Jan. 23, 1951 E. D. EKENSTAM 2,539,063

VARIABLE WIDTH DITCH PAVER

Filed Dec. 6, 1948 5 Sheets-Sheet 1

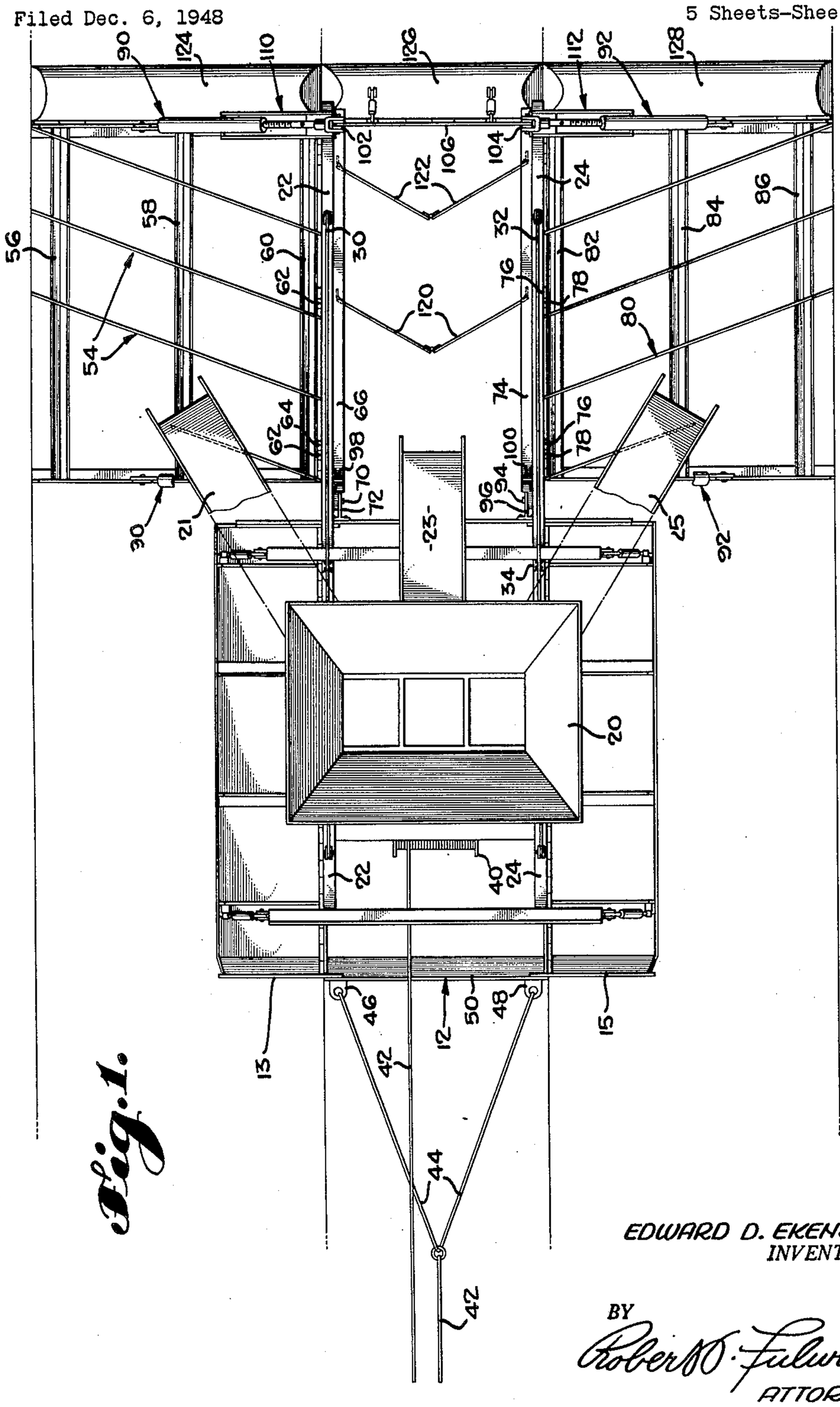

Fig. 1.

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Fig. 2.

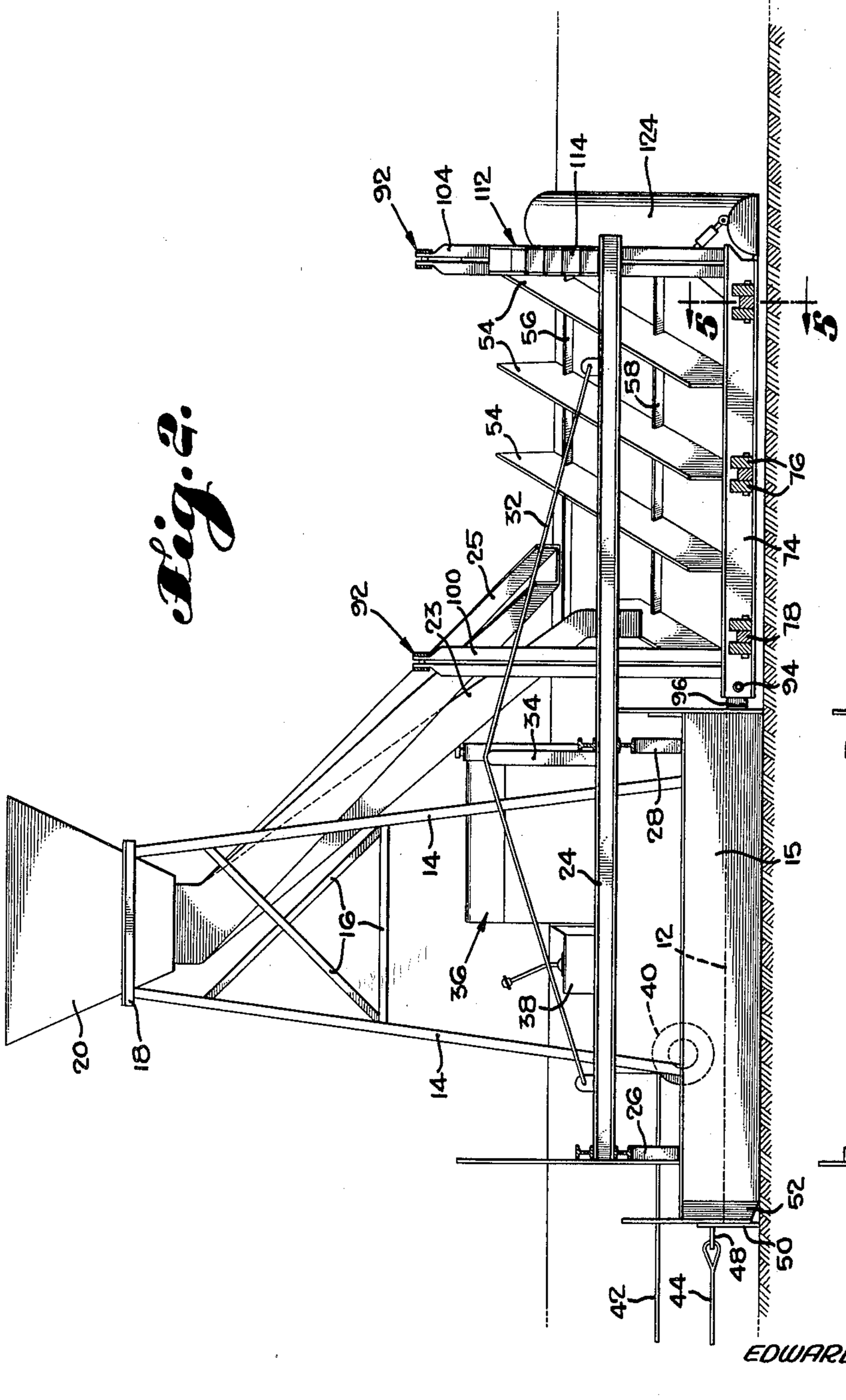

Fig. 3.

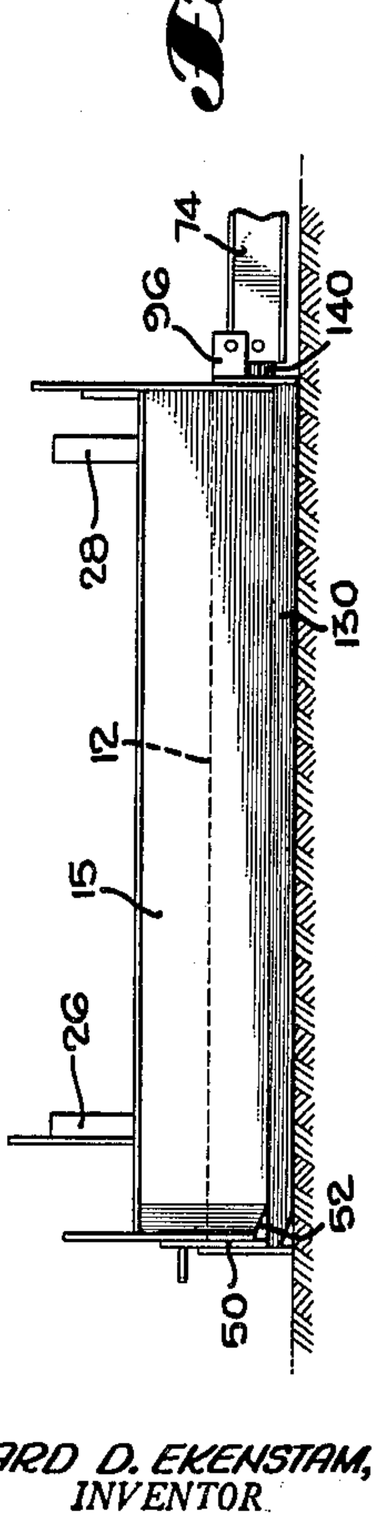

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Fig. 4.

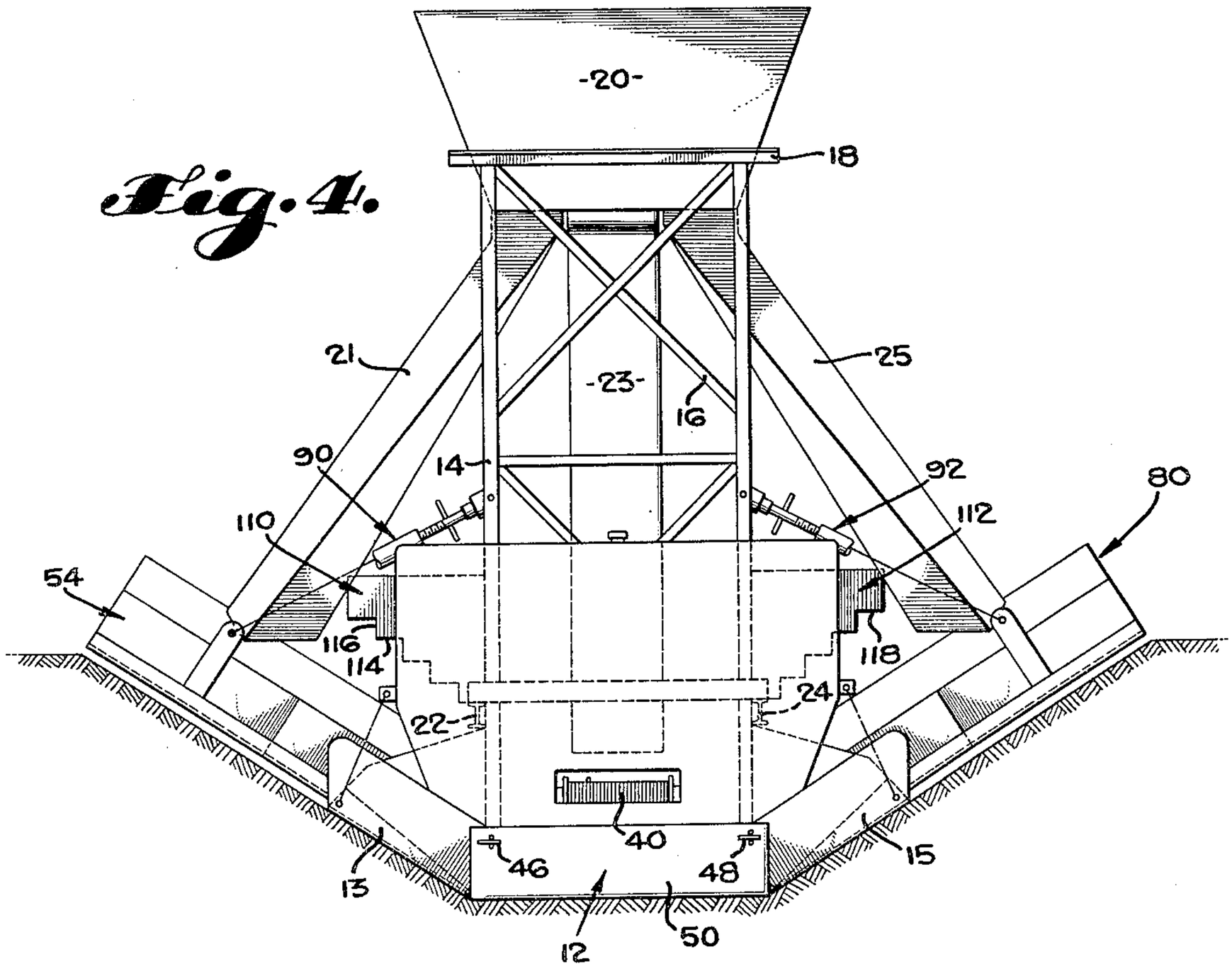
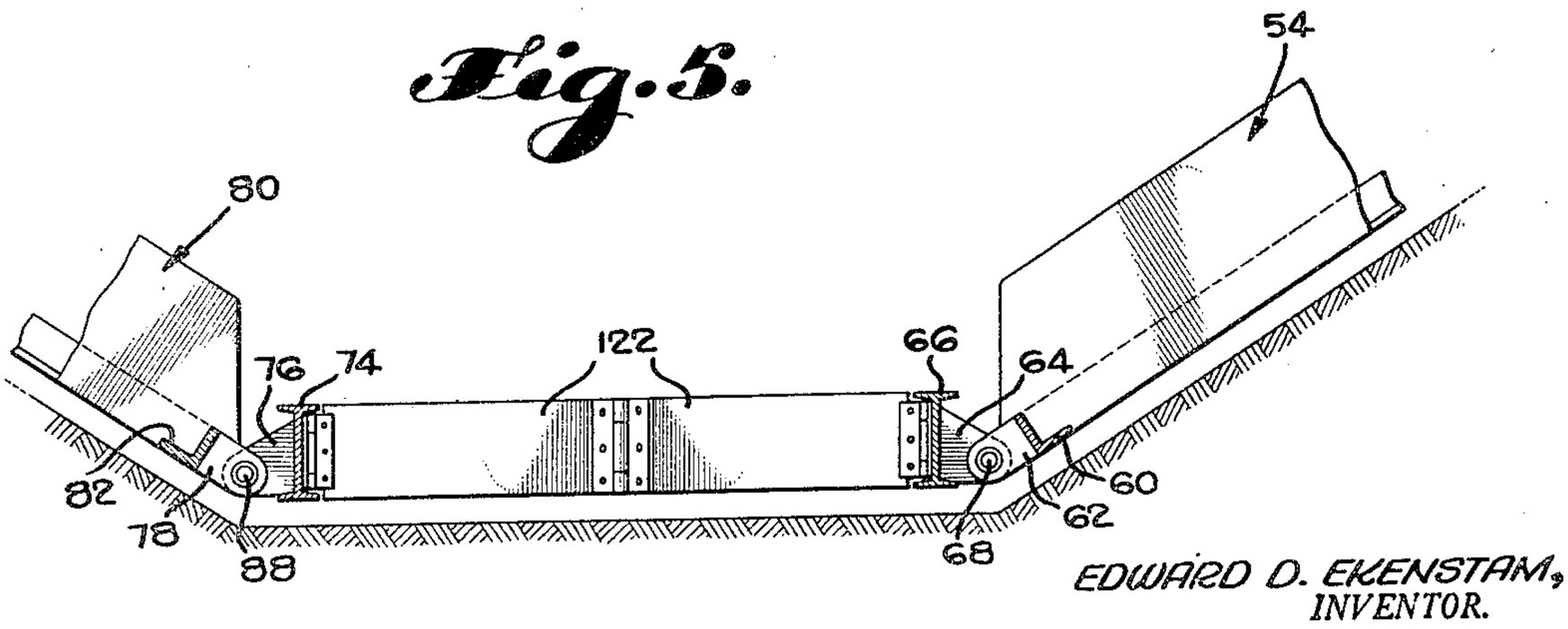


Fig. 5.



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VARIABLE WIDTH DITCH PAVER

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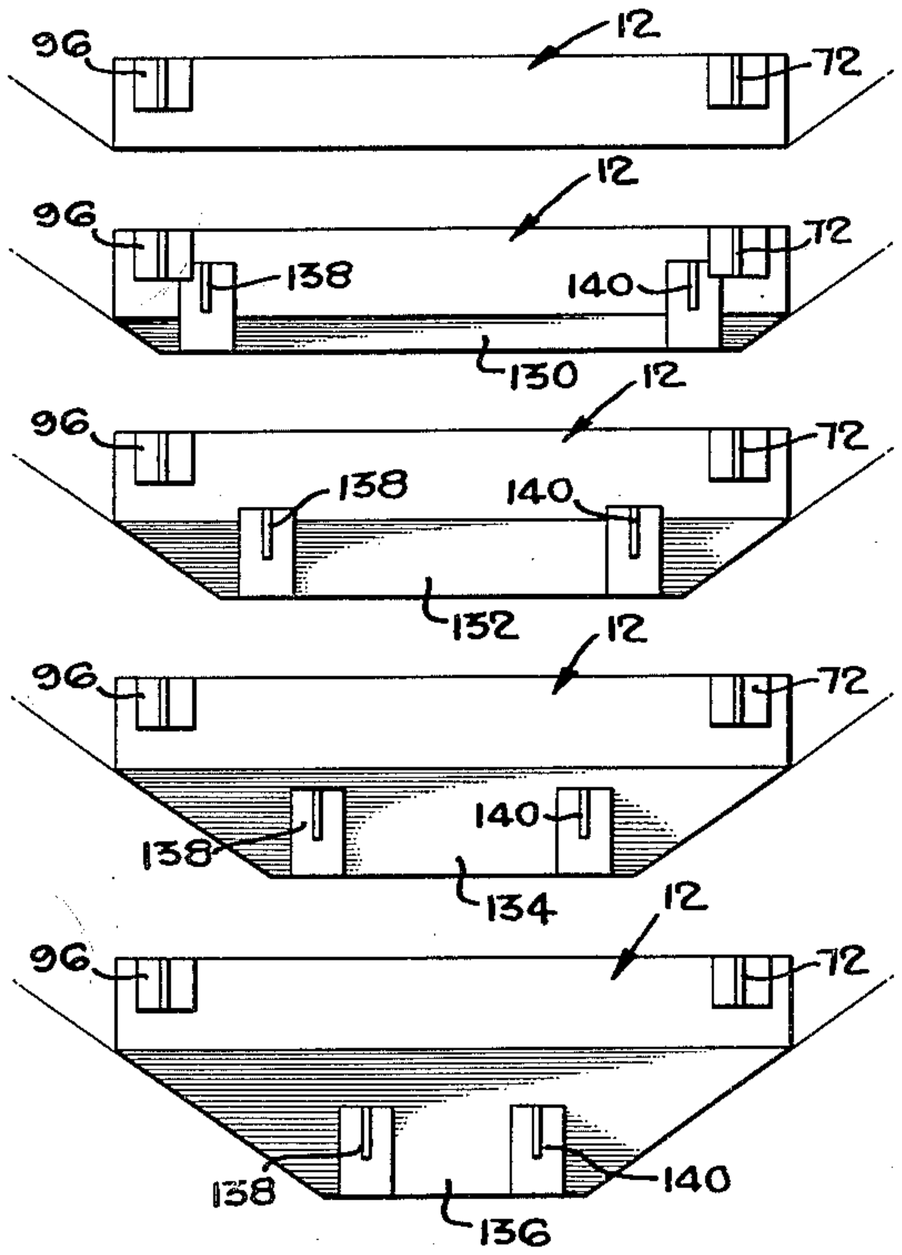

Fig. 6.

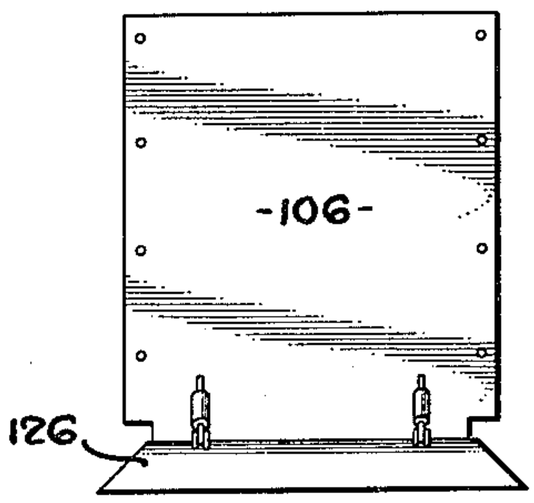

Fig. 7.

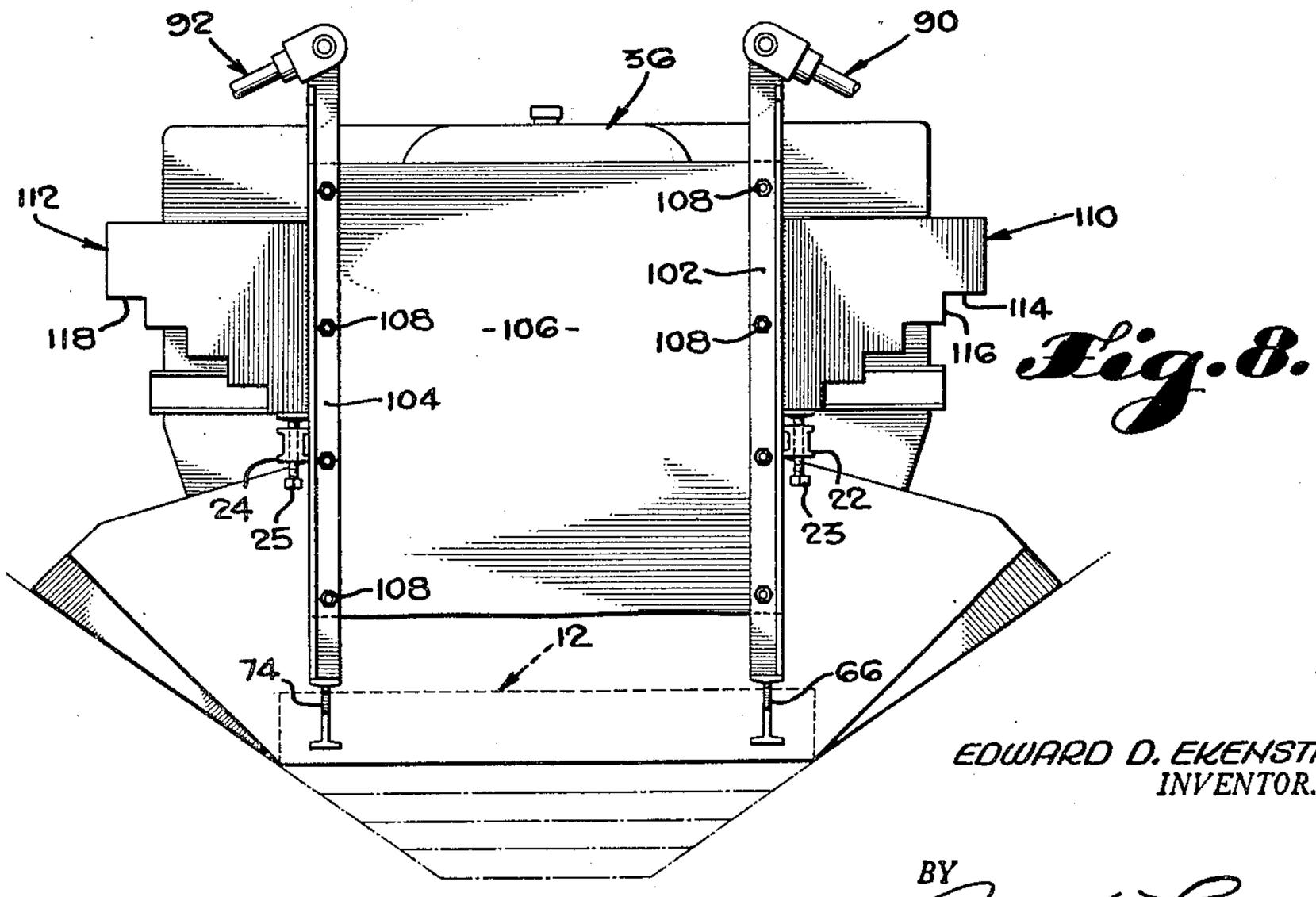

Fig. 8.

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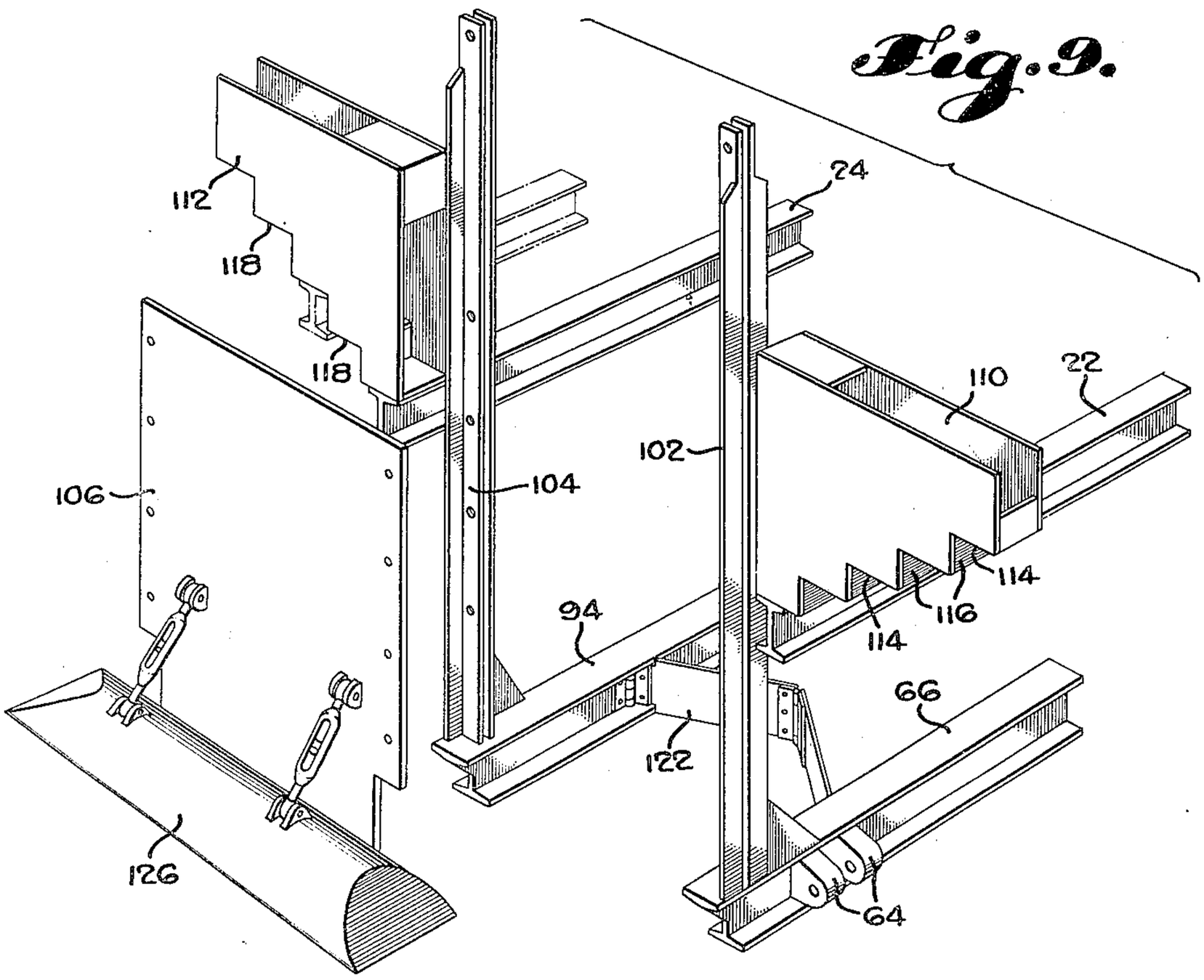
Fig. 9.



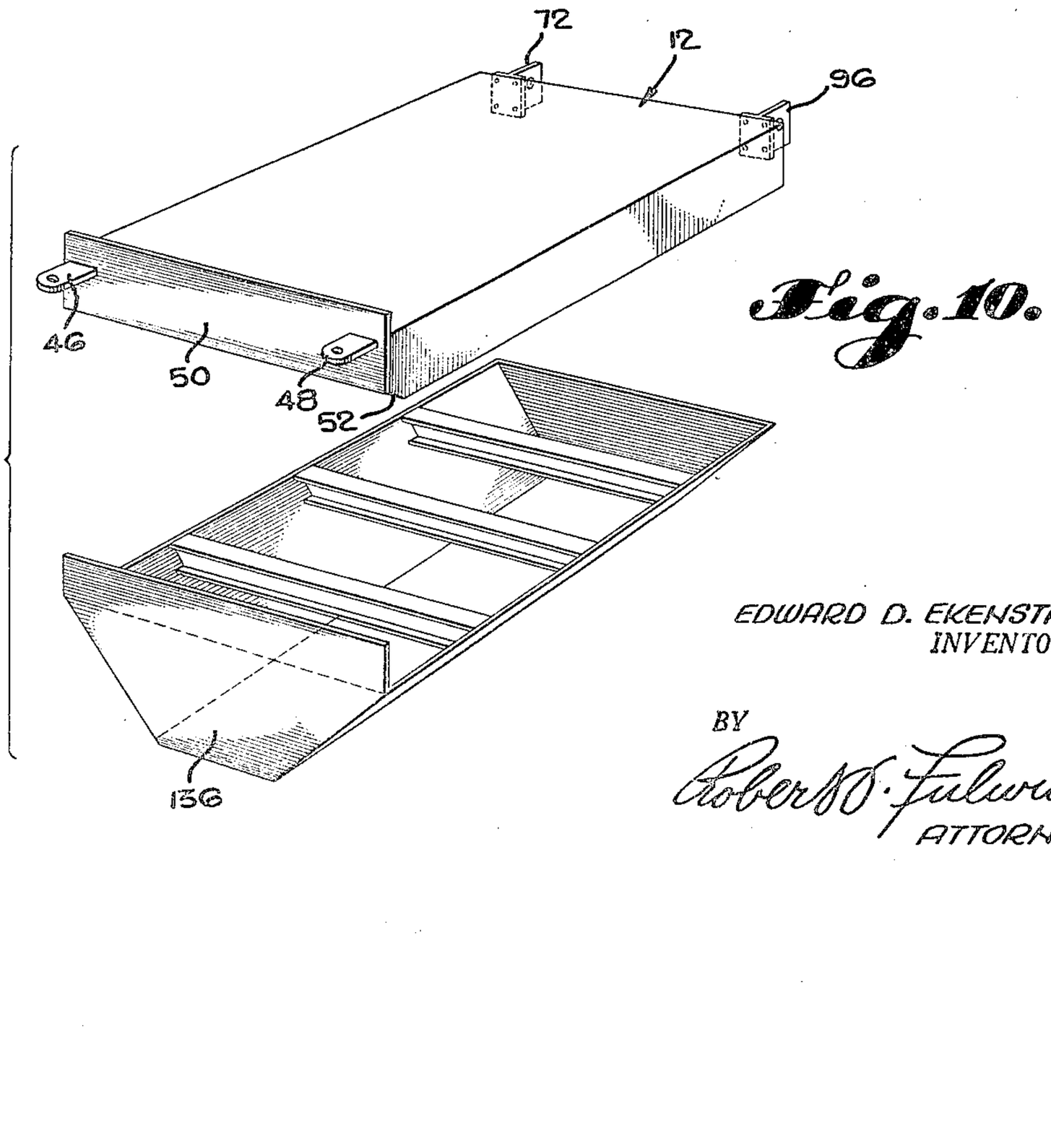


Fig. 10.

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UNITED STATES PATENT OFFICE

2,539,063

VARIABLE WIDTH DITCH PAVER

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Application December 6, 1948, Serial No. 63,833

6 Claims. (Cl. 61—63)

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This invention relates to a machine for lining ditches such as irrigation ditches, drain ditches, and the like.

The main objects of this invention are: to provide a machine for applying a lining of plastic material such as asphalt mix or the like to the bottom and sides of a ditch or trench; to provide a machine of this character which may be readily changed in size to fit a wide range of ditch sizes; to provide a machine of this character which will spread the lining material to a uniform desired thickness, and will smooth and finish the exposed surface thereof, all in one pass or operation; and to provide such a machine of simple and rugged construction which may be fabricated from standard structural beams, angles and plates.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:

Fig. 1 is a top plan view of the improved paving machine;

Fig. 2 is a view in side elevation of the same with a portion thereof shown in vertical section;

Fig. 3 is a fragmentary view in side elevation of the base or pan which supports the machine, and having a supplemental base or pan mounted thereon;

Fig. 4 is a view in front elevation of the improved machine positioned in a flat bottom sloping sided ditch;

Fig. 5 is an enlarged fragmentary sectional view taken on the line 5—5 of Fig. 2 looking in the direction indicated by the arrows;

Fig. 6 is an end elevational view showing the foundation or base pan upon which the machine is mounted, and with a series of supplemental bases or pans mounted thereunder, the view being taken from the rear ends of the structures;

Fig. 7 is a view in rear elevation of one of the spacer plates used in conjunction with the variable width frame;

Fig. 8 is a fragmentary view in rear end elevation of the machine, partly in section, and showing how the sub-bases reduce the horizontal dimension at the bottom of the ditch being paved;

Fig. 9 is an exploded view showing in perspective various parts of the adjustable structure for fitting various sized ditches; and

Fig. 10 is a view in perspective of the base pan upon which the machine is mounted, and one sub-pan for mounting thereunder.

The ditch paving machine of the present invention is an improvement over the machine

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shown in my Patent No. 2,447,571, issued August 24, 1948. In the machine of my prior patent, adjustability of width was secured by telescoping the pan, but obviously such a construction has limitations as to narrow width. A certain amount of room is necessarily required for the power plant and winch mechanism, and these units determine how narrow the pan can be adjusted. In the present construction, there is a wider range of adjustment and a more simple and rugged construction for attaining the desired object.

As pointed out in my prior patent, there are many instances where it is economically advisable to put a lining in an irrigation ditch or a drain ditch, particularly the former, where there is considerable loss of irrigation water due to seepage and leakage through the walls of the ditch. It is also of advantage to pave some ditches solely for the purpose of controlling the weeds which grow up along the ditch sides and eventually fill up and choke off the capacity of the ditch.

In the construction shown in the drawings, the machine comprises a horizontally disposed substantially rectangular shaped pan or base 12 upon which is mounted a vertically disposed upwardly tapered rectangular frame comprising corner posts 14, cross braces 16, and a rectangular top frame 18 which supports a paving material receiving hopper 20. The bottom of the hopper 20 is provided with three spouts or chutes 21, 23, and 25 which are positioned to distribute material to the sides and bottom of the ditch being paved rearwardly of the pan 12, as shown in Figs. 1, 2, and 3. The pan 12 also supports and has mounted thereon a pair of horizontally disposed laterally spaced control beams 22 and 24 supported and braced by posts 26 and 28. The beams 22 and 24 extend rearwardly of the base pan 12, and are each provided with tension tie rods 30 and 32, the mid-points of which are supported by vertical king posts 34 for imparting rigidity to the overhanging rearwardly extending portions of the side beams.

A prime mover generally designated 36 is also mounted on a base pan 12 which, through a gear-shift mechanism 38, drives a cable winch drum 40 about which a cable 42 is wound for dragging the machine along the bottom of a ditch. The cable 42 is drawn out forwardly, passed about a sheave anchored at a point in front of the machine, and is looped back as shown in Fig. 1 to a bridle 44 which connects to lugs 46 and 48 welded to the front wall of the base pan 12.

As in my above identified patent, the front

end of the pan 12 is provided with a vertically disposed transversely extending shear plate 50 which strikes off and determines the exact contour of the ditch through which the machine is being dragged, and the pan immediately back of the shear plate 50 is beveled at its forward end as shown at 52 for causing it to slide over the surface of the ditch and not dig into such surface, particularly where the formation is relatively soft.

Means are provided for spreading the lining material over the surface of the ditch, and comprise a plurality of spreader blades 54 mounted in spaced parallel relation on three longitudinally extending frame members 56, 58, and 60. The frame member 60 is provided with three hinge members 62 rigidly welded thereto which are received between embracing hinge members 64 welded to the outside face of the web of an I-beam 66. Each of the hinges is provided with a hinge pin 68 so that the assembly may be angularly adjusted with respect to the machine.

The I-beam 66 is longitudinally disposed as shown particularly in Fig. 1 of the drawings, and has its forward end pivotally connected at 70 to a rearwardly extending bracket 72 which is riveted and welded to the rear face of the pan 12. A similar I-beam 74 is provided in spaced parallel relation to the I-beam 66, and the outer surface of its web is likewise provided with hinge portions 76 which embrace hinge portions 78 of a wing structure comprising a plurality of spreader blades 80 mounted on spaced longitudinally extending parallel frame members 82, 84, and 86. Hinge pins 88 are likewise provided so that the assembly as a whole may be angularly adjusted with respect to the machine.

Means are provided for angularly adjusting the wings, and comprise turnbuckle assemblies generally designated 90 and 92 which have their inner ends mounted pivotally to the frame structure and their outer ends pivotally connected to the spreader wings, as shown most clearly in Figs. 4 and 8 of the drawings. The forward end of the beam 74 is pivoted at 94 to a rearwardly extending bracket 96 which is riveted to the rear end wall of the pan 12.

The forward ends of the beams 66 and 74 are provided with vertically disposed posts 98 and 100, and their rear ends are likewise provided with vertically disposed posts 102 and 104, respectively. Means are provided for securing the posts 102 and 104 in spaced rigid relationship, and comprise a plate 106 generally rectangular in shape having its side marginal edges removably secured to the posts 102 and 104 by bolts 108. A series of plates similar to the plate 106 are provided which have widths varying in predetermined increments.

The outside faces of the posts 102 and 104 have laterally extending brackets 110 and 112, respectively, rigidly welded thereto, and which have stepped lower surfaces in the form of inverted stair steps, thus providing a series of horizontally disposed surfaces 114, and a series of vertically disposed surfaces 116. The horizontally disposed surfaces 114 preferably bear a relation of one and one-half to one with respect to the surfaces 116, but it will be understood, of course, that this ratio may be varied, and that the number of surfaces may be varied in accordance with any set of predetermined increments. The horizontal surfaces 114 of the bracket 110 and the similar surfaces 118 of the

bracket 112 are adapted to rest upon the top surfaces of the rearwardly extending I-beams 22 and 24 for supporting the spreader structure as a whole in spaced relation above the surface being paved.

Means are provided for spreading paving material along the flat bottom of the ditch, and comprise two pairs of broad V-shaped spreader blades 120 and 122 having their outer ends hinged to the inside faces of the I-beams 66 and 74, and having their apexes pivotally joined as shown most clearly in Fig. 1 of the drawings so that the angle of the V formed by the blades may vary when the beams 66 and 74 are adjusted toward or away from each other.

Means are provided for smoothing the spread paving material, and comprise a series of smoothing irons 124, 126, and 128 pivoted to the rear ends of the spreader wings and to the spacer blade 106.

Referring particularly to Fig. 6 of the drawings, the main pan or base 12 is shown provided with a series of sub-pans 130, 132, 134, and 136. Each of the sub-pans varies in horizontal and vertical dimensions by increments equal and of the same magnitude as the steps 114 and 116 of the brackets 110 and 112, and a series of spacer plates 106, the others of the series not being shown, are also provided of widths varying in accordance with the horizontal increments of the two brackets 110 and 112 combined. The rear ends of each of the sub-pans shown in Fig. 6 are also provided with rearwardly extending brackets or lugs 138 and 140 to which the forward ends of the beams 66 and 74 may be pivotally attached when the sub-pan is in place underneath the main pan 12.

In the operation and use of this machine as shown in Figs. 1, 2, and 4, the main pan 12 only is being used to dimension the ditch, together with side wings 13 and 15. Paving material dumped into the hopper 20 is fed downwardly by gravity through the chutes 21, 23, and 25 and deposited on the side walls and bottom of the ditch in front of and between the spreader blades 54, 80, 120, and 122. The blades being held in spaced relation to the bottom and sloping sides of the ditch spread the material uniformly over the sides and bottom, and the smoothing irons 124, 126, and 128 smooth the surface of the spread paving material in the usual manner.

When it is desired to use the machine to pave a smaller ditch, the appropriate sub-pan 130, 132, 134, or 136 is positioned underneath the main pan 12 and securely bolted thereto. At the same time the plate 106 is removed and the appropriate plate corresponding in size to the sub-pan selected is bolted in place, thus bringing the two spreader wings and associated framework into closer or narrower relationship. As the posts 102 and 104 are brought closer together, the brackets 110 and 112 are brought closer together, thus permitting the spreader assembly to rest at a lower position on the appropriate horizontal portions of the step brackets. For instance, when the sub-pan 136 is used and the appropriate spreader plate used in place of the plate 106, then the outermost horizontal surfaces of the brackets 110 and 112 will rest upon the beams 22 and 24, and in this position the entire spreader assembly will be positioned four increments lower than as shown in Fig. 8 of the drawings, and the spreader wing supporting beams 66 and 74 will be

attached to the lugs 138 and 140 of the sub-pan 136.

While the machine shown herein has been designed to contour and apply paving material to five different sizes of ditches, it will be understood that the invention is not limited to that particular number, nor limited to the particular one and one-half to one ratios between the horizontal and vertical increments of the step brackets or of the spacer plates 106.

In the modified form shown in Fig. 8 of the drawings, the rear ends of the beams 22 and 24 are provided with screw jacks 23 and 25, respectively, by which fine vertical adjustment of the entire spreader assembly may be secured for varying the thickness of the spread lining material.

I claim:

1. A machine for lining a sloping sided V-shaped ditch comprising: a horizontally disposed framework; a supporting and guiding pan secured to the underside of said framework for supporting said machine; a pair of spreader blade supporting frames on said framework rearwardly of said pan, one at each side thereof; means for securing each of said spreader blade frames to said framework in any one of a plurality of positions spaced uniformly along an inclined line parallel to the sloping sides of said ditch to thereby adjust the distance between said spreader blade frames; and a sub-pan detachably secured to the underside of said supporting pan, the cross sectional contour of said sub-pan being a flat bottomed V having an upper width equal to the width of said supporting pan and having a base surface of lesser width joined to upwardly and outwardly sloping sides parallel to said inclined line, whereby upon changing the positions of said spreader blade frames along said inclined line, said sub-pan may be replaced with another having a different depth and having a base surface width corresponding to the distance between said spreader blade frames in said changed positions.

2. A machine for lining a sloping sided V-shaped ditch comprising: a horizontally disposed framework; a supporting and guiding pan secured to the underside of said framework for supporting said machine; a pair of spreader blade supporting frames on said framework rearwardly of said pan, one at each side thereof; means for securing each of said spreader blade frames to said framework in any one of a plurality of positions spaced uniformly along an inclined line parallel to the sloping sides of said ditch to thereby adjust the distance between said spreader blade frames; a sub-pan detachably secured to the underside of said supporting pan, the cross sectional contour of said sub-pan being a flat bottomed V having an upper width equal to the width of said supporting pan and having a base surface of lesser width joined to upwardly and outwardly sloping sides parallel to said inclined line; and means for detachably securing said spreader blade frames to said sub-pan at locations corresponding to the width of said base surface, whereby upon changing the positions of said spreader blade frames along said inclined line, said sub-pan may be replaced with another having a different depth and having a base surface width corresponding to the distance between said spreader blade frames in said changed positions.

3. A machine for lining a sloping sided V-shaped ditch comprising: a horizontally disposed framework including a pair of spaced rearwardly extending frame beams; a supporting and guiding pan secured to the underside of said framework for supporting said machine; a spreader blade frame assembly comprising a pair of vertically disposed laterally spaced posts, a pair of laterally spaced horizontally disposed beams, one attached to the lower end of each post, a spreader blade on each of said beams, and a pair of oppositely extending brackets, one on each of said posts, the undersides of said brackets having stepped notches for resting on said rearwardly extending frame beams, said stepped notches having vertical and horizontal increments defining an inclined line parallel to the sloping sides of said ditch to permit adjustment of the distance between said spreader blades; and a sub-pan detachably secured to the underside of said supporting pan, the cross sectional contour of said sub-pan being a flat bottomed V having an upper width equal to the width of said supporting pan and having a base surface of lesser width joined to upwardly and outwardly sloping sides parallel to said inclined line, whereby upon adjusting the positions of said spreader blade frame assemblies along said inclined line, said sub-pan may be replaced with another having a different depth and having a base surface width corresponding to the distance between said spreader blades in said adjusted positions.

4. A machine for lining a sloping sided V-shaped ditch comprising: a horizontally disposed framework including a pair of spaced rearwardly extending frame beams; a supporting and guiding pan secured to the underside of said framework for supporting said machine; a spreader blade frame assembly comprising a pair of vertically disposed laterally spaced posts, a pair of laterally spaced horizontally disposed beams, one attached to the lower end of each post, a spreader blade on each of said beams, and a pair of oppositely extending brackets, one on each of said posts, the undersides of said brackets having stepped notches for resting on said rearwardly extending frame beams, said stepped notches having vertical and horizontal increments defining an inclined line parallel to the sloping sides of said ditch to permit adjustment of the distance between said spreader blades; horizontally disposed V-shaped spreaders connected between said spreader blade frame assemblies, said V-shaped spreaders being articulated to accommodate said adjustment of the distance between said spreader blades; and a sub-pan detachably secured to the underside of said supporting pan, the cross sectional contour of said sub-pan being a flat bottomed V having an upper width equal to the width of said supporting pan and having a base surface of lesser width joined to upwardly and outwardly sloping sides parallel to said inclined line, whereby upon adjusting the positions of said spreader blade frame assemblies along said inclined line, said sub-pan may be replaced with another having a different depth and having a base surface width corresponding to the distance between said spreader blades in said adjusted positions.

5. A machine for lining a sloping sided V-shaped ditch comprising: a horizontally disposed framework including a pair of spaced rearwardly extending frame beams; a supporting and guiding pan secured to the underside of said framework for supporting said machine; a spreader blade frame assembly comprising a pair of ver-

tically disposed laterally spaced posts, a pair of laterally spaced horizontally disposed beams, one attached to the lower end of each post, a spreader blade on each of said beams, a pair of oppositely extending brackets, one on each of said posts, the undersides of said brackets having stepped notches for resting on said rearwardly extending frame beams, said stepped notches having vertical and horizontal increments defining an inclined line parallel to the sloping sides of said ditch to permit adjustment of the distance between said spreader blades, and a plate extending between and detachably secured to said posts; and a sub-pan detachably secured to the underside of said supporting pan, the cross sectional contour of said sub-pan being a flat bottomed V having an upper width equal to the width of said supporting pan and having a base surface of lesser width joined to upwardly and outwardly sloping sides parallel to said inclined line, whereby upon detaching said plate and adjusting the positions of said spreader blade frame assemblies along said inclined line, said sub-pan

may be replaced with another having a different depth and having a base surface width corresponding to the distance between said spreader blades in said adjusted positions, and said plate may be replaced with another having a width also corresponding to said distance.

6. A structure as defined in claim 3 characterized by having screw jacks interposed between said rearwardly extending frame beams and the horizontal notched surfaces of said bracket to secure a fine vertical adjustment of the spreader blade frame assemblies for varying the thickness of the spread material.

EDWARD D. EKENSTAM.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,447,571	Ekenstam	Aug. 24, 1948