Aug. 29, 1944. B. V. REANY 2,356,797

VERTICAL BLADE ATTACHMENT FOR ELEVATING GRADERS

Filed Sept. 21, 1942 3 Sheets-Sheet 1

Fig. 1.

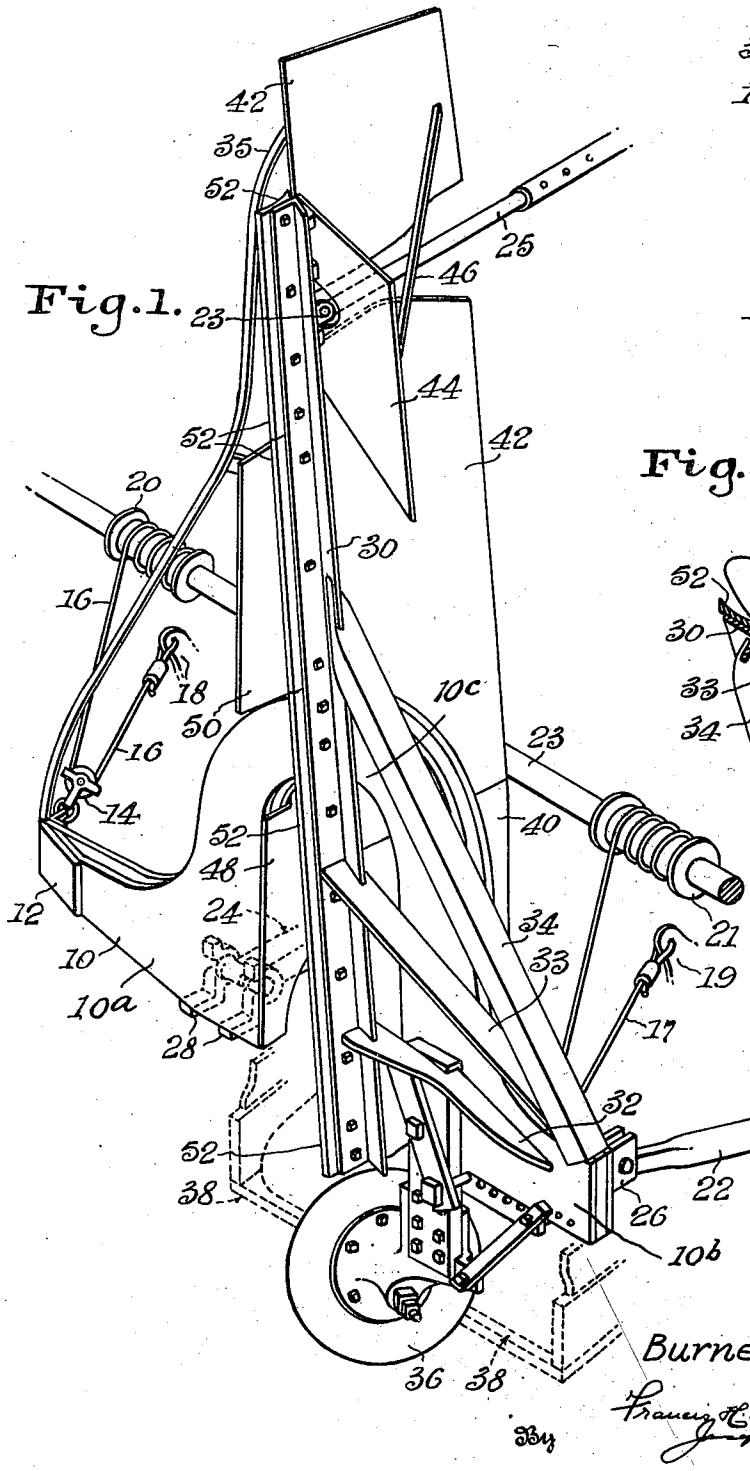
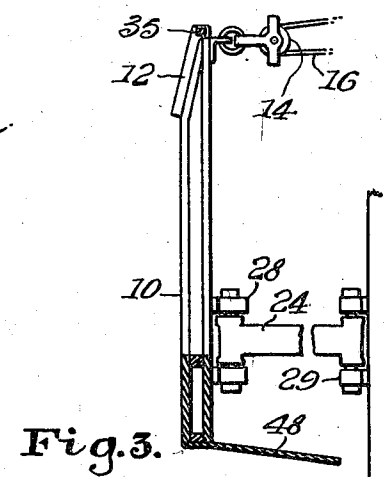
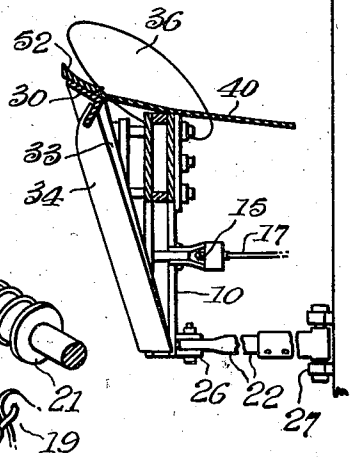


Fig. 3.





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Aug. 29, 1944. B. V. REANY 2,356,797

VERTICAL BLADE ATTACHMENT FOR ELEVATING GRADERS

Filed Sept. 21, 1942 3 Sheets-Sheet 2

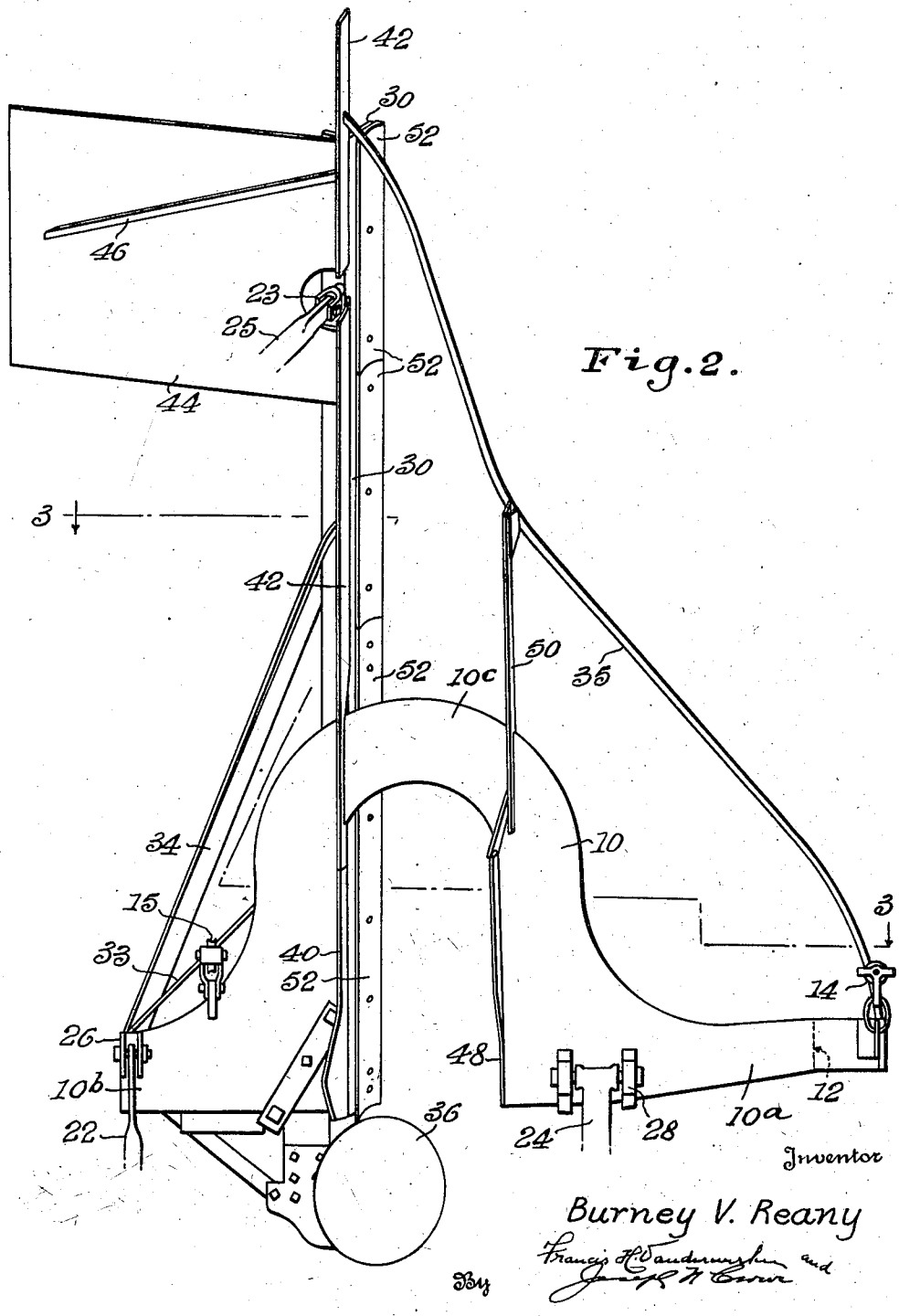


Fig. 2.

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VERTICAL BLADE ATTACHMENT FOR ELEVATING GRADERS

Filed Sept. 21, 1942 3 Sheets-Sheet 3

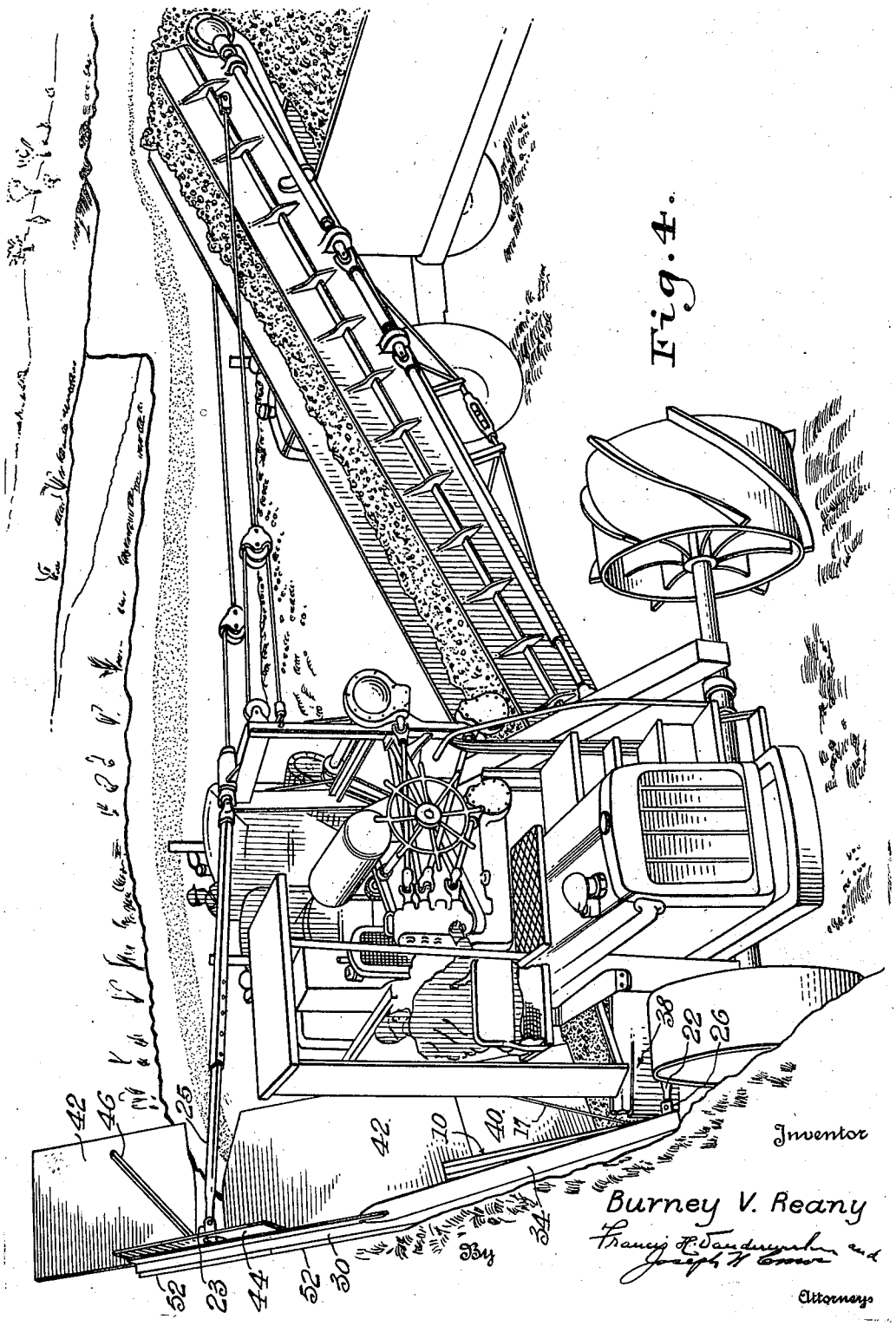


Fig. 4.

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2,356,797

VERTICAL BLADE ATTACHMENT FOR ELEVATING GRADERS

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Application September 21, 1942, Serial No. 459,128

10 Claims. (Cl. 37—110)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without payment to me of any royalty thereon.

This invention relates to road building and dam construction machines and more particularly to that type known as elevating graders.

An elevating grader is a machine which is pulled by a tractor and which has a vertical cutting disc, generally about two feet in diameter, which cuts a furrow in the earth as the machine is pulled by the tractor. The disc can take a maximum cut of about eighteen inches and is placed so as to push the dirt removed onto a conveyor which elevates the dirt and drops it into trucks which keep pace with the grader.

In constructing highway fills and compacted earth fill dams, a mixture of several materials such as clay, silt and sand are required in specified proportions in order to make the fill impervious. The different materials entering into the mix must be in the proper proportions and thoroughly mixed as are the ingredients in concrete. The various types of soil, which enter into the mix used in the impervious sections of road grades and compacted earth fill dams, are found in stratified layers from one-half to five feet in thickness. The ordinary grader can only load one type of material at a time.

In locating the proper materials for use in the impervious section of the fill, borings are made in the proposed borrow pits to obtain samples of the material at various depths. These samples are then analyzed and the depth of cut required to give the correct proportion of the various materials entering into the mix is determined.

The primary object of the present invention is to provide a vertical cutter which will take a cut the full depth of the pit, as predetermined, so as to have the correct percentage of each material entering into the mix and to have these materials well mixed before loading so that stratification does not occur in the fill. The mixing occurs as the material is sliced from the face of the pit and falls along the vertical blade to the ground where it is then picked up and forced onto the revolving belt which loads it into trucks.

Another object of this invention is to provide a means of eliminating the time lost in mixing and loading the properly proportioned materials.

These and other objects and advantages of my invention will become apparent upon a consideration of the following detailed description when taken in conjunction with the accompanying drawings in which—

Fig. 1 is a perspective view from the right front of the attachment;

Fig. 2 is a rear elevation of the attachment;

Fig. 3 is a plan view of the attachment along the line 3—3 of Fig. 2; and

Fig. 4 is a view of my device in operation.

Reference being had to Fig. 1 of the drawings, in will be seen that there has been provided an arched plow beam 10 including longitudinally alined toe and heel portions 10*a* and 10*b* and an intermediate arched portion 10*c*. The extreme forward end of the toe portion 10*a* is tapered to a blunt point and provided with a buffer 12. Likewise, to the extreme end of the toe portion 10*a* is affixed a pulley 14 adapted to receive cable 16, one end of which is attached to a fixed bracket 18 and the other to a winding drum 20 keyed to shaft 23 from the power plant. Similarly, a bracket 19 is provided to engage one end of cable 17 which is adapted to pass through pulley 15 attached to the heel portion 10*b* of the plow beam and to engage the drum 21 on shaft 23, as clearly shown in Fig. 1 of the drawings.

A blade supporting mast 30, consisting of a section of angle iron is supported in a position adjacent to the trailing edge of the arch portion 10*c* of the plow beam 10 and is slightly inclined from the plane of the side of the plow beam, by means of the supporting arms 32, 33 and 34. The supporting arms are slotted at one end to receive one side of the angle iron mast 30 and shaped to engage the side and the top respectively of the trailing end of the heel portion 10*b* of plow beam 10. The lower edge of the heel portion 10*b* of the plow beam carries a circular cutting disc 36. This disc is similar to those now in general practice and requires no further description. A stiffener bar 35 has one end attached to the forward extremity of the toe portion 10*a* and its opposite end affixed to the beam 10 and the upper end of the mast 30.

In order to insure the removed material falling onto the conveyor 38 or in position to be scooped up by the disc 36, guide vanes are provided. Vane 40 is attached to the rear of the arch of the plow beam and extends on either side thereof. On the cutting side the vane 40 is shaped to contact throughout its length the mast 30, while on the dirt removal side it extends a sufficient distance to assure the retaining of the removed material by the conveyor. Arranged in the same plane as vane 40 is a vane 42 which extends around and above the plow beam 10 arranged to contact the mast 30 throughout the remainder

of its length. The vane **42** is also arranged to extend past the upper end of the mast **30**. Near the upper end of the mast **30** and extending at right angles to the vane **42** may be placed a vane **44** to protect the operator from falling particles. The vanes **42** and **44** are braced by a spacing member **46**. On the opposite side of the arch and flush therewith is a vane **48** extending on the removal side a distance corresponding to that of the vane **40**. If desired, a vane **50** may be attached over the arch in a position corresponding to the vane **42**. To secure it at its upper end, it is attached to the stiffener bar **35**.

To provide a cutting edge, grader blades **52** are bolted to an arm of the mast **30**. These blades are attached in sufficient number and of sufficient size to accommodate the depth of cut which it is desired to take.

The method of securing the attachment to the tractor will be clear from a consideration of Figs. 2 and 3. It will be seen that there is provided at the rear end of the plow beam **10** an adjustable spacing arm **22** pivoted to the beam by the bearing bracket **26** and to the frame of the tractor by bearing bracket **27**. Near the forward edge of the arch of the plow beam is provided a second adjustable spacing arm **24** pivoted to the beam by means of bearing bracket **28** and to the frame of the tractor by bearing bracket **29**. A third adjustable spacing arm **25** is attached at one end to a bearing bracket **23** near the top of the mast **30** and at the other end to the frame of the tractor.

The operation of my device will be clear from a consideration of Fig. 4. Suitable test borings having been made to determine the proper depth of cut to obtain the desired mixtures, the device is attached to the tractor with a sufficient number of cutting blades **52** to take a cut varying in depth from eight to fifteen feet and from one-half inch to six inches in thickness. In this connection it is to be noted that variations in the dimensions of the cut are obtained by varying the length of the spacing arm **25** whereby the plow beam **10** may be tilted through an angle sufficient to provide a cut of the desired thickness. The tractor is driven into the borrow pit around the edge to be removed. The material cut away by the blades falls between the guide vanes and is directed onto the conveyor **38**. The fall of the material will aid in its thorough mixing. The mixed material is then removed by suitable trucks to its point of use. Should additional power be needed to draw the grader or to overcome the turning effect produced by the resistance of the bank to the cutters, an additional tractor may be used.

It will be seen that I have provided a machine which can take a cut varying in depth from eight to fifteen feet and in thickness from one-half of an inch to six inches. By this construction, a truck may be loaded while the machine is traveling any distance from twenty to two hundred fifty feet in the borrow pit. If the tests made on the material of the borrow pit show that the correct proportions of materials can be obtained while the machine is traveling a distance of twenty feet, a heavy cut is taken. On the other hand, if the tests show that in another portion of the pit material is required from a one hundred fifty foot section in order to obtain the correct proportions, a lighter cut is taken. In this manner the correct proportion of materials entering into the required mix is obtained at all times and as the various materials are well mixed at the time of loading, no further mixing or processing is required before placing in the fill. Due to the increased speed in loading and to the fact that no separate mixing operation is required, a large saving is effected and better results are obtained as the correct proportions of mix are maintained at all times.

While I have described my invention with reference to a single embodiment thereof, it is to be understood that I do not wish to be limited to the particular details and assemblies described, since obvious modifications within the spirit of the invention will suggest themselves to one skilled in the art.

Having described my invention, what I claim as new and wish to secure by Letters Patent is:

1. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor mounted upon and supported transversely of said frame, a ground cutting element located adjacent the mouth of the conveyor and being adapted to deflect dirt onto said conveyor, a supplementary cutting element disposed in a vertical plane above said ground cutting element, said ground and supplementary cutting elements being attached to said frame for movement about a horizontal axis of rotation paralleling the longitudinal axis of said frame and disposed adjacent the lower end of said supplementary cutting element, and means in connection with the upper end of said supplementary cutting element for effecting adjustment of said ground and supplementary cutting elements about said horizontal axis of rotation to produce a cut of predetermined thickness.

2. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor mounted upon and supported transversely of said frame, a disk cutter located adjacent the mouth of the conveyor and being adapted to deflect dirt onto said conveyor, a straight-edge cutter blade disposed above said disk cutter in a vertical plane and constituting a continuation of the peripheral plane of said disk cutter, said cutter blades being mounted for movement about a horizontal axis of rotation paralleling the longitudinal axis of said frame and disposed adjacent the lower end of said straight-edge cutter blade, and means in connection with the upper end of said cutter blade for effecting its adjustment about said horizontal axis whereby to produce a cut of predetermined thickness.

3. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor carried by and supported transversely of said frame, a rotary disk cutter located adjacent the mouth of the conveyor and being adapted to deflect dirt onto said conveyor, a straight-edge cutter blade situated above said disk cutter and in a vertical plane substantially coextensive with the peripheral plane of said disk cutter, said disk cutter and cutter blade being attached to said frame for adjustment about a horizontal axis of rotation paralleling the longitudinal axis of said frame and disposed adjacent the lower edge of said cutter blade, a vane extending from said cutter blade and constituting a rearward projection thereof for directing cutaway material into the mouth of said conveyor, and means in connection with the upper end of said cutter blade for effecting adjustment of said disk cutter and cutter blade about said horizontal axis of rotation to produce a cut of predetermined thickness.

4. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor carried by and supported transversely of said frame, a disk cutter located adjacent the mouth of the

conveyor and being adapted to deflect dirt onto said conveyor, a mast disposed substantially vertically above said disk cutter, a straight-edge cutter blade attached to said mast, a vane contacting said cutter blade and forming a rearward extension thereof, the width of said vane being such as to direct cutaway material into the conveyor, means for supporting said mast and disk cutter, said means being swivelly attached to one side of the frame for movement about a horizontal axis of rotation paralleling the longitudinal axis of said frame and disposed adjacent the lower end of said mast, and additional means in connection with the upper end of said mast to effect adjustment of said mast and cutter supporting means about said horizontal axis of rotation whereby to cause said cutter blade to produce a cut of predetermined thickness.

5. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor carried by and supported transversely of said frame, a ground cutting element located adjacent the mouth of the conveyor and being adapted to deflect dirt onto said conveyor, a substantially vertical mast disposed above said ground cutting element, means for supporting said mast and ground cutting element, said means being mounted for adjustment about a horizontal axis of rotation paralleling the longitudinal axis of said frame and disposed adjacent the lower end of said mast, a plurality of cutter blades arranged in end to end relation and attached to said mast, said cutter blades being provided with rearwardly extending vanes adapted to direct the cutaway material onto the conveyor, and means in connection with the upper end of said mast for effecting its adjustment about said horizontal axis of rotation to regulate the thickness of the cut of said cutter blades.

6. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor carried by said frame and supported transversely thereof, a disk cutter disposed adjacent the mouth of the conveyor and being adapted to deflect dirt onto said conveyor, a substantially vertical mast disposed above said disk cutter, means for supporting said mast and disk cutter, said means being attached to said frame for adjustment about a horizontal axis of rotation paralleling the longitudinal axis of said frame and disposed adjacent the lower end of said mast, a plurality of straight-edge cutting blades arranged in end to end relation and attached to said mast, said cutting blades being provided with rearwardly extending vanes located in the same plane and forming a rearward extension of said cutting blades for deflecting dirt onto said conveyor, a protective vane attached to the upper end of said mast and extending in a plane normal to that of said first-mentioned vanes, and means in connection with the upper end of said mast for effecting adjustment of said first-mentioned means about said horizontal axis of rotation to produce a cut of predetermined thickness.

7. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor carried by and supported transversely of said frame, a disk cutter located adjacent the mouth of said conveyor and being adapted to deflect dirt onto said conveyor, a straight-edge cutter blade disposed substantially vertically above said disk cutter, said disk cutter and straight-edge cutter blade being attached to said frame and mounted for adjustment vertically and about a horizontal axis of rotation paralleling the longitudinal axis of said frame and disposed adjacent the lower end of said cutter blade, dirt deflecting means extending rearwardly from said cutter blade for directing cutaway material onto said conveyor, and means in connection with said disk cutter and cutter blade for effecting their adjustment vertically and about said horizontal axis of rotation to produce a cut of predetermined thickness.

8. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor carried by and supported transversely of said frame, a ground cutting element located adjacent to the mouth of said conveyor and arranged to deflect dirt onto said conveyor, a supplementary cutting element disposed substantially vertically above said ground cutting element, a plow beam supporting said cutting elements, said plow beam including toe and heel portions and being mounted for movement vertically and about a horizontal axis of rotation adjacent to and parallel with the longitudinal axis of said toe and heel portions of said beam, and means in connection with said plow beam and the upper end of said supplementary cutting element for adjusting said plow beam vertically and about said horizontal axis of rotation to produce a cut of predetermined thickness.

9. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor carried by and supported transversely of said frame, a disk cutter located adjacent the mouth of the conveyor and being adapted to deflect dirt onto said conveyor, a mast disposed substantially vertically above said disk cutter, a straight-edge cutter blade attached to said mast and provided with a rearwardly extending vane adapted to direct cutaway material into the conveyor, a plow beam supporting said mast, cutter blade and vane, said beam including toe and heel portions and being mounted for movement vertically and about a horizontal axis of rotation adjacent to and parallel with the longitudinal axis of said toe and heel portions, and means in connection with said plow beam and the upper end of said mast for adjusting said plow beam vertically and about said horizontal axis of rotation to produce a cut of predetermined thickness.

10. In a grader or like implement, the combination of a wheeled vehicle frame, a conveyor mounted on and supported transversely of said frame, a disk cutter located adjacent the mouth of the conveyor and being adapted to deflect dirt onto said conveyor, a mast disposed substantially vertically above said disk cutter, a straight-edge cutter blade attached to said mast and provided with a rearwardly extending vane and adapted to deflect dirt into said conveyor, a plow beam supporting said mast, cutter blade and vane, said beam including toe and heel portions and being attached to said frame and mounted for movement vertically and about a horizontal axis of rotation adjacent to and parallel with the longitudinal axis of said toe and heel portions, means in connection with said toe and heel portions of said beam for imparting vertical movement to said beam, and additional means in connection with the upper end of said mast for adjusting said plow beam about said horizontal axis of rotation to product a cut of predetermined thickness.

BURNEY V. REANY.