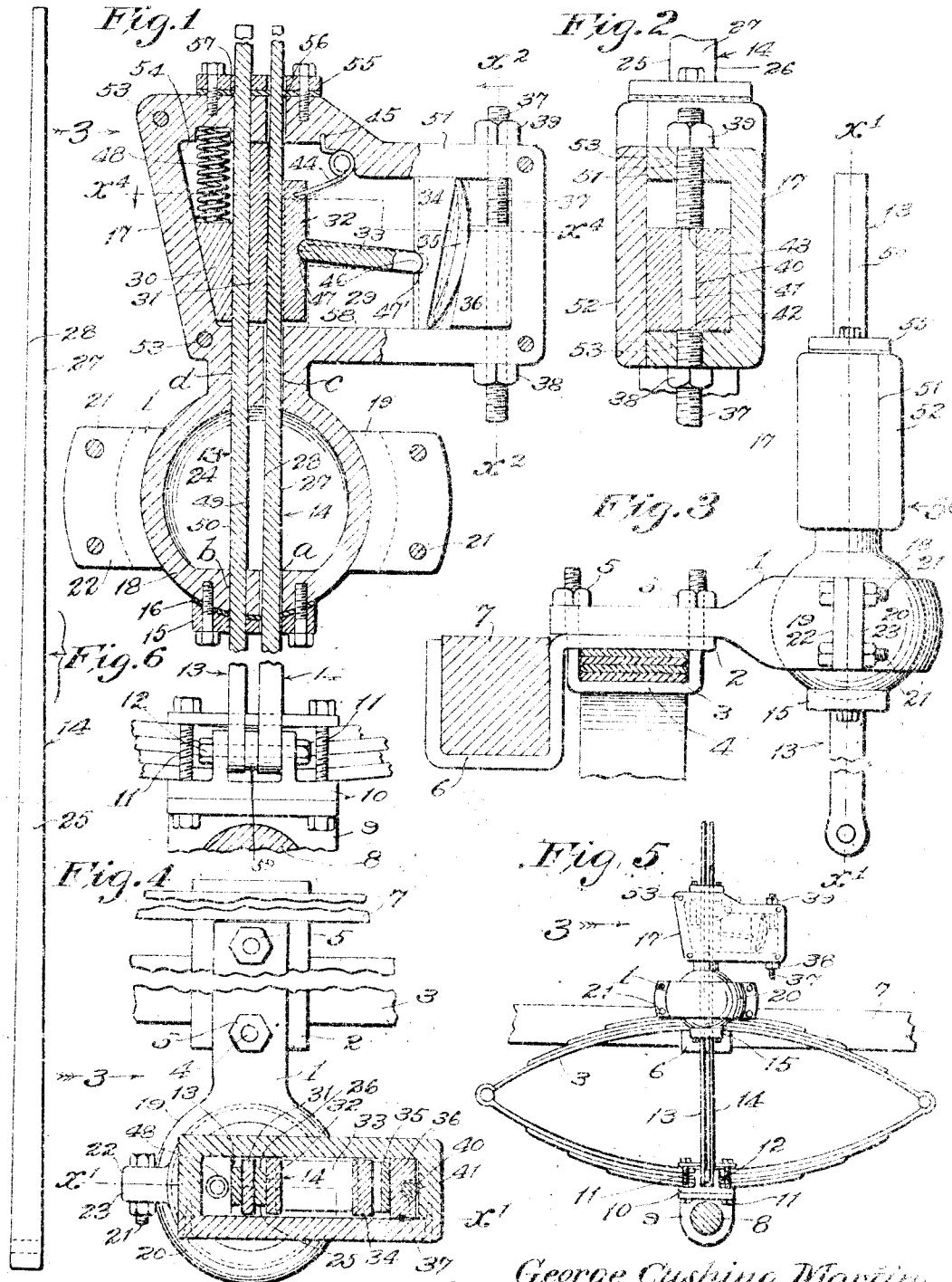


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SHOCK ABSORBER.
APPLICATION FILED JULY 7, 1909.

1,034,634.

Patented Aug. 6, 1912.



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UNITED STATES PATENT OFFICE.

GEORGE CUSHING MARTIN, OF LOS ANGELES, CALIFORNIA.

SHOCK-ABSORBER.

1,034,634.

Specification of Letters Patent.

Patented Aug. 6, 1912.

Application filed July 7, 1909. Serial No. 508,407.

To all whom it may concern:

Be it known that I, GEORGE CUSHING MARTIN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Shock-Absorbers, of which the following is a specification.

This invention relates to improvements in a certain shock-absorber described in an application for Letters-Patent of the United States filed by me on the 10th day of April, 1909, Serial No. 489,214, in which is shown a slip rod extending into a case and frictionally engaged by a toggle-joint operated brake shoe when moved lengthwise in one direction.

Objects of this invention are:

(1.) To provide a more positive and easily manipulated adjustment of the pressure of the brake-shoe on the slip-rod;

(2.) To provide novel means for taking up the movement of the shock-absorber in all directions; that is,—to provide the device with an effective universal joint;

(3.) To provide a resilient device in connection with the pivot which forms the principal element of the toggle-joint whereby pressure on the slip-rod may be regulated and whereby the said pressure may be constantly maintained in case the rod may or may not wear more in one place than in another; and to provide means for taking up, through the action of said spring, wear on various parts of the device.

(4.) To provide a novel shoe which engages frictionally the slip-rod and is so arranged as to move freely upward with the upward motion of the slip-rod, thereby reducing the pressure of said shoe on said slip-rod, and to provide for forcing said shoe downward on the instant that the slip-rod starts to move downward, thereby frictionally engaging the said slip-rod.

(5.) To make provision whereby the frictional surface of said slip-rod may be increased without materially increasing the weight or size of the device. This is accomplished by using in the place of a single-piece slip-rod a multiple slip-rod which may be formed of two or more parallel flat pieces, strips or sections running through the case of the shock-absorber and arranged in much the same manner as the former slip-rod; the parallel portions of the slip-rod being held apart by a shoe which remains

stationary when the slip-rod moves in either direction. The slip-rods may be variously formed but preferably will be flat with the broad sides between and engaging the shoes, and the number of slip-rod members may be increased if it is desired to increase the friction surface. The slip-rod members may be fastened together at the bottom in any suitable way as by means of a bolt running through an eye-piece which will be used for fastening the slip-rod to the axle, and the parts above mentioned may be separated by soft rubber washers to prevent rattle.

(6.) An object is to provide a shock-absorber the resistance of which to the recoil of the spring will be proportional to the force of such recoil, and which will automatically offer high resistance to the recoil of the highly-compressed spring, and will not offer any resistance to the easy motion of the automobile-springs in their normal position under a normal load.

The accompanying drawings illustrate the invention in the form at present deemed most desirable.

Figure 1 is an elevation partly in longitudinal mid-section on line indicated by x^1 , Figs. 3 and 4. The removable side is omitted from the non-sectioned portion. Fig. 2 is a transverse section on line indicated by x^2 , Fig. 1; the side wall being fastened in place. Fig. 3 is an elevation from the arrow 3 in Figs. 1, 4 and 5. Portions of the frame and of one leaf of the spring are shown in section. Fig. 4 is a plan section from irregular line x^4 , Fig. 1. Fig. 5 is a view of the appliance attached to one side of a vehicle, a fragment of which is shown. This view is from the arrow 5 at the right of Fig. 3. Fig. 6 is a detail of the taper slip-rod which is shown in edge elevation.

The bracket 1 is mounted on the fish-plate 2 which is fastened to the top of the spring 3 by the clip 4 having nuts 5, said fish-plate 2 having a bent seat 6 in which is fitted the bar 7 of the frame of the vehicle, to the axle 8 of which vehicle the lower portion of the spring 3 is secured by the clip 9 to which the slip-rod foot is fastened by bolts 11. The slip-rod may be pivoted to the foot 10 by a bolt 12 the axis of which is at right angles to the vehicle axle 8 and parallel with the spring 3, and said slip-rod may consist of one or more members, a plurality of members being preferred.

In the drawings, two parallel members 13

and to sustain the body of the slip-rod and these members pass through a stuffing-box indicated by the plate 15 and the yielding padding 16 and then up through the case 17 of the shoe 32 in which case the frictional means for engaging the slip-rod are mounted. The lower end of said shoe is provided with a spherical extension 18 that forms the ball of a walking shoe. At 19, the socket of which joint is composed of a concave plate 19 of the bracket and a concave cap 20 that is fastened to said bracket by bolts 21 passing through lugs 22, 23 of said bracket and cap. The upper 24 of extension 18 is hollow, the cap 24 thereof being adapted to contain lubricant for the slip-rod. The stuffing-box may serve to retain the lubricant or may be employed simply to keep out dirt, the rod being allowed to run dry. Where the slip-rod is composed of a plurality of members as shown in the drawing, one of said members, as 12, may be of uniform cross-section from end to end, while the other may be wedge-shaped, having two parallel edges 25, 26 and two oppositely-curving sides 27, 28. The extension 18 and case 17, provided with ways *a, b, c, d*, for retention of the rod.

Inside the cavity 29 of the case are provided frictional means to resist downward movement of the slip-rod and to allow free upward movement of such rod, and said means may comprise a wedge-block 30 to engage the section 13, a separating block 31 between the sections 13 and 14, a brake shoe 32 to engage the wedge-like section 14 of the slip-rod, a toggle-bar 33 in pivotal relation with the shoe 32, a yielding toggle-bar-support 34 that may be in the form of a wedge supported by a stiff spring 35 and an adjustable wedge-like seat 36 for the spring 35, by which the tension of the spring may be increased or diminished. Said seat 36 may be an upwardly-tapering wedge formed by an adjusting-bolt 37, on which an adjusting-nut 38, 39 is engaged, the case 17 to move the bolt 37 upward or downward, when bolt may be fixed to the seat 36 by means of a vertical slot 40 in the seat into which a reduced neck 41 of the bolt is seated, so that the shoulders 42 and 43 at the ends of said neck will engage the block to move it up and down. The neck 41 may be non-circular in cross-section so that the bolt is thereby held from rotation when the nuts are screwed. A spring 44 having one end seated in a recess 45 in the case and the other end engaging the shoe 32, is arranged to press the shoe downwardly inside the case.

The toggle-bar 33 is pivotally connected with the shoe 32 and the toggle-bar-support 34 preferably by rounded ends 46, 47, where seats 47, 47' in said case and block, the seat 47' being lower than the seat 47, and the toggle-bar is adjustably secured to the

spring 44, both the ends of the shoe 32 being free from the walls of the case so that said shoe is a floating member, the spring 44 of which tends to keep the toggle 33, thereby to constantly hold the section 14 tight against the block 31 which in turn is tightly held against the section 13, which in turn is tightly held by the wedge-block 30. Said wedge-block is resiliently held tight by a spiral spring 48 which presses the wedge-block downward in the same direction that the spring 44 presses the shoe 32. It is thus seen that the members 30, 31 and 32 all act as brake-shoes upon the faces of the slip-rod that they engage, and that by providing a plurality of sections the frictional surface of the slip-rod thus to be engaged is greatly increased.

The frictional faces 27, 28 and 49, 50 may be of any desired form as convex, concave, corrugated or plain. The plain form is preferable for convenience of construction.

The case 17 may be in the form of a box having an open side 51 upon which is a cover 52 fastened thereto by screws 53. The inside wall 54 of the end of the case that is engaged by the wedge-block 30 may be adjustably inwardly downward as shown so as to accentuate the wedging action of the wedge-block. A gland 55 may also be provided at the top of the case around the openings 56, 57 through which the sections 13, 14 extend upward, said gland being for the purpose of excluding dust.

In practical operation, when the vehicle-axle 8 is moved upward by the vehicle going over an obstruction, the spring 3 is thereby compressed and the sections 13 and 14 of the slip-rod are suddenly driven upward through the case, the wedge formation 14 of the section 14 serving to lift the shoe 32, so that after the initial upward movement the sections will move freely up through the case. Immediately the compression of the spring ceases from the upward movement of the axle the springs 14 and 48 act to tighten the shoe-members, and the toggle-bar then acts forcibly to cause the shoes to powerfully grip the slip-rod and thereby cause the spring to return greatly to normal position. When the spring returns to normal position the thinner upper end of the wedge-like section 14 comes between the shoe 32 and the separating-block 31, thereby allowing the shoe 32 to come to rest on the floor 58 of the case, as indicated in dotted lines in Fig. 1, so that the springs 3 of the vehicle may operate normally until again abnormally compressed. When the spring 3 is compressed and the slip-rod is driven up between the frictional means 29, 31 and 32, then upon the recoil of the spring, the slip-rod being drawn back through the case will engage the shoe of the toggle joint, thereby causing it to bind with increased force.

due to the extra thickness of the slip-rod, and the resiliency of the spring 35 allows the toggle-joint to assume a position nearly at right angles to the slip-rod where it exerts its most effective force until the thinner portion of the slip-rod is reached; the spring 35 being constructed to positively support the toggle-bar-support 34 in approximately the position shown in Fig. 1, except when the toggle-bar is brought near right-angled position as above stated. In this way the shock-absorber automatically accommodates itself to all conditions; that is, it does not grip the slip-rods at all in a normal position, but grips them with an increased grip as the bump is increased or the compression of the spring is increased.

It is not important that the upper portion of the slip-rod be tapered, but the taper may extend from end to end of the taper-section. It is not necessary that the slip-rod shall be constructed in more than one section except for the purpose of increasing the frictional surface, it being apparent from the drawings and from my said other application that the operation of the section 14 will be the same as that described, regardless of whether the section 13 which supports the same is or is not movable endwise.

In Fig. 1 a rubber washer 59 on the pivot bolt 12 holds the sections of the slip-rod apart and prevents rattling.

It is thus seen that by producing the combination of two elements, means to resiliently hold said elements apart, and mechanism constructed to yieldingly resist the parting movement of said elements when the elements are abnormally near each other, and to offer comparatively slight resistance to the parting movement when the elements are normally spaced apart, I have preserved free resilient movement when the springs are not abnormally compressed, and I avoid any action of the springs which will tend to cause the vehicle-body to bound.

I claim:—

1. The combination with a case, of a slip-rod comprising a plurality of sections longitudinally movable in the case, a plurality of shoes to engage the slip-rod sections, a toggle-bar support, a toggle-bar between said support and the shoes to operate the shoes, and a spring to hold said support in opposition to the thrust of the toggle-bar.

2. The combination with a case, of a slip-rod comprising a plurality of sections longitudinally movable in the case, a plurality of shoes to engage the slip-rod sections, a toggle-bar support, a toggle-bar between said support and the shoes to operate the shoes, a spring to hold said support in opposition to the thrust of the toggle-bar, and means for adjusting the tension of the spring.

3. In a shock-absorber, the combination

with a case, of a slip-rod movable in said case, means operable by the movement of the slip-rod in one direction to frictionally resist such movement, a resilient support for said means, an upwardly-tapering wedge to adjust said support, and a bolt with nuts to adjust the wedge.

4. In a shock-absorber provided with a slip-rod and frictional mechanism therefor, the combination with a case, of a bolt extending through the case and provided with a neck inside the case, nuts to adjust the bolt in the case, and a wedge provided with a slot on said neck and movable therewith for the purpose of adjusting the frictional mechanism of the shock-absorber.

5. In a shock-absorber, the combination of a case, a slip-rod in the case, a wedge-block on one side of the slip-rod, a spring to hold said block in wedging position, a brake shoe on the other side of the slip-rod, a spring to hold the brake-shoe in wedging position, and a toggle-bar operable by the movement of said brake-shoe to cause said shoe to frictionally engage the slip-rod when said slip-rod moves in the direction in which it is pressed by the spring.

6. In a shock-absorber, the combination of a case, a slip-rod in the case, a wedge-block on one side of the slip-rod, a spring to hold said block in wedging position, a brake-shoe on the other side of the slip-rod, a spring to hold the brake-shoe in wedging position, a toggle-bar operable by the movement of said brake-shoe to cause said shoe to frictionally engage the slip-rod when said slip-rod moves in the direction in which it is pressed by the spring, and means for resiliently resisting the thrust of the toggle-bar.

7. In a shock-absorber, the combination of a case, a slip-rod in the case, a wedge-block on one side of the slip-rod, a spring to hold said block in wedging position, a brake-shoe on the other side of the slip-rod, a spring to hold the brake-shoe in wedging position, a toggle-bar operable by the movement of said brake-shoe to cause said shoe to frictionally engage the slip-rod when said slip-rod moves in the direction in which it is pressed by the spring, and means for resiliently resisting the thrust of the toggle-bar, said slip-rod being provided with a taper portion to loosen the shoe on the reverse movement of the slip-rod.

8. In a shock-absorber, the combination with a case, of a slip-rod comprising two sections one of which has parallel sides and the other of which tapers, a wedge-block to engage one of said parallel sides, a separating block between the sections, a brake-shoe engaging the tapering section, and a toggle-bar operable by the shoe to frictionally engage and hold the taper-section when it moves in the direction of its thicker end

and to release when the shoe moves in the reverse direction.

9. In a shock-absorber, the combination with a case, of a slip-rod comprising two sections one of which has parallel sides and the other of which tapers, a wedge-block to engage one of said parallel sides, a separating-block between the sections, a brake-shoe engaging the tapering section, springs to hold the wedge-block and brake-shoe, and a toggle-bar operable by the shoe to frictionally engage and hold the taper-section when it moves in the direction of its thicker end and to release when the shoe moves in the reverse direction.

10. In a shock-absorber, the combination with a case, of a slip-rod comprising two sections one of which has parallel sides and the other of which tapers, a wedge-block to engage one of said parallel sides, a separating-block between the sections, a brake-shoe engaging the tapering section, a toggle-bar operable by the shoe to frictionally engage and hold the taper-section when it moves in the direction of its thicker end and to release when the rod moves in the reverse direction, and a resilient support for the toggle-bar.

11. In a shock-absorber, the combination with a case, of a slip-rod comprising two sections one of which has parallel sides and the other of which tapers, a wedge-block to engage one of said parallel sides, a separating-block between the sections, a brake-shoe engaging the tapering section, springs to hold the wedge-block and brake-shoe, a toggle-bar operable by the shoe to frictionally engage and hold the taper-section when it moves in the direction of its thicker end and to release when the rod moves in the reverse direction, and a resilient support for the toggle-bar.

12. In a shock-absorber, the combination with a case, of a slip-rod comprising two sections one of which has parallel sides and the other of which tapers, a wedge-block to engage one of said parallel sides, a separating-block between the sections, a brake-shoe engaging the tapering section, a toggle-bar operable by the shoe to frictionally engage and hold the taper-section when it moves in the direction of its thicker end and to release when the rod moves in the reverse direction, a resilient support for the toggle-bar, and means for adjusting said resilient support.

13. In a shock-absorber, the combination with a case, of a slip-rod comprising two sections one of which has parallel sides and the other of which tapers, a wedge-block to engage one of said parallel sides, a separating-block between the sections, a brake-shoe engaging the tapering section, springs to hold the wedge-block and brake-shoe, a toggle-bar operable by the shoe to frictionally engage and hold the taper-section when it moves in the direction of its thicker end and to release when the rod moves in the reverse direction, a resilient support for the toggle-bar, and means for adjusting said resilient support.

14. The combination with a slip-rod having relatively thick and thin portions, of a brake-shoe to engage such slip-rod, a toggle-bar support, resilient means to hold said support, and a toggle-bar between said brake-shoe and the support.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 2d day of July, 1909.

GEO. CUSHING MARTIN.

In presence of—

JAMES R. TOWNSEND,
L. BELLE RICE.