May 29, 1956 M. C. GRIFFIN 2,747,307

ADJUSTING MECHANISM FOR ENDLESS CONVEYOR TYPE DITCHING MACHINE

Filed April 23, 1951 2 Sheets-Sheet 1

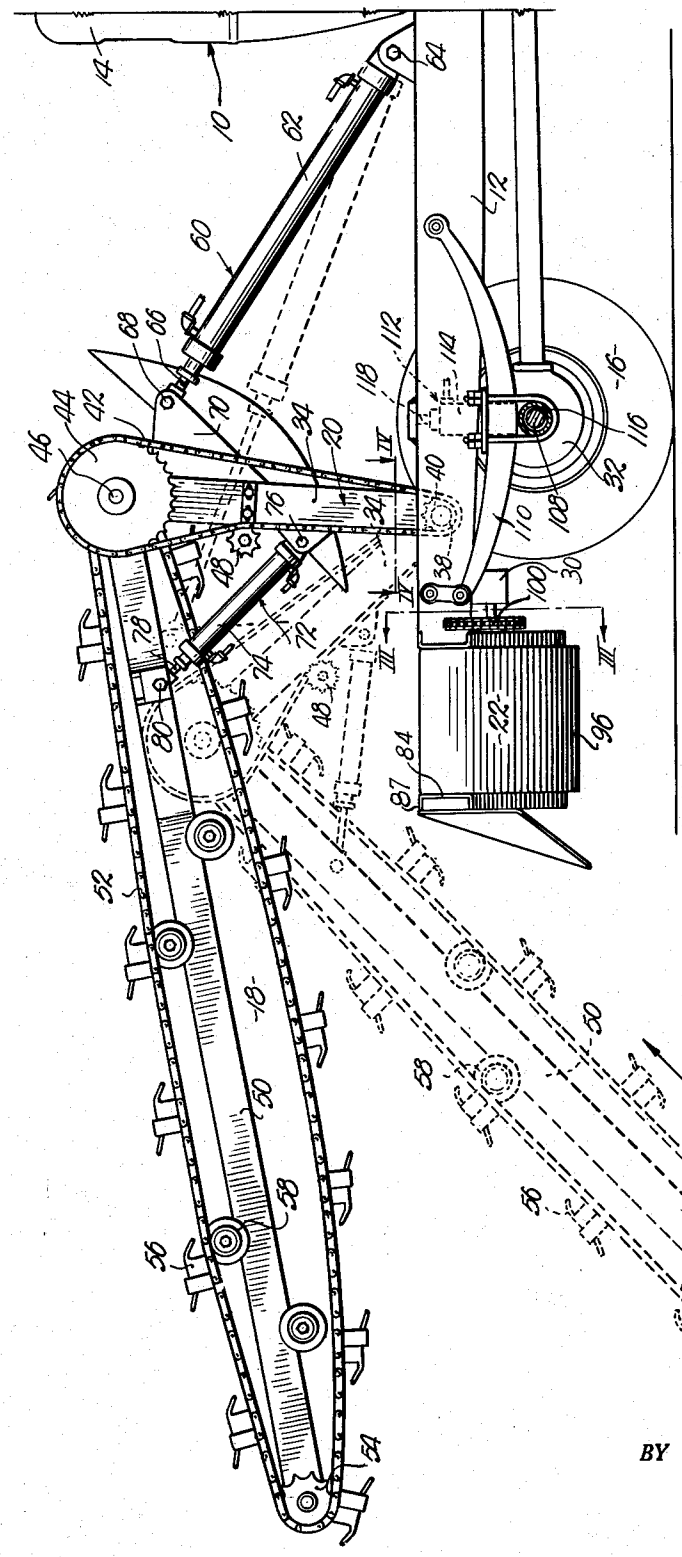

Fig. 1.

INVENTOR.
Mark C. Griffin
BY
Joel Hovey
ATTORNEY.

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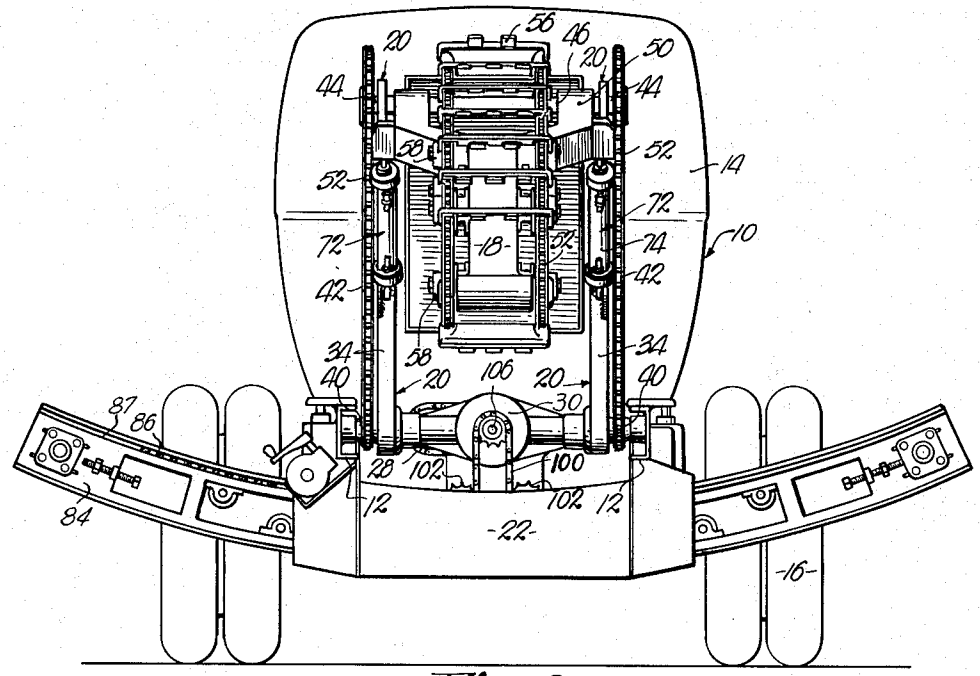

Fig. 2.

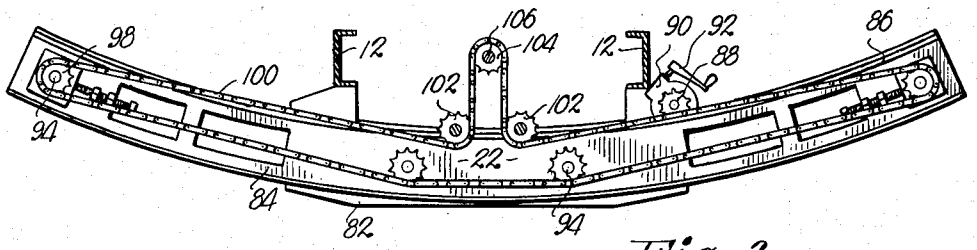

Fig. 3.

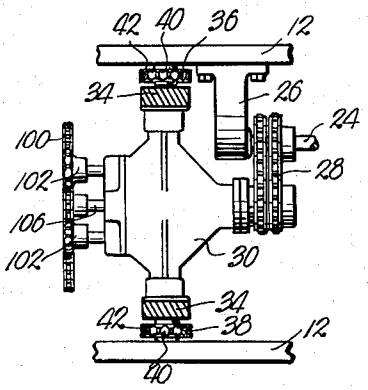

Fig. 4.

INVENTOR.
Mark C. Griffin
BY
ATTORNEY.

United States Patent Office

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ADJUSTING MECHANISM FOR ENDLESS CONVEYOR TYPE DITCHING MACHINE

Mark C. Griffin, Merriam, Kans.

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1 Claim. (Cl. 37—90)

This invention relates to earth-handling apparatus and more particularly to a trench digger, the primary object being to provide a highly maneuverable conveyor means that is in turn provided with flight elements for digging and moving the earth, all for the purpose of permitting the digging of relatively deep trenches from various angles and thereby facilitating operation in restricted or confined areas.

It is the most important object of the present invention to provide a trench digger that includes an elongated conveyor of the kind just above mentioned that is swingable on a horizontal axis and is in turn mounted on an auxiliary frame that is also swingable on a suitable support for the purpose of permitting adjustment of the conveyor to virtually any desired position necessary to the digging of trenches.

Another important object of the present invention is the provision of a trench digger that includes a digging and earth-moving conveyor swingably mounted on a swingable frame, there being extensible means between the conveyor and the frame for swinging the former relative to the frame and extensible means between the frame and the support for swinging the frame and the conveyor as a unit relative to the support.

Another object of the present invention is to provide toggle-like structure for swingably mounting a trench digger conveyor, together with actuating means for the conveyor that includes rotatable members on the axes of swinging movement of the conveyor and the frame whereby the adjustment of the conveyor may take place during continuous driving thereof.

A further object of this invention is the provision in a trench digger of an auxiliary conveyor for receiving the dirt and transferring the same laterally along either side of the trench and taking the form of a continuous belt that is arched longitudinally to convey the dirt entirely free of the trench being dug.

A still further object of this invention is the provision of a trench digger that includes the aforesaid features, together with a support therefor in the form of a mobile vehicle, there being structure for leveling the vehicle frame relative to its wheel and axle assembly and capable of serving the additional function of absorbing shock when the machine is under travel on the road.

Many more minor objects including details of construction, will be made clear as the following specification progresses.

In the drawings:

Figure 1 is a fragmentary, side elevational view of a ditching machine made pursuant to my present invention illuustrating certain parts in various positions.

Fig. 2 is a rear elevational view thereof.

Fig. 3 is a vertical, cross-sectional view taken on line III—III of Fig. 1 looking in the direction of the arrows; and

Fig. 4 is a fragmentary, detailed, cross-sectional view

taken on line IV—IV of Fig. 1 looking in the direction of the arrows.

Thos skilled in this art appreciate the difficulty of providing an automatic trench digging machine of a size sufficient to handle great quantities of dirt and capable of digging through various terrain at relatively great depths while making provision for operation in confined spaces. Oftentimes trenches or ditches must be dug close to vertical walls or foundations, under sidewalks or streets and within spaces that permit only short distances of forward travel. Under these same conditions it becomes necessary at times to dig the trench relatively deep and in conventional structures the machines are usually too large and bulky or not sufficiently maneuverable to permit such confined operation.

The advantages emanating from uses of the trench digger or ditching machine hereof will become clear as the following description progresses, and in the instance illustrated, the entire assembly is mounted upon a mobile vehicle such as a truck **10**, having a frame **12**, a cab **14** and a rear wheel and axle assembly **16**. A main conveyor **18** is swingably mounted on a frame **20** that is in turn swingably secured to the frame **12** rearwardly of the assembly **16** and an auxiliary conveyor **22** is also carried by the frame **12** at the rearmost end thereof.

A power take-off shaft **24** from the main prime mover (not shown) of the vehicle **10**, is rotatably mounted on the frame **12** through means including a bracket **26** having a bearing therein, and endless chains **28** operably couple the shaft **24** with a train of gears (not shown) and of conventional character within a differential housing **30**. In this respect it is to be noted that the housing **30** is separate from the main differential housing **32** of the vehicle **10**. Frame **20** includes a pair of upright members **34** extending from the housing **30** and swingable on horizontal shafts **36** and **38** that are operably connected with the aforesaid train of gears within differential housing **30**.

Shafts **36** and **38** are provided with sprocket wheels **40** exteriorly of the housing **30** for receiving a pair of endless chains **42** that are trained over corresponding sprocket wheels **44** at the uppermost ends of the members **34**, sprocket wheels **44** being secured to a shaft **46** substantially parallel with the shafts **36** and **38**.

An idler **48** is provided for each chain **42** respectively to maintain the same in a taut condition. The shaft **46** is rotatably carried by the members **34** and swingably receives framework **50** at one end of the latter and forming a part of the conveyor structure **18**. Conveyor **18** includes additionally, a pair of endless chains **52** trained over corresponding sprocket wheels **44** on the shaft **46** and over sprocket wheels **54** at that end of the framework **50** opposite to shaft **46**. The chains **52** are interconnected by a plurality of flight elements **56** and since such flight elements are of conventional character and adapted to dig or cut away the earth and to drag the same as conveyor **18** is placed in operation, their details of construction need not be set forth.

The framework **50** carries a plurality of rollers **58** for guiding the chains **52**. The frame **20** is additionally connected with the frame **12** by means of an extensible device **60** for each member **34** respectively and including an hydraulic cylinder **62** pivotally connected with the frame **12** as at **64** and a piston within the cylinder **62** (not shown) having a stem **66** pivotally connected as at **68** on a gusset **70** secured to the corresponding member **34**. Likewise, the conveyor **18** and the frame **20** are additionally connected by means of a similar extensible member **72** to each frame member **34** respectively.

Extensible elements **72** each include a hydraulic cylinder **74** pivotally joined to the corresponding member **34** as at **76** and contains a reciprocable piston (not shown)

having a stem 78 pivotally joined to the framework 50 as at 80.

The lateral conveyor 22 includes a pair of spaced-apart, elongated tracks 82 depending from the frame 12 rearwardly of the wheel and axle assembly 16, together with a pair of spaced-apart, interconnected arcuate side pieces 84 carried by the tracks 82 therebetween for sliding movement along the longitudinal axes of the side pieces 84. One of the side pieces 84 is provided with an elongated, arcuate rack 86 consisting of a plurality of openings in flange 87, and a small gear 88 in mesh with the rack 86 is carried by a housing 90 secured to one of the tracks 82. Gear 88 is rotated by means of a hand-crank 92 that is operably connected with the gear 88 through a train of gears (not shown) within housing 90. A plurality of transverse shafts 94 interconnect the side pieces 84 and are provided with drums or rollers, not shown, for supporting an endless belt 96. Each shaft 94 respectively has a gear 98 thereon that receives an endless chain 100, the latter passing beneath a pair of spaced idler sprockets 102 and over a drive sprocket 104, all rotatably carried by the housing 30. Sprocket 104 is connected with the train of gears in housing 30 by means of a shaft 106.

The frame 12 of vehicle 10 is joined with the rear axle 108 of assembly 16 in the usual manner by means of a pair of springs, one only of which is shown in Fig. 1 and designated by the numeral 110. In order to adjust the horizontal position of frame 12 with respect to the axle 108 and to provide shock-absorbing means, there is provided an extensible device 112 adjacent each spring 110 respectively. The device 112 includes a vertical hydraulic cylinder 114 secured directly to housing 116 for axle 108 and having a vertically reciprocable piston therein (not shown) provided with a stem 118 that is secured to the frame 12.

In the inoperative position, conveyor 18 and frame 20 are disposed substantially as illustrated in full lines of Fig. 1 of the drawings.

Conveyor chains 52 are placed in motion on rotation of the shaft 24 and the drive may be traced therefrom through chains 28, the train of gears in housing 30, shafts 36 and 38, chains 42, sprocket wheels 44 and shaft 46 to the sprocket wheels on the latter, which receive the two endless chains 52.

Such operation may take place irrespective of the positions of the conveyor 18 and frame 20 relative to each other or relative to the frame 12. Conveyor 18 may be moved toward the ground or surface in which a trench is to be dug by operation of the hydraulic extensible means 60 and it is seen that outward movement of the two stems 66 will cause the frame 20 to swing on the shafts 36 and 38 thereby moving the frame 20 and the conveyor 18 as a unit toward the dotted line position illustrated in Fig. 1 of the drawings.

It is to be understood that the hydraulic system for controlling all of the extensible elements 60, 72 and 112 may be of conventional character in that suitable valves are provided for such manual control, all not shown but conveniently mountable on the frame 12 rearwardly of cab 14. Simultaneously or separate from the extension of elements 60, conveyor 18 may be swung relative to the frame 20 by operation of the elements 72. During such operation the stems 78 may be moved outwardly as illustrated in dotted lines in Fig. 1, thereby increasing the angle between conveyor 18 and the frame 20. Downward movement of the conveyor 18 and its position relative to the horizontal, may be adjusted as the trench deepens and the flight elements 56 will cut-away the earth and drag the loose dirt upwardly in the direction of the arrow shown in Fig. 1 for deposit on the continuous moving conveyor belt 22. This belt 22 is driven through the train of gears in housing 30 by means of shaft 106 rotating the sprocket 104 and thereby actuating the continuous chain 100.

The loose dirt deposited upon the endless belt 22 will be projected laterally a substantial distance away from the trench being dug and by means of suitable clutch controls coupling with the mechanism in housing 30, the direction of movement of the conveyor belt 22 may be reversed as desired by the operator. It is similarly notable that the distance the dirt is projected may be varied by operating handle 92. This causes rotation of the small gear 88 and since the same is in mesh with rack 86, the entire auxiliary conveyor 22 will shift with respect to the tracks 82 in either direction.

When fluid is directed to the cylinders 114, the devices 112 operate to elevate the frame 12 with respect to the axle 108 and thereby acts as an agent to prevent frame 12 from riding on axle 108 when the vehicle 10 is to be driven a substantial distance over rough roads or the like which would tend to allow part of the mechanism to strike the ground. Otherwise, the elements 112 operate to level the frame 12 and either or both of the stems 118 may be moved upwardly so that the trench being dug by the elements 56 of conveyor 18 will have substantially vertical side walls.

It is now seen further that because of the high maneuverability of the conveyor 18 not only through its swinging connection with frame 20 but by virtue of the latter swinging on frame 12, it is possible to dig relatively deep trenches in close quarters, beneath sidewalks, adjacent vertical walls or foundations, under streets, and virtually at any point covering an area at least as long as the entire assembly illustrated in the drawings.

Details of construction may of course, be varied but those that fairly come within the broad principles hereof, are contemplated by the invention and it is therefore, desired to be limited only by the scope of the appended claim.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

A ditching machine adapted for mounting on a truck frame having a lateral conveyor at the rearmost end thereof, said machine comprising an upright member pivotally mounted on said frame forwardly of the conveyor for swinging movement about a horizontal axis parallel with the direction of travel of the conveyor; an excavating conveyor swingably mounted on said member at the uppermost end of the latter for swinging movement on a horizontal axis and extending rearwardly from the member in overlying relationship to the lateral conveyor, said excavating conveyor including an endless chain provided with a plurality of flight elements for dragging dirt from within an excavation upwardly and forwardly onto the lateral conveyor; double acting hydraulic piston and cylinder means pivotally interconnecting the frame forwardly of said member with the latter adjacent the uppermost end of said member for swinging the member reawardly and downwardly into overlying relationship to the lateral conveyor; and double-acting hydraulic piston and cylinder means pivotally interconnecting the member and the excavating conveyor for altering the angle of inclination of the excavating conveyor when the member is in overlying relationship to the lateral conveyor.

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