

[54] **ADJUSTABLE PINION FOR MOTOR GRADER CIRCLE DRIVE**

1,528,906 3/1925 Arndt.....172/796
1,841,403 1/1932 Dean.....172/796

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[22] Filed: **Oct. 5, 1970**
[21] Appl. No.: **77,971**

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[52] **U.S. Cl.**.....172/796
[51] **Int. Cl.**.....E02f 3/76
[58] **Field of Search**.....172/796, 795, 781, 780

[57] **ABSTRACT**

A drive pinion unit for a blade support circle which is readily adjustable relative to the blade circle gear to regulate the mating tolerance and minimize wear-caused backlash between the pinion and the circle gear.

[56] **References Cited**

UNITED STATES PATENTS

2 Claims, 4 Drawing Figures

2,670,551 3/1954 Keeler.....172/796

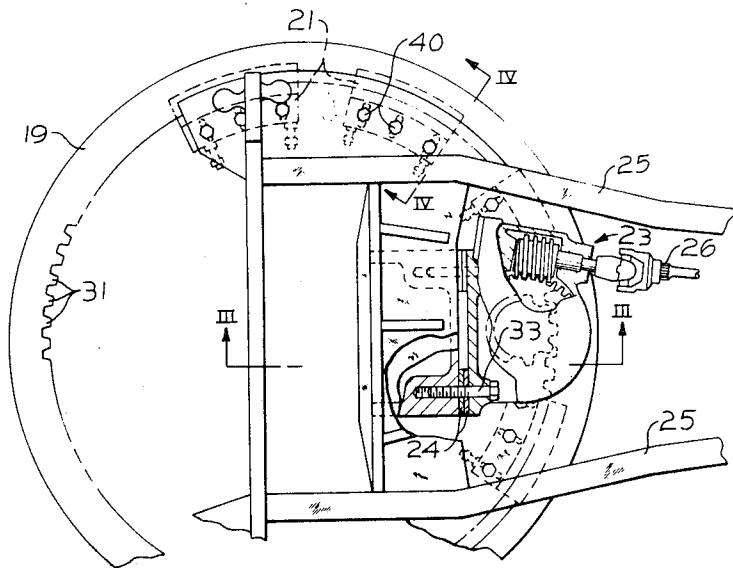


FIG. 1

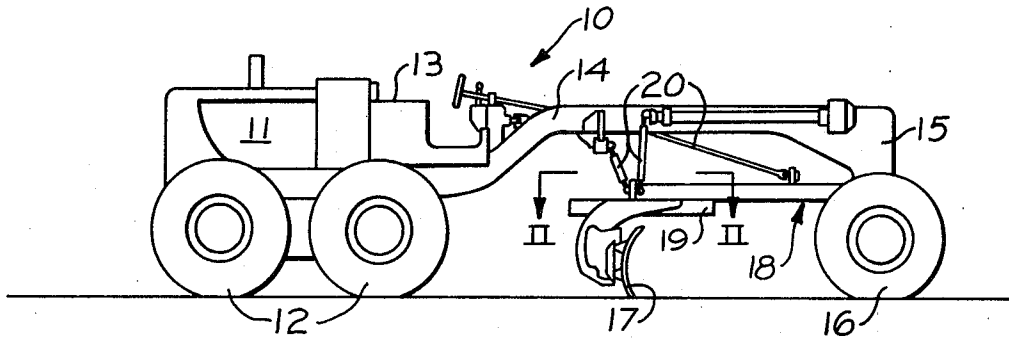
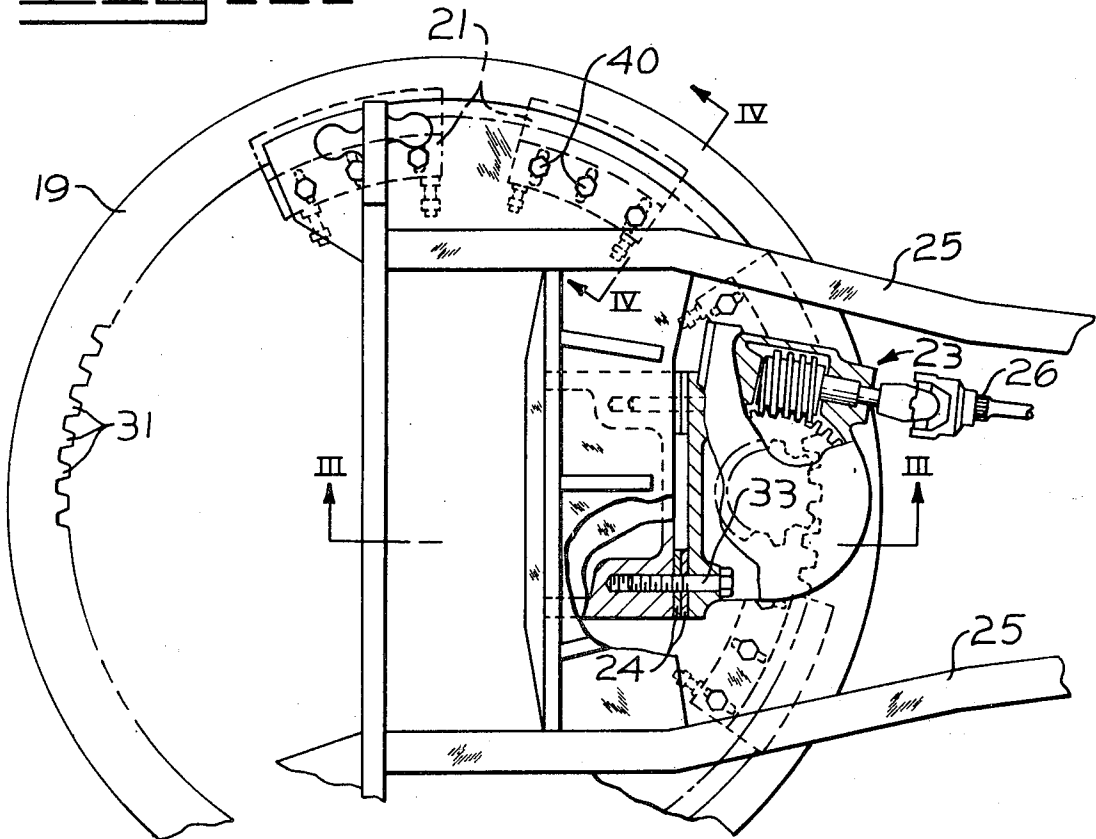


FIG. 2



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Fig. 3.

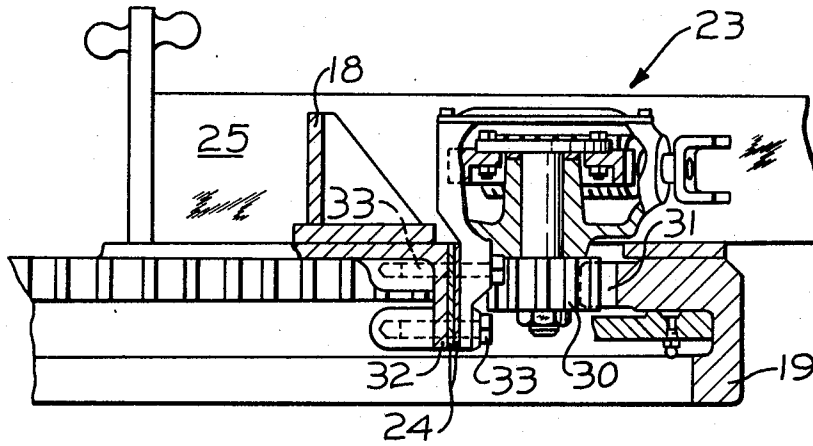
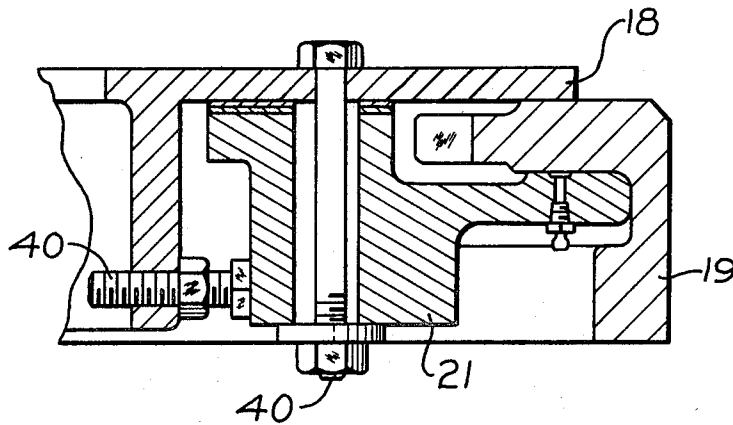


Fig. 4.



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ADJUSTABLE PINION FOR MOTOR GRADER CIRCLE DRIVE

BACKGROUND OF THE INVENTION

This invention relates to a new and improved adjustable drive pinion for use with a motor grader blade support circle. More particularly, the invention is directed to an arrangement whereby the tolerance between the drive pinion and the blade circle gear with which it mates may be readily adjusted.

A typical motor grader has a motor-driven, wheel-mounted frame which supports an earth-engaging blade. The blade is mounted so that it can be selectively raised, lowered, tilted or rotated with respect to the motor grader frame to suit job requirements. The grader blade is usually mounted on a supportive circle which, in turn, is rotatably supported upon the frame by means of a plurality of circumferentially-spaced shoes. The blade is rotated along with this support circle by means of a pinion which is fixed to the frame and which drivingly engages an annular set of gear teeth on the blade circle. The environment in which the motor grader generally operates often necessitates rather extreme blade adjustments for satisfactory side-hill, and deep-ditch cutting operations which result in heavy transient concentrated loading of the blade. Because of these erratic peak loads upon the blade and its support structure, wear occurs. This generally is a serious problem which requires almost constant maintenance in order to retain accurate grading characteristics.

A particularly vexing problem is wear-produced backlash or slack between the drive pinion and the blade support circle gear. Prior to this invention, this backlash was reduced by the tedious periodic adjustment of each individual circumferentially-spaced support shoe with consequent movement of the blade circle itself. Various rather sophisticated forms of adjustable support shoes and ball support members have been developed by the assignee of the present invention to facilitate this type of adjustment.

This invention is principally directed to an arrangement whereby the aforementioned backlash problem can be eliminated without recourse to adjustment of the individual circle support shoes.

One object of the present invention is to reduce maintenance requirements and difficulties associated with adjustment of the blade circle of a motor grader.

Another object of this invention is to provide a precisely positionable drive pinion for the blade support circle of a motor grader.

Still another object of this invention is to provide an adjustable drive pinion arrangement for a motor grader which can be readily adapted for use with conventional motor grader blade circles.

A further object of this invention is to provide a drive pinion adjustment means which utilizes easily insertable shims.

Another object of this invention is to provide a means for adjusting the circle drive pinion of a motor grader without requiring the adjustment of the circle support shoes.

Other objects and advantages of the present invention will become apparent from the following description and claims.

The accompanying drawings shown, by way of illustration, the preferred embodiments of the present in-

vention and the principles thereof which are considered to be the best mode contemplated for utilizing these embodiments. It is recognized that other embodiments of the invention utilizing the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a reduced side elevation view of a motor grader embodying the present invention;

FIG. 2 is a partly broken-away plan view of the blade support circle and drive pinion means of the motor grader taken along the line II—II of FIG. 1;

FIG. 3 is a sectional view of the blade circle and drive means taken along the line III—III of FIG. 2 illustrating the engagement of the pinion gear and circle gear;

FIG. 4 is another sectional view of the blade circle taken along the line IV—IV of FIG. 2 and showing the details of a circle supporting shoe.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIG. 1, a motor grader is shown generally at 10. The grader comprises an engine 11 mounted on the wheels 12, an operator's station 13, an arched main frame 14, which extends forwardly to a bolster 15 which is, in turn, mounted on front wheels 16. A grader blade 17 is shown attached to a bifurcated draw bar structure 18 by means of a rotatable blade circle assemblage 19. Suitable control linkages 20 are provided for the purpose of positioning the blade 17.

Referring now to FIGS. 2, 3, and 4, it is seen that the blade circle 19 is provided with a plurality of circumferentially-spaced circle supporting shoes 21 which provide stable rotational support for the blade circle in the generally known manner. The shoes are adjustably fixed, by means of bolts 40, to the draw bar structure 18. Prior to this invention, all of these bolts had to be relieved in order to adjust the blade circle relative to its drive pinion to eliminate the aforementioned backlash. The adjustable drive pinion unit of the present invention is shown generally at 23. A pinion gear 30 drivingly engages the teeth 31 of an annular gear on the support circle 19 to provide for rotational movement of said circle. The pinion unit is mounted upon a transverse portion of the draw bar structure 18 which joins the bifurcations 25 of the draw bar structure. A bracket means 32 which is unitary with said transverse portion supports the pinion unit as best shown in FIG. 3. The bracket means is connected to the drive pinion unit housing by means of bolts 33 and is spaced therefrom by means of shims 24.

Initially, when the drive pinion unit is installed, the teeth 30 of the pinion gear are closely mated to the planetating teeth 31 of the blade circle gear. After a period of use, however, wear occurs and a tolerance between said pinion and circle gear teeth is created and consequent backlash is exhibited.

In accordance with the present invention, this tolerance can be readily adjusted and the accompanying backlash eliminated. By the simple expedient of relieving the bolts 33 and inserting additional shim members 24, the pinion unit can be moved radially into closer engagement with the support circle gear. Thus,

the desired tolerance can be obtained along with maximum effectiveness of the drive connection.

In order to accomodate the attendant radial movement of the pinion unit, the pinion control linkage 20 is provided with a telescopic spline connection 26 which adjusts for this movement.

While the preferred embodiments of the invention have been illustrated and described, it is to be understood that these embodiments are capable of variation and modification and are not limited to the precise details set forth, but rather they include such variations and modifications as fall within the scope of the appended claims.

I claim:

1. In a motor grader having a wheel mounted frame means with drawbar means attached thereto and an earth-working blade-carrying support circle means rotatably mounted upon said drawbar means, the improvement comprising; drive means for said support circle means, said drive means including a pinion gear, said support circle means including gear means which

engage said pinion gear, adjustment means for adjustably mounting said drive means upon said drawbar means to permit selective movement of said drive means with respect to said drawbar means and said support circle means, said pinion gear being adjustably mounted upon said drawbar means by said adjustment means, said adjustment means including bolts and shims to permit adjustments between said drive means and said support circle means to be readily accomplished by movement of said drive means, and said drive means being interconnected to and controlled by said adjustment means which adjustment means further include frame mounted operator-actuated control linkage means having a telescopic spline connection which accomodates movement of said drive means.

2. The motor grader of claim 1 wherein said relative movement between said drive means and said support circle means is accomplished without movement of said support circle means.

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