Feb. 20, 1962 F. E. COOK ET AL 3,022,060

SHOCK ABSORBER FOR ROAD GRADERS

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FIG. 1

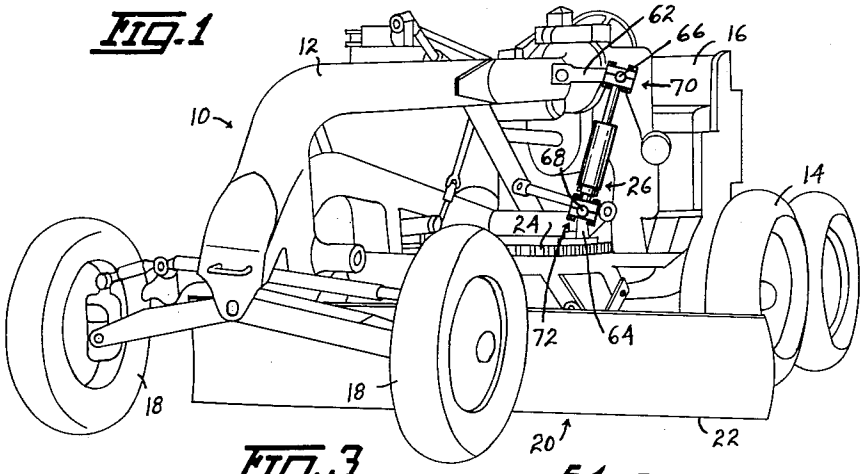


FIG. 2

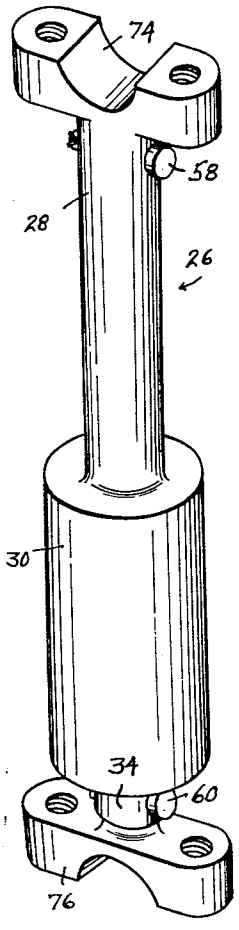


FIG. 3

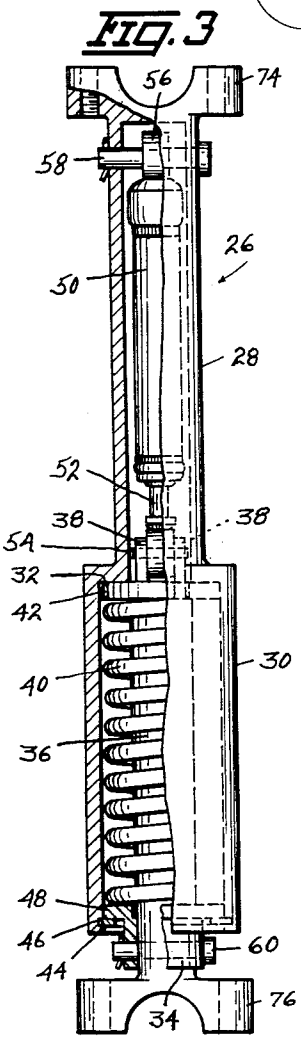
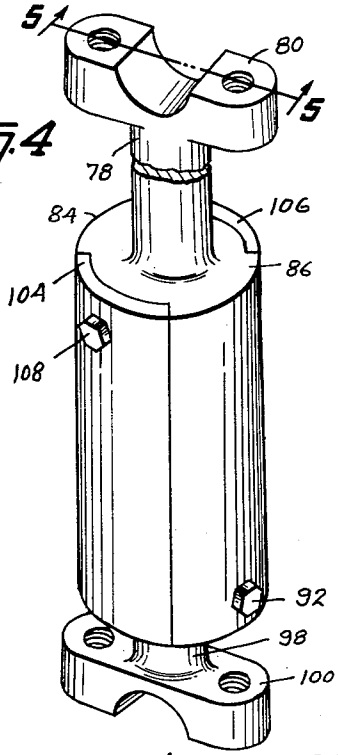


FIG. 4



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FIG. 5

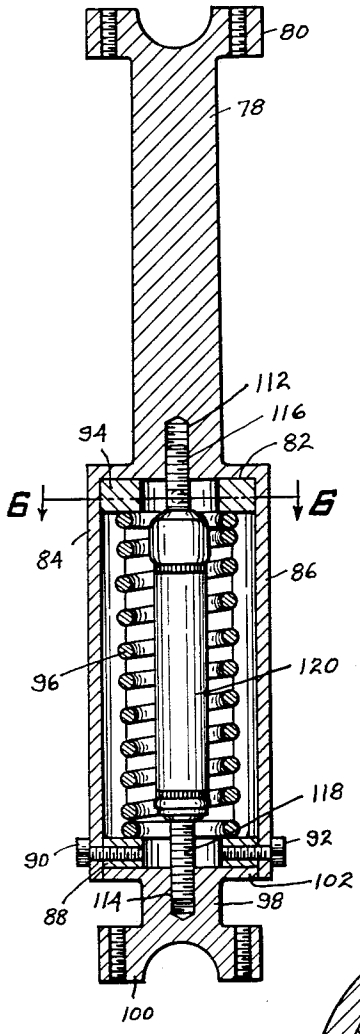


FIG. 7

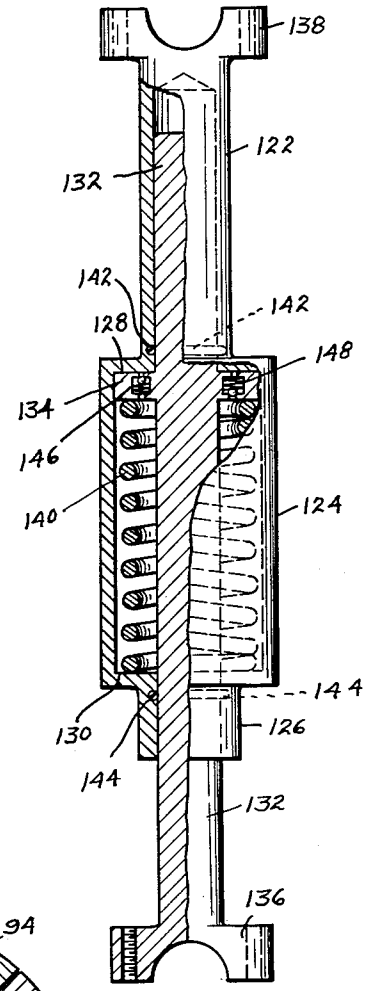
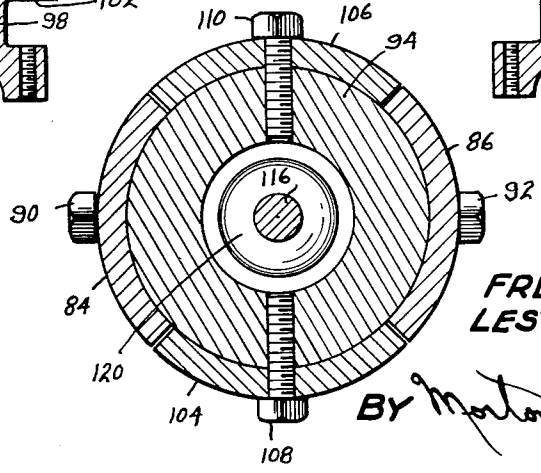


FIG. 6



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SHOCK ABSORBER FOR ROAD GRADERS

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5 Claims. (Cl. 267—1)

Our invention relates to shock absorbers and has been designed more particularly for use on motorized road graders.

One of the important objects contemplated by this invention is the provision of improved shock absorber means between the frame and blade on a road grader to eliminate the washboard like movement of the blade due to irregularities in the surface of a roadbed.

Another object inhering in this invention is to provide an improved shock absorber of the above class that materially reduces wear on the grader blade.

A further object herein is to provide a shock absorber for the moldboard assembly of a road grade which increases the ease in manipulating the grader control levers and thereby reduces operator fatigue.

Still another object of this invention is to provide a shock absorber as indicated that will provide a stiff arm action on down pressure applied to the blade and can be similarly used on up pressure merely by the insertion of a pin.

Other objects and advantages of this invention reside in the details of construction and correlation of the various parts and will be apparent as the description proceeds.

This invention consists of novel parts and combination of parts to be hereinafter described whereby the objects set forth are attained, as pointed out in the claims, and illustrated in the accompanying drawings, in which:

FIG. 1 is a front perspective view of a road grader showing our invention mounted thereon.

FIG. 2 is an enlarged perspective view of our new shock absorber.

FIG. 3 is a side elevational view of the device in FIG. 2 shown partly cut away and partly in section to more clearly illustrate the construction thereof,

FIG. 4 is an enlarged perspective view of a modified form of our shock absorber,

FIG. 5 is a longitudinal section view taken on the line 5—5 of FIG. 4,

FIG. 6 is a cross sectional view taken on the line 6—6 of FIG. 4, and,

FIG. 7 is a side elevational view of another modified form of our invention partly cut away and partly in section to illustrate the construction thereof.

Referring to the drawings a usual form of road grader is indicated generally at 10 and includes the frame 12 extending forwardly from the rear portion which houses the drive assembly (not shown in detail), rear wheel assembly 14 and operator's compartment 16. The forward end of frame 12 carries the front wheels 18 and intermediate wheels 18 and compartment 16 is the scraper blade or moldboard assembly 20. No invention is claimed in assembly 20 per se which generally includes the scraper blade 22 and is secured to what is known as the circle 24 with such circle being operatively connected to frame 12 and to suitable controls located in compartment 16 in a well known manner whereby blade 22 can be rotated and tilted as the circumstances require. Our invention resides in an improved shock absorber member 26 connecting the circle 24 to frame 12 for which reference is made more particularly to FIGS. 2 and 3 in the following description. It should be mentioned at the outset however, that members 26 are generally used in pairs at opposite sides of frame 12, but since such units are identical only one is being described in detail.

Member 26 includes an upper cylindrical housing portion 28 which terminates at its lower end in an integral concentrically enlarged lower cylindrical housing portion 30 forming the shoulder 32 as seen in FIG. 3. Attached at the bottom of housing portion 30 is a casting which includes the stub cylindrical neck projection 34 at the lower end having a diameter substantially the same as that of housing portion 28 and an integral concentrically enlarged flange-like plate 48 at the upper end. A shaft 36 is disposed within housing portion 30 and carries a pair of spaced apertured ears 38 on its inner end. The length of shaft 36 is such that ears 38 are positioned just above shoulder 32. A compression spring 40 is mounted on shaft 36 and bears against an annular plate 42 secured to shaft 36 near the top thereof and below ears 38 and which acts against spring 40 to compress it on the downward movement of shaft 36. At the bottom of housing portion 30 the bottom of spring 40 will bear against plate 48, which, together with its attached neck 34, is held within housing 30 by the snap ring 44 in groove 46.

In the upper housing 28 we have placed a conventional type shock absorber member which includes the cylinder 50 and piston rod 52. Rod 52 is attached to ears 38 of shaft 36 by a pin 54 and the other end of cylinder 50 carries an eye 56 for mounting on pin 58 that extends transversely of housing 28. A second pin 60 is removably insertable through the neck 34 of the lower housing 30 and through shaft 36 to hold such shaft immovable relative to member 26 at times as will later appear. As indicated above, member 26 is mounted between frame 12 and circle member 24 and for this purpose (FIG. 1) a projecting arm 62 is mounted to frame 12 and a suitable bearing member 64 is placed on circle 24. Members 62 and 64 include the respective rod members 66 and 68 which are engaged by the respective split block fastening means 70 and 72 at the top and bottom of member 26. It will be understood that blocks 70 and 72 are well known in the art comprising complementary halves for attachment to a rod and as shown in the drawings, one half of each such block is integrally formed on the respective upper end of housing 28 and lower end of shaft 36, being designated by the respective numerals 74 and 76.

For normal operation of member 26, pin 60 will be removed so that shaft 36 can move longitudinally within housing 30 in response to the operation of rod 52 with spring 40 providing a floating action to take advantage of the damping action thereof. This takes the washboard like movement off of the blade 22 and leaves it in the grader body. It will be noted that member 26 is a closed body so that the working parts are sealed off from dirt and dust. It is also pointed out that for downward pressure on blade 22, member 26 is capable of always acting as a stiff arm as can be seen from FIG. 3 and in situations where a stiff arm is desired on upward pressure, the same can be accomplished by inserting pin 60 as described.

Reference is made to FIGS. 4, 5 and 6 where we have shown a modified form for member 26. In this arrangement an elongated connecting member which may be in the form of a tube or rod 78 has an integral split block half 80 on its upper end for attachment to arm 62 similar to part 74 in FIG. 2 and for the same purpose at the lower end of member 78 there is the integral centrically enlarged shoulder 82 having the oppositely disposed downwardly extending arcuate straps 84 and 86 which at a point near their lower ends are attached to an annular plate 88 by the stud screws 90 and 92. A second annular plate 94 is seated intermediate straps 84 and 86 against shoulder 82 and a compression spring 96 engages plates 88 and 94 on opposite ends as shown. A second connecting member shown here as a stub shaft 98 (FIG. 5) but which may be tubular, has half of a split block 100 inte-

gral at the lower end for attachment to bearing 64 similar to part 76 in FIG. 2 and for the same purpose, and on its upper end has the concentrically enlarged flange 102 which includes the integral oppositely disposed upwardly extending arcuate strap members 104 and 106. Straps 104 and 106 are fastened at their upper ends to plate 94 by the stud screws 108 and 110 and each strap will be intermediate the straps 84 and 86 so that the four straps 84, 86, 104 and 106 are complementary in forming a cylindrically shaped housing as shown in FIG. 4. Flange 102 intermediate straps 104 and 106 will be adjacent the inner sides of straps 84 and 86 and beneath plate 88 (FIG. 5). The lower end of member 78 and upper end of shaft 98 are provided with the respective internally threaded bores 112 and 114 in axial alignment for threadably receiving the respective threaded extensions 116 and 118 on opposite ends of a shock absorber member 120 which is concentrically disposed within spring 96. Thus arranged, the effect and operation of this form of our invention operates as follows. As the grader wheels 18 move over uneven ground, the shock absorber 120 by its normal action permits the stub shaft 98 to which it is attached to vertically reciprocate and as this occurs, shaft 98 being connected to plate 94 by arms 104 and 106 causes such plate to alternately compress and release spring 96 in providing a floating action similarly as described for member 26. In this action, arms 104 and 106 will move longitudinally relative to arms 84 and 86.

In FIG. 7 we have shown a further modified structure for this invention which includes an upper elongated cyclindrical housing 122 with the integral concentrically enlarged lower cylindrical housing or chamber 124 and a projecting neck or collar 126 below housing 124 that is of the same diameter as housing 122 and in axial alignment therewith a shoulder 128 is formed intermediate housing 122 and 124 and a second shoulder 130 is similarly formed intermediate housing 124 and neck portion 130. A shaft 132 is longitudinally movable in housings 122 and 124 and carries a concentrically enlarged flange or plunger head 134 disposed to seat at times against shoulder 128. The lower portion of shaft 132 projects from neck 126 and has the integral half portion 136 of a split block for attachment to bearing 64 similar to part 76 in FIG. 2. A similar half portion 138 of a split block is formed at the upper end of housing 122 for attachment to arm 62 as previously described. Within housing 124 a compression spring 140 is concentrically arranged on shaft 132 so that its respective upper and lower ends bear against head 134 and shoulder 130. Housing 124 contains a suitable hydraulic fluid and fluid seals 142 and 144 are respectively placed at the lower end of housing 122 and upper end of collar 126. A one way ball check valve 146 is placed at one side in head 134 and at an opposite point on such head another one way ball check valve 148 for the opposite direction is located.

Spring 140 and the hydraulic fluid in housing 124 provide an effective damping action in reducing materially the bouncing effect of the blade 22 on an uneven roadbed. As spring 140 becomes compressed displaced fluid will pass upwardly through valve 148 to the top of housing 124 above head 134 and as the spring expands, fluid above head 134 will pass down through valve 146 into housing 124. Seals 142 and 144 will of course confine the fluid to housing 124.

It is submitted that the invention shown and described is aptly suited to achieve the purposes intended and is characterized by a combination of highly useful and mutually cooperating elements that combine their respective and proportionate functions in accomplishing the objects sought to be obtained.

It will be understood that the phraseology employed herein is for the purpose of description and not for limitation and that modifications and changes in the construction and arrangement of this invention can be made within the scope of what is claimed, without departing from the spirit and purpose thereof. It is thus intended to cover by the claims, and modified forms of structure or mechanical equivalents which may be reasonably included within their scope.

We claim:

1. A shock absorber unit, comprising an elongated rod member terminating at its lower end in a concentrically enlarged flange, oppositely disposed elongated arcuate arms depending from said flange, a stub shaft having a concentrically enlarged flange on its upper end, oppositely disposed elongated arcuate arms extending upwardly from said flange, said arms on said rod and said stub shaft arranged in meshing relationship to form an enclosed cylindrical housing with said rod and stub shaft in spaced axial alignment, means to secure said meshing relationship of said arms and constituting opposite ends of the housing, a yielding means within said housing connected at respective opposite ends to said rod and said stub shaft to permit said rod and stub shaft to move away from and towards each other respectively in axial alignment, a second yielding means within said housing concentrically disposed relative to said first mentioned yielding means and acting against opposite ends of said housing, and respective fastening means on the upper end of said rod and the lower end of said stub shaft.

2. A shock absorber unit comprising means forming an elongated housing of rigid material having a first and second end respectively, said first end terminating in an axially projecting first connecting member adapted to carry a fastening member, a second connecting member axially projecting from said second end and adapted to carry a fastening member, a first yielding means within said housing connected at respective opposite ends to said respective connecting members to yieldingly permit movement of said connecting members toward and away from each other in axial alignment, said first yielding means being a shock absorber, a second yielding means within said housing concentrically disposed relative to said first yielding means, said second yielding means having a first and second end correspondingly positioned relative to said first and second ends of said housing, means on said second connecting member for acting against the first end of said second yielding means, and means on the second end of said housing acting against the second end of said second yielding means.

3. A shock absorber unit comprising means forming an elongated housing of rigid material having a first and second end respectively, said first end terminating in an axially projecting first connecting member adapted to carry a fastening member, a second connecting member axially projecting from said second end and adapted to carry a fastening member, a first yielding means within said housing connected at respective opposite ends to said respective connecting members to yieldingly permit movement of said connecting members toward and away from each other in axial alignment, said first yielding means being a shock absorber, a second yielding means in the form of a compression spring within said housing concentrically disposed relative to said first yielding means, said second yielding means having a first and second end correspondingly positioned relative to said first and second ends of said housing, means on said second connecting member for acting against the first end of said second yielding means, a bearing plate at the second end of said housing, and the second end of said second yielding means acting against said bearing plate.

4. In a shock absorber unit, means forming an elongated housing of rigid material having a top and bottom end, axially spaced first and second connecting members at the respective top and bottom ends of said housing, a shock absorber connecting said connecting members for axial movement toward and away from each other, a compression spring within said housng concentrically disposed relative to said shock absorber, means on the bottom of the housing acting against one end of said com-

pression spring, and means on said second connecting member for acting against the other end of said compression spring.

5. A shock absorber unit comprising means forming an elongated housing of rigid material having a first and second end respectively, said first end terminating in an axially projecting first connecting member adapted to carry a fastening member, a second connecting member axially projecting from said second end and adapted to carry a fastening member, a first yielding means within said housing connected at respective opposite ends to said respective connecting members to yieldingly permit movement of said connecting members toward and away from each other in axial alignment, said first yielding means being a shock absorber, a second yielding means in the form of a compression spring within said housing concentrically disposed relative to said first yielding means, said second yielding means having a first and second end correspondingly positioned relative to said first and second ends of said housing, means on said second connecting member for acting against the other end of said compression spring, and means on said second connecting member for acting against the first end of said second yielding means, and means on the second end of said housing acting against the second end of said second yielding means.

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