Aug. 16, 1932. C. G. SCHMID ET AL 1,871,473

SPRING LOADED STRUT FOR SHOULDER FINISHING MACHINES

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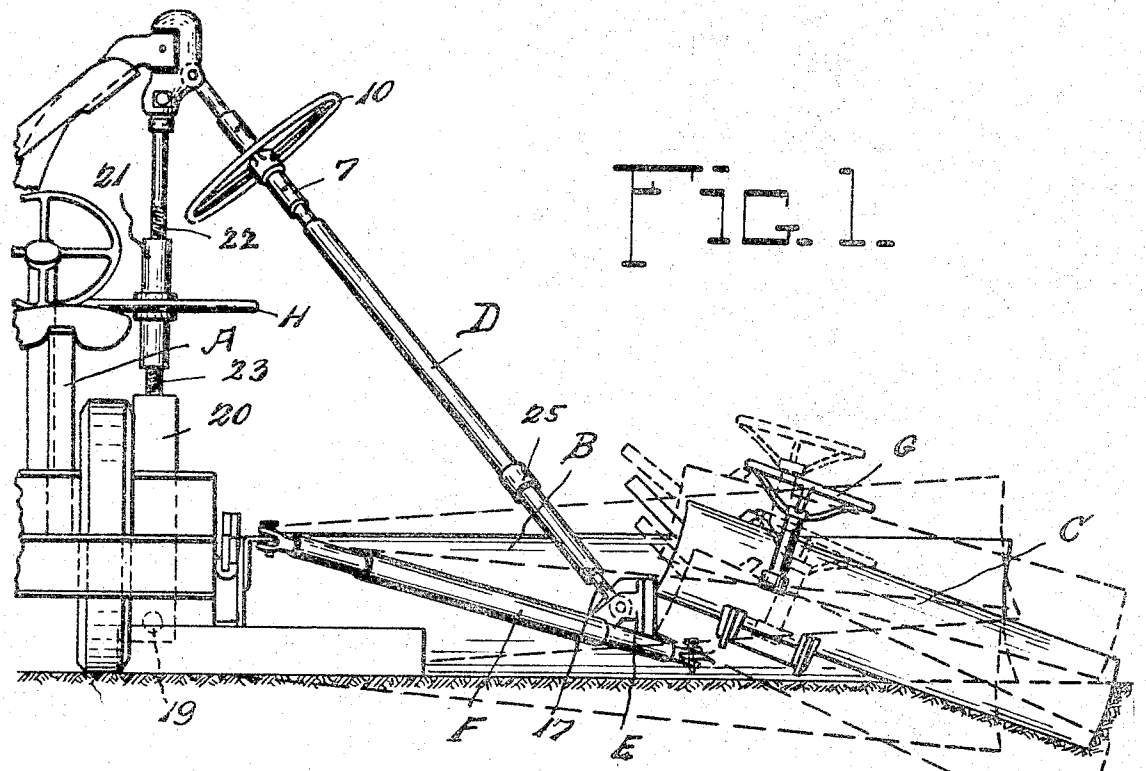


Fig. 1.

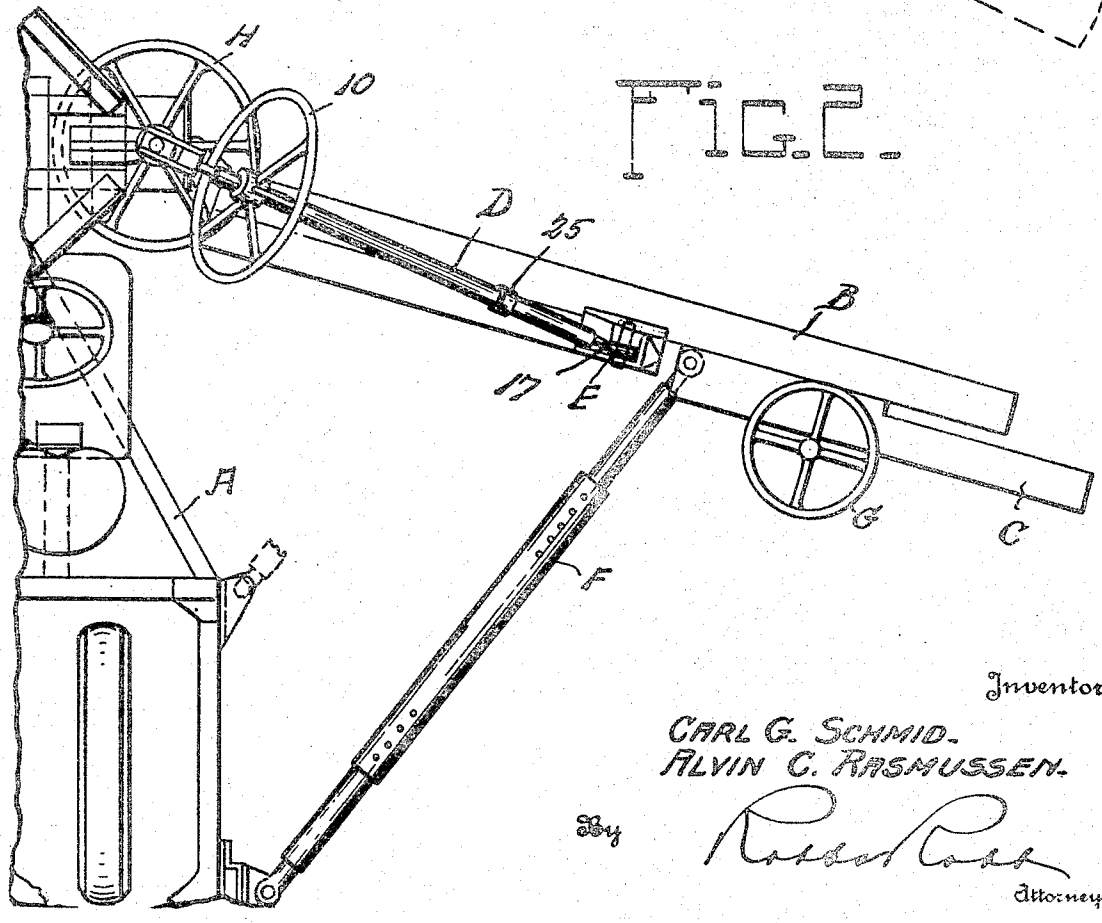


Fig. 2.

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FIG. 3.

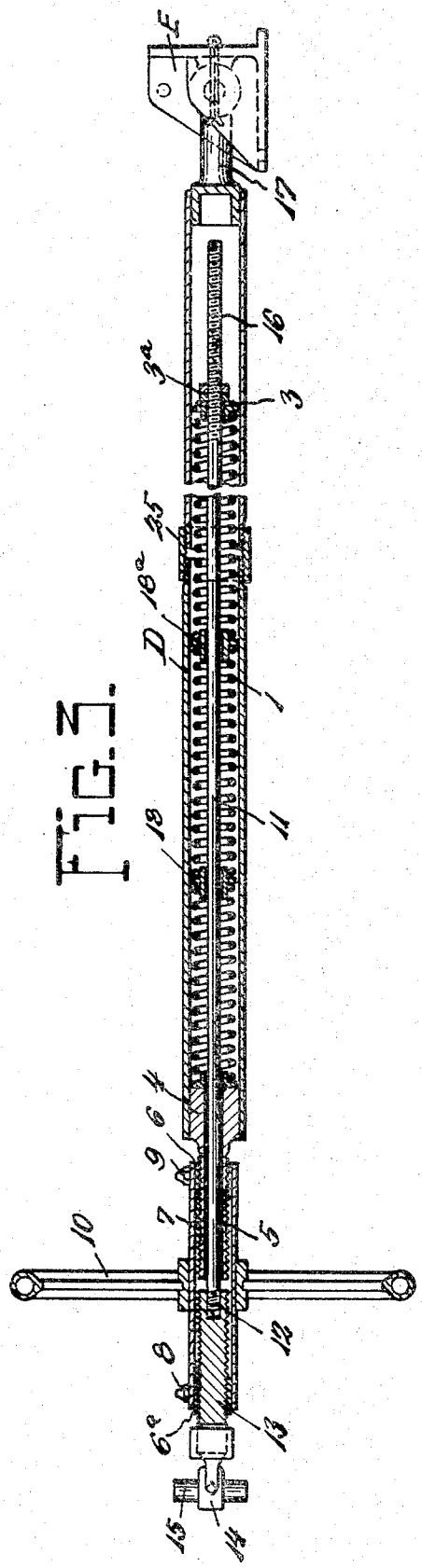
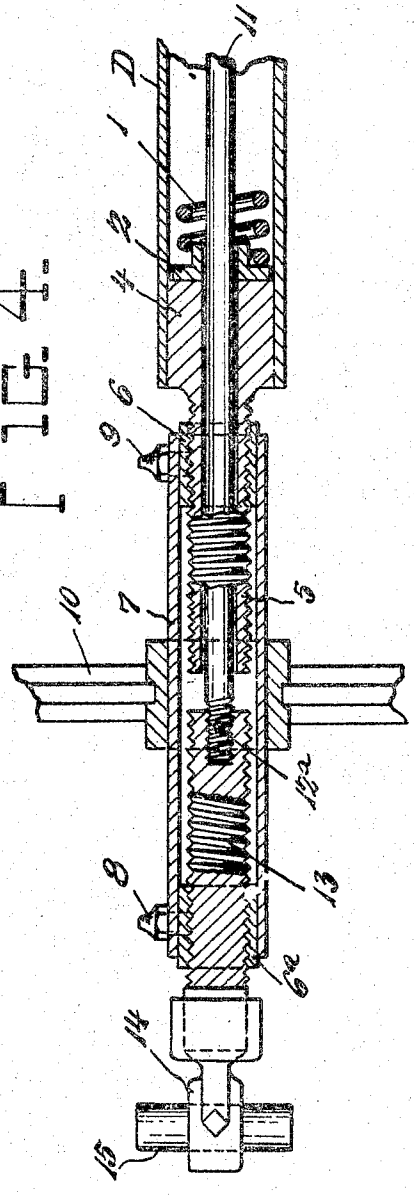


FIG. 4.



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UNITED STATES PATENT OFFICE

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SPRING LOADED STRUT FOR SHOULDER FINISHING MACHINES

Application filed November 23, 1931. Serial No. 576,856.

In the finishing of highway shoulders, it is customary to employ machines for this purpose which have an adjustable blade for finishing the height and slope of the shoulder which is laid along the roadway; and as it is necessary, under various conditions, to adjust the slope of the shoulder to conform to the regulation of the State in which the highway is being laid, as well as it being necessary to raise the shoulder forming blade, in operating the machine, in order to clear culverts and other obstructions, it is very desirable to provide a construction wherein the required adjustments and manipulations of the blade be effected as easily as possible. It will be remembered that in using the standard types of road grading machines, the machine proper carries the cutting blades, and in nearly all cases these blades protrude considerably to one side; and because of the considerable weight, the aforesaid adjustments often require more labor than one man is able to give.

The adjustment is customarily effected through the operation of a handwheel which operates a shaft passing through a hollow reinforcing strut. The present invention is aimed to provide a means or mechanism wherein the weight of the blade carried by the wheel is counterbalanced so as to produce an easier actuation of the wheel with attendant adjustment of the blade.

The present invention, in general, comprises a novel supporting strut for carrying the shoulder finishing blade of usual construction. This strut is hollow and encloses a spring which acts upon the usual shaft of the adjusting handwheel so that the force of the compression of the spring will tend to act oppositely to the pull of the blade so as to counteract this pull in such a manner that when the blade is in substantially horizontal position, its weight will be substantially entirely counteracted by the compressional force of the spring.

This construction will be brought out in more detail hereinafter, and more fully explained; but it may be here mentioned that by adjusting the initial compression in this spring according to the weight of the supported members, it is possible to make the spring compression equal to the overhanging weight, so that any adjustment of the height of the blade supporting member can be made by the operator with no more effort than is necessary to overcome the friction of the screws in the nuts. Any adjustment lifting the blades above this mean adjustment position requires an increasing effort on the part of the operator as the amount of adjustment increases, for in this case the compression in the spring is gradually relieved and the operator has to lift the unbalanced weight of the supported structure. On the other hand, if the supported structure be lowered below the position of the level adjustment, then the spring is compressed with the result that the operator has to exert enough effort to overcome the unbalanced load of the compressed spring; but in either case, the adjustments are much facilitated by the present novel construction.

Furthermore, it will be seen that the improved construction of the present case provides that the working parts of the adjusting mechanism are enclosed in a protective and dust-proof housing which materially retards or inhibits wear of the parts, and which also protects an operator from possibility of injury through operation of these parts.

The invention will be more readily understood by referring to the accompanying drawings, in which—

Figure 1 is a rear elevational view of a portion of a road grading machine showing the shoulder for the grading and sloping blades, with adjustments therefor shown in dotted lines, together with the carrying supports for mounting the shoulder grading blades.

Figure 2 is a view of the parts shown in Figure 1, but looking downwardly thereon from above.

Figure 3 is a longitudinal sectional view through the novel strut of this invention, showing the mounting of the spring and arrangement of the adjusting mechanism.

Figure 4 is an enlarged fragmentary view of the left-hand end of the construction of Figure 3.

Referring more particularly to the drawings, the letter A represents, in general, a shoulder grading machine provided with the adjustable shoulder levelling blade B and the auxiliary sloping shoulder blade C. The blade B is adjustably mounted for vertical positioning through the strut D, one end of which is joined to the frame of the shoulder grading machine, and the other end connects with the shoulder levelling blade B through the connection shown at E. The inner end of the levelling blade B is vertically adjustable by operation of the handwheel H. Additional means for positioning the grading or levelling blade B are provided as necessary. Such additional means are illustrated by the strut F, which is also adjustable in the well known manner. The angular slope of the shoulder sloping blade C is carried out through operation of the handwheel G mounted on this blade.

As has been previously pointed out, the operation of the shoulder blades B and C is difficult for a single operator owing to the considerable weight of these blades; and as these blades require adjustment from time to time, through various causes, it is desirable to provide means for permitting this adjustment in a manner as easily as possible, so that it will not require attention of more than a single operator to perform the necessary adjusting manipulations, and to render such manipulations well within the limitation of the strength of that single operator.

To this end, the strut comprises a hollow tube D enclosing a spring 1, this spring being positioned between washers 2 and 3, and being compressed between these washers to an extent calibrated at the assembling of the machine, so that the force of the spring will be acting in a direction opposite to the pull of the shoulder blades B and C and so that these opposing pulls will substantially counterbalance each other when the blade B is in horizontal direction.

The washer 2 bears against a hollow head or plug 4 provided with a projecting threaded extension 5, which is threaded into a screw section 6 of a sleeve or hollow shaft 7. To the sleeve or shaft 7 is secured the handwheel 10 by manipulation of which there is effected the vertical adjustment of the shoulder grading blade B.

Extending substantially through the center of the strut D is the rod 11 which is provided with threads at each end.

It will be understood that the left hand end of the construction shown in Figures 3 and 4 is the upper end of the adjusting mechanism when the device is assembled. The threaded end 12 of the rod 11 is screwed into the threaded member 13 and permanently attached by a crosspin 12*a*. A screw section 6*a* similar to the section 6, previously mentioned, is adapted to coact with the member 13. The member 13 is threaded with left-hand threads, while the extension 5 is threaded with right-hand threads. Turning the handwheel 10, the two members 5 and 13 are drawn toward each other simultaneously, or pushed out simultaneously depending upon direction of rotation. The member 13 projects beyond the end of the sleeve 7 so as to carry a bracket 14 which is connected to a suitable element of the frame of the shoulder grading machine A through the instrumentalities of a bolt 15.

For lubrication of these members, connections 8 and 9 are provided, which permit attachment of a grease gun for pressure lubrication.

The hollow shaft 7 with its operating hand wheel 10 is accordingly mounted to cause movement of the parts 5 and 13 together or apart in accordance with the direction of rotation of the handwheel. The right or outer end of the rod 11 is provided with threads along a substantial length of the shaft, such threads being indicated at 16. The washer 3 is moved along these threads for adjusting the compression of the spring when the strut is assembled, the adjusted compression of the spring being maintained by proper positioning of the nut 3*a*.

Suitably secured in position in the end of the tube D is a connecting head, or member, 17, which is attached to the part E, which, in turn, is connected with the blade B for supporting this blade.

Suitable guiding members 18 and 18*a* may be positioned along the rod 11 to hold this rod in proper spaced relation with respect to the spring 1 and tube D, which guiding members also enable the use of several shorter springs instead of one long, unwieldy and expensive spring.

As has been previously described, adjustment of the blade B is made by operating the handwheel 10. It will be seen that the weight of the blades B and C will be carried by the connection E and transmitted to the hollow tube D, thence to the head or plug 4, the extension 5 of which is threaded in the section 6, thence transmitted to the sleeve 7 and parts 6*a*, 13, 14 and 15. This will tend to pull the parts of the mechanism downwardly, but opposed to this downward pull will be the force of the compression of the spring 1, acting upon the rod 11, the part 4, and the members 13, 6, 7, 6*a*, 13, 14 and 15. The force of this compression will be exerted in a direction oppositely to the pull of the weight of the blades B and C. It will therefore be seen that by properly adjusting the compression of the spring 1, the force of the spring and of the gravity pull of the blades B and C may be equalized, or substantially equalized, so that in this position of equilibrium, the operation of the handwheel 10 requires an effort only sufficient to overcome

the friction of the threaded members 5 and 13, working in the parts 6 and 6a carried in the sleeve. It will be apparent that rotation of the handwheel 10 will cause the sleeve 7 and the screw parts 6 and 6a to travel along the threads of the parts 5 and 13, so as to cause operation of these parts, for of course the part 13 is rigidly mounted against all movement.

The blade B is pivoted to the machine at 19, this pivotal connection permitting the vertical adjustment of the blade. Likewise the member 20 to which the blade B is pivoted, is adjustable vertically for purposes of altering the vertical position of the inner end of the blade B. The handwheel H is used to effect this vertical adjustment, the handwheel being carried by a sleeve 21 connecting right and left hand threaded rods 22 and 23. This assembly of parts just described constitutes, in effect, a second strut for adjustably carrying the pivoted end of the blade adjacent the machine.

In operation, the handwheel 10 is turned so that the hollow member D and the part 4 are inwardly moved toward the left as seen in Figures 3 and 4, while the rod 11 is forced to the right relatively to member 4 by virtue of the connection between its end and plug 13. This will release gradually the compression of the spring more or less.

The opposite effect will take place upon lowering the blade B below the horizontal position. To effect this adjustment, the distance between the handwheel 10 and the blade B must be lengthened. This is accomplished by turning the wheel 10 so that the part 4 and hollow member D will be moved outwardly or to the right in Figures 3 and 4, while the rod 11 is retracted relatively to the member 4, or moved to the left. This produces a compression of the spring, so that as the distance between the blade and its horizontal position increases, an operator will have to exert increased efforts to overcome the increased compression of the spring.

However, within the normal range of adjustment, there is no appreciable difference to the operator.

The screw thread portions of the members 6 and 6a are pitched in opposite directions as has been previously explained. The tubular member D may be made in parts connected by a coupling 25, removable to enable access to the parts within the member D.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States, is—

1. A mechanism of the character described comprising the combination with shoulder grading blades carried by a shoulder finishing machine, of an adjustable supporting strut for the blades, means for adjusting the blades and strut, and means associated with the strut and adjusting means for counteracting the weight of the blades for facilitating adjustment of the blades.

2. A mechanism of the character described, comprising the combination with shoulder grading blades carried by a shoulder finishing machine, of a strut including a hollow adjustable supporting member for the blade, means operating through the hollow member for adjusting the blade, and means within the said member for counteracting the weight of the blades for facilitating adjustment of the blades.

3. A mechanism of the character described, comprising the combination with shoulder grading blades carried by a shoulder finishing machine, of a strut assembly including an adjustable supporting member for the blades, means operating through the member for adjusting the blade, and resilient instrumentalities within the member for counteracting the weight of the blades for facilitating adjustment of the blades.

4. A mechanism of the character described, comprising the combination with shoulder grading blades carried by a shoulder finishing machine, of a supporting strut construction for the blades including a tubular member carrying the blades, an adjusting wheel interconnected with the tubular member for adjustment thereof in accordance with corresponding rotations of the wheel, and a compressed spring disposed within the tubular member arranged to exert a force opposing that produced by the weight of the blade, the compression of the spring being adjusted to substantially neutralize, through its compressional force, the gravitational pull of the blades.

5. A mechanism of the class described, comprising the combination with shoulder grading blades carried by a shoulder finishing machine, of a strut construction for carrying the blades and including a tubular member directly carrying the blades, and an adjusting mechanism connected to the tubular member for adjusting the position of the blades, the adjusting mechanism including a handwheel, a hollow shaft carrying the handwheel and turnable therewith, screw sections at opposite ends of the shaft and oppositely pitched, a head at one end of the said tubular member and having a portion screwed into the adjacent screw section of the shaft of the wheel, a second head at the other end of the shaft of the wheel in threaded engagement with the other screw section of the shaft and terminating in a bracket securing the strut assembly to the shoulder finishing machine, a rod secured to the second named head and extending through the head of the tubular member and also a substantial distance in the tubular member itself and terminating in a threaded portion, a nut on said rod, and a spring compressed between the head of the tubular member and the nut aforesaid and

adapted to exert a force to counteract the gravitational pull of the blades.

6. A mechanism of the character described, comprising the combination with shoulder grading blades carried by a shoulder finishing machine, of a supporting strut construction for the blades including a tubular member carrying the blades, an adjusting wheel for moving the tubular member in accordance with corresponding rotations of the wheel, instrumentalities interconnecting the wheel and tubular member and including a head member within the tubular member, a threaded extension on the head member, a shaft operable by the wheel, a threaded member in the shaft secured to the shoulder finishing machine and provided with threads running oppositely to those on the extension, and threaded sections within the shaft receiving the extension and member respectively, a rod threaded in the said threaded member and projecting through the extension and head and into the tubular member, an extension in the tubular member carrying the grading blades, and a compressed spring on the shaft arranged to counteract the weight of the blades.

7. A mechanism of the character described, comprising the combination with shoulder grading blades carried by a shoulder finishing machine, of a supporting strut construction for the blades including a tubular member carrying the blades, an adjusting wheel for moving the tubular member in accordance with corresponding rotations of the wheel, and instrumentalities interconnecting the wheel and tubular member, the instrumentalities comprising a head for the tubular member, a threaded extension on the head, a shaft operable by the wheel, a threaded member in the shaft secured to the shoulder finishing machine and provided with threads running oppositely to those on the extension, and threaded sections receiving the extension and member, the extension together with the tubular member being thereby moved toward and away from the said threaded member.

8. A mechanism of the character described, comprising the combination with shoulder grading blades carried by a shoulder finishing machine, one of the blades having an end pivotally mounted adjacent the machine, of means for adjusting the blades in a vertical plane, the means comprising a spring strut structure including a spring arranged to counteract the weight of the blades on the strut, together with adjusting means therefor, a second strut carrying the pivoted end of the blade adjacent the machine, comprising a vertically adjustable member secured to the end of the blade for lifting the said end, and instrumentalities for operating the member including a handwheel, a sleeve secured thereto, and oppositely threaded rods in the sleeve, one of which is secured to the machine adjacent to the spring strut structure, the adjustment of the blades being effected by cooperative adjustments of the two struts.

9. A mechanism comprising the combination with shoulder grading blades carried by a shoulder finishing machine, of adjusting mechanism for vertically adjusting the blades, including a pair of struts, each strut being formed of a vertically adjusting member pivotally connected with the blade, an operating member for lifting and lowering the adjusting member, and oppositely threaded rods operatively connected to the operating member, one of the said rods being secured to the machine, the other rod being connected to the adjusting member, one of the struts including a resilient member acting to counteract the weight of the blades, the said blades being adjusted by cooperative manipulation of the operating members of both struts.

In testimony whereof we affix our signatures.

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