April 2, 1963 W. E. BROLIN 3,083,954

MOLDBOARD MOUNTED DISK PAVING CUTTER

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FIG. 1.

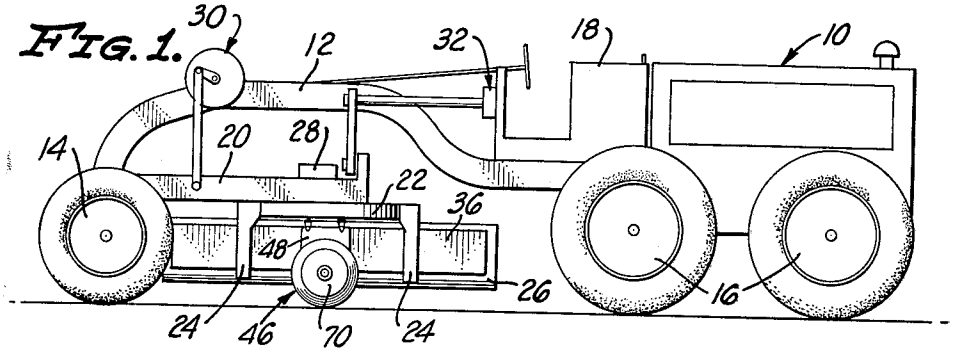


FIG. 2.

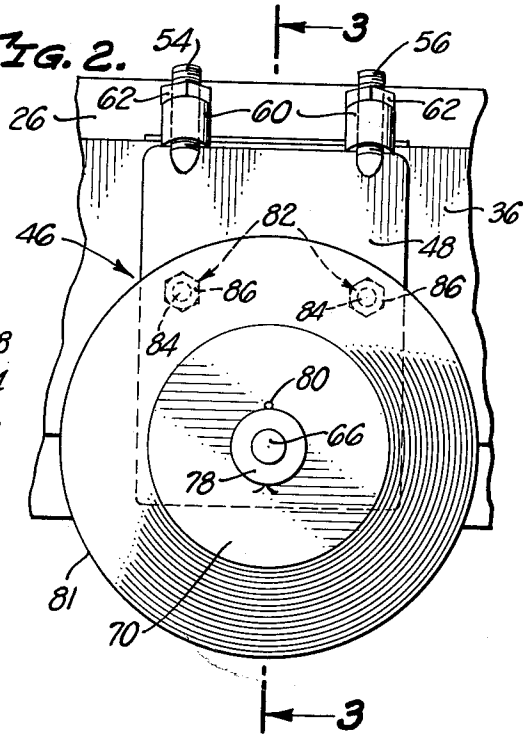
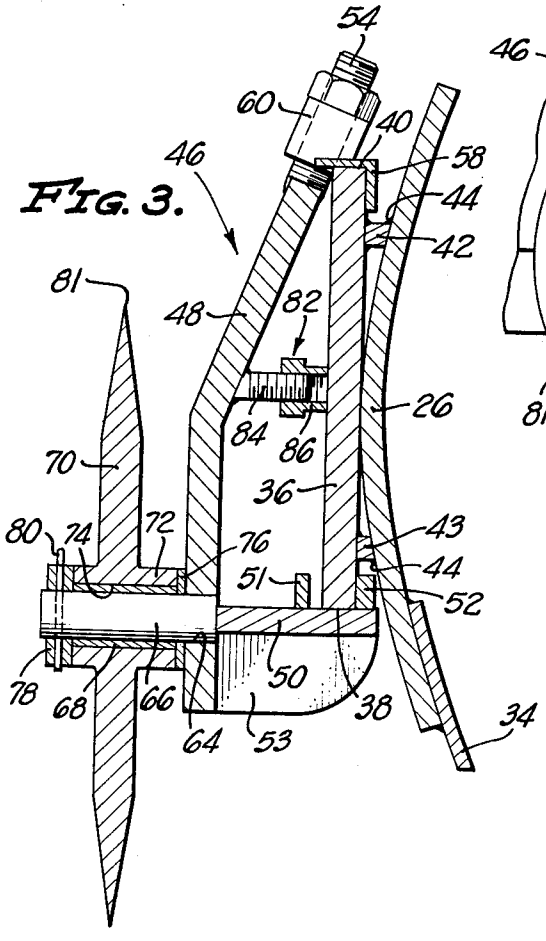


FIG. 3.



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MOLDBOARD MOUNTED DISK PAVING CUTTER

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The present invention relates to apparatus for cutting through blacktop pavement such as asphalt or macadam, and the like, when it ibecomes necessary to dig trenches for the installation of underground conduits or pipes, and the primary object of the invention is to provide a new and improved disk cutter which is adapted to be detachably mounted on the back side of the moldboard of a road grader.

The motorized road grader of the type referred to is a well-known piece of road-building equipment which is widely used because of its versatility and capacity, and consists of a long, heavily built frame which is supported at the front end on a pair of steerable wheels, and at the rear end on two pairs of driving wheels arranged in tandem. Mounted on the frame between the front and rear wheels is a moldboard, which may be rotated about a vertical axis, or tilted about a fore-and-aft extending axis, or raised and lowered between transport and working positions. The operator sits on the rear portion of the machine, behind the moldboard, where he can watch the latter and manipulate the controls for driving and steering the machine, and for adjusting the position of the moldboard.

The grader is also equipped with ripper teeth, which are mounted on the frame near the front end thereof and are used to tear up old pavement. Disk cutters that have been used on road graders in the past to make s traight line cuts through blacktop pavement have usually been attached to the ripper teeth or associated structure. While this arrangement has worked satisfactorily under certain conditions, as when the paving is relatively thin or soft, it has one serious disadvantage when working on thick or hard pavement, and that is its tendency to lift the front wheels of the grader off the ground, or at least to take a substantial part of the weight off the front wheels, so that steering control is lost. Moreover, it is virtually impossible to follow a curved line, or to change direction while cutting the pavement, owing to the fact that steering is accomplished solely by the front wheels of the grader, and with the disk cutter mounted on the ripper teeth behind the front wheels, any turning of the front wheels forces the cutter sideways through the paving. This usually results in damage to the asphalt alongside the cut, and sometimes to the cutter, itself.

Another important object of the invention is to provide a disk cutter for use with a motorized road grader, which provides maximum penetration of the cutter without loss of steering. In fact, the present invention, by virtue of being mounted on the rotatable moldboard, is actually capable of carrying the entire weight of the front end on the cutter, and steering of the motor grader may be accomplished by turning the moldboard with its attached cutter.

Another object of the invention is to provide a device that cuts through the asphalt paving with a clean vertical cut, and causes no damage to the paving immediately alongside the cut. One advantageous feature of the invention is that it has no tendency to lift the asphalt paving off the sub-base.

Still another object of the present invention is to provide a paving cutter that is quickly and easily mounted or removed from the moldboard of a motorized road grader, and one that is adjustable to any moldboard.

A further object of the invention is to provide a disk

cutter which can be inclined at a slight angle to the line of advance so that the disk has a plowing action to break the asphalt layer on only one side of the cut away from the sub-base, without damaging the asphalt on the other side of the cut.

These and other objects and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of the preferred embodiment thereof, reference being had to the accompanying drawings, wherein:

FIGURE 1 is a side elevation of a motorized road grader having the disk cutter of my invention mounted on the moldboard thereof;

FIGURE 2 is an enlarged fragmentary view, in side elevation, of the disk cutter; and

FIGURE 3 is a further enlarged cross-sectional view of the same, taken at 3—3 in FIGURE 2.

In the drawings, the reference numeral 10 designates a motorized road grader, which is shown more or less schematically. The road grader comprises an elongated, fore and aft extending frame 12, supported at its front end on a pair of steerable wheels 14, only one of which can be seen in the drawings; and at its rear end driving wheels 16. The operator's station is shown at 18, and from this position the operator controls the speed and direction of the grader, as well as the depth and inclination of the moldboard carried thereby.

Flexibly connected to the front end of the frame 12, and extending rearwardly therefrom is a yoke 20. A turntable 22 is rotatably mounted on the underside of the yoke 20 at the rear end thereof, and projecting downwardly from opposite sides of the turntable are two laterally spaced legs 24 which carry a horizontally elongated moldboard 26. A driving mechanism 28 provides means for rotating the turntable 22 and attached moldboard 26 through 360 degrees of rotation about a vertical axis. Other mechanisms 30 and 32 on the motor grader are operatively connected to the yoke 20 to raise and lower the same or to tilt the yoke, for the purpose of raising and lowering the moldboard or for tilting the same from side to side.

As best shown in FIGURE 3, the moldboard 26 is a cylindrically curved blade having a strip 34 of hard, wear-resistant metal attached to the lower edge thereof to provide the scraping edge. Mounted on the back side of the moldboard and extending from one end thereof to the other, is a stiffening plate 36, having a downwardly facing bottom edge 38 and an upwardly facing top edge 40. In the construction illustrated herein, the stiffening plate 36 has two vertically spaced, parallel ribs 42 and 43 welded to one side thereof, and these ribs are welded at 44 to the back side of the moldboard 26.

Mounted on the back side of the moldboard 26 and secured to the stiffening plate 36 is the disk cutting attachment of the present invention, which is designated in its entirety by the reference numeral 46. The main body of the device 46 consists of a heavy, rectangular steel plate 48, preferably about one inch thick, which is disposed generally vertically, behind the stiffening plate 36. The lower half of the plate 48 is practically parallel to the stiffening plate 36, but the upper half thereof is inclined toward the plate 36 at an angle of about 22° so as to bring the top edge of the plate 48 closely adjacent the top edge of the plate 36.

Welded to the plate 48 near the bottom edge thereof is a horizontal flange 50, which projects under and engages the bottom edge 38 of the reinforcing plate 36. A pair of laterally spaced, parallel strips 51 and 52 are welded to the top side of the flange 50, and the bottom edge 38 of the plate 36 is received between these strips, as shown in FIGURE 3. A reinforcing block 53 is welded

to the underside of the flange **50** and to the adjacent side of the plate **48**, to stiffen and brace the flange.

Welded to the top edge of the plate **48** and projecting upwardly therefrom are two laterally spaced, threaded studs **54** and **56**, and slidable vertically on these studs is a clamp **58**. The clamp **58** is preferably in the form of a length of angle iron having a horizontal flange that overlies and bears downwardly against the top edge **40** of the plate **36**, and a vertical flange that projects down behind the back side of the plate, as shown in FIGURE 3. Tubular sleeves **60** are welded to the top side of the horizontal flange of the clamp **58** at an angle such that the sleeves are parallel to the studs **54**. The sleeves **60** surround the studs **54** and are slidable vertically thereon. Nuts **62** are threaded onto the studs **54**, and these engage the top ends of the sleeves **60** to draw the clamp **58** down tightly against the plate **36**.

Near the bottom edge, the plate **48** has an aperture **64** provided therein, into which one end of a shaft **66** is inserted. The shaft **66** is welded to the plate **48** and projects laterally outboard therefrom. Surrounding the shaft is a sleeve bearing **68**, and journaled on this bearing is the cutting disk **70**. The cutting disk **70** is a heavy steel disk, preferably about 1¼ inches thick and about 19 inches in diameter. At the center of the disk **70** and projecting laterally from opposite sides thereof is a hub **72**, having a central bore **74** running on the bearing sleeve **68**. A washer **76** provides a thrust bearing surface between the inner end of the hub **72** and the plate **48**, and on the outer end of the shaft is a locking ring **78**, which is secured to the shaft by a cotter pin **80**. The disk **70** is beveled around its outer circumference, to provide a sharp cutting edge **81**, which is adapted to penetrate and cut clean through the blacktop paving.

The disk cutter assembly **46** is solidly braced to the reinforcing plate **36** on the back side of the moldboard by a pair of laterally spaced adjustable bracing means **82**, each of which comprises a threaded stud **84**, having a stop **86** screwed onto it. When the disk cutter is mounted on the reinforcing plate **36**, the two adjustable stops **86** are turned on the studs **84** until the outer end of the stop bears against the outer face of the plate approximately midway between the top and bottom edges **40** and **38**, respectively. Applying a wrench to the stops **86** causes the latter to press hard against the plate **36**, pushing the plate **48** outwardly and bringing both the vertical flange of the clamp **58** and the outer strip **52** up tight against the inside of the plate **36**.

The operation of the invention is believed to be more or less apparent from the foregoing description. The disk cutter unit **46** may be attached to any stiffening member or pair of vertically spaced members on the back side of the moldboard of a road grader, within the scope of the clamp **58**. If the moldboard is of a type that does not have such stiffening members on its back side, it is a simple matter to weld a pair of vertically spaced lengths of angle iron or the like to the back of the moldboard at the desired position along the length thereof, so as to provide an upwardly facing top shoulder which can be engaged by the clamp **58**, and a downwardly facing bottom shoulder which can be engaged by the flange **50**.

The disk cutter unit **46** is positioned along the length of the fore and aft extending moldboard according to the conditions of use. For example, if the paving is extremely hard and resistant to penetration by the cutter **70**, the unit might be mounted as far back on the moldboard as possible, so as to place it close to the heavy rear end portion of the grader, where the maximum downward pressure could be applied to the cutter without lifting the front wheels off the ground. On the other hand, if it were necessary to cut the paving along a winding or curving line, it would be better for the unit **46** to be mounted as far forward on the moldboard as possible, so as to place it closely adjacent the steerable front wheels **14**. For most purposes, the unit **46** could be mounted at the midpoint of the moldboard **26**, where it is readily visible to the operator and also capable of being pushed downwardly with sufficient force to penetrate average blacktop paving without adversely affecting the steering of the front wheels **14**.

The cutter disk **70** can be steered by turning the turntable **22**, or tilted toward either side, or raised or lowered, by manipulating the usual controls on the grader which actuate the moldboard.

While I have shown and described in considerable detail what I believe to be the preferred form of my invention, it will be understood by those skilled in the art that various changes may be made in the shape and arrangement of the several parts without departing from the broad scope of the invention as defined in the following claims.

I claim:

1. A paving cutter adapted to be detachably mounted on the back side of the moldboard of a road grader of the type wherein said moldboard is rotatable within a horizontal plane and is adjustable vertically, and said moldboard has means on the back side thereof presenting an upwardly facing top shoulder and a downwardly facing bottom shoulder, said paving cutter comprising, in combination:

(*a*) a vertically disposed member having means at the bottom edge thereof engageable with said downwardly facing bottom shoulder,

(*b*) a clamp adjacent the top edge of said member and movable vertically with respect thereto to engage said upwardly facing top shoulder,

(*c*) means on said member for drawing said clamp down tightly against said top shoulder,

(*d*) bracing means projecting horizontally from said member and engageable between said top and bottom shoulders to push said member outwardly with respect to said moldboard, and

(*e*) a cutting disk rotatably supported on said member in a vertical plane generally parallel to the plane of said moldboard and projecting downwardly below the bottom edge of the moldboard for a distance at least equal to the depth of cut.

2. A paving cutter as defined in claim 1, wherein said bracing means is adjustable toward and away from said moldboard.

3. A paving cutter adapted to be detachably mounted on the back side of the moldboard of a road grader of the type wherein said moldboard is rotatable within a horizontal plane and is adjustable vertically, and said moldboard has means on the back side thereof presenting an upwardly facing top shoulder and a downwardly facing bottom shoulder, said paving cutter comprising, in combination:

(*a*) a generally vertically disposed plate having a flange projecting horizontally from the lower portion thereof and engaging said downwardly facing bottom shoulder,

(*b*) a clamp adjacent the top edge of said plate and movable vertically with respect thereto to engage said upwardly facing top shoulder,

(*c*) means for drawing said clamp down tightly against said top shoulder, whereby said flange is also clamped against said downwardly facing bottom shoulder,

(*d*) at least one threaded stud fixed to said plate and projecting horizontally therefrom toward said moldboard,

(*e*) an adjustable stop threaded on said stud and bearing against said moldboard between said top and bottom shoulders to push said plate outwardly with respect to the moldboard, and

(*f*) a cutting disk rotatably supported on said plate in a vertical plane generally parallel to the plane of said moldboard and projecting downwardly below the

bottom edge of the moldboard for a distance at least equal to the depth of cut.

4. A paving cutter adapted to be detachably mounted on the back side of the moldboard of a road grader of the type wherein said moldboard is rotatable within a horizontal plane and is adjustable vertically, and said moldboard has a stiffening plate attached to its back side and extending horizontally along the length thereof, said stiffening plate presenting an upwardly facing top edge and a downwardly facing bottom edge, said paving cutter comprising in combination:

(*a*) a vertically disposed plate having a horizontal flange projecting from the lower portion thereof and engaging said downwardly facing bottom edge,

(*b*) a pair of threaded studs fixed to and projecting upwardly from the top edge of said plate,

(*c*) a clamp slidable vertically over said studs and engageable with said top edge of said stiffening plate,

(*d*) nuts threaded on said studs and bearing downwardly against said clamp, whereby said stiffening

plate is clamped tightly between said horizontal flange and said clamp,

(*e*) a pair of horizontally spaced threaded studs fixed to and projecting laterally from said plate intermediate the top and bottom edges thereof,

(*f*) adjustable stops threaded on said last-named studs and bearing against said stiffening plate between said top and bottom edges, to push said plate outwardly with respect to the moldboard, and

(*g*) a cutting disk rotatably supported on said plate in a vertical plane generally parallel to the plane of said moldboard and projecting downwardly below the bottom edge of the moldboard for a distance at least equal to the depth of cut.

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