April 12, 1949. V. SCHIAVI 2,467,157

ATTACHMENT FOR ROAD GRADING MACHINERY

Filed May 29, 1946 2 Sheets-Sheet 1

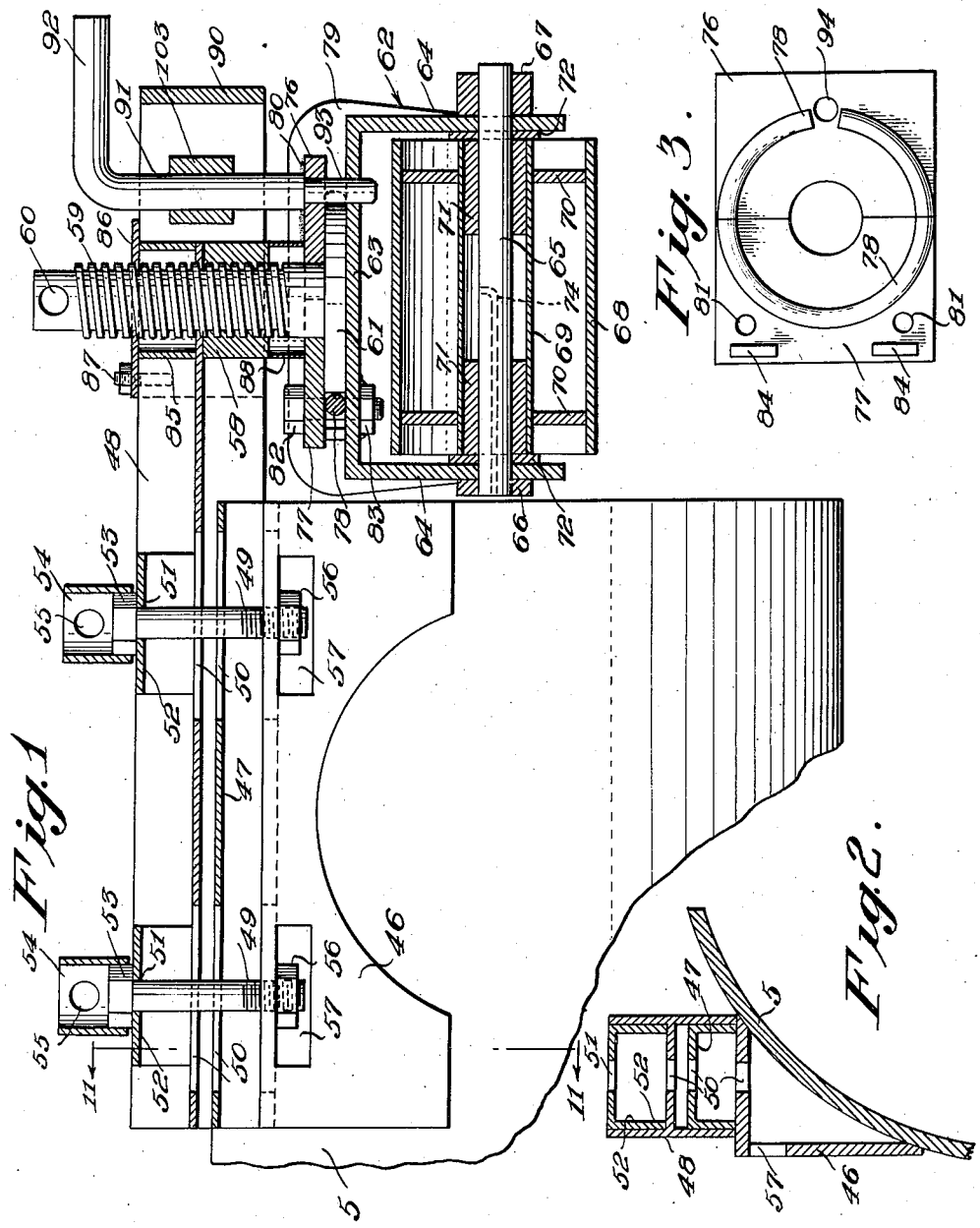


Fig. 1

Fig. 2.

Fig. 3.

Inventor
Vincent Schiavi
by Miller & Miller
Attorneys

April 12, 1949. V. SCHIAVI 2,467,157

ATTACHMENT FOR ROAD GRADING MACHINERY

Filed May 29, 1946 2 Sheets-Sheet 2

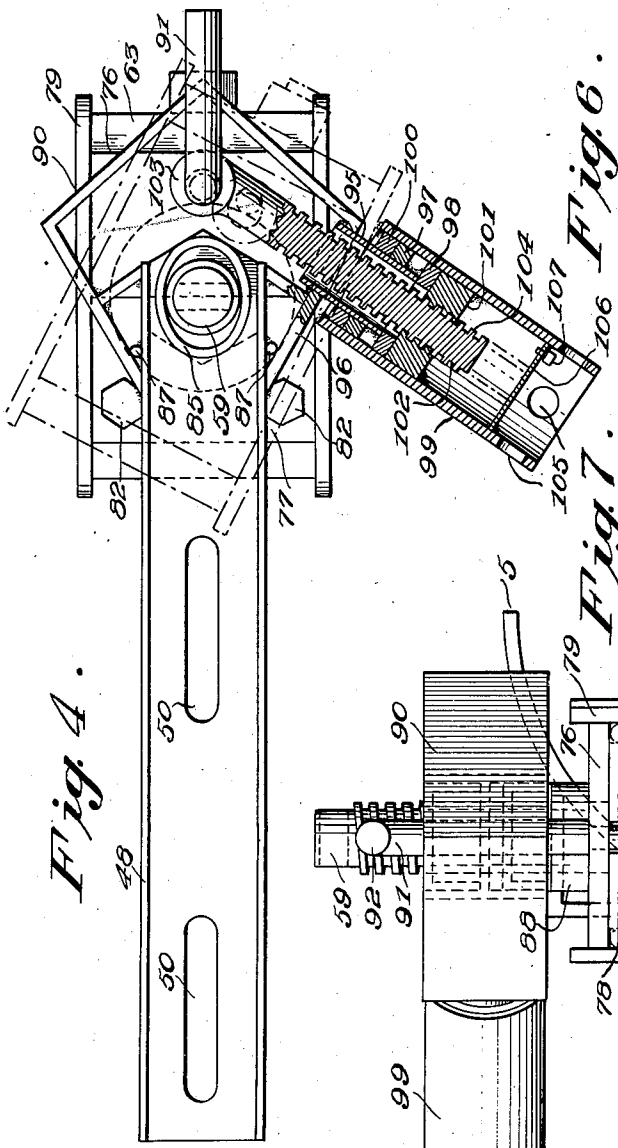


Fig. 4.

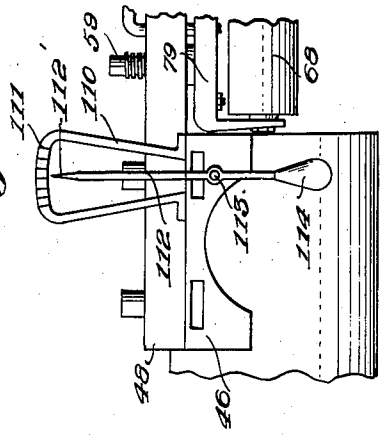


Fig. 6.

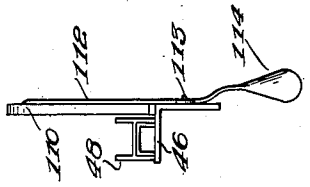


Fig. 7.

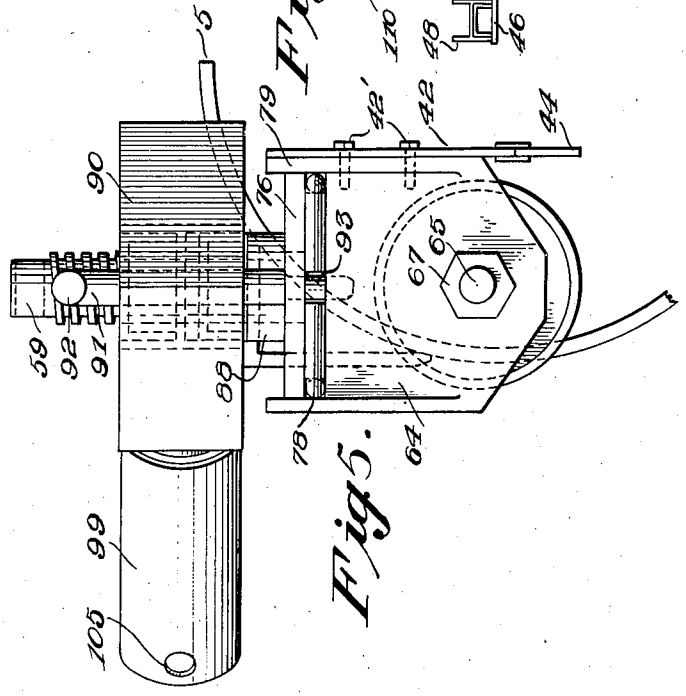


Fig. 5.

Inventor:
Vincent Schiavi
by Miller & Miller
Attorneys

Patented Apr. 12, 1949 2,467,157

UNITED STATES PATENT OFFICE

2,467,157

ATTACHMENT FOR ROAD GRADING MACHINERY

Vincent Schiavi, Wilmington, Del., assignor to Roadgrader Gauge Corporation, a corporation of Delaware

Application May 29, 1946, Serial No. 672,934

8 Claims. (Cl. 37—108)

1

My invention relates to improvements in street and road building equipment employing a scraper blade and more particularly to means for adapting and regulating the operation of the scraper blade for use as an accurate leveling and depth gauging tool in the preparation of a road bed to receive a predetermined depth of concrete which will be uniform in thickness throughout.

Such equipment as has been referred to is generally termed a road grader or bulldozer, and my invention has for its object to broaden and increase the utility of such power-operated equipment by providing an attachment therefor for vertically supporting the grader scraper blade on rollers adapted to travel upon and follow an edge portion of a preformed road section or curbing and the parallel widely spaced top surface of a metallic side form or header such as are used for retaining concrete, the rollers being of adequate length and mounted on stub shafts which are both vertically and arcuately adjustable relative to the opposite ends of the grader blade.

A further object of my invention is to provide a pair of roller supporting means adjacent the remote ends of a road grader scraper blade which means are swiveled for horizontal adjustable swinging movements about vertically adjustable screws so that the horizontal axes of the pair of rollers may be positioned and secured in parallel offset relation for accurately supporting the scraper for operation in a space between road side forms of considerably less width than that of the scraper blade.

Another aim of my invention is to provide a form or rail supported and guided road grader scraper blade with an attachment including both supporting and guiding rollers which are mounted on the rear end edge portions of the blade for relative adjustment and operation in maintaining the supported scraper blade in predetermined adjusted position throughout its operation.

A still further purpose of my invention is to provide means readily operable from above the road grader scraper blades for vertically adjusting the king pin mounting means of the swingable blade supporting rollers relative to the associated guiding rollers whereby the blade may be adjusted to the desired depth for continuous operation between a pair of supporting forms or rails and the angle varied as required by changes in the distances between the forms or rails during operation.

A still further object of my invention is to provide a depth gauging attachment for the

2

opposite ends of a road grader scraper blade which is capable of being expeditiously mounted on or removed from the blade without alterations of the blade.

Yet another object is the provision of a depth gauging attachment for the opposite ends of a road grader scraper blade, said attachment including a roller supporting member removably carried by the blade for adjustment longitudinally thereof, the supporting member being provided with means for mounting a roller on an axis normally parallel with the supporting member, and for vertical adjustment as well as horizontal rotary adjustment for disposition of the axis of the roller at an angle to the supporting member; the supporting member and roller mount means being provided with means operable manually or hydraulically for effecting the horizontal rotary adjustment of the roller and retaining same in any given position of adjustment.

Another aim of the invention is the provision of a depth gauging attachment including a bar adapted for longitudinal adjustable connection with the end of a road grader scraper blade and which adjacent one end thereof is provided with a vertical adjustment screw having a relatively large disc on its lower end and about which a bracket is supported for rotary adjustment about the axis of the screw, the bracket supporting a shaft about which a roller is rotatably journalled, said bar and bracket having cooperating means for effecting rotation of the bracket about the disc.

Still another aim of the invention is the provision of gravity actuated means adapted for connection with the opposite ends of a road grader scraper blade operable to indicate the angularity of the blade relative to the horizontal.

Other aims and purposes of my invention relate to a novel attachment for road grader scraper blades and to the combination and arrangement of parts whereby the costs of manufacture as well as the cost usually incident to accurate leveling and grading operations in paving are materially decreased.

Referring now to the accompanying drawings on which similar reference characters represent similar parts:

Fig. 1 is a rear elevational view of one end of a road grader scraper blade showing a preferred form of a depth gauging attachment removably connected thereto.

Fig. 2 is a vertical sectional view in the plane of line II—II of Fig. 1.

Fig. 3 is a bottom plan view of a portion of

the roller supporting bracket swivel connection means.

Fig. 4 is a top plan view of the attachment according to Fig. 1 with certain parts thereof in horizontal section and showing the roller supporting bracket in an adjusted angular position in dot and dash lines.

Fig. 5 is a right hand end elevational view of the attachment.

Fig. 6 is a fragmentary elevational view showing the application of means for visually indicating the position of a road grader scraper blade relative to a horizontal plane; and

Fig. 7 is a left-hand elevational view of the structure shown in Fig. 6.

Before referring to the various parts by reference numerals it is desired to point out that in road building using a hard surface such as concrete or other plastic material, it is vitally essential that a predetermined grade be maintained. The most common method now in use is to rough grade the soil or sub-base and then place thereon forms to contain the plastic materials or if a portion of the road has been built to use that portion as one side of the form. Prior to the pouring of the plastic material it is essential to "fine grade" the soil or sub-base so that the latter is true in depth. Consequently when the plastic materials are poured and finished the roadway will be of uniform thickness throughout.

Several methods of obtaining the required depth are now in use as follows:

1. *Hand grading.*—A slow and costly process which is not particularly accurate depending upon the degree of care exercised by the individuals performing the operation.

2. *Power fine grading machines.*—These while satisfactory in some cases are nevertheless expensive initially, cumbersome and costly to use under many conditions, as for example when short distances are to be graded or where frequent moving of the equipment is necessary. Finally, hand grading is not entirely eliminated.

3. *Drag or trail type grader.*—Made to be pulled or drawn by hand or by power equipment. This does not always give satisfactory results on mixed types of soil constituting the sub-base. Additionally, it is a very slow method of fine grading and the use of a drag grader or trail type grader always requires hand grading to create a satisfactory base. Such equipment, furthermore, is not of use for any other purpose.

It will now be apparent that the invention contemplates an attachment for regulating the depth of cut necessary to bring the soil or subbase to a uniform grade before the pouring of the concrete or other plastic material composing the roadway. The depth gauge, as pointed out heretofore, is to be employed as an attachment for any type of grading equipment embodying a scraper blade or drag, which equipment may still be used for other purposes as well as the final fine grading.

In the drawings, the invention is shown as comprising a scraper blade **5** having a concaved front face, from top to bottom and a corresponding convex rear surface, although the particular shape of the blade is not of primary importance.

In the use of the scraper blade, however, it is adapted to be moved along while supported by a suitable source of mechanical power or by hand to cause its lower edge to scrape and level a section of ground, which is usually flanked by sideforms or other generally parallel arranged rails, road sections, curbing or the like.

While various types of subgraders have heretofore been used for subgrade leveling, and which have no doubt been generally satisfactory for the contemplated purposes, I am not aware of any means heretofore used for converting a common road grader or bulldozer to produce the accurate leveling and gauging required in laying a predetermined thickness of concrete in paving operations. With the instant invention, however, the utility of a generally available common road grader, bulldozer or similar rod building equipment used for ordinary scraper duties is increased to encompass fine grading. It will be understood that while the attachment increases the utility it in no way interferes with other normal uses of the aforementioned equipment.

Means permitting very careful and accurate gauging and setting of the scraper for operation over long stretches of ground is required which can be readily actuated and set without necessitating attention by expert help.

In accordance with a preferred embodiment of the invention, a bracket **46** is suitably secured, as by welding, to the convex face of the blade **5** adjacent each end thereof and rigidly attached to the horizontal face of the bracket, also as by welding, is a guide rail **47** which preferably is of inverted U-channel form. The attachment is otherwise wholly removable from the blade, the brackets **46** and rails **47** being the only parts rigidly supported by the blade whereby the rough grader may be used for its usual purposes upon removal of the attachment therefrom.

The attachment comprises an elongated bar **48** which is H-form in cross section and which is slidably supported on the rail **47**. The bar is rigidly retained in any longitudinally adjusted position by means of bolts **49** which project through normally alined elongated slots **50** in the rail, bar and bracket as well as through apertures **51** in washers **52** also of inverted U-form. The bolts **49** include heads **53** to which are rigidly fastened, as by welding, cylindrical members **54** provided with manipulating pin receiving apertures **55**. The nuts **56** for the bolts are disposed below the horizontal faces of the brackets **46** and in order to hold such nuts against turning upon operation of the head, the vertical walls of the brackets are equipped with tool-receiving openings **57**. The bar **48** adjacent its free end has a nut **58** which is rigidly connected, as by welding, to the bar beneath the central horizontal web thereof as is clearly indicated in Fig. 1.

A relatively heavy square threaded screw **59** extends vertically through the nut **58** and has at its upper end a manipulating tool-receiving aperture **60**. The screw at its lower end rigidly supports a relatively large and heavy disc **61** which, as will later appear, mounts the roller supporting bracket for both vertical and horizontal adjustment.

A roller supporting bracket **62** is provided and includes a horizontal base plate **63** from the opposite ends of which project shaft supporting members **64** which are integral with the plate **63** and extend at right angles thereto. A shaft **65** extends through the opposed bracket end members **64** and is secured in position therein by inner and outer nuts **66** and **67**, respectively. The roller includes an outer relatively heavy cylinder **68**, a smaller and lighter inner cylinder **69** and a pair of vertical circular webs **70** rigidly connected with the cylinders. The inner cylinder **69** is of substantially greater radius than shaft **65** and is rotatably supported on bearings **71** dis-

posed adjacent opposite ends of the roller, a pair of washers 72 surrounding the shaft 65 and being disposed between members 64 and the adjacent ends of cylinder 69 and bearings 71. The shaft 65 is provided with an oil duct 74 for admission of lubricant into the chamber within cylinder 69 and between bearings 71.

The screw supported disc 61 is rotatably connected with the bracket 62 by means of a pair of rectangular plates 76 and 77, each of which has a semi-circular bead 78 rigidly secured, as by welding, to its lower face, the beads jointly forming a circular race for the disc 61 as will be clear from Fig. 3. The plate 76 is rigidly fastened in position, also as by welding, to the side flanges 79 of the bracket 62 as indicated at 80 in Fig. 1. The plate 77, however, is removable to facilitate mounting and dismounting of the disc and bracket and accordingly said plate is provided with a pair of apertures 81 for receiving bolts 82 releasably engaged with nuts 83 welded to the underface of base plate 63 and which also has bolt receiving apertures alined with the apertures 81. The plate 77 is also preferably provided with stabilizing lugs 84 which relieve strain on the bolts 82. With the structure thus far described, it will be seen that the roller supporting bracket 62 has a swivel connection with the lower end of screw 59 by which such swivel connection is vertically adjustable and thus the roller is capable of adjustment both vertically and in the horizontal axial plane of shaft 65. An oblong lubricant retaining sleeve 85 is rigidly secured, also as by welding, within the bar 48 and above the horizontal web thereof and in surrounding relation to the screw 59. A cover plate 86 is removably fastened, as by bolts 87, over the upper end of the sleeve 85. A second, and preferably rubber lubricant-retaining sleeve 88, is disposed in surrounding relation to the screw 59 and between nut 58 and the plates 76 and 77.

A frame 90 is rigidly attached by welding to the free end of bar 48 and said frame, as more clearly shown in Fig. 13, provides a relatively large space for movement of a quite heavy pin 91 whose upper end is turned forming a handle 92 and whose lower end is reduced as at 93 for removable engagement within apertures 94 in plate 76 and base plate 63, respectively. At this point it is to be noted that the bead 78 is interrupted adjacent the aperture 94 as illustrated in Fig. 3. The pin 91 is horizontally adjustable within the frame 90 to adjust the roller about the disc 61 and for this purpose, a relatively small sleeve 95 is welded to the side wall 96 of the frame 90 and welded to the outer face of sleeve 95 are thrust washers 97 and 98 which provide a swivel connection for an outer large operating cylinder 99 provided internally and rigid therewith, with a thrust washer 100 cooperating with washer 97 and a nut 101 cooperating with washer 98. A relatively heavy pin actuating rod 102 has a head 103 through which pin 91 is removably disposed and such rod for the major portion of its length is square threaded as at 104 for cooperation with the nut 101. Thus upon turning of cylinder 99, rod 102 will be moved inwardly or outwardly of frame 90 with a resulting horizontal movement of pin 91 and a swinging of the roller to an angular position as is indicated by dot and dash lines in Fig. 4.

While rod 102 is constrained mostly for axial movement and the lower end of pin 91 is constrained for arcuate movement, the slight play between the thrust washers, some play of pin 91 in its apertures and the fact that head 103 is rotatable about the axis of rod 102 will allow for such combined movement. The operating cylinder has operating tool-receiving apertures 105 and slightly inwardly of these apertures the cylinder is provided with a closing web 106 having a connection 107 for admitting lubricant to the threaded rod within the cylinder. In this embodiment of the invention, the scraper plate 42 is secured to opposite roller bracket end members by means of bolts 42'.

In order to ascertain the angularity of the blade 5 relative to a horizontal plane as when grading curves, each end of the blade is preferably provided with indicating means which may conveniently include a bracket 110 supported on each bracket 46 as in Figs. 6 and 7. The upper end of bracket 110 is arcuate and has a scale 111 and a vertically disposed arm 112 is pivatally carried by bracket 46 as at 113, the lower end of the arm having a weight 114. Thus since arm 112 will remain vertical any angularity of the blade 5 will be readily apparent upon relative movement of the scale and pointer 112' on the arm 112.

It is to be observed that the apertures 55, 60 and 105 are all of the same size whereby all adjustments may readily be made by the same tool. Finally, it will be noted that the swivel mounting of the roller bracket effected by the disc 61, plate 63 and plates 76 and 77 is such that the screw 59 is substantially relieved of any harmful stresses in the event that the roller engages a form or other surface at a point or points to one side of the axis of the screw or in non-symmetrical relation thereto due to the rather large bearing areas of these parts.

While the invention has been described in detail, various changes will occur to those skilled in the art. It is contemplated to cover all such and to be limited in this respect only as may be necessary by the scope of the claims hereto appended.

Having now described my invention in detail, what I claim and desire to secure by Letters Patent is:

1. An attachment for each end of the blade of a rough road-bed grading machine operative to effect fine grading thereby comprising a supporting member removably supported by each end of the blade for adjustment longitudinally thereof, vertically adjustable means supported by the free end of said supporting member, a form-engaging roller, means supporting said roller from the vertically adjustable means for adjustment about a vertical axis, and horizontally disposed rotatable means supported by said supporting member and cooperating with the roller supporting means for effecting adjustment of said roller about said vertical axis.

2. The structure of claim 1, wherein said vertically adjustable means comprises a screw having a relatively large disk rigid with the lower end thereof and wherein the means supporting said roller comprises a bracket having a circular raceway receiving said disk.

3. A subgrade scraper comprising an elongated blade, a cylindrical roller carried adjacent to and outwardly of each end of the blade, a shaft rotatably mounting each roller, supporting means for each shaft, means including a rotatable screw carried by the blade for vertically adjusting said supporting means, and a second horizontally disposed screw also carried by the blade for moving said supporting means about the axis of said first-mentioned screw.

4. An attachment for each of the opposite ends of the blade of a rough grading machine comprising a bar having a form-engageable roller carried thereby, a shaft rotatably mounting each roller, rotatable supporting means for each shaft, means including a rotatable screw carried by said bar for vertically adjusting said supporting means, and a second rotatable screw also carried by the bar for moving said supporting means about the axis of said first-mentioned screw.

5. An attachment for each of the opposite ends of the blade of a road bed rough grading machine comprising an elongated bar longitudinally adjustably supported on the blade, a nut rigidly carried by said bar adjacent its free end, a vertically disposed screw threaded through said nut, a relatively large disc rigidly supported in horizontal position by the lower end of the screw, a roller supporting bracket having a circular raceway receiving said disc for rotatable adjustment of the bracket about the vertical axis of said screw, a vertically disposed pin having its lower end removably engaged within said bracket, and means supported by the bar and operatively engaged with the pin for effecting movement thereof transverse to its axis for adjustably rotating the bracket about said disc.

6. The structure according to claim 5, wherein said blade has a guide rail extending longitudinally thereof, said bar being slidably mounted on said guide rail, an angular bracket having a horizontal wall fastened to the convex wall of said blade, said rail being rigidly secured to said horizontal wall.

7. The structure according to claim 5, wherein said raceway includes an upper horizontal plate

of said bracket, a pair of rectangular plates disposed above said horizontal plate and spaced therefrom by a circular rib confining the periphery of said disc, one of said plates being rigidly secured to said horizontal plate and the other of the plates being detachably connected to the horizontal plate thereby providing for assembly and disassembly of the bracket and disc.

8. The structure according to claim 5 wherein said means comprises a horizontally disposed threaded bar, a sleeve rigidly supported by the longitudinally adjustable bar and partially surrounding said threaded bar, axially spaced thrust washers rigidly supported by said sleeve externally thereof, a cylinder surrounding said sleeve and having a thrust washer and nut rigidly secured thereto and internally thereof, the thrust washer and nut cooperating with the first named thrust washers and the threaded bar extending through said washer, the threaded bar having an apertured head through which said pin extends, and apertures in said cylinder for reception of a tool for rotating same.

VINCENT SCHIAVI.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
561,633	Walker	June 9, 1896
899,719	Edzards	Sept. 29, 1908
1,203,188	Ellis	Oct. 31, 1916
1,230,768	Parrish	June 19, 1917
1,849,754	Darrow	Mar. 15, 1932