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SHOCK-ABSORBING MECHANISM

Gustave O. Gabriel, West Haven, Conn., assignor
of one-half to Perma Realty Co., New York,
N. Y., a co-partnership

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This invention relates to improvements in shock-absorbing mechanisms.

An object of this invention is to provide a shock-absorbing mechanism including a stack of shocks in the form of compressible rubber pads, each of which is adapted to be distorted under compression to provide the required resilient action.

Another object of this invention is to provide a shock-absorbing mechanism which includes a stack of distortable elements arranged for simultaneous compression and requiring no lubrication.

A further object of this invention is to provide a shock-absorbing mechanism, which is capable of operation under an extremely wide range of temperatures and in any attitude, thereby adapting the mechanism for use on farm tractors, motorcycles, automobiles, air-borne vehicles, and the like.

A still further object of this invention is to provide a shock-absorbing mechanism which is relatively simple in structure, easy to assemble and disassemble, and cheap to manufacture.

The above and still further objects and advantages of the present invention will become apparent upon consideration of the following detailed description of the invention when taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a side elevational view of the shock-absorbing mechanism of the present invention, shown connected between a fixed support and the seat of a farm tractor;

Figure 2 is a fragmentary front elevational view of the assembly of the shock-absorbing mechanism and the seat shown in Figure 1, and taken from the right of Figure 1; and

Figure 3 is an enlarged, fragmentary, sectional view taken substantially along the line 3—3 of Figure 1, showing the detailed construction of the shock-absorbing mechanism of the present invention.

Referring now more particularly to the drawings, wherein like reference numerals have been used throughout the several views to designate like parts, there is shown the shock-absorbing mechanism of the present invention, generally designated by the reference numeral 10, which is connected between a fixed supporting surface 11 and a seat structure 12. The seat structure 12, which forms no part of the present invention, includes a seat-supporting bracket 13 carrying a seat portion 14' contiguous to one end thereof, the bracket 13 being mounted contiguous to the other end thereof for rocking movement about

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the horizontally disposed pin 14. The pin 14 is secured between the sides 15 and 16 of a base plate 17, the base plate being secured to the fixed supporting surface by means of the bolts 18. Dependingly carried by the bracket 13 is arm 19 which is rotated counterclockwise about the pin 14 in response to the movement of the seat section 14' toward the fixed supporting surface 11.

As clearly illustrated in Figure 3, the shock-absorbing mechanism 10 includes a casing 20 which has one end closed, designated by the reference numeral 21, and has the other end open, as designated by the reference numeral 22.

Extending axially of the casing 20 is a piston rod 23 which is mounted for longitudinal sliding movement by means of the end plate 24 and the bearing 25 carried contiguous to the closed end 21 of the casing 20. The piston rod 23 has one end terminating adjacent to and spaced from the open end 22 of the casing, and has the other end projecting exteriorly of the closed end 21 of the casing and provided with a threaded portion 26.

Disposed transversely of the interiorly disposed end of the piston rod 23 and supported thereon is a piston head 27.

Loosely circumposed about the piston rod 23 between the piston head 27 and the end plate 24 is a stack of compressible shocks, generally designated by the reference numeral 28. The shocks are disposed in spaced relation with respect to each other and each is in the form of a cylindrical body 29 fabricated of a special rubber flexing in the range of temperatures between 50° below zero to 150° above zero on the Fahrenheit scale. Each of the cylindrical bodies 29 has its inner periphery spaced from the periphery of the piston rod 23 and has its outer periphery arcuately cut away longitudinally, as indicated by the reference numeral 30. The special rubber employed in the fabrication of the shocks particularly adapts the shock-absorbing mechanism for operation under an extremely wide range of temperatures often encountered in using farm equipment and air-borne devices.

Interposed between adjacent compressible shocks 28 is a pair of compression plates 31 and 32 which are disposed in back-to-back, face-abutting relation with respect to each other. Each of the compression plates 31 and 32 has a flange 33, 34 projecting from the non-abutting face thereof, the flanges 33 and 34 extending between and slidably engaging with the piston rod 23 and the adjacent one of the stack of shocks 28. It is to be noted that a single compression

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plate is supported intermediate the end plate 24 and the adjacent shock, and a single compression plate is also supported between the piston head 27 and the adjacent one of the shocks 28.

Disposed within the casing 20 contiguous to the open end 22 thereof is an abutment block 35 which is secured to the casing 20 by means of the transversely extending pin 36. Interposed between the head 27 and the abutment block 35 is a recoil element 37 which is compressible upon the expansion of the assembly of the shocks 28.

Disposed in end-to-end relation with respect to the head-carrying end of the piston rod 23 is a guide bar 38 which is secured to or formed integrally with the piston rod 23. Contiguous to one end the guide bar 38 is provided with a threaded head 39 on which is supported a nut 40 which bears against the adjacent face of the piston head 27 and maintains the latter in its assembled position with respect to the piston rod 23 and the adjacent compression plates and shocks. The other end of the guide bar 38 is slidably received and supported within a sleeve 41 which is carried contiguous to the open end of a longitudinally extending bore 42 provided in the abutment block 35.

Suitable means are provided on the projecting end of the piston rod 23 for connecting the latter to the supporting arm 19 of the seat structure 12, to thereby effect the sliding movement of the piston rod 23 in response to the movement of the bar 19 about the pivot 14. The means on the projecting end of the piston rod comprises a stop plate 44 which is supported transversely of and in threaded engagement on the threaded portion 26 of the piston rod 23 contiguous to and spaced from one face of the arm 19. Interposed between the stop plate 44 and the adjacent face of the arm 19 is a cushion element 45 fabricated of rubber-containing material. Supported contiguous to the outer face of the arm 19 is a nut 46 which is held in a select position of its movement along the threaded portion 26 of the piston rod 23 by a lock nut 47. Accordingly, upon the pivotal movement of the arm 19 in a counterclockwise direction about the pivotal axis 14, the piston head 27 is urged toward the end plate 24 to compress the shocks supported therebetween. The counterclockwise movement of the arm 19 will be effected in response to a weight being placed upon the seat 14'. Upon removal of the weight from the seat, the arm 19 will rotate in a clockwise direction and the piston head 27 will be urged toward the abutment block 35, the rubber element 37 taking up the recoil. In the event that the position of the seat 14' with respect to the support 11 is to be varied, it is merely necessary to change the supported position of the arm 19 on the piston rod 23.

The abutment block 35 is provided with an extension 48 disposed exteriorly of the adjacent end of the casing 20, the extension being pivotally connected to the bracket 49 by means of a bolt 50. The bracket 49 is connected to the supporting surface 11 and cooperates with the bolt 50 to support the adjacent end of the casing 20 for rocking movement about a substantially horizontal axis spaced from the supporting surface 11.

While the specific embodiment of the invention as hereinabove described defines a pair of compression plates 31 and 32 as being interposed between adjacent shocks, it is to be understood that a one-piece separator can be employed, said separator including an anchoring element projecting from each face thereof and extending be-

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tween and slidably engaging the rod and the adjacent one of the shocks.

Although the shock-absorbing mechanism 10 of the present invention has been held connected to a seat structure 12, it is readily apparent to one skilled in the art that it can be connected to numerous other pieces of equipment, such as the wheels of automotive vehicles, motorcycles, airplanes, and the like.

Numerous modifications of the shock-absorbing mechanism of the present invention can be made without departing from the spirit of the invention, as set forth in the appended claims.

What I claim is:

1. In a shock absorbing mechanism, a casing having one end closed and the other end open, an end plate positioned within said casing adjacent said one closed end thereof, a bearing carried by said end plate, an abutment block positioned within said casing adjacent to and closing said other open end thereof, there being a bore extending longitudinally inwardly from the face of said abutment block contiguous to said end plate, a sleeve supported in said bore, a piston rod extending axially of said casing and mounted in said bearing for longitudinal sliding movement, said piston rod having one end terminating adjacent to and spaced from said abutment block and having the other end projecting exteriorly of the closed end of said casing, a piston head on the other end of said piston rod, a guide bar carried by said piston head and slidably supported in said sleeve, a stack of compressible shocks disposed in spaced relation with respect to each other and circumposed about and spaced from said piston rod between said head and said end plate, a compression plate interposed between adjacent compressible blocks, a flange on each of said compression plates extending into the space between and slidably engaging with said piston rod and adjacent shocks, means on the projecting end of said piston rod for attachment to a supporting member, and means on the face of said abutment block remote from said end plate for connection of a supporting surface thereto.

2. In a shock absorbing mechanism, a casing having one end closed and the other end open, an end plate position within said casing adjacent said one closed end thereof, a bearing carried by said end plate, an abutment block positioned within said casing adjacent to and closing said other open end thereof, there being a bore extending longitudinally inwardly from the face of said abutment block contiguous to said end plate, a sleeve supported in said bore, a piston rod extending axially of said casing and mounted in said bearing for longitudinal sliding movement, said piston rod having one end terminating adjacent to and spaced from said abutment block and having the other end projecting exteriorly of the closed end of said casing, a piston head on the other end of said piston rod, a guide bar carried by said piston head and slidably supported in said sleeve, a stack of compressible shocks disposed in spaced relation with respect to each other and circumposed about and spaced from said piston rod between said head and said end plate, a compression plate interposed between adjacent compressible blocks, a flange on each of said compression plates extending into the space between and slidably engaging with said piston rod and adjacent shocks, a compressible recoil element interposed between and engageable with said piston head and abut-

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ment block and surrounding said guide bar, means on the projecting end of said piston rod for attachment to a supporting member, and means on the face of said abutment block remote from said end plate for connection of a supporting surface thereto.

GUSTAVE O. GABRIEL.

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