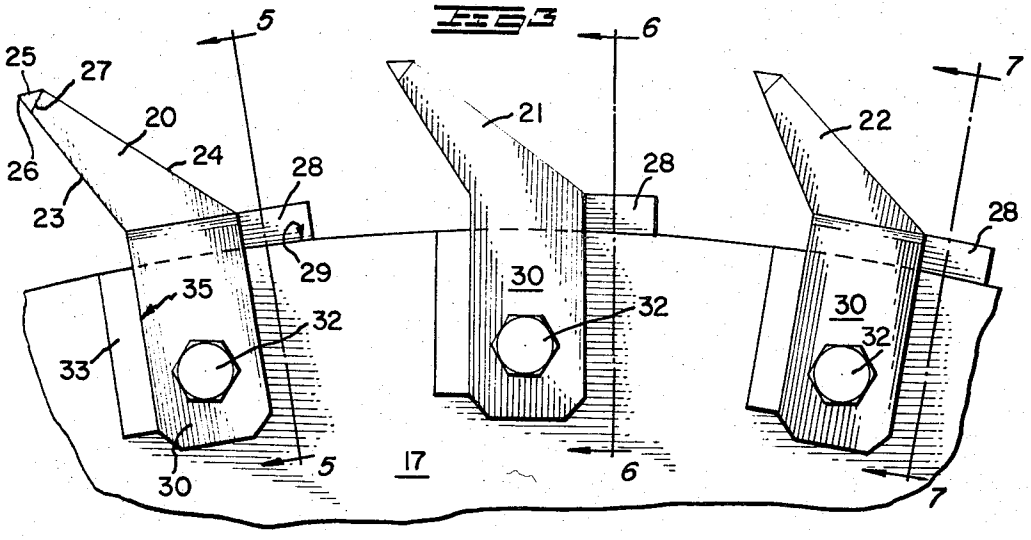


Fig 4.

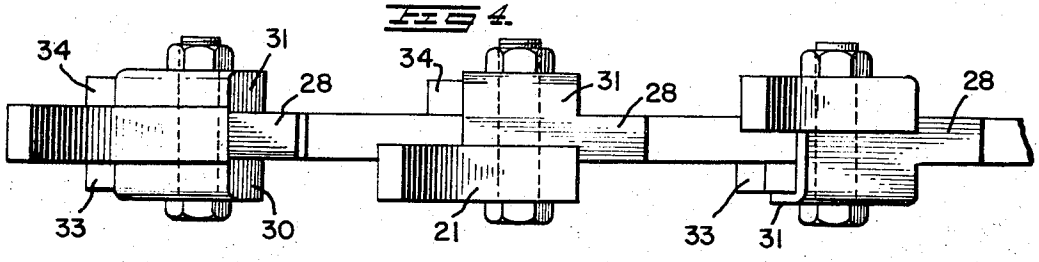


Fig 5.

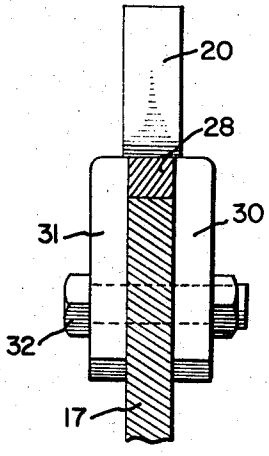


Fig 6.

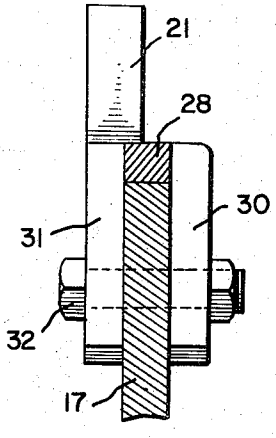
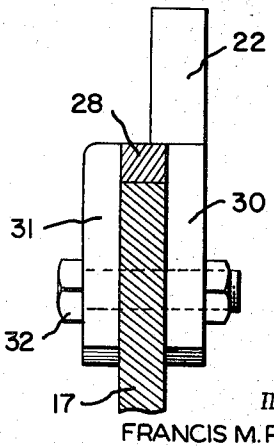


Fig 7.



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DITCHING WHEELS AND MOUNTINGS THEREFOR

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U.S. Cl. 37—94 2 Claims
Int. Cl. E02f 5/08

ABSTRACT OF THE DISCLOSURE

A ditching machine comprising a ditching wheel in the form of a relatively thin annular plate detachably supported from a hub, the plate including welded stop blocks at each side of the plate in spaced predetermined positions to abut removable teeth, the teeth being arranged in arrays and including cutter elements and spaced legs joined together by intermediate portions, the intermediate portions being defined in part by rearwardly extending lugs to prevent rocking movement of the teeth.

This invention relates to improvements in ditching wheels and mountings therefor.

The object of the present invention is to provide a ditching wheel capable of cutting different types of soil formations, such as rock, clay or the like, to form narrow trenches particularly for the laying of cables, the concept embodying the utilization of readily removable teeth of different types for cutting through various earth formations at high speed.

One of the objects of the invention is to provide a ditching wheel in which the wheel body is formed of sheet steel and is provided with a detachable replaceable hub, the latter being fixed on a shaft supported in spaced pillow blocks which are supported on an appropriate box frame for support and adjustment by a power implement.

Another object of the instant invention is to provide a drive for a ditching wheel of the type in question in which the source of power is a fluid motor connected through a right angle speed reducer with the drive shaft, whereby a cushioned power source is available to eliminate undesirable vibration.

Another object of the invention is the provision of a novel array of cutting teeth for a ditching wheel mounted in such a manner as to apply appropriate cutting surfaces continuously at various areas of the ditch surface so that maximum speed may be obtained without excessive loading.

These and other objects of the invention will more clearly hereinafter appear by reference to the accompanying drawings forming a part of the instant specification and wherein like reference characters designate corresponding parts throughout the several views, in which:

FIG. 1 is a side elevation of the ditching wheel assembly;

FIG. 2 is a section on line 2—2 of FIG. 1;

FIG. 3 is an enlarged fragmentary elevation of the outer periphery of a ditching wheel showing a tooth array and its mounting;

FIG. 4 is a top plan view of the disclosure of FIG. 3;

FIG. 5 is a section on line 5—5 of FIG. 3;

FIG. 6 is a section on line 6—6 of FIG. 3; and

FIG. 7 is a section on line 7—7 of FIG. 3.

Referring to FIGS. 1 and 2 the invention is shown as mounted on a box frame comprising longitudinal beams 1 and 2 and end beams 3 and 4, the side and end beams being appropriately spaced to define a supporting frame of suitable length and width to properly position and support the ditching wheel assembly. It will be understood that the box frame will be mounted upon suitably propelled power equipment to provide for the lowering

and raising of the box frame and the ditching wheel, as is conventional in the art.

A pair of spaced aligned pillow block bearings 5 and 6 are mounted medially of the longitudinal side beams 1 and 2 and support in their bearings a shaft 7 which is driven from a suitable fluid motor 8 through a conventional right angle speed reducer 9 to provide the source of power for the rotation of the ditching wheel at a proper controlled speed. The fluid motor 8 can receive its power from a suitable pressure source through the conduits 10 and 11, the compressor and the power for the compressor being carried on tractor equipment supporting the frame. By this means the ditching wheel and its mounting will comprise a unit assembly for use with proper equipment by a simple interchange of the box frame.

The shaft 7 is provided with a medial enlarged hub 14 supporting an annular plate 15 which is bolted by a plurality of bolts 16 about the flat steel wheel or disc 17, the latter being provided with a central opening for the passage of the hub 14 and likewise being provided with suitably spaced bolt openings for the reception of the bolts 16. The annular plate 15 carried by the hub 14 is of relatively large size to provide a bracing for a relatively large area of the sheet steel disc or wheel 17 upon which the cutting teeth are mounted, it being understood that the hub 14 and the annular plate 15 will be proportionately of greater diameter or lesser diameter in accordance with the dimensions of the disc or wheel 17 as the hub and plate structure 14–15 transmit the forces from the power source to the cutting teeth and must be relatively proportioned and designed to provide for the stiffening of the disc 17. As an example, it has been found that with a disc or wheel approximating six feet in diameter, a six inch hub with a twelve inch supporting plate connecting the hub and wheel will provide satisfactory results with the thickness of the sheet steel forming the wheel being approximately one-half inch. Likewise, in a structure having the approximate values indicated, the annular plate 15 connecting the wheel and the hub should have a thickness of approximately three-quarter inch.

Referring now to FIGS. 3 to 7, inclusive, the cutter tooth structure and the arrangement of the arrays of teeth about the peripheral edge of the ditching wheel 17 are illustrated. The teeth are illustrated as in arrays of three with the lead tooth 20, as shown in FIGS. 4 and 5, lying with its longitudinal center in the center of the ditching wheel 17. The following teeth 21 and 22 are reduced in their length and, therefore, will not penetrate as deeply into the cut as the lead tooth 20 and are arranged at alternate sides of the center of a vertical plane extending through the ditching wheel 17, as shown in FIGS. 4, 6 and 7.

Referring now to the lead tooth 20, which as stated, is of greater length and, therefore, makes a deeper cut than the trailing teeth 21 and 22, this lead tooth 20 is of a width slightly greater than the thickness of the ditching wheel 17 and projects forwardly in the direction of the cut being defined by the converging side faces 23 and 24 and having their outer extremities 25 sheared to define a transverse cutting edge 26 for engaging and initially removing the material from the ditch. The marginal cutting edge 26, in instances where the soil being worked includes considerable rock formation, may be appropriately hardened by an appropriate alloy or by the use of a cutting insert welded thereto, as for instance, along the dotted line indicated at 27. It will be understood that a quick interchange of teeth can be made on a ditching wheel in the nature of the present invention where during an operation a change in the soil occurs, as for instance, changing from clay to rock or from a mixture of clay, sand and rocks.

Each of the teeth is formed with an elongated extension **28** which projects rearwardly of the tooth and overlies the peripheral flat outer surface of the ditching wheel **17** and has its bottom face **29** contoured to seat snugly and firmly on the outer surface of the ditching wheel. The length of the rearwardly projecting extension **28** may be determined by the size of the tooth and similar factors to provide a solid mounting along the outer peripheral edge of the tooth greater than the width of the tooth. By having the rearwardly extending projection **28**, the tendency of the tooth to rock due to the force applied during the cutting operation is eliminated and the life of the tooth is substantially improved. Each of the teeth **20**, **21** and **22** is formed as a yoke structure to provide a pair of spaced depending clamp legs **30** and **31** which are spaced to straddle and snugly engage at their bases the outer face of the peripheral portion of the ditching wheel **17** and bolts **32** extend through suitably aligned bolt openings in the clamp legs **30** and **31** and through suitably positioned bolt openings in the ditching wheel **17** so that the teeth can be clamped snugly and tightly into position and/or removed from their position for replacement.

In order to further fixedly secure the teeth in position, there is provided at each side of the wheel at suitably spaced points radially extending stop blocks **33** and **34** which engage the adjacent faces **35** of the depending clamp legs **30** and **31** of the teeth. The radially positioned blocks **33** and **34** are appropriately welded or otherwise secured in position at each side of the wheel and further prevent any tendency of the teeth to rock due to the forces applied during a cutting or ditching operation. By the structure shown and described, each tooth while readily demountable, when positioned is rigidly secured against any possible movement in any direction. It will be noted that the base of the yoke formed by the spaced depending clamp legs **30** and **31** lies flush and forms a continuous surface with the elongated extension **28** and that this continuous surface is contoured to firmly seat on the outer peripheral surface of the wheel.

Referring now to the tooth indicated by reference character **21**, it will be noted in FIGS. 4 and 6 that this tooth is positioned in staggered relation to the lead tooth **20** and at one side of the lead tooth **20**. It will also be noted that the tooth **21** partially overlies the outer marginal surface of the ditching wheel **17** and generally is offset with respect to its rearward extension **28**. The tooth **21** does not extend radially from the wheel **17** to the extent of the lead tooth **20** and, therefore, will make a cut at one side of the cut made by the tooth **20** and of slightly less depth. The same arrangement is found with respect to tooth **22** and by an examination of FIGS. 4 and 7 it will be seen that tooth **22** is offset generally in the manner of tooth **21** but is offset in the opposite direction from the tooth **21** so as to make a cut at the opposite side of the cut made by the lead tooth **20**. In the same manner as tooth **21**, tooth **22** will make a cut of less depth than the lead tooth **20**. Thus, each array of three teeth makes a deep center cut and lateral cuts of less depth than the center cut with the lateral teeth acting as cutters, as well as cleaners for the front tooth **20**. In arranging the arrays of teeth, it will be understood that additional teeth may be provided further offset with respect to the lead tooth **20** to further cut away lateral walls in forming a trench.

By the arrangement shown, the cutting action of the teeth with the rapidly rotating wheel provides for such equal distribution of forces that any tendency of lateral distortion of the wheel is eliminated and the trenching operation produces a regular cut defining clear trench walls without any accumulation of cut-out material so that a wire or cable laying apparatus may closely follow the ditching wheel and a rapid operation of ditching, cable laying and filling of the relatively narrow ditch can be performed at exceedingly high speed and without

causing an unnecessary top accumulation of earth following the cable laying operation

What is claimed is:

1. In a ditching machine of the character described, a supporting frame including a pair of spaced beams, aligned bearing blocks mounted on said beams, a shaft having an enlarged central hub portion mounted in said bearings, means for driving said shaft at a controlled rate of speed, an annular plate fixed about said hub and projecting therefrom, a ditching wheel comprising a flat annular wheel mounted on said hub and abutting said annular plate, removable means for securing said wheel to said annular plate, and a continuous series of spaced tooth structures uniformly arranged about the periphery of said wheel, said tooth structures each including a cutter and a base portion, said tooth structures being arranged in arrays, the lead tooth of each array having its cutter centrally posi.ioned with respect to the periphery of the wheel and the cutters of the following tooth structures having their cutters alternately staggered with respect to the lead tooth cutter and lying in a common plane with said flat annular wheel, each of said tooth structures including spaced leg means depending from the base for normally straddling said wheel and an integral projection extending rearwardly of the tooth and below the tooth and overlying the periphery of the wheel to prevent rocking movement of the tooth in one direction, radially extending stop blocks welded into position at each side of the wheel in predetermined spaced positions about the wheel periphery for engaging the legs of each of the tooth structures to prevent the movement of the teeth in an opposite direction, and bolt means extending through the legs and wheel for removably securing the teeth in position.

2. In a tooth array for mounting about a ditching wheel having a flat peripheral outer area, each of the teeth of the array including a yoke-shaped body portion comprising a pair of spaced depending clamp legs for enclosing a peripheral area of the wheel, bolt openings through the legs for securing the tooth in position, each of the teeth including rearwardly projecting portions having a bottom portion lying generally in the plane of the base of the yoke-shaped body to provide an elongated seating area, and a cutting extension having flat parallel sidewalls projecting outwardly from the body portion of each of the teeth of the array, said sidewalls lying in a common plane with said ditching wheel, certain of the cutting extensions being laterally displaced and at least one of the teeth having its cutting extension centrally disposed.

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U.S. Cl. X.R.

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