Aug. 9, 1955 L. A. CRAWFORD 2,714,775

TRENCH FILLING MACHINE

Filed Aug. 31, 1951 4 Sheets-Sheet 1

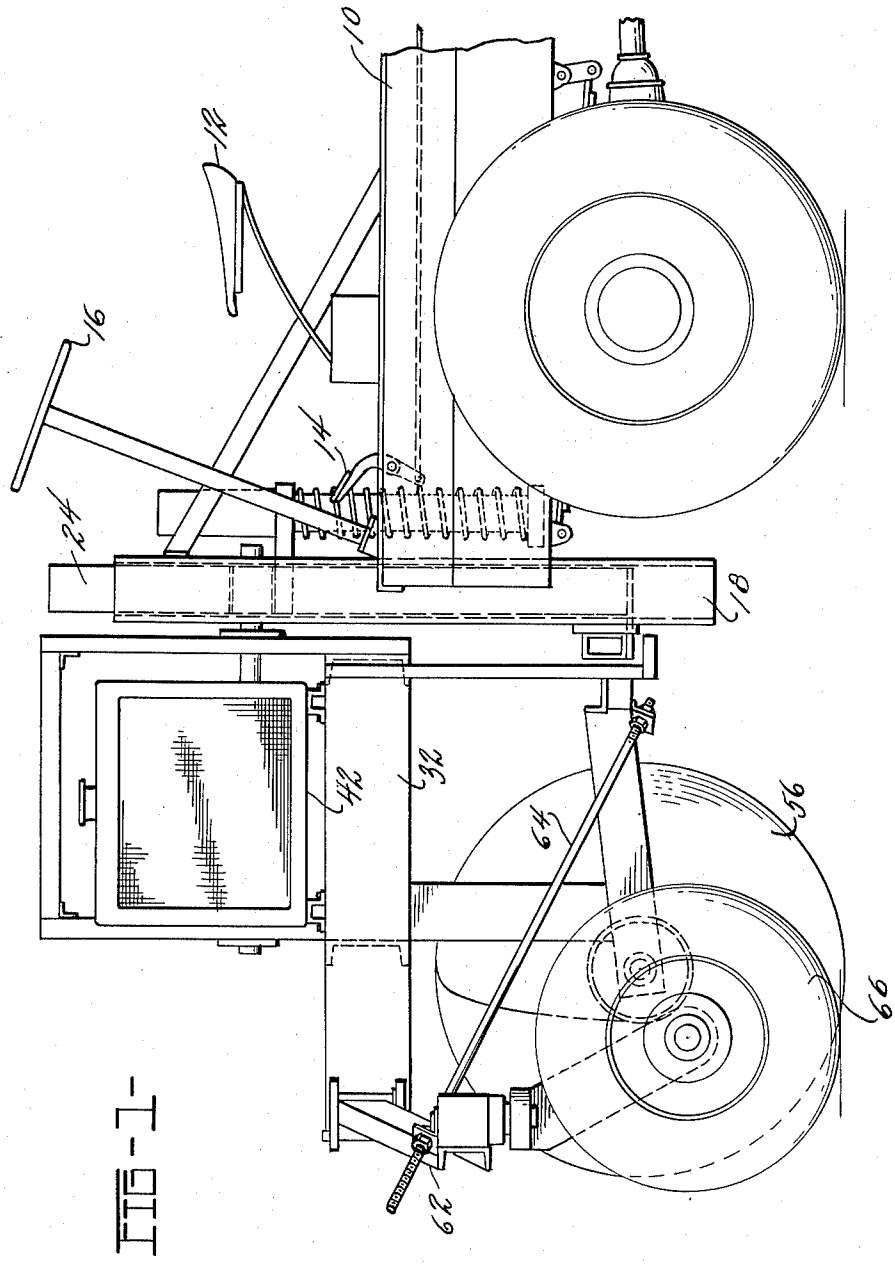


FIG-1-

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TRENCH FILLING MACHINE

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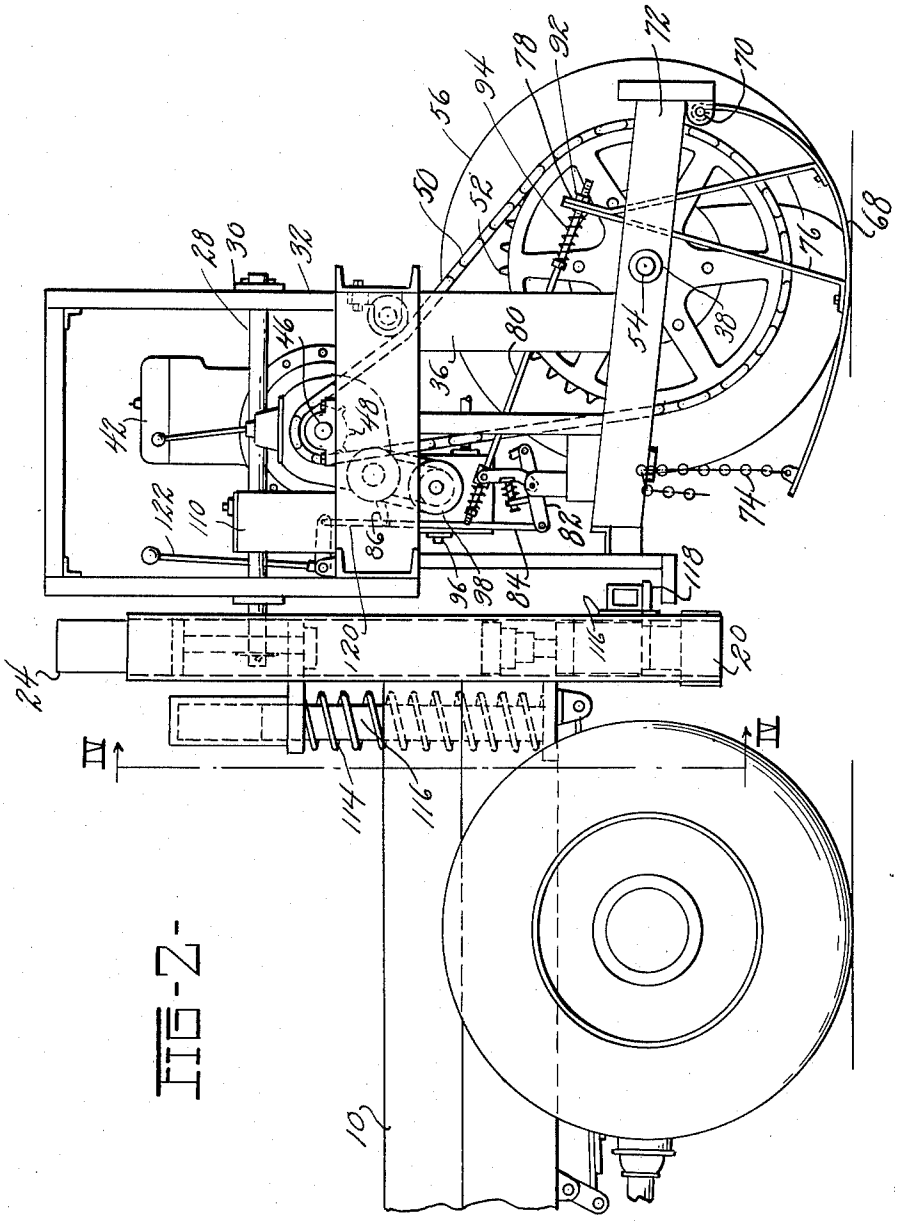


FIG-2-

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TRENCH FILLING MACHINE

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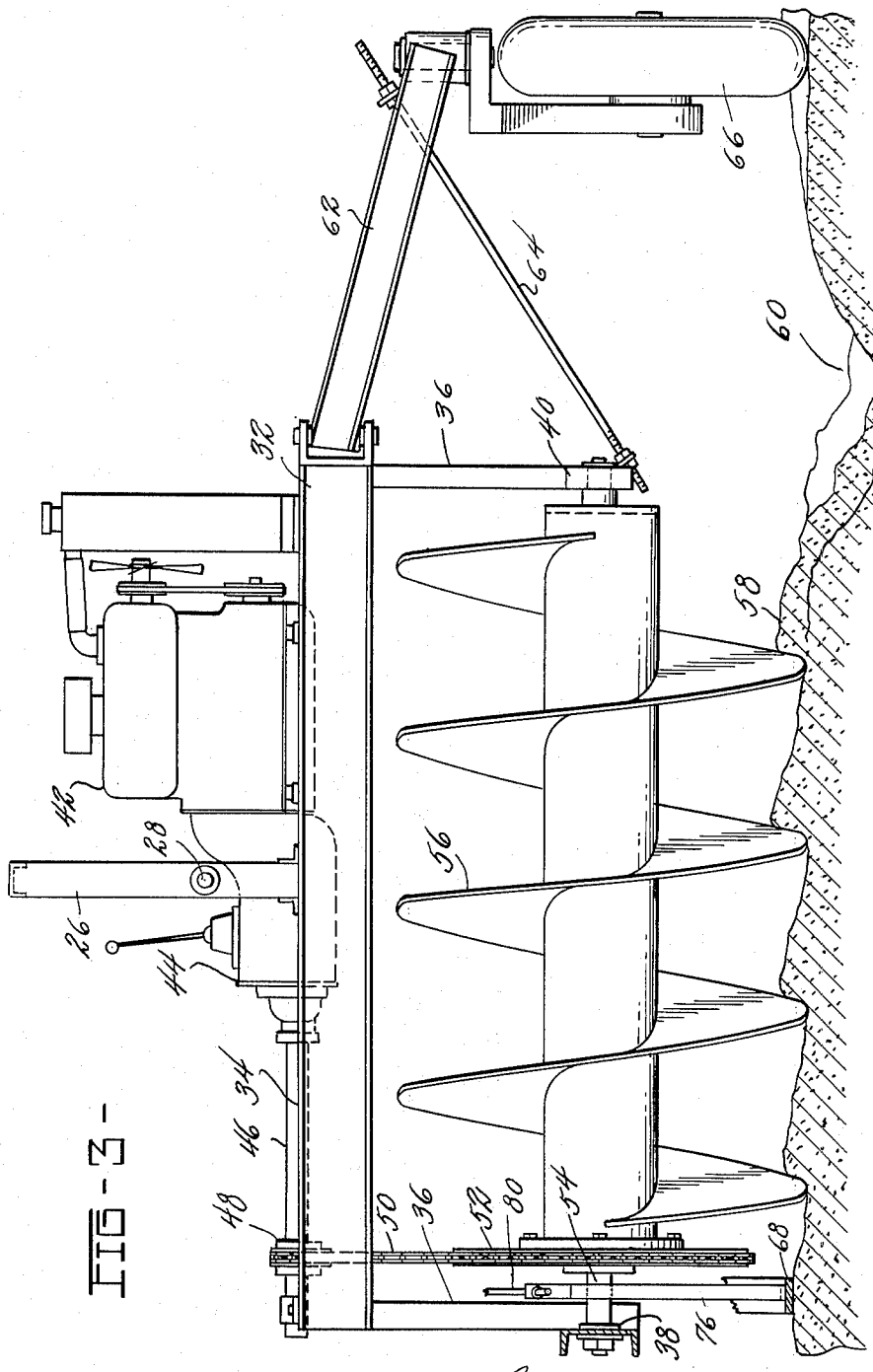


FIG-3-

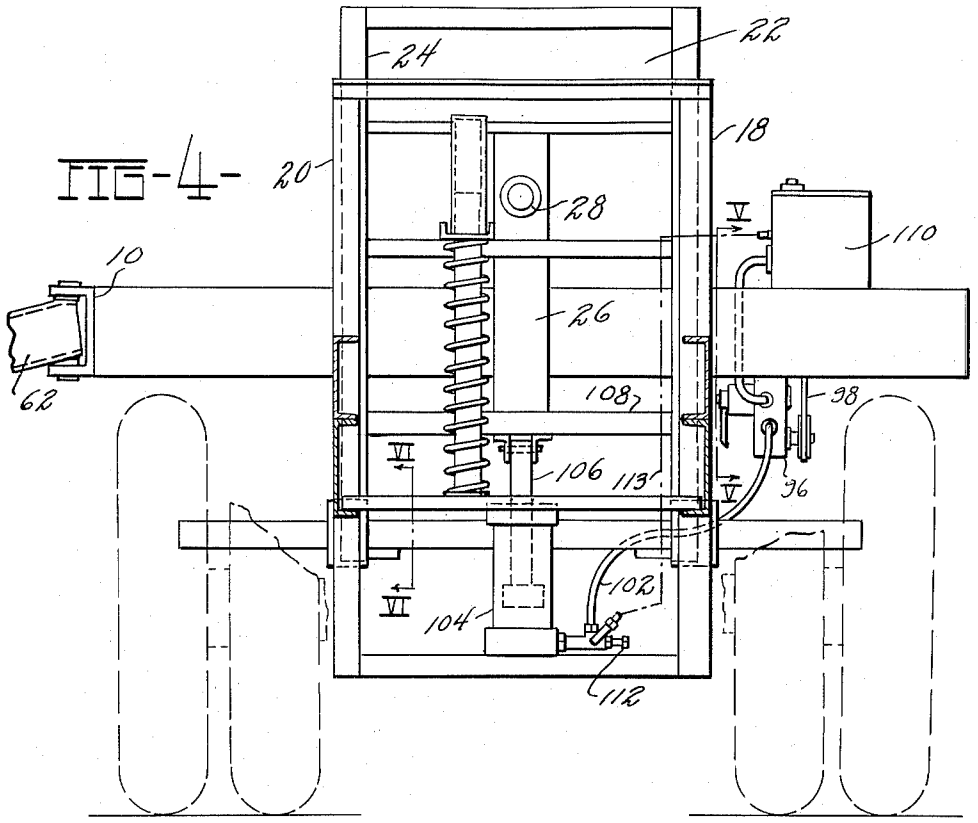
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TRENCH FILLING MACHINE

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FIG-4-



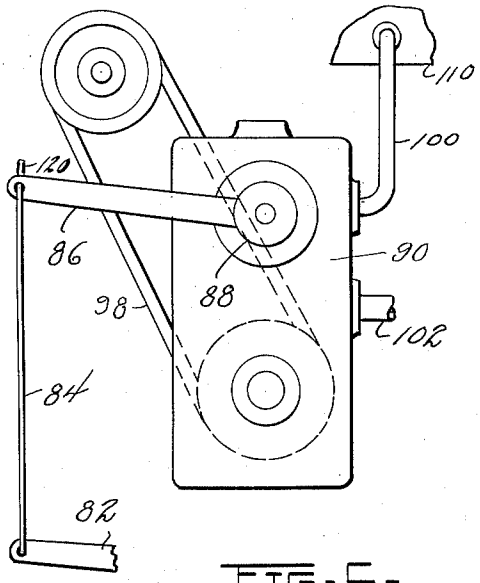


FIG-5-

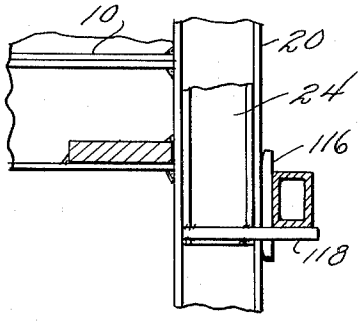


FIG-6-

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United States Patent Office 2,714,775 Patented Aug. 9, 1955

2,714,775

TRENCH FILLING MACHINE

Laurel A. Crawford, Deshler, Ohio

Application August 31, 1951, Serial No. 244,543

3 Claims. (Cl. 37—144)

This invention relates to earth moving and shifting equipment, more particularly to back-filling equipment and apparatus, specifically trench fillers.

An object of this invention is to provide a self-propelled vehicle which may be guided along an earth mound previously thrown up along a line or trench excavation, and return the earth into the excavation.

Another object of this invention is to provide an arrangement of parts and distribution of weight in the machine whereby the apparatus may follow the line of earth to be shifted without itself being shifted out of its desired line of progress by the earth mass.

Another object of this invention is to provide a device, wherein the earth shifting part may be automatically controlled in its position relatively to the earth's surface over which it is moved.

Another object of this invention is to provide a novel mount for the earth mass contacting and shifting screw.

Another object of this invention is to provide a novel control for the various functions of the apparatus.

And another object of this invention is to provide a hydraulic positioning apparatus for the operating element including automatic controls in combination with manual controls for co-ordinating the functions of the machine.

Other objects and advantages of this invention relating to the arrangement, operation and function of the related elements of the structure, to various details of constructing, to combinations of parts and to economies of manufacture, will be apparent to those skilled in the art upon consideration of the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

Referring to the drawings:

Fig. 1 is a side elevation of the mechanism, including the invention herein, showing a mounting thereof on a self-propelled vehicle;

Fig. 2 is a view from the opposite side of the machine of Fig. 1;

Fig. 3 is a view of the earth shifting element and its drive, looking into the device from the right of Fig. 2;

Fig. 4 is a view on the line IV—IV, Fig. 2;

Fig. 5 is a view on the line V—V, Fig. 4; and

Fig. 6 is a view on the line VI—VI, Fig. 4.

The operating mechanism of the invention herein is normally mounted on the rear of a truck chassis **10**, preferably a so-called "heavy-duty" truck, that is one having a substantial tonnage rating.

The truck chassis **10** is fitted with an operator's station **12** on the rear deck thereof, together with adjacent controls including a pedal **14** and a steering control **16**, by which an operator may have complete control of the movements of the tractor **10**, which herein, while the earth mechanism is in operation, is usually driven in reverse to the normal driving direction of the chassis **10** with the movements controlled by an operator positioned in station **12** manipulating the pedal **14** and the wheel **16**.

A pair of spaced parallel vertical guides **18**, **20** are fixed to the tractor chassis rear and provide a slide-way **22** therebetween for accommodating frame **24**. This frame **24** is a substantially box construction, braced to

form a rigid structure including a center piece **26** which mounts a horizontally positioned pintle or pin **28**.

This pin **28** mounts bearings **30** carried by frame **32** for pivotally supporting this pendulous frame **32** on the pin **28**. The frame **32** includes a platform region **34** and a sub-frame structure **36** including a pair of aligned bearings **38**, **40**.

The platform **34** mounts an engine **42** together with cooperating parts including a controllable transmission **44** for driving shaft **46** having sprocket **48** keyed thereon. This sprocket serves as a drive for chain **50** to sprocket **52** fixed on shaft **54** mounted in the bearings **38**, **40**.

The size of the sprockets **48**, **50** are selected to determine a speed reduction drive therebetween beyond the controlled speed of shaft **46** as selected by operation of the transmission **44**. Incidently, the control for the transmission is located within reach of the operator in station **12**. This allows a complete one operator control of both the tractor and the earth shifting tool or screw **56**.

The shaft **54** serves as an axle for the earth shifting tool **56** herein shown as a helix or screw rotatable with the shaft **54** to serve as a screw conveyor element to shift earth **58** laterally as into a trench **60** from which the earth has previously been removed. This machine is extremely useful in farm areas which are being tiled. The trench **60** is dug by suitable trench digging equipment and the earth **58** piled along and adjacent the rim of the trench. Tile is laid within the trench and this machine then moves along and beside the trench line with the screw continuously back filling into the trench. Not only is the fill complete but all of the loose earth can be completely moved into the trench and the surface graded or smoothed therealong.

With the frame **32** pivotally suspended from the pin **28**, the screw **56** may be rocked in response to any overload, thereby avoiding damage to the tool and defeating any slowing up of the tractor's linear movement as well as defeating any tendency of the tool pushing the tractor laterally from its desired path or imparting undesirable stresses to the apparatus.

Additionally, the drive and transmission for the tool being mounted on the rear of the tractor, adds sufficient weight to the tractor, so that the screw action will positively shift the earth rather than abut the earth and shift the tractor. The engine **42** thereby serves a dual purpose, that of a drive and a ballast.

For stability, the frame **32** carries an extension **62** having an adjustable link connection **64** with the frame to vary its lateral angular position as to the frame. The extension **62** mounts a caster wheel **66** which normally rolls along the side of the trench being filled, opposite the side along which the tractor is moving. The caster wheel **66** stabilizes the tool and if, in rolling over the terrain, contacts an obstruction, this caster will tilt the tool accordingly.

Adjacent the tool end, remote from the caster **66**, a ground engaging skid or shoe **68** slides along the surface of the terrain. This shoe **68** is hingedly connected at one end on pivot **70** carried by a forwardly projecting arm **72** from the frame **32**. The free end of the shoe may be restricted by a chain connection **74** between the shoe and arm **72**. Intermediate the extent of the skid **68**, frame work **76** extends upwardly to provide an eye **78** for engaging link **80** extending between said frame worw **76** and one end of bell crank **82** pivotally mounted on the frame **32**. The opposite end of this crank **82** is connected by a link **84** to arm **86** fixed to a rotary member or valve **88** in valve housing **90**.

The link **80** is adjustably attached to the frame work **76** which attachment includes an adjustable nut **92** thereon operable against spring **94** thus providing a resilient connection between the elements **76** and **80**.

As the shoe slides over the surface of the ground as carried by the machine, it will follow the contours of the terrain and rock on the pivot **70**, and through linkage **80**, **82**, **84** and **86**, operate the valve **88**. This valve controls fluid flow from pump **96** driven by a suitable connection **98** from the motor **42**. At one position of the valve, pressure fluid is passed by the valve from duct **100** to duct **102** to cylinder **104** of a fluid motor and the piston therein vertically moves piston rod **106** to lift cross bar **108** which is a part of the pintle carrying frame **24**. The frame is lifted in the slide-way **22**, in turn lifting the pintle, the frame **32** suspended therefrom and hence the tool **56**. A reverse movement of the valve allows the cylinder **104** to drain to sump **110**. An adjustable relief valve **112** and by-pass **113** in the hydraulic system determines the rate of fluid flow limiting the movements of the elevator for the tool.

The mass of the frame **32**, including its load, is cushioned on a spring device **114** about post **116** mounted on the chassis **10**.

It will be seen that the tool **56** will automatically lift and fall in response to the ground contour encountered by the shoe **68**. This is a protective feature and one which contributes to a constant filling speed of the device.

The elevator **24** is provided with a rub plate **116** sliding adjacent or against the forward faces of the slides **18**, **20**, limiting any canting of the elevator due to stresses on the machine and a stop **118** may be provided as an elevator limiting device.

The supporting frame, the elevator frame and tool carrying frame may all be fabricated for strength and proper weight to insure a smooth operation of the machine and providing a flexibility over various terrains.

The automatic lift has additional linkage **120** from the valve operating arm **86** to lever **122** adjacent the operator's station. This permits a manual control for the lift and fall of the tool **56**.

It is obvious if the obstruction is met by the caster **66**, the tool will be lifted at that end and tilted as to the shoe **68** thereby operating the hydraulic control the same as if an obstruction were directly met by the shoe, so that only one shoe is necessary for full control over the area traversed by the filling device.

It is not intended to imply that the rise and fall of the screw is quickly responsive to every slight change in ground contour, nor that every clod of earth engaging either the shoe **68** or the wheel **66** will effect a change in adjustment. The operation of the elevating mechanism is based on the average rise and fall of the earth's surface over a comparatively large area. The combined weight of the the screw, the elevator, and the accompanying mechanism is considerable and the operating valves are so adjusted that the flow of operating fluid therethrough is restricted, so that an elevation or drop of the screw is slow in response to a shift in the shoe **68**. However, if a high or low strip is encountered and the shoe **68** is held in a shifted position for a length of time, then the elevator operating mechanism will have time to adjust the screw to meet the general land contour without responding to short impulses. It is to be understood that this machine is designed to be used over rough terrain, and the screw operated to adjust itself to the general surface of the terrain and does so effectively.

It is to be understood that the above detailed description of the present invention is intended to disclose an embodiment thereof to those skilled in the art, but that the invention is not to be construed as limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of being practiced and carried out in various ways without departing from the spirit of the invention. The language used in the specification relating to the operation and function of the elements of the invention is employed for purposes of description and not of limitation, and it is not intended to limit the scope of the following claims beyond the requirements of the prior art.

What is claimed and desired to secure by United States Letters Patent:

1. In a back filling mechanism of the class described, a tractor having elements for supporting and guiding the tractor for movement generally parallel to the longitudinal axis of the tractor, a pair of vertical guides on said tractor spaced apart in a plane transverse to said tractor longitudinal axis, a frame mounted for vertically shifting movement in said vertical guides, a horizontal pintle carried by said frame in a position generally parallel and coaxial to the longitudinal axis of said tractor, a support mounted upon said pintle for free pivotal movement about the axis of said pintle, a shaft fixedly mounted upon said support generally parallel to the plane of said frame, a conveyor element mounted upon said shaft and operable when rotated to engage and shift material laterally and transversely of said frame, motor means carried by said support and connected to rotate said conveyor, wheel means in general alignment with but spaced substantially outboard of and beyond the end of said conveyor element toward which end said conveyor is operable to shift material and engageable with the same surface that supports said tractor to support the end of said conveyor adjacent said wheel means and a spring carried by said tractor and constructed and arranged to resiliently support a portion of the weight of said frame and support and mechanism on said support.

2. The device described in claim 1 wherein said wheel means is castered about a substantially vertical axis, an extension hingedly connected at a first point to said support to mount said castered wheel means, and a link adjustable in length connecting said castered wheel means to a second point on said support and vertically spaced from said first point, whereby the horizontal axis of said wheel may be raised or lowered with respect to the shaft upon which the conveyor is mounted.

3. In the device described in claim 1 a ground engaging skid adjacent the other end of the conveyor element from said wheel means, said skid being pivoted upon said support and operable to slide over the surface of the ground adjacent said other end of the conveyor element, a fluid motor operable to shift said frame vertically in said vertical guides, a source of fluid under pressure, a control valve connecting said source to said fluid motor and shiftable to control the admission to or the release of fluid from said motor to shift said frame, and means connecting said skid to said control valve and operable to move said valve in either direction in response to movements of said skid about its axis, whereby the skid in its movement over an uneven ground surface is effective to raise or lower said frame and support with respect to said tractor.

References Cited in the file of this patent

UNITED STATES PATENTS

1,532,723	Webb	Apr. 7, 1925
1,567,495	Fahrney	Dec. 29, 1925
1,574,230	Brown	Feb. 23, 1926
1,677,342	Hodgen	July 17, 1928
2,064,022	Maloon	Dec. 15, 1936
2,109,393	LeBleu	Feb. 22, 1938
2,132,790	Jeswine	Oct. 11, 1938
2,402,976	Olson	July 2, 1946
2,473,655	Lohn	June 21, 1949
2,482,213	Ritchie	Sept. 20, 1949
2,514,764	Herigstad	July 11, 1950
2,527,840	Mott	Oct. 31, 1950
2,567,107	Gobeil	Sept. 4, 1951
2,589,553	Kesselring	Mar. 18, 1952

FOREIGN PATENTS

913,047	France	May 20, 1946