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W. L. JAHN

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SHOULDER SHAPING ATTACHMENT FOR ROAD WORKING MACHINES

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Fig. 1

Fig. 6

INVENTOR
WILLIAM L. JAHN

July 28, 1953

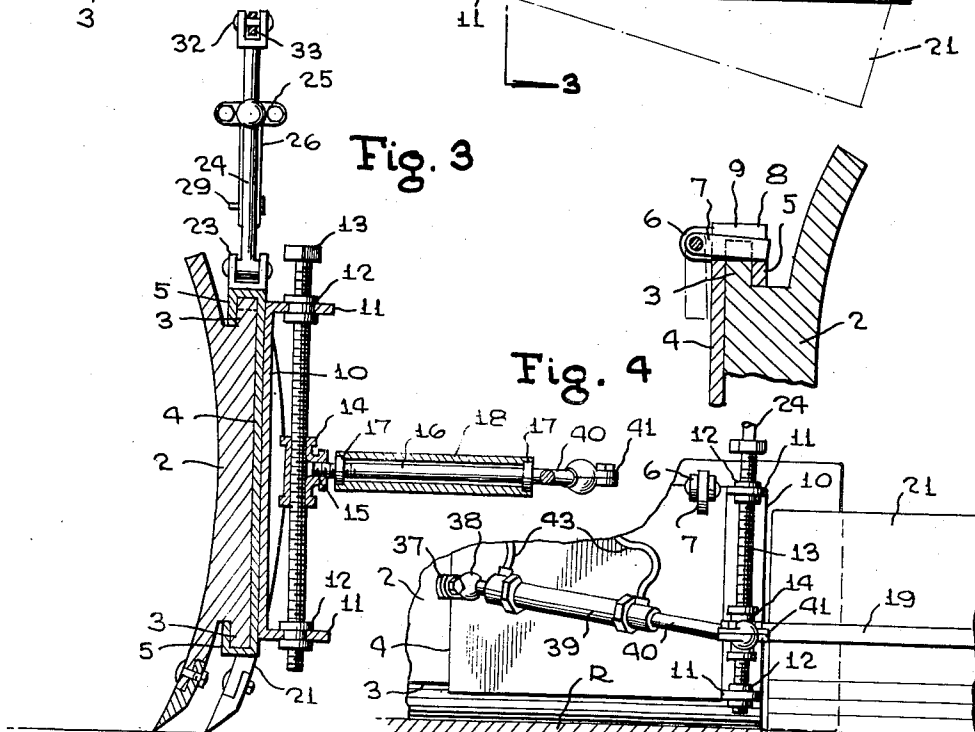
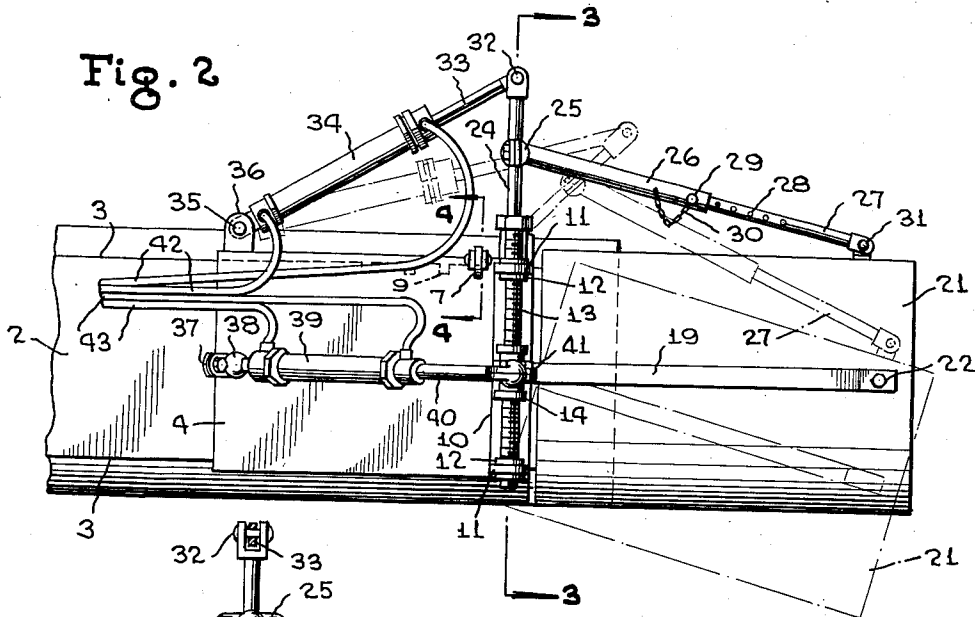
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2 Sheets-Sheet 2



WILLIAM L. JAHN

BY
McMorrow, Berman & Davidson
ATTORNEYS

UNITED STATES PATENT OFFICE

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SHOULDER SHAPING ATTACHMENT FOR
ROAD WORKING MACHINES

William L. Jahn, Grand Forks, N. Dak.

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7 Claims. (Cl. 37-155)

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This invention relates to a shouldering attachment for road working machines, such as graders or the like, and more particularly has reference to an attachment of the character described adapted, when secured to a blade of a road working machine, to form or shape a shoulder of a selected angle and elevation adjacent a roadway over which said machine is moved.

To my knowledge, there is a considerable need, which has not been met by such shouldering attachments as have heretofore been devised, for an attachment as stated that can be either attached to or wholly removed from the road working machine with maximum speed and facility; that will require no modification of the construction of the machine, except perhaps to a very minor extent; that will not involve redesigning of the machine or changes in the manufacturing practices used in building the machine; and that will be efficient in forming horizontal shoulders or inclined shoulders at any selected elevation relative to the road surface while providing for minimum wastage of the material used in forming the shoulder.

The main object of the present invention is to provide a machine attachment of the character described that will fulfill these needs.

Another important object is to provide an attachment as described that will be swingably adjustable through vertical and horizontal planes, with said adjustments being controllable from the deck of the machine, while the machine is in operation, and with each of said adjustments being variable relative to the other at any time.

Another important object is to provide an attachment as stated wherein said vertical adjustment will be efficiently adapted to form a distinct and straight shoulder line of a selected angle of inclination.

Another important object is to provide a construction, in an attachment as described, wherein the horizontal adjustment referred to will be effective to equalize material dumped upon the shoulder without drawing said material over upon a pavement newly laid upon the adjacent road surface.

Still another object is to provide, in a structure of the type stated, means for bodily shifting the attachment to selected levels of elevation relative to the main blade provided on a road working machine, thereby to allow the blade attachment to be lowered while still extending in parallelism with the main blade, thus to remove unwanted material from a shoulder before the replacement of new material upon the shoulder.

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Yet another object is to provide, in an attachment of the type stated, a construction wherein said last-named adjustment will allow the extension blade of the attachment to be elevated above the level of the main blade of the road working machine while still retained parallel thereto, thus to form the shoulder to a level higher than the level of the paved road surface, and thus allow the rolling and packing of a newly formed shoulder into the pavement level.

Referring to the drawings:

Figure 1 is a top plan view of a road grader and of an attachment formed in accordance with the present invention and mounted upon the blade of said grader; the dotted lines indicating one position to which the attachment is horizontally adjustable, a portion of the grader being broken away;

Figure 2 is a rear elevational view of the attachment, the dotted lines indicating a position to which the attachment is vertically adjustable, the grader blade being shown fragmentarily;

Figure 3 is an enlarged sectional view taken substantially on line 3-3 of Figure 2;

Figure 4 is a detail sectional view, still further enlarged, taken on line 4-4 of Figure 2;

Figure 5 is a fragmentary rear elevational view of the attachment, wherein the blade of the attachment has been bodily shifted vertically of the grader blade;

Figure 6 is a schematic view of the fluid pressure system.

Referring to the drawings in detail, a road grader of conventional construction has been generally designated 1, and includes the main blade 2, which, in accordance with conventional practice, is adjustably mounted upon the grader.

Integral or otherwise rigid with the back surface of the main blade 2 are longitudinally extended, parallel tongues 3 over which is slidably positioned a support plate 4, the top and bottom edges of which are formed with inturned flanges 5 engageable with the respective tongues.

Rigidly secured to and extended rearwardly from the top edge of the support plate 4 are ears 6 (Figure 4) between which is pivotally connected one end of a swinging latch 7 adapted to be releasably engaged in registering notches 8 and 9 of the plate 4 and blade 2, respectively. As seen from Figure 2, the upper tongue of the main blade 2 is formed with a series of longitudinally spaced notches 9 in any of which the latch may engage. Thus, the support plate 4 can be readily removed wholly from the main blade to permit use of the road grader without

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the attachment whenever desired. When, however, it is desired to use the attachment, the support plate 4 is slidably positioned over the tongues 3, and may be adjusted longitudinally of the main blade 2 as desired. Thereafter, when the main blade and support plate have been relatively arranged in the desired relationship, the latch 7 is swung into the selected notch 9 to secure the support plate fixedly, but removably, to the main blade.

Secured rigidly to the back surface of the support plate 4 is a vertically disposed bracket 16 having outwardly extended, vertically spaced ends 11 in which are formed vertically aligned bearing openings.

Rotatably mounted in the respective bearing openings are flanged collars 12 rigidly secured to and spaced longitudinally of a vertical screw 13 having at its upper end a head adapted to be manually gripped for the purpose of rotating the screw, said head being also adapted to receive a wrench or similar tool.

Intermediate opposite ends of the screw 13, there is threadably engaged therewith a follower 14 having a lateral, internally threaded extension 15 in which is threadably engaged one end of a shaft 16 extended horizontally and outwardly of said follower.

Rigid with and spaced longitudinally of the shaft 16 are bearing collars 17 on which is rotatably mounted a cylinder 18.

Rigidly connected at one end to the cylinder 18 (Figure 1) are braces 19 and 20 extending to the outer end of an extension blade 21 to which said braces are fixedly secured, as at 22.

By reason of the construction described above, the extension blade 21 is mounted upon the main blade for horizontal swinging movement, this result obtaining by rotation of the follower 14 on its vertical axis. Further, the extension blade 21 is mounted to swing in a vertical plane, pivoting on the horizontal axis defined by the shaft 16. Further, the extension blade is bodily shiftable vertically of the main blade, by rotation of the screw 13 which acts to shift the follower 14 vertically of said screw.

Means is provided for controlling the vertical swinging movement of the extension blade 21, and to this end I fixedly mount upon the upper edge of the support plate 4 a yoke 23 receiving and pivotally connected to the lower end of an upstanding arm 24, whereby said arm is swingably connected to the support plate for movement in a vertical plane.

Intermediate opposite ends of the arm 24 there is mounted thereupon a ball socket 25 in which is disposed a ball rigid with one end of a tube 26 in which is telescopically mounted an extension rod 27 having a longitudinal series of openings 28 any of which is registrable with a complementary opening formed in the tube 26, a pin 29 being connected to the tube 26 by means of a chain 30 and being extendable through the registrable openings for the purpose of securing the tube and extension rod in selected positions of telescopic adjustment.

At its outer end the extension rod 27 is pivotally connected to the outer end of the extension blade 21, as at 31. Thus, if the arm 24 is swung, for example, to the dotted line position illustrated in Figure 2, the blade 21 will be dropped to an inclined position, as shown by dotted lines in Figure 2.

For the purpose of controlling the swinging of the arm 24, I pivotally connect to the upper end

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of the arm, as at 32, a piston 33 slidable in a hydraulic cylinder 34, said cylinder 34 being pivotally connected, as at 35, to ears 36 of the support plate 4 for swinging movement in a vertical plane.

Means is also provided for controlling horizontal swinging movement of the extension blade 21. A ball socket member 37 is rigidly connected to the inner end of the support plate 4, and is connected to a complementary ball socket member 38, to receive a ball rigidly connected to the inner end of a hydraulic cylinder 39. A piston 40 is slidable in the cylinder 39, and is provided at its outer end with a ball engaged in a ball socket connection mounted upon the outer end of the shaft 16.

Thus, it will be noted that in any position to which the extension blade 21 is bodily shifted vertically of the main blade, said extension blade can be swung either vertically or horizontally by means of the hydraulic devices described above and the universal connections between said hydraulic devices and the extension blade.

Connected to opposite ends of the cylinder 34 are hoses 42 through which fluid may be supplied under pressure for the purpose of extending or retracting the piston 33. Hoses or fluid pressure lines 43 are connected to opposite ends of the cylinder 39, and as seen from Figure 6, said hoses 42 and 43 extend to a double unit selector valve generally designated 44 mounted upon the deck of the road working machine, and controlled by valve handles 45.

Extending from the valve 44 is a fluid pressure line 46 extending to a pump 47 of conventional construction, and a line 48 extends from said pump to a reservoir 49. A line 50 is extended from the reservoir to the valve 44.

Although the pump 47 is illustrated in Figure 6 as having electrical connections extending therefrom indicating it to be an electrically powered pump, I believe it is sufficiently obvious as not to require special illustration, that the pump may be operatively connected directly to the motor of the road working machine at some power take-off point, or may be linked with one of the regular deck controls of the machine and locked in operating position so as to operate at all times.

By reference to Figure 1, it may be noted how the attachment is utilized in equalizing material dumped upon the shoulder, and in controlling the spreading of said material during formation of the shoulder in a manner whereby said material will not be pushed over upon the pavement of the road surface R. When the main blade 2 is adjusted to the dotted line position seen in Figure 1, and the extension blade 21 horizontally adjusted to the dotted line position thereof also seen in Figure 1, movement of the road working machine along the roadway will be effective to spread evenly the material of which the shoulder S is to be formed without said material spilling over upon the pavement surface.

It will be understood in this connection that at the option of the operator, the main blade 2 and the extension blade 21 can be positioned at any desired angles relative to one another found to produce the best results in accomplishing the particular task.

Referring to Figure 2, there is here provided an illustration as to how the vertical adjustment of the extension blade 21 on its pivot axis 16 is carried out. Fluid under pressure is supplied to the cylinder 34, causing extension of the rod or piston 33, thereby to swing the arm

24 outwardly, which has the effect of swingably lowering the extension blade. In this way an inclined shoulder of a selected angle will be formed by the extension blade during movement of the road working machine along the roadway.

If greater variation in the angle of inclination is desired, the extension rod 27 can be adjusted outwardly of the tube 26, and said rod and tube pinned in the new relationship.

Referring to Figure 4, there is illustrated the means whereby the extension blade 21 is bodily shifted vertically of the main blade 2. This is accomplished by manual rotation of the screw 13 which has the effect of lowering or elevating the extension blade, while still preserving the previously adjusted relationship of said extension blade and main blade. In other words, if the extension blade was previously adjusted, for example, to the angle of inclination shown in dotted lines in Figure 2, rotation of the screw 13 would be operative to preserve the angular relationship between the blades while still elevating and lowering the extension blade bodily. Or, if, as illustrated in Figure 4, the extension blade extends outwardly in parallelism with the main blade, rotation of the screw 13 serves to position the bottom edge of the extension blade either higher or lower than the edge of the main blade, while still retaining said edges in parallel relation. In Figure 4, the extension blade is illustrated by way of example as having been adjusted downwardly relative to the main blade, and thus a shoulder S will be formed parallel to the surface of the roadway R, but at a lower elevation. This adjustment is particularly effective in scraping shoulders, preliminary to dumping of new material upon the shoulders for formation of a new shoulder upon the old one.

It is believed obvious that a shoulder S can be formed parallel to but higher than the surface of the roadway R, and can be packed or rolled down to the plane of the paved road surface.

Whenever it is desired to use the road working machine for its ordinary purposes without the attachment, it is necessary merely to disengage the latch 7, permitting the support plate 4 to be removed from the main blade. This acts to remove not only the support plate, but also the extension blade and all the parts associated with said plate and extension blade, since said parts are mounted entirely upon these two parts of the structure.

What is claimed is:

1. The combination with a road machine having a main blade, of a shouldering attachment including a supporting plate removably and fixedly connected to said main blade; a vertical screw mounted on said plate for rotation under the control of an operator; a follower threadably engaged with said screw for movement vertically of the screw responsive to rotation of the screw; an extension blade connected to the follower so as to swing vertically and horizontally upon the main blade, said vertical movement of the follower constituting means for bodily shifting the extension blade vertically of the main blade; and means carried by the supporting plate and operatively associated with the extension blade to effect said vertical and swinging movements of the extension blade relative to the main blade.

2. The combination with a road machine having a main blade, of a shouldering attachment including a supporting plate removably and fixedly connected to said main blade; a vertical screw mounted on said plate for rotation under

the control of an operator; a follower threadably engaged with said screw for movement vertically of the screw responsive to rotation of the screw; an extension blade connected to the follower so as to swing vertically and horizontally upon the main blade, said vertical movement of the follower constituting means for bodily shifting the extension blade vertically of the main blade; and means carried by the supporting plate and operatively associated with the extension blade to effect each of said movements of the extension blade through vertical and horizontal planes, the second-named means comprising hydraulic cylinders connected to the support plate, pistons in said cylinders operatively connected to the extension blade to exert pressures thereagainst tending to swing the extension blade through said vertical and horizontal planes, and means for supplying fluid under pressure to each of said cylinders independently of the other.

3. The combination with a road machine having a main blade, of a shouldering attachment including a supporting plate removably and fixedly connected to said main blade; a vertical screw mounted on said plate for rotation under the control of an operator; a follower threadably engaged with said screw for movement vertically of the screw responsive to rotation of the screw; a shaft rigid with and extended laterally and outwardly from the follower; an extension blade connected to said shaft to swing in a vertical plane, said extension blade swinging in a horizontal plane on rotation of said follower upon the screw, said rotation of the screw constituting means for bodily shifting the extension blade vertically of said plate; means for controlling vertical swinging movement of the extension blade including an arm pivotally connected at one end to and upstanding from said plate to swing in a vertical plane, a hydraulic cylinder pivotally connected to said plate to swing in a vertical plane, a piston in said cylinder pivotally connected to the arm whereby to effect said swinging movement of the arm, and a telescopic link extending between the arm and extension blade; and means for controlling horizontal swinging movement of the extension blade including a second cylinder universally connected to said plate, and a piston in said second cylinder universally connected to the outer end of said shaft whereby to swing the shaft horizontally in an arcuate path about said screw.

4. The combination with a road machine having a main blade, of a shouldering attachment including a supporting plate connected to said main blade; a vertical screw mounted on said plate for rotation under the control of an operator; a follower threadably engaged with said screw for movement vertically of the screw responsive to rotation of the screw; an extension blade connected to the follower so as to swing vertically and horizontally upon the main blade, said vertical movement of the follower constituting means for bodily shifting the extension blade vertically of the main blade; and means carried by the supporting plate and operatively associated with the extension blade to effect said vertical and swing movements of the extension blade relative to the main blade.

5. The combination with a road machine having a main blade, of a shouldering attachment including a supporting plate connected to said main blade; a substantially vertical screw mounted on said plate for rotation under the

control of an operator; a follower threadably engaged with said screw for movement longitudinally of the screw responsive to rotation of the screw; an extension blade connected to the follower so as to swing upon the main blade about axes respectively arranged normally to and in alignment with the axis of rotation of said screw, said movement of the follower longitudinally of the screw constituting means for bodily shifting the extension blade substantially vertically of the main blade; and means carried by the supporting plate and operatively associated with the extension blade to effect movements of the extension blade about the respective axes of swinging movement thereof.

6. The combination with a road machine having a main blade, of a shouldering attachment including a supporting plate connected to said main blade; a substantially vertical screw mounted on said plate for rotation under the control of an operator; a follower threadably engaged with said screw for movement longitudinally of the screw responsive to rotation of the screw; an extension blade connected to the follower so as to swing upon the main blade about axes respectively arranged normally to and in alignment with the axis of rotation of said screw, said movement of the follower longitudinally of the screw constituting means for bodily shifting the extension blade substantially vertically of the main blade; and means carried by the supporting plate and operatively associated with the extension blade to effect movements of the extension blade about the respective axes of swinging movement thereof, said second-named means comprising hydraulic cylinders connected to the support plate, pistons in said cylinders operatively connected to the extension blade to exert pressures thereagainst tending to swing the extension blade about said axes of swinging movement thereof, and means for supplying fluid under pressure to each of said cylinders independently of the other.

7. The combination with a road machine having a main blade, of a shouldering attachment including a supporting plate connected to said main blade; a vertical screw mounted on said plate for rotation under the control of an operator; a follower threadably engaged with said screw for movement vertically of the screw responsive to rotation of the screw; a shaft rigid with and extended laterally and outwardly from the follower; an extension blade connected to said shaft to swing in a vertical plane, said extension blade swinging in a horizontal plane on rotation of said follower upon the screw, said rotation of the screw constituting means for bodily shifting the extension blade vertically of said plate; means for controlling vertical swinging movement of the extension blade including an arm pivotally connected at one end to and upstanding from said plate to swing in a vertical plane, a hydraulic cylinder pivotally connected to said plate to swing in a vertical plane, a piston in said cylinder pivotally connected to the arm whereby to effect said swinging movement of the arm, and a telescopic link extending between the arm and extension blade; and means for controlling horizontal swinging movement of the extension blade including a second cylinder universally connected to said plate, and a piston in said second cylinder universally connected to the outer end of said shaft whereby to swing the shaft horizontally in an arcuate path about said screw.

WILLIAM L. JAHN.

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