United States Patent

[11] 3,548,955

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[21] Appl. No. **739,342**
[22] Filed **June 24, 1968**
[45] Patented **Dec. 22, 1970**

[54] **GRADER BLADE VERTICAL ADJUSTMENT MECHANISM**
2 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **172/793,** 172/710
[51] **Int. Cl.** **E02f 3/76**
[50] **Field of Search** 172/793, 794, 795, 710; 92/18; 74/471; 188/67

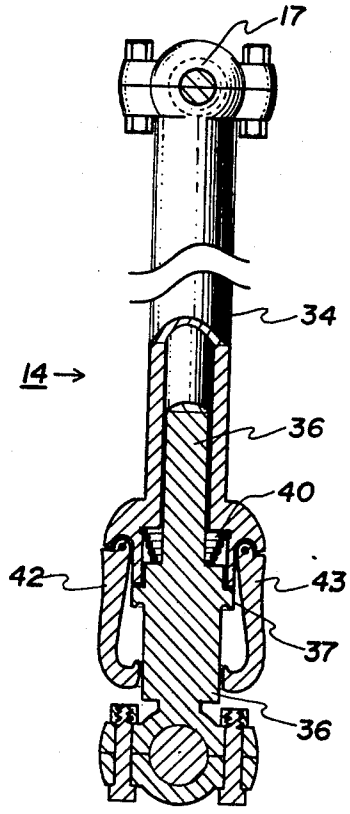
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ABSTRACT: An improved grader blade vertical adjustment mechanism having a pair of floating links coupling the A-frame to the bell crank of the lifting mechanism of a grader, each linkage being telescopically received within a cylinder and being carried via a ball joint at one end of the bell crank, a pair of adjustable jaws for limiting the vertical travel of the telescoping link in its floating position and allowing for locking the linkage in an extreme downward position when desired.



PATENTED DEC 22 1970

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SHEET 1 OF 2

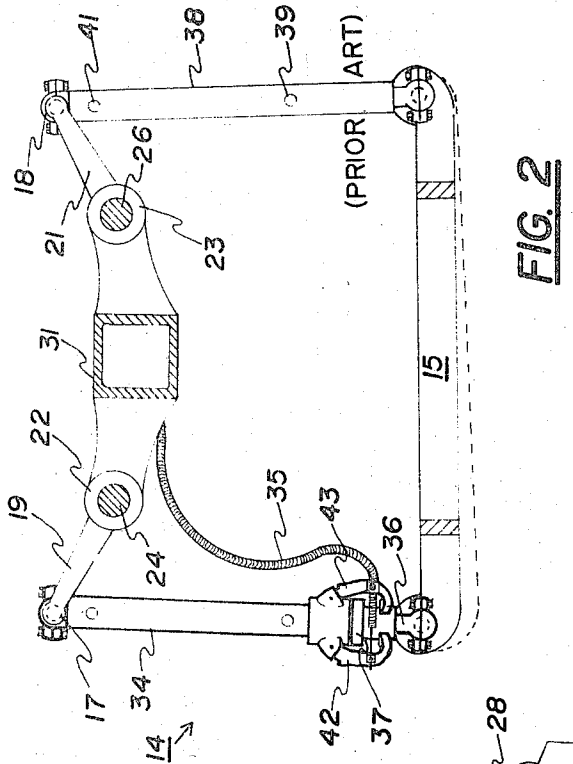


FIG. 2

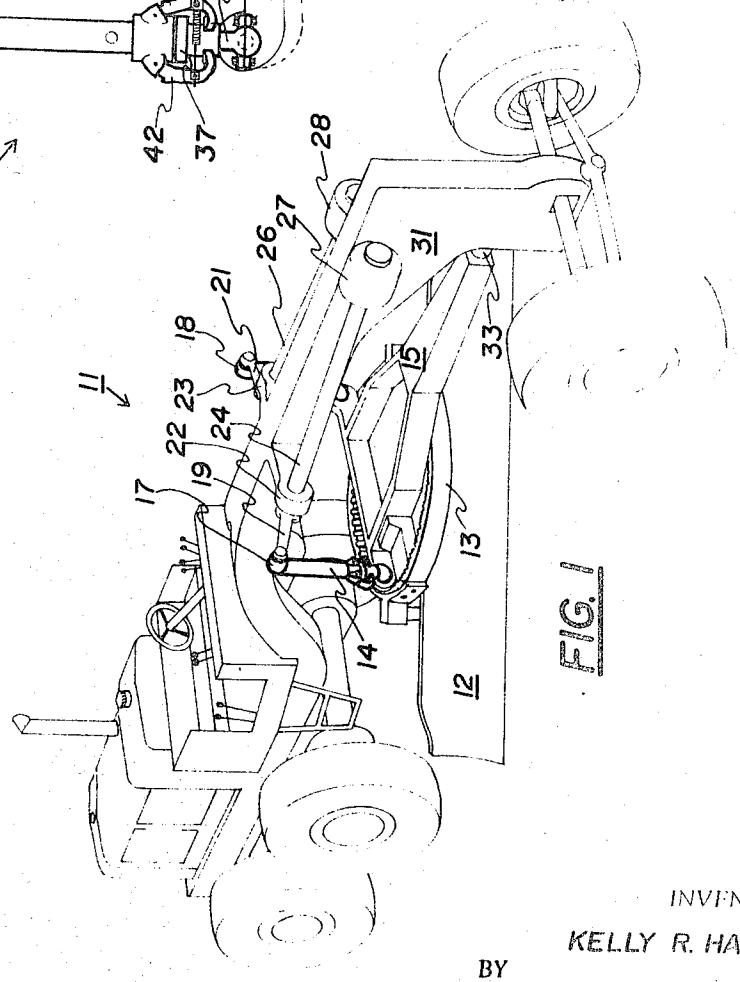


FIG. 1

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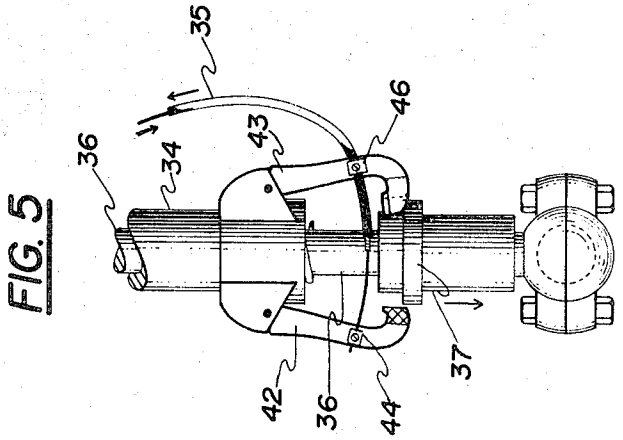


FIG. 5

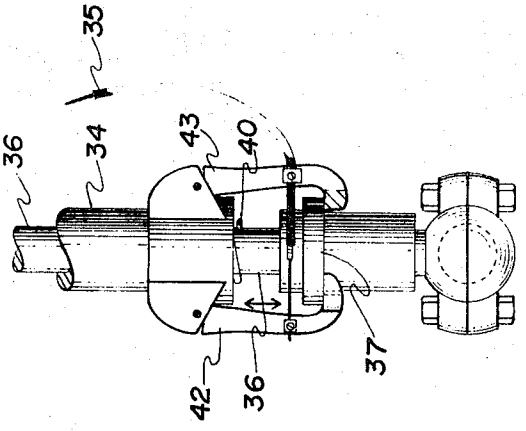


FIG. 4

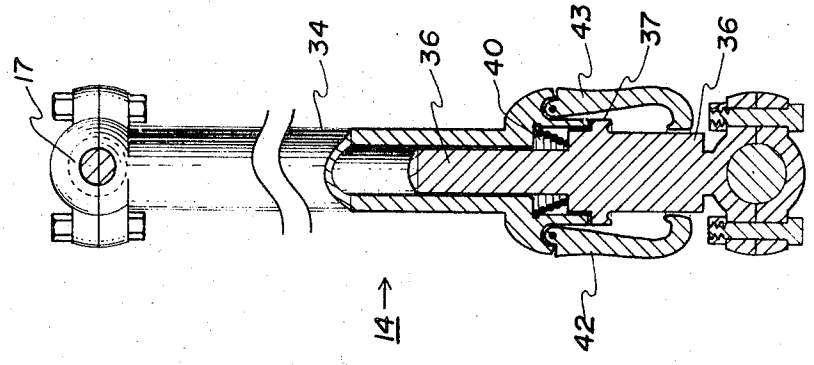


FIG. 3

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GRADER BLADE VERTICAL ADJUSTMENT MECHANISM

PRIOR ART

Prior art mechanisms for adjusting the vertical position of a grader blade have, in the main, been dependent upon an adjustable linkage coupled to the bell cranks which, in turn, are motor-driven. The chief disadvantage of this system lay in its inability to cope with terrain of varying hardness and softness together with varying elevations, i.e., since it was rigidly held in any given position minor terrain variations of minor duration would have to be compensated for by the operator, as well as main terrain variations.

BRIEF DESCRIPTION OF THE INVENTION

The present invention relates to an improved grader blade vertical adjustment linkage and more particularly to an improved grader blade vertical adjustment linkage which is floating to accommodate minor terrain variations.

According to the invention, the A-frame of a grader is coupled to the bell cranks via two adjustable and floating linkages. The linkages are each actually physically coupled to the bell crank by a ball joint. The linkages consist of a cylinder which telescopically receives a shaft, the shaft being physically coupled to one side of the A-frame. At the entrance to the cylinder, a pair of adjustable jaws are in contact with the sides of the shaft, the shaft having a flange at one location to limit its ward travel by a physical coupling with the jaws, its upward travel being limited by physical contact between the cylinder and the flange. A push-pull flex cable is preferably coupled to each of the jaws for widening their opening to allow the flange on the rod to drop below the jaws resulting in a rigid lower most setting of the blade via a conventional setting pin. The push-pull flex cable would have its control in proximity to the operator so this operation can be handled without the necessity of the operator's leaving the grader. A compression spring can be carried by the cylinder for exerting a slight downward force onto the blade.

An object of the present invention is to provide an improved grader blade coupling linkage which is floating over a predetermined distance.

Another object of the invention is the provision of an improved grader blade vertical adjustment linkage which automatically adjusts for minor terrain variations.

Still another object of the invention is the provision of an improved floating blader grade vertical coupling linkage which allows for the blade to be locked in a predetermined vertical position from the operator's seat.

Yet another object of the invention is the provision of an improved grader blade vertical adjustment linkage which is spring-loaded to exert a downward force on the grader blade.

A still further object of the invention is the provision of an improved grader blade vertical adjustment linkage which is compatible with existing graders.

Other objects and many of the attendant advantages of the invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIG. 1 is a perspective view of a grader showing the present invention in situ;

FIG. 2 is a front elevation of the adjustment link of the present invention shown coupled to a bell crank in conjunction with a prior art adjustment link coupled to a bell crank;

FIG. 3 is a front elevation of the adjustment link of the present invention partially sectioned;

FIG. 4 is a front elevation showing the adjustment link in one position; and

FIG. 5 is a front elevation of the vertical linkage of the present invention showing the adjustment linkage in a released position.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIG. 1, a grader is shown generally at 11 having a blade 12 coupled to a blade angle drive gear 13. Blade angle drive gear 13 is coupled through the A-frame 15 to adjustment linkages 14 and 16 which terminate in ball joints 17 and 18, respectively, coupling linkages 14 and 16 to bell cranks 19 and 21, respectively.

Bell cranks 19 and 21 are coupled through bushings 22 and 23 to shafts 24 and 26 which, in turn, are driven by motors 27 and 28, respectively. Bushings 22 and 23 and motors 27 and 28 are carried by main frame 31. Blade angle drive gear 13 is carried by blade support A-frame 15 which is coupled at 33 via a ball joint to main frame 31.

Referring to FIG. 2, adjustable linkage 14 is shown coupled to ball joint 17 which, in turn, is coupled to bell crank 18 and shaft 24. Adjustable linkage 14 consists of a cylinder 34 which telescopically receives a shaft 36 having a flange 37. Shaft 36 is coupled to one side of A-frame 15. A prior art adjustment link 38 has adjustment holes 39 and 41 and is coupled between A-frame 15 and bell crank 21. Adjustable jaws 42 and 43 are rotatably coupled to cylinder 34 and terminate around shaft 36 limiting the vertical movement of shaft 36 within cylinder 34.

Referring to FIG. 3, jaws 42 and 43 are shown in contact with shaft 36 beneath flange 37, flange 37 resting against lower end of cylinder 34.

Referring to FIG. 4, jaws 42 and 43 are shown limiting the downward travel of shaft 36 by abutting flange 37.

Referring to FIG. 5, jaws 42 and 43 are shown in their maximum spread position being spread by push-pull flex cable 35 which is fixedly attached to jaw 42 at 44 and to jaw 43 by a clamp 46. In this position, jaws 42 and 43 are outside of flange 37 allowing shaft 36 to drop to a lower position than that shown in FIG. 4. Shaft 36 can be locked in this position by a conventional locking pin.

OPERATION

Referring now to all of the figures, it can be seen that by adjusting the position of shaft 36 within cylinder 34, the vertical position of blade 12 is varied. Since spring 40 (FIG. 3) and gravity urges shaft 36 downward, the blade will ride on the surface of the terrain, but be allowed to rise several inches should terrain variations require this. This is an inherent feature of the instant invention and requires no action on the part of the operator.

Should the operator desire to drop blade 12 to a lower position, he merely spreads jaws 42 and 43 by push-pull flex cable 35 allowing flange 37 to ride through jaws 42 and 43. He then releases push-pull flex cable 35 allowing jaws 42 and 43 to close. A conventional locking pin (not shown) will prevent shaft 36 from returning or from telescoping within cylinder 34. When the reverse is true, he merely opens jaws 42 and 43 and removes the locking pin allowing shaft 36 to return within cylinder 34 and the jaws are then allowed to close to their float limiting position as shown by FIGS. 3 and 4. The locking pin can be solenoid operated for remote control

It should be understood, of course, that the foregoing disclosure relates to only a preferred embodiment of the invention and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

I claim:

1. In a grader of the type having a blade adjustably attached to a main frame, the improved grader blade vertical adjustment mechanism comprising:

a cylinder coupled to the main frame;

a shaft telescopically received by said cylinder;

an inner shoulder in said cylinder;

an outer shoulder in said shaft;

spring biasing means slidably carried by said shaft and compressed between said inner shoulder in said cylinder and said outer shoulder in said shaft for biasing said shaft in a downward direction, said shaft being coupled at its lower end to said grader blade;

limit means coupled to said shaft for limiting the upward and downward movement of said shaft within said cylinder; and

a pair of expandable jaws attached to and substantially parallely disposed to said cylinder and riding on said shaft below said limit means.

2. The improved grader blade vertical adjustment mechanism of claim 1 wherein:

said expandable jaws can be expanded sufficiently to allow said limit means to pass through said expandable jaws.