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L. O. GREELEY

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CUSHIONED CYLINDER HEAD

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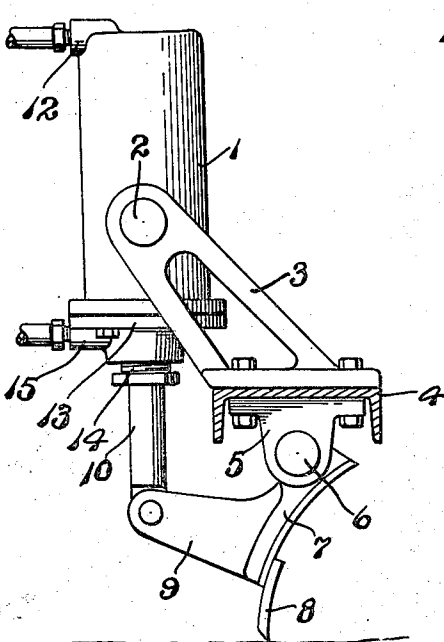


Fig. 1.

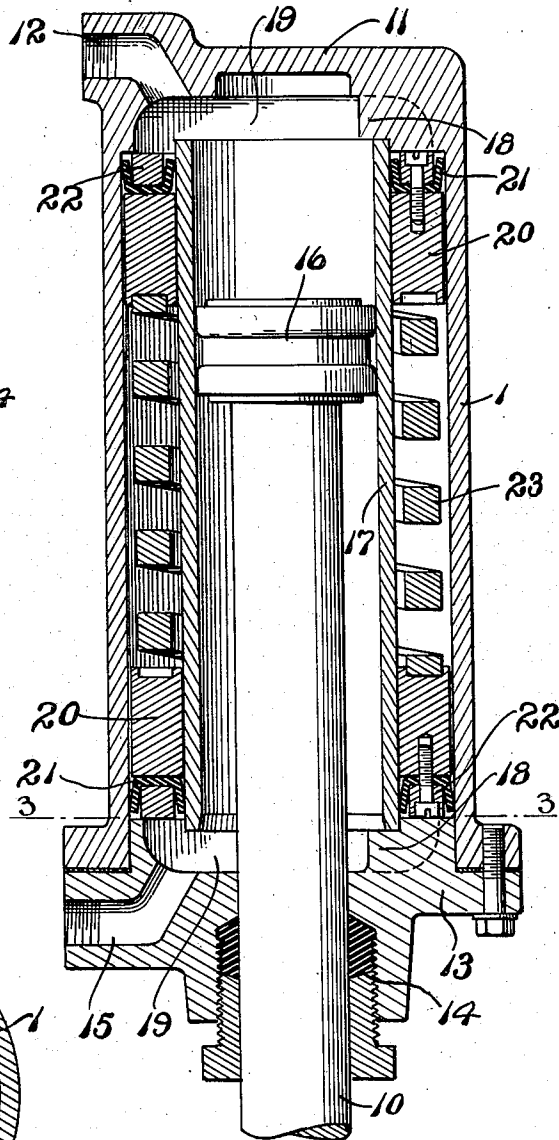


Fig. 2.

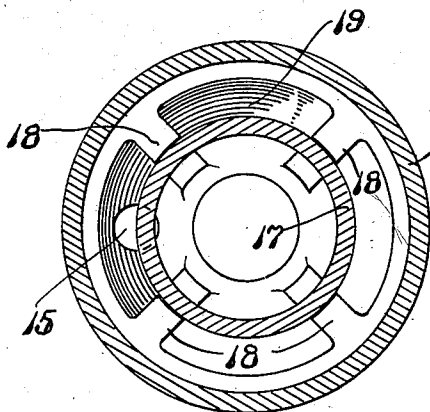


Fig. 3.

Inventor
By Leo O. Greeley
Liverance & Van Antwerp
Attorneys

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CUSHIONED CYLINDER HEAD

Leo O. Greeley, Cadillac, Mich., assignor to General Sales Company of Cadillac, Cadillac, Mich., a limited partnership

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6 Claims. (Cl. 121—38)

1 The present invention relates to a cushioned hydraulic cylinder. One place where such cylinder is especially useful is in road scraping equipment, wherein a road surface engaging and scraping blade is movably mounted for raising and lowering, utilizing hydraulic power and pressure to force the blade against the road surface over which it moved. In scraping road surfaces the blade frequently encounters solid obstructions over which it must pass and, therefore, the blade must be lifted in such passage against the hydraulic pressure acting upon it. Inasmuch as liquids are incompressible means must be supplied to permit such lifting of the blade in order to avoid damage or breakage. The present invention provides a very practical and useful mechanism for such purpose.

Furthermore, in the installation of the hydraulic road scraper blade upon a motor truck carrying it, the space available is limited. With my invention the space is reduced to a minimum, the cylinder which is located vertically being of no greater height than it would be if my invention was not present.

My invention has for its objects and purposes a provision of a particularly effective space saving, practical and durable cushioned hydraulic cylinder construction, one which is readily manufactured and assembled and which is sturdy and durable in construction and capable of fully withstanding the severe conditions to which it is subjected in operation.

An understanding of the invention may be had from the following description, taken in connection with the accompanying drawing, in which,

Fig. 1 is a side elevation partly in section showing the cushioned hydraulic cylinder of my invention.

Fig. 2 is an enlarged central vertical section through the cylinder construction, and

Fig. 3 is a horizontal section substantially on the plane of line 3—3 of Fig. 2.

Like reference characters refer to like parts in the different figures of the drawing.

The cylinder construction includes an outside cylinder **1** positioned vertically, from opposite sides of which trunnions **2** extend which are mounted for rocking movement at the upper ends of brackets **3** bolted or otherwise connected at the upper side of the substantially horizontal transverse beam **4** which, in practice, is mounted under the chassis of a motor vehicle and suspended therefrom. At the under side of the beam **4** a plurality of journal brackets **5** are permanently secured, through which a rock shaft

2 **6** extends and on which the scraper element **7** is mounted for rocking movement, having a blade **8** to directly engage the road surface. An arm **9** extends from the blade mounting **7** in the same direction as the brackets **3** to the end of which the lower end of the piston rod **10** is pivotally connected. The piston rod enters at the lower end of the cylinder **1**, as hereafter described.

The cylinder **1** at its upper end has an integral head **11** with an inlet and outlet port **12** to which a pipe may be connected (Fig. 1) for carrying liquid pressure into or for exhausting liquid at the upper end of the cylinder. The lower end of the cylinder which initially is open is closed by a lower head **13** bolted to an outwardly extending flange at the lower end of the cylinder. The piston rod **10** passes through the head **13** and through a conventional stuffing box **14** to prevent leakage. Said head **13** has an inlet and outlet port **15** for liquid passage therethrough, similar to the part **12**, and with which a second pipe or other conduit is connected.

The piston rod **10** at its upper end is supplied with a piston **16** located within an interior cylinder **17** open at both ends and held between the heads **11** and **13**, bearing upon radial inwardly extending bosses or lugs **18** on the cylinder heads. Open communicating passages **19** or large areas are provided between the liquid passages at **12** and **15** and the upper and lower ends of the inner cylinder **17**. The inner cylinder **17** having an exterior diameter materially less than the interior chamber of the cylinder **1** there is a concentric space between the cylinders; and this space likewise at both its upper and lower ends is in open connection with the passages at **12** and **15**.

Around both the upper and lower end portions of the cylinder **17** a heavy ring **20** of metal is located. The upper ring at its upper side and the lower ring at its lower side carries a packing ring **21** of leather or other suitable material which are secured in place by clamping rings **22** screw connected to the rings **20**. Between the annular pistons **20** a strong compression spring **23** is disposed normally under a compression which forces said pistons against the inwardly extending radial bosses **18**.

In the operation of road scrapers, the blade **8** is elevated when the scraper is not used. It is moved downwardly to operating road engaging position when in use by pumping liquid into the upper end of the cylinder. The mechanism for such pumping is no part of the present invention and is old and well known. When pumped into

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the bottom of the cylinder the piston 16 is lifted whereupon the road scraper blade is correspondingly lifted, the liquid above the piston being exhausted through the outlet 12. When the blade is moved to its working position, the flow of pumped liquid is reversed, entering at the upper end of the cylinder to force piston 16 and rod 10 down as is evident. After the piston 16 has been moved down to the desired position, or with the desired pressure against it, a valve (not shown) controlling the flow of pressure fluid to and from the passage 12 is closed and therefore the liquid in the cylinder above the piston is trapped. The pressure imparted is heavy in order that the blade 8 may suitably engage and scrape the road surface. Such pressure is also imparted to the upper clamping ring 22 thence to the upper ring 20 and thence to the heavy spring 23 which is of sufficient strength that it will not normally be compressed to any great degree if at all.

When in passing over the road surface the blade 8 comes to an obstruction requiring that the blade be lifted to pass over it, such lifting will move the piston 16 upwardly within the cylinder 17. The liquid above the piston moved and displaced by such piston movement will thereupon act upon the upper clamping ring 22 and the upper ring 20 with a pressure force of increased amount causing a compression of the spring 23, the upper ring 20 moving downwardly to provide space for the displaced liquid above the piston 16. The packings 21 are to seal against the passage of liquid into the space in which the spring 23 is housed.

Although the foregoing description and the drawing disclose the device as "double ended" or having passages between the inner and outer cylinders at both ends with the two annular pistons 20 located in the outer cylinder whereby the piston 16 may yield under abnormal pressure in either direction it is pointed out that the device may practically be built and operate as a "single ended" device.

In this form there would be no communication between the inner and outer cylinders at one end, as for example the lower end, and the annular piston 20 at that end would be eliminated. When so constructed the piston 16 would yield only in a direction toward the end of the device whereat there is communication between the inner and outer cylinders.

The construction described is very practical, useful, strong and durable. It is evident that the vertical height of the cylinder is not greatly increased. It is a construction which is readily manufactured and assembled. This invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. In a construction as described, an outer cylinder having closed ends with liquid carrying passages one at each end thereof, an interior cylinder within the outer cylinder spaced therefrom and extending between the ends thereof, said ends of said interior cylinder being open and the space between said cylinders being open to said liquid carrying passages, a piston within said interior cylinder, a piston rod extending therefrom, ring pistons surrounding the interior cylinder between it and the outer cylinder, a heavy compression spring between said ring pistons and packings at the outer ends of said ring pistons preventing liquid passage past them.

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2. In a construction as described, a vertical exterior piston having closed ends, each end having a liquid carrying passage therethrough from the interior of the piston leading to the outside, an interior cylinder located vertically within the exterior cylinder having its sides spaced from the sides of said exterior cylinder, said interior cylinder being open at both ends and at its ends engaging against the ends of the exterior cylinder, said interior cylinder at each end and the space between it and the first cylinder being in freely open connection with said liquid carrying passages, a ring piston surrounding the interior piston adjacent its upper end, packings at the upper end of said ring piston preventing passage of liquid in a downward direction, a heavy coiled spring surrounding the interior cylinder between it and the first cylinder adapted to be compressed on downward movement of said ring piston, means between said interior cylinder and the exterior cylinder adjacent the lower ends thereof preventing upward passage of liquid to the space between said cylinders, a piston within the interior cylinder and a piston rod extending therefrom through one end of the first cylinder.

3. A construction as described comprising, an exterior cylinder having closed ends, each with a liquid conducting passage from within the cylinder to the outside, an interior cylinder within the exterior cylinder spaced therefrom having open ends, said interior cylinder and the space between the cylinders being in open communication with said passages, movable elements located around the interior cylinder between it and the exterior cylinder subjected to liquid pressure at the opposite ends of the cylinders, yielding means forcing said movable elements apart, means preventing the passage of liquid past said movable elements to the space between said exterior and interior cylinders, a piston within the interior cylinder and a piston rod connected thereto.

4. An exterior cylinder closed at both ends having a liquid passage therethrough from the interior of the cylinder to the outside at each end of the cylinder, an interior cylinder within the exterior cylinder lengthwise thereof open at both ends and at its ends engaging against the ends of the exterior cylinder, there being free and open communication between said passages, the ends of the interior cylinder and the spaces between said interior and exterior cylinders, shock absorbing means disposed between said interior and exterior cylinder subject to the pressure of liquid under pressure entered at either end of the exterior cylinder, means associated with said shock absorbing means for preventing the passage of liquid to the interior space between said interior and exterior except at the ends thereof, a piston within the cylinder and a piston rod connected to said piston extending therefrom beyond said exterior cylinder.

5. A construction as described comprising, an exterior cylinder, an interior cylinder of materially less diameter located within the exterior cylinder, said exterior cylinder having closed ends bearing against the ends of the interior cylinder, said interior cylinder being open at both ends and the closed ends of the cylinder each having a liquid carrying passage having large area communicating with the adjacent ends of the interior cylinder and with the space between adjacent ends of the interior and exterior cylinders, a movable element surrounding the interior cylinder adjacent an end thereof, yielding means normally holding said movable element in a prede-

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terminated position but yieldable under force of pressure of liquid carried to the end of the cylinder, and means preventing the passage of liquid into the space between said exterior and interior cylinders.

6. A construction as described comprising an exterior cylinder, a concentric interior cylinder of less diameter providing an annular space between the two cylinders, an unrestricted communication between the inner and outer cylin- 10

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ders at an end thereof, an annular piston reciprocally mounted in said annular space between the two cylinders, yieldable means for thrusting said annular piston in a direction toward the communication between the two cylinders, a piston and piston rod in the inner cylinder and means for admitting fluid under pressure to said inner cylinder at the end whereat it communicates with the outer cylinder.

LEO O. GREELEY.