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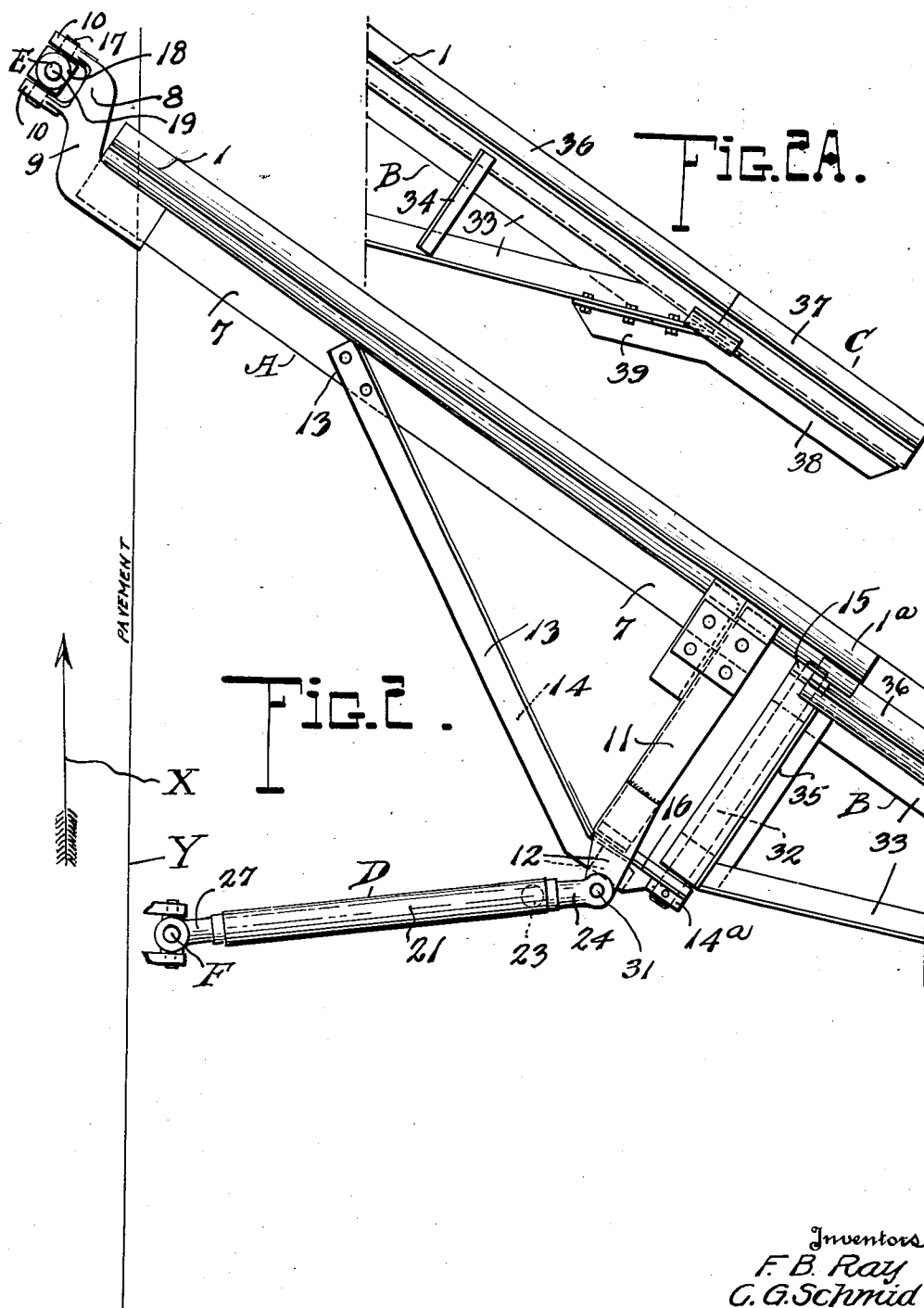
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ROAD SHOULDER FINISHING MACHINE

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ROAD SHOULDER FINISHING MACHINE

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This invention relates to road building and maintenance machinery and more particularly to road grading scrapers for finishing the shoulders of highways and roads in which the shoulder and slope blades are easily and quickly adjusted to meet certain road conditions as the machine advances along the highway.

In the actual use of these finishing machines it has been found that the slope blade unit must be changed very quickly at times to meet the existing conditions, for instance, if rocks are encountered which cannot be dug out by the blades or when a culvert or other permanent obstruction is encountered, the sloped blade must be quickly adjusted or raised to clear this obstruction and again lowered after the machine has passed the obstacle. In some instances the blade must be raised until it is practically vertical to obtain sufficient clearance.

It has been found that the ordinary shoulder blade in use today is entirely inadequate to resist the twisting or torsional strains produced by the pressure of dirt against the lower edge of the slope blade, especially when a comparatively long slope blade is used.

These twisting or torsional stresses are materially increased when the slope blade extends either downwardly or upwardly at an appreciable angle with respect to the shoulder blade and in order to make these blades and their carrying frame fully capable of withstanding these torsional stresses it would be ordinarily necessary to construct them of such heavy material that free and easy adjustment of the blades would be impossible. An object of our invention, therefore, is to provide means for swinging and adjusting the slope blade whereby the angle thereof may be changed with a minimum amount of effort and with great rapidity.

Another object of our invention is to provide a counter-balancing feature for the slope blade whereby the blade is substantially balanced thus reducing to the minimum the amount of effort necessary to change the position of the slope blade or to swing the same into and out of inoperative position when desired, as is necessary to pass an immovable obstruction.

Another object is to provide a self-locking adjusting means for the slope blade unit whereby the blade is positively maintained in any of its adjusted positions, together with a manually operable member for controlling the adjusting means.

A still further object is to provide a truss frame structure for the main shoulder blade whereby

the blade is strengthened against torsional stresses while at the same time extreme lightness is maintained.

Another object is to provide a slope blade unit which is pivoted to the main shoulder blade unit for independent angular adjustment; the slope blade unit as well as the main shoulder blade unit being of a truss frame formation to resist torsional stresses.

A further object is to connect the truss units aforesaid with a unitary triangular brace member secured to the main frame at the apex of the triangle and having its base disposed adjacent the truss frame in a vertical plane whereby the free end of the main shoulder blade unit is positively held against twisting or torsional stresses caused by the slope blade.

A still further object is to so construct the frame at the outer end of the shoulder blade so that the slope blade may be secured thereto in rear of the main shoulder blade at spaced points disposed in a horizontal plane while the triangle bracing frame may be secured to the shoulder blade frame at spaced vertical points, the bracing frame being of tubular welded construction whereby twisting of the main shoulder blade frame by the slope blade unit is positively prevented.

Another object is to provide shoulder and slope blade structures in which the carrier blades are of relatively wide curved longitudinal formation and form a part of the rigidifying structure, the lower portion of the blades being formed to receive a comparatively narrow removable scraping blade, the face of these latter blades being disposed in the same plane as the face of the shoulder and the slope carrier blades.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawings:

Fig. 1 is a fragmentary side elevation of our improved shoulder and sloped blade finishing attachment, the full lines illustrating the position of the shoulder and slope blades when forming a substantially horizontal shoulder, the dotted lines disclosing the slope blade in raised or inoperative position while the dash lines show the slope blade inclined downwardly for cutting an adjacent slope at the side of the shoulder;

Fig. 1a is a continuation of the slope blade as seen in Fig. 1 and disclosing a removable extension for the slope blade which may be used when it is desired to form an extremely long slope.

Figs. 2 and 2a are plan views of our improved form of shoulder and slope blades and disclosing our improved tubular brace member; the counter-balancing means and adjusting means for the slope blade are omitted from this figure for the sake of clearness;

Fig. 3 is an elevation of our improved tubular wheeled bracing frame or connecting member which extends between the finishing machine frame proper (not shown) and the outer end of the shoulder blade frame;

Fig. 4 shows a tubular extension tongue or bar member which is adapted to be adjustably secured within the tubular bracing frames shown in Fig. 3, whereby the angular relation of the shoulder blade with respect to the line of travel of the finishing machine may be changed;

Fig. 5 is an end elevation of the shoulder blade frame and disclosing the angle frame, the blade mounting and the arrangement of the adjusting means for changing the position of the slope blade unit, and

Fig. 6 is an end elevation of the slope blade unit, the dotted lines representing the advance relation of the shoulder blade unit with respect to the slope blade unit when the parts are assembled.

Like reference characters designate corresponding parts in the several figures of the drawings.

In the drawings attention is specifically directed to Figs. 1 and 2 in which A indicates generally a shoulder blade unit to which is pivoted the adjustable slope blade forming unit B. The unit B is provided with a removable longitudinal extension unit C which when attached as shown in the drawings increases the length of slope to be scraped or finished by the machine.

The shoulder blade structure A is pivoted at E to the main frame of the finishing machine (not shown) and may be swung to substantially any vertical or horizontal position, the arrangement of the vertical and horizontal pivots at E effectively preventing twisting of the adjacent end of the blade structure with respect to the main finishing machine frame.

An adjustable brace member D is pivoted to the outer end of the blade structure or unit A and is pivotally secured at F to the main frame of the finishing machine.

In order to adjust the position of the shoulder blade unit A with respect to the main finishing machine frame an adjustable brace unit or member G is provided which member is pivoted to the frame A at a point H intermediate the ends of said frame. The other end of the member G is pivotally secured at H' to the main frame of the finishing machine. The slope blade unit B which is pivoted to the shoulder blade unit A is provided with adjusting means indicated generally at I for raising or lowering the slope blade.

Referring particularly to Figs. 1, 2 and 5 the shoulder blade carrying unit A comprises a main relatively wide blade 1 which is curved in cross section as clearly seen in Fig. 5 to assure proper cutting and scouring and to give rigidity to the same. The lower portion of this blade 1 is formed with a rabbet or groove 2 to receive the shoulder scraper blade proper 3 which may be of especially hard wear resisting material. The front curved surface of the blades 1 and 3 when assembled are flush with each other as clearly seen in the drawings. Welded or otherwise secured to the rear convex surface of the main shoulder blade 1 is a longitudinally disposed re-

inforcing angle or strip 4. The lower flange of this strip extends downwardly to the lower edge of the blade 1 and is apertured at 5 to receive the shoulder scraper blade fastenings 6. These fastenings pass through both the lower edge of the holder blade 1 and the reinforcing strip or angle 4.

Disposed on the horizontal flange of the angle 4 and secured thereto is the plate or strip 7 which further stiffens the blade 1 longitudinally. The bracket 8 is secured to the blade 1 and plate 7 at the inner ends thereof, this bracket being offset at 9 and terminating in the apertured arms 10 as clearly seen in Fig. 2 of the drawings. Adjacent the other end of the angle 4 and plate 7 is an angular trapezoidal frame 11 which extends to the rear of the blade 1 and carries spaced connecting arms 12 to which the brace member D is attached.

Diagonal brace members 13 and 14 extend from the upper and lower corners of the frame 11 inwardly and downwardly to a point on the angle 4 adjacent the rear face of the main blade 1 thus forming a substantially triangular pyramidal truss frame with the apex of the triangle disposed inwardly toward the finishing machine and the base extending outwardly. These brace members 13 and 14 are welded or otherwise secured to the plate 7 and angle 4 as indicated at 13 in Figs. 1 and 2 of the drawings.

The brace member 14 extends outwardly beyond the frame 11 and has secured thereto the bearing member 14a. A corresponding bearing member 15 is welded or otherwise secured to the projecting portion 1a of the shoulder blade 1. Suitable gusset plates 16 are provided to further strengthen the bearing member or support 14a.

From the above it will be observed that in our improved form of shoulder blade unit construction we have provided a truss structure of comparatively light material while at the same time possessing extreme rigidity.

The bracket 8 extends materially across the shoulder blade holder 1 and is adapted to receive the trunnions 17 of the bearing block 18 thus permitting the blade 1 to swing in a vertical plane. The bearing block 18 is pivoted to the main frame of the finishing machine (not shown) on a vertical axis 19 thus permitting the blade unit and the block to swing in a horizontal plane. However, rotative or twisting movement of the end of the unit due to torsional strains is positively prevented by this arrangement. The brace member D for supporting the outer end of the blade 1 as seen particularly in Fig. 3 is of a tubular triangular welded construction and consists of a main tubular sleeve 20, a diagonal tubular member 21 extending upwardly from the sleeve 20 and bent at 21a adjacent its end into parallel relation with respect to the sleeve 20. A compression strut member 23 is disposed between the free ends of the sleeve and inclined member 21 and welded thereto. An adjustable tubular member or bar 26 is telescopically arranged within the sleeve 20 and provided with a plurality of openings 28 which may be brought into register with openings 29 in the sleeve and a pin 30 inserted in the openings to secure the member 26 against longitudinal and rotative movement within the sleeve. The member 26 likewise carries a bifurcated extension 27 for connection with the main frame of the finishing machine. In connecting the brace member D to the shoulder finishing unit A the two connecting arms 12 on the frame 11 are inserted between the bifurcated connecting mem-

bers 24 and 25 carried by the frame D and coupling pins 31 inserted. The coupling member 27 at the other end of the frame D is hingedly connected to the main frame of the finishing machine in any suitable manner.

Referring to Fig. 2 of the drawings the arrow X indicates the direction of travel of the finishing machine while Y indicates the edge of the pavement on which the machine operates. The brace D in this figure is in its contracted or retracted position which disposes the shoulder blade unit A and the slope blade unit B at a considerable angle with respect to the draft of the machine.

When it is desired to change this angle, the pin 30 in the frame D may be withdrawn and the angularity of the shoulder blade adjusted, whereupon the pin is reinserted and the blade is held in its adjusted position. If it is desired to set the blade units A and B at right angles to the line of draft of the machine the member 26 may be removed and a longer extension bar such as disclosed in Fig. 4 used in place thereof. By using a proper length bar or member 26 the scraper blades may be actually disposed at an angle opposite to that shown in Fig. 2 of the drawings so that the blades will actually throw the dirt toward the pavement.

The adjustable brace G supports the free end of the blade unit A and by manipulation of the hand wheel 31', the blade may be adjusted to change the angle of the road shoulder as desired.

The slope blade unit B is pivotally secured to the shoulder blade unit A through the instrumentality of a pin 32 supported in the bearings or brackets 14a and 15 as seen in Fig. 2 of the drawings. This unit is quite similar in construction to the unit A in that it comprises a relatively wide slope blade holder 36 of curved formation backed by the triangular angle iron frame 33 as seen in Figs. 1, 2 and 2a. Brace or truss members 34 and 35 are provided to further strengthen and rigidify the frame 33 with respect to the slope blade holder 36.

The extension C is in the form of a curved blade holder 37 to which is secured the angle bar 38 having a projecting portion 39 adapted to overlap and be bolted to the frame 33 as shown. The unit B may be swung vertically around the axis of the pin 32 and to accomplish this operation the unit I is provided which consists of a casing 40 secured to the frame 11 of the unit A. The casing contains a worm and gear unit not shown which is arranged to be operated by the hand wheel 41 carried by the shaft 42. The shaft 42 carries a worm which meshes with a worm gear secured to the shaft 44 journaled in the casing 40. The casing is carried by bracket 43 secured to the frame 11.

Rotation of the hand wheel 41 actuates the shaft 44 to which is secured the actuating arm 45. This arm has pivoted thereto the link 46 which is in turn pivoted to a bracket 47 carried by the slope blade holder 36. The arm 45 is provided intermediate of its length with a laterally projecting plate 48 apertured at 49 to receive the counterbalancing spring unit 50. The other end of this unit is secured to the plate 7 and angle 8 at 51.

It should be observed that the slope blade holder 33 and its extension 37 are both provided with scraper blades 33a similar in form to the shoulder scraper blade 3, these blades being also secured to their holders in a similar manner.

In the operation of the device especially with

a comparatively long slope blade it is quite frequently necessary to change the position of the slope blade and to quickly raise it to clear obstructions such as rocks which cannot be dug out of the ground by the blades. Dirt also piles up in front of the blades to such an extent that the machine is overloaded and this necessitates raising the blades to release this dirt. Not infrequently are culverts, bridges and stone-work encountered in forming a shoulder which also requires raising the blades. At times it is necessary to raise the blades to an almost vertical position to clear certain obstructions.

By the use of our counter-balancing feature just described in conjunction with the worm and gear blade shifting device the adjustment of the blade is accomplished with minimum effort on the part of the operator and with great rapidity. Also the worm and gear construction effects a self-locking and holding means for the blades when in operative or inoperative position.

When the slope blades 33a are operating at a considerable angle with respect to the shoulder blades 1 and 3 an enormous torque or turning movement is created tending to cause longitudinal twisting or torsional strain on the shoulder blade unit A. However, with the use of the truss form of unit as above described and our improved form of rigid tubular triangular shaped brace unit D all twisting of the blade units is absolutely prevented.

While the specific details of construction have been herein shown and described, the invention is not confined thereto as changes and alterations may be made without departing from the spirit thereof as defined by the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a shoulder finishing machine of the class described, a shoulder finishing blade, a rigid truss frame carrying said blade connected at one end to the machine to swing in vertical and horizontal planes only, and a brace connecting the other end of said truss frame at spaced points disposed in different horizontal planes, said brace having a connection with the machine at the other end.

2. In a finishing machine having a main frame forming a support adapted to travel over the highway to be finished, a shoulder blade structure including a blade for finishing the dirt shoulder adjacent the highway, a truss frame connected to said shoulder blade structure for rigidly carrying the blade, said truss frame comprising an angular trapezoidal frame and brace members, an adjustable brace member for the truss frame provided with connecting instrumentalities for connecting the adjustable brace member to the main frame, and spaced interconnections for connecting the truss frame with the adjustable brace member, said interconnections being disposed in different horizontal planes and attached to the adjustable brace member and truss frame.

3. In a finishing machine of the class described having a main frame, a shoulder blade, a support therefor, a supporting frame therefor comprising a longitudinal angle secured at one end to said support, a frame projecting laterally from the blade at one end in a substantially vertical plane, diagonal brace members extending from the corners of said frame to said angle to brace the same with respect to the blade, and a bracing frame extending from the upper and lower rear portions of the angle frame to said main frame

whereby torsional twisting of the shoulder blade unit is prevented.

4. In a shoulder finishing machine, a shoulder scraper blade, a truss frame for supporting said blade extending towards the machine and connected thereto against axial rotative movement, the said frame including inclined brace members for the frame, a slope blade removably pivoted on the scraper blade adjacent the free end thereof for vertical swinging movement, counter-balancing means for counter-balancing the weight of the slope blade, means for adjusting the position of the slope blade with respect to the shoulder blade, and brace members for rigidly supporting the free end of the shoulder blade against movement and torsional strains caused by angular disposition of the slope blade thereto.

5. In a shoulder finishing machine having a main frame, a shoulder blade unit carried thereby to swing in vertical and horizontal planes only, a bracing frame adapted to be connected to the main frame and having one side disposed in a substantially vertical plane adjacent the free end of the shoulder blade unit, means for connecting said unit and bracing frame together including spaced vertical connections whereby the free end of the unit is rigidly supported against torsional stresses, a slope blade unit pivoted in a horizontal plane at the free end of said shoulder blade bracing frame, and means for adjusting the angular relation thereof with respect to the shoulder blade unit.

6. In a road finishing machine of the class described having a main frame, a shoulder blade unit connected thereto for vertical adjustment, a rigid triangular tubular frame member pivoted at spaced points in the vertical plane to the shoulder blade unit, means for connecting the other end of the tubular frame to the main frame, a slope blade unit pivoted to the extremity of the shoulder blade unit whereby the slope blade unit is adapted to swing in a vertical plane, means for adjusting the slope blade unit with respect to the shoulder blade unit and means connecting the shoulder blade unit and slope blade unit for counter-balancing the weight of the slope blade unit with respect to its pivot whereby the slope blade unit may be easily adjusted by the adjusting means.

7. In a road shoulder forming machine of the class described having a main frame, a shoulder blade unit carried thereby having a relatively wide blade curved laterally of its length, an angle member in rear thereof and secured thereto, a substantially trapezoidal frame disposed on said blade adjacent the outer end thereof and projecting laterally therefrom, strut brace members extending between the corners of said frame and the rear of said blade intermediate its length, and a brace frame having one side disposed in a vertical plane adjacent the end of said trapezoidal frame and pivoted thereto in a vertical plane, the brace frame being connected at its other end to the said main frame.

8. In a machine of the class described, having a main frame, a shoulder blade unit adjustably carried thereby and including a reinforcing truss frame, a slope blade unit adjustably carried by the shoulder blade unit, means for adjusting the angular relation of one of the units with respect

to the other unit, and a rigid brace frame connected to the shoulder blade unit at spaced points, said frame having a connection to the main frame at a single point.

9. In a shoulder finishing machine, a shoulder scraper blade, a truss frame for supporting said blade extending towards the machine and connected thereto against axial rotative movement, the said frame including inclined brace members for the frame, a slope blade removably pivoted on the scraper blade adjacent the free end thereof for vertical swinging movement, counter-balancing means for counter-balancing the weight of the slope blade, means for adjusting the position of the slope blade with respect to the shoulder blade, brace members for rigidly supporting the free end of the shoulder blade against movement and torsional strains caused by angular disposition of the slope blade thereto, a bracing frame for the slope blade, and means for interconnecting the bracing frame with the truss frame.

10. In a shoulder finishing machine, a shoulder scraper blade unit comprising a scraper blade, and a frame for supporting said blade upon a machine by which it may be carried, a slope blade movably pivoted on said scraper blade unit adjacent to the free end thereof for vertical swinging movement, a device for adjusting the position of the slope blade in relation to its angularity respecting the scraper blade and comprising a pivoted arm with means for pivotally moving said arm, together with a connection between said arm and the slope blade and a spring attached to the scraper blade unit at one end and having attachment at the other end with said arm of the device for raising the slope blade whereby to counterbalance the weight of the slope blade and assist in the elevation of the same as described.

11. In a road finishing machine of the class described having a main frame, a shoulder blade unit connected thereto for vertical adjustment, a frame member pivoted to the shoulder blade unit, means for connecting the other end of the frame member to the main frame, a slope blade unit pivoted to the shoulder blade unit, means for adjusting the slope blade unit with respect to the shoulder blade unit, and counterbalancing instrumentalities connecting the shoulder blade unit and slope blade unit for permitting easy adjustment of the latter.

12. In a road finishing machine of the class described having a main frame, a shoulder blade unit connected thereto for vertical adjustment, a frame member pivoted to the shoulder blade unit, means for connecting the other end of the frame member to the main frame, a slope blade unit pivoted to the shoulder blade unit, means for adjusting the slope blade unit with respect to the shoulder blade unit, and counterbalancing instrumentalities connecting the shoulder blade unit and slope blade unit for permitting easy adjustment of the latter, the said counterbalancing instrumentalities comprising a link pivotally connected to the slope blade unit, an actuating arm pivotally connected to the shoulder blade unit and said link and resilient means connected to said adjusting arm and shoulder blade unit.

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