July 15, 1969 P. E. HANSER ET AL 3,455,400

SCRAPER CONTROL MECHANISM

Filed Nov. 26, 1965

2 Sheets-Sheet 1

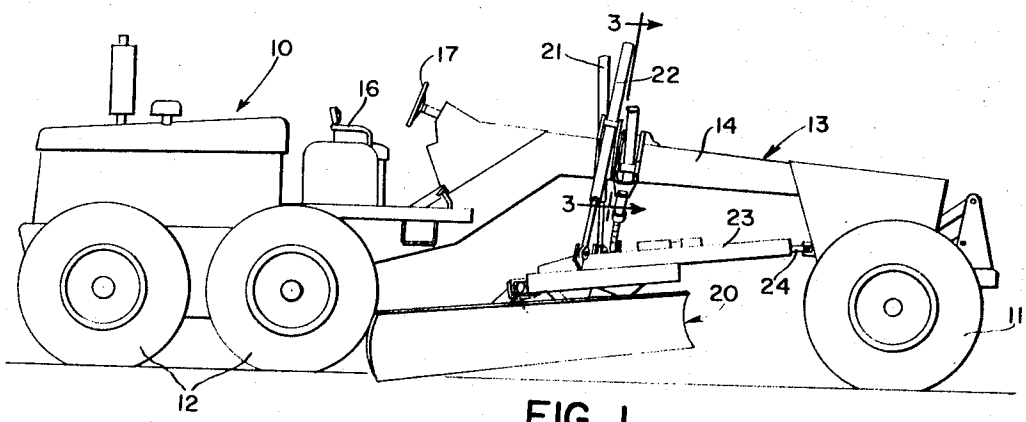

FIG. 1

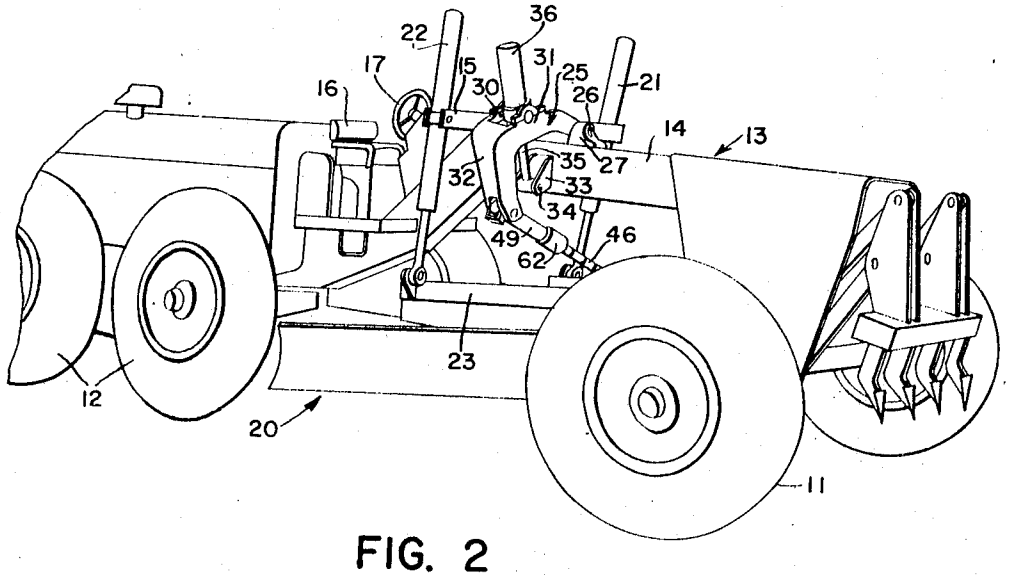

FIG. 2

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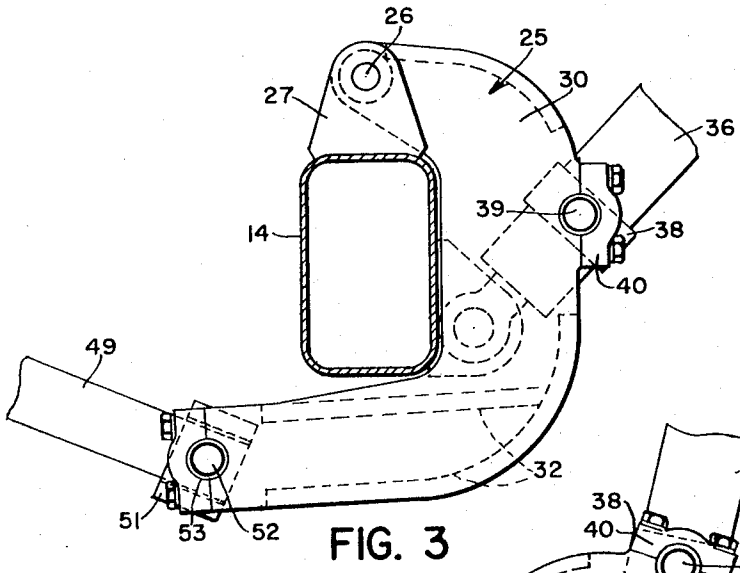

FIG. 3

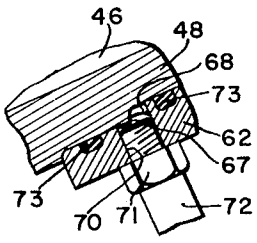

FIG. 6

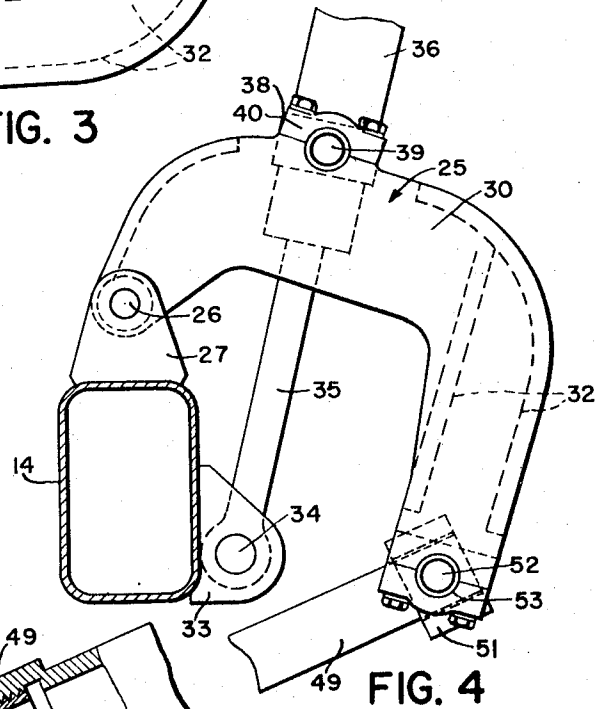

FIG. 4

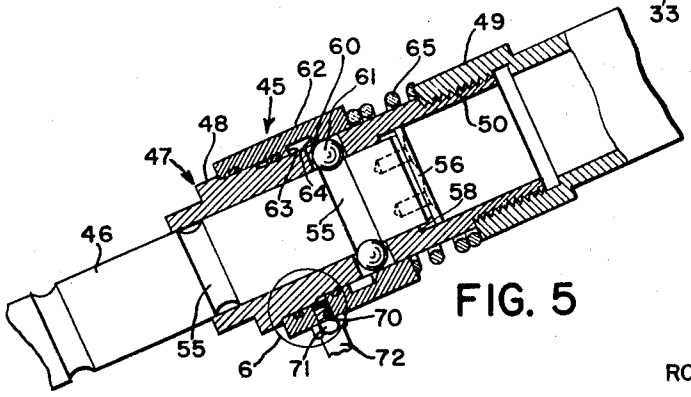

FIG. 5

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SCRAPER CONTROL MECHANISM

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Int. Cl. E02f 3/12, 3/76
U.S. Cl. 172—793 7 Claims

ABSTRACT OF THE DISCLOSURE

On a grader having a main longitudinal fore-and-aft extending beam, an arm pivotally mounted on the beam to shift vertically and transversely, a hydraulic cylinder extending between the beam and arm for raising and lowering the arm, an extensible and retractable link extending between the lower end of the arm and a blade structure beneath the longitudinal beam, and a hydraulically controlled locking device for locking the link against extension or retraction, the link being capable of being extended or retracted by the hydraulic cylinder when the lock device is in unlocked position.

This invention relates to a land grading and leveling implement of the type having a rear traction vehicle with a forwardly projecting elongated beam that is connected to the vehicle and is supported at its forward end by a pair of steerable front support wheels. Still more particularly this invention relates to the blade structure that is suspended beneath the elongated beam so as to both tilt and to shift laterally or sidewise. The ability to both tilt and to shift laterally is important for the purpose of providing banks on the sides of roads or to form large ditches.

It is the primary object of the present invention to provide a side shift mechanism for shifting the blade structure that includes a transversely shiftable arm supported on the main beam to pivot about a fore-and-aft extending horizontal axis. A hydraulic cylinder is utilized to raise and lower the arm. The lower end of the arm is connected by an extensible link to the blade structure so that as the arm is swung vertically, it will impart a horizontal movement as well as a vertical movement of the blade structure.

It is a further object of the present invention to provide a unique extensible link between the lower end of the arm and the blade structure that includes a pair of telescoping members with the inner of the members having a series of axially spaced apart annular indentations in its outer surface. The outer of the telescoping members carries a series of locking elements or balls that may be shifted into the indentations of the inner member to thereby lock the inner member against movement. A collar is supported by and shiftable axially on the external surface of the outer member. The inner surface of the collar is shaped so as to engage and drive the locking elements or balls inwardly to be recessed in the indentations of the inner member. The collar may also be shifted so as to move an annular groove adjacent the locking elements so that they may be shifted outwardly of the annular indentation of the inner member. There is further provided a pair of opposed shoulders on the outer surface of the outer member and the inner surface of the collar and hydraulic fluid is supplied into the spacing between the shoulders so as to adjust the collar axially along the outer telescoping member. Consequently the collar may be shifted so as to move the locking elements inwardly, or may be shifted so that the locking elements may be permitted to move outwardly and out of the indentation

on the inner telescoping member. When in the latter position the hydraulic cylinder that shifts the arm may be utilized to extend or retract the link connecting the arm to the scraper blade structure.

Other objects and advantages will become apparent to those skilled in the art as the nature of the invention is better understood from the following description and as shown in the accompanying drawings.

FIG. 1 is a side view of a scraper incorporating the structure of the present invention.

FIG. 2 is a front and side perspective view of the scraper shown in FIG. 1.

FIG. 3 is a sectional view taken substantially along the line 3—3 of FIG. 1.

FIG. 4 is a view similar to FIG. 3 but showing the parts in a different disposition than that of FIG. 3.

FIG. 5 is a vertical sectional view of the extensible link connecting the side shiftable arm to the scraper blade structure.

FIG. 6 is an enlarged sectional view of a part of the structure shown in FIG. 5 as indicated by the circular sectional portion 6 shown in FIG. 5.

The scraper leveler is composed of a main tractor **10** that is normally disposed at the rear of the implement and a pair of front steerable wheels **11** that is interconnected to the tractor **10** by a main beam structure **13** that extends longitudinally fore and aft from the tractor **10** to the steerable wheels **11**. The beam structure is composed of a main fore-and-aft extending beam **14** and a transverse horizontally extending beam **15** that is rigid with the beam **14** and extends to opposite sides of the beam **14**. The tractor **10** is provided with traction wheels **12** and the beam structure **13** carries an operator's station as indicated by the seat **16** and steering wheel **17** that controls the steering of the implement. The connection between the main beam structure **13** and tractor **10** is shown in a pending application Ser. No. 468,744 and reference may be had to that application should it be considered necessary for proper understanding of the present invention.

Hydraulic controls are provided adjacent the operator's seat **16** for controlling the various hydraulic systems and units on the scraper.

A blade structure, indicated in its entirety by the reference numeral **20**, is suspended on and beneath the transverse beam **15** by a pair of hydraulic links **21, 22** extending from opposite ends of the transverse beam **15** to opposite sides of a blade subframe **23** that is articulately connected at **24** to the forward end of the beam structure **13**. The connection **24** is of a universal type that permits tilting and shifting of the subframe **23**.

Oftentimes it is desirable to shift the blade structure **20** so that the blade is outboard of the wheels **11, 12** and is generally or close to being vertical. The cylinders **21, 22**, while being capable of tilting the blade, are not capable of shifting it outwardly and consequently a side shift structure is required to shift it outwardly for purposes of banking the blade structure **20**. The present invention relates to the side shift structure. The side shift structure is composed of an L-shaped arm **25** that has a vertical leg portion carried on a pivot pin **26** that in turn is supported by upwardly projecting bracket structure **27**. The arm **25** may therefore shift transversely about the fore-and-aft extending axis of the pin **26**. The arm **25** is L-shaped and, as shown in FIG. 3, may have a vertical portion lying adjacent a vertical side of the main beam **14** and a horizontal leg portion lying closely adjacent and directly beneath the underside of the main beam **14**. The arm **25** is composed of a pair of identical fore-and-aft spaced apart members **30, 31** rigidly connected by flange sections **32** so as to give a bifurcated appearance to the arm **25**.

A transversely extending and outwardly projecting bracket structure **33** is provided on one side of the beam **14** and is pivotally connected at **34** to the rod portion **35** of a hydraulic cylinder **36**. An external collar **38** is fixed to the outer surface of the cylinder **36** and has a pair of outwardly projecting pivot pins **39** that fits adjacent the outer edge of the arm sides or members **30, 31** and is received in a bearing block, such as at **40**, on the respective arm members **30, 31**. Consequently as may best be seen in FIGS. 2, 3 and 4, the hydraulic unit **35, 36** extends through the bifurcated arm **25** and is pivotally supported on the arm by the bearing blocks **40** and pivot pins **39**. Also, as may be seen in FIG. 3, the bifurcated arm **25** is adapted to sit on opposite sides of the bracket structure **33** when the arm is closely adjacent the beam **14**.

An extendible and retractable link structure **45** extends between the lower end of the arm **25** and a side of the subframe **23**. The link structure is composed of an inner rod member **46** that is telescopingly received within an outer member **47**. The outer member **47** is composed of first and second parts **48, 49** that are threadedly jointed at **50** so as to be coextensive with one another. The upper end of the link part **49** is rigid with a block **51** that carries fore-and-aft and outwardly projecting pivot pin portions **52** that extend through suitable journals **53** in the lower ends of the respective side plates **30, 31** of the arm **25**.

The inner member or rod **46** is provided with a series of axially spaced apart annular surface indentations or grooves **55** adapted to receive locking elements. The upper end of the rod **46** is provided with a limiting plate **56** bolted to the end of the rod **46** and is positioned to contact a shoulder **58** on the internal surface of the telescoping outer part **48**. The outer part **48** is provided with openings **60** that are circular in shape and project through the part **48**. Positioned in the openings **60** are locking elements in the form of metallic balls **61** that have a slightly larger diameter than the thickness of the part **48**. As may be seen in FIG. 5, the balls **61** are adapted to rest partially in the annular groove or indentation **55** when the openings **60** are in registry with one of the indentations **55**. A collar **62** is supported externally and slidably on the outer telescoping member **48**. The collar **62** is provided with an internal groove **63** that may, when in registry with the openings **60**, receive a part of the locking elements or balls **61** so that the balls **61** may shift outwardly and out of the respective annular indentation **55**. An inclined surface **64** is provided on one end of the groove **63** and will operate, when in contact with the surfaces of the balls **61**, to drive the balls inwardly in response to axial movement of the collar **62**. A biasing spring **65** is coiled around the outer surface of the part **48** and is disposed between the end of the collar **62** and the end of the upper part **49** that forms the upper section of the outer telescoping member **47**. Consequently the collar **62** is biased toward the lower end of the link structure **45** and to a position, as shown in FIG. 5, in which the groove **63** is axially offset from the openings **60** and locking elements **61**.

Referring now to FIG. 6, the outer telescoping member part **48** and the collar **62** are provided with an outer radial shoulder **67** and an inner shoulder **68** respectively that are in opposed relation to one another and define a fluid opening between them. The collar **62** has a fluid inlet **70** that receives a fitting **71** on a hydraulic hose **72**. Through suitable controls, not shown, but at the operator's station on the grader, fluid may be introduced and withdrawn from the fluid area between the shoulders **67, 68** so as to cause the collar **62** to move axially against the force of the spring **65** into the area of radial alignment with the openings **60** and locking elements **61**. Suitable packing rings **73** are provided to prevent leakage of the hydraulic fluid.

In operation, the extensible link **45** may be adjusted by moving the collar **62** to a position in which the balls **61** may be shifted into the groove **63**. When so positioned, the hydraulic cylinder **36** may be adjusted to move the arm **25** and to extend or retract the rod **46** in respect to the outer telescoping member **47**. When the desired length of the link structure **45** is reached, fluid is withdrawn from the area between the shoulders **67, 68** and the spring **65** will force the collar axially so as to lock the balls **61** in their locking position in one of the indentations **55**. Consequently the hydraulic cylinder **36** and the arm **25** serve to shift the subframe **23** and also operate to extend and retract the link structure **45**. Therefore, between the two operations, the entire blade structure **20** may be shifted to the desired angular and transverse position.

What is claimed is:

1. On a land grader having a main longitudinal fore-and-aft beam structure in overlying and vertical spaced relation to a grader blade structure and on which the blade structure is suspended by link means extending between the beam and blade structures that are adjustable to raise and lower the sides of the blade structure, the improvement residing in a side shift mechanism comprising: means providing a fore-and-aft extending pivot above the beam structure; an arm swingable on said pivot, the arm being L-shaped and adapted to move into a position in which one leg portion is vertically disposed and closely alongside the side of the beam structure and the other leg portion is horizontally disposed and closely alongside the underside of the beam structure; a hydraulic cylinder extending between the beam structure and arm for effecting adjustment of the arm about its pivotal axis; and an extendible and retractable link device extending between the lower end of the arm and the blade structure with means thereon for locking the link device against extension and retraction.

2. The structure as set forth in claim **1** in which the cylinder is composed of a rod portion and a cylinder portion and further characterized by lug means on the side of the beam structure for pivotal connection to the rod portion, and the vertical leg portion of the arm is bifurcated to receive the lug means as it moves alongside the beam structure; and further characterized by trunnion means pivotally supported on the bifurcated portion and adapted for external connection to the cylinder.

3. The structure as set forth in claim **1** further characterized by the means for locking the link against extension and retraction includes a locking device that is controlled for release by hydraulic means.

4. On a land grader having a main longitudinal fore-and-aft beam structure in overlying and vertical spaced relation to a grader blade structure and on which the blade structure is suspended by link means extending between the beam and blade structures that are adjustable to raise and lower the sides of the blade structure, the improvement residing in a side shift mechanism comprising: an arm supported on the beam structure above the blade structure to swing transversely thereon about a fore-and-aft extending horizontal axis; hydraulic motor means between the arm and beam structure for selectively positioning the arm in a plurality of positions; a telescoping link device extending between the lower end of the arm and the blade structure including a pair of telescoping members, the inner of the members having axially spaced apart surface indentations and the outer of the members having radial opening means; and a hydraulically operated locking device composed of locking elements retained in said opening means shiftable radially into and out of the surface indentations and a hydraulically operated axially shiftable collar supported on the members and engageable with the locking elements to effect radial movement of the elements to and from a locking position in response to axial shifting of the collar.

5. The structure as set forth in claim **4** further characterized by biasing means between the collar and outer telescoping member for biasing the collar toward a position that holds the locking elements in the surface indentations.

6. The structure as set forth in claim 4 further characterized by the collar and outer telescoping member having internal and external shoulders respectively in opposed relation to one another; and means for moving fluid into and out of the spacing between the shoulders for shifting the collar axially.

7. The structure as set forth in claim 4 in which the surface indentations are annular grooves in the surface of the inner telescoping members, the locking elements are metallic balls, the opening means are small openings that receive the balls and permit them to shift radially, and the internal surface of the collar includes an annular groove that may receive at least a portion of the balls to permit the balls to shift clear of annular grooves in the inner telescoping member.

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