T. LEA.

SHOCK ABSORBER FOR VEHICLES.

APPLICATION FILED DEC. 8, 1909.

958,510. **Patented May 17, 1910.**

2 SHEETS—SHEET 1.

FIG. I.

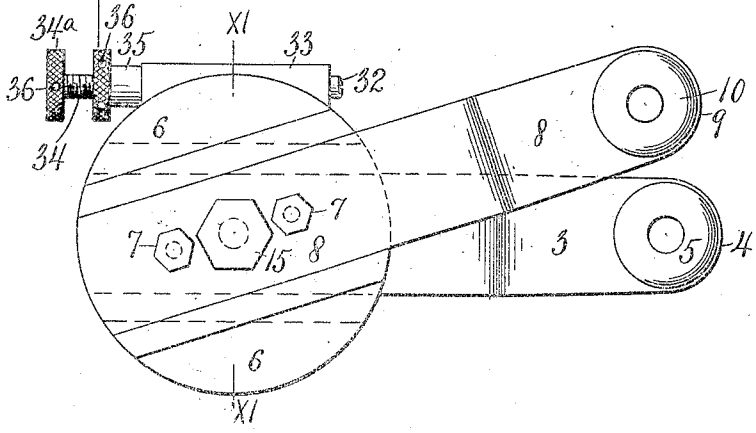
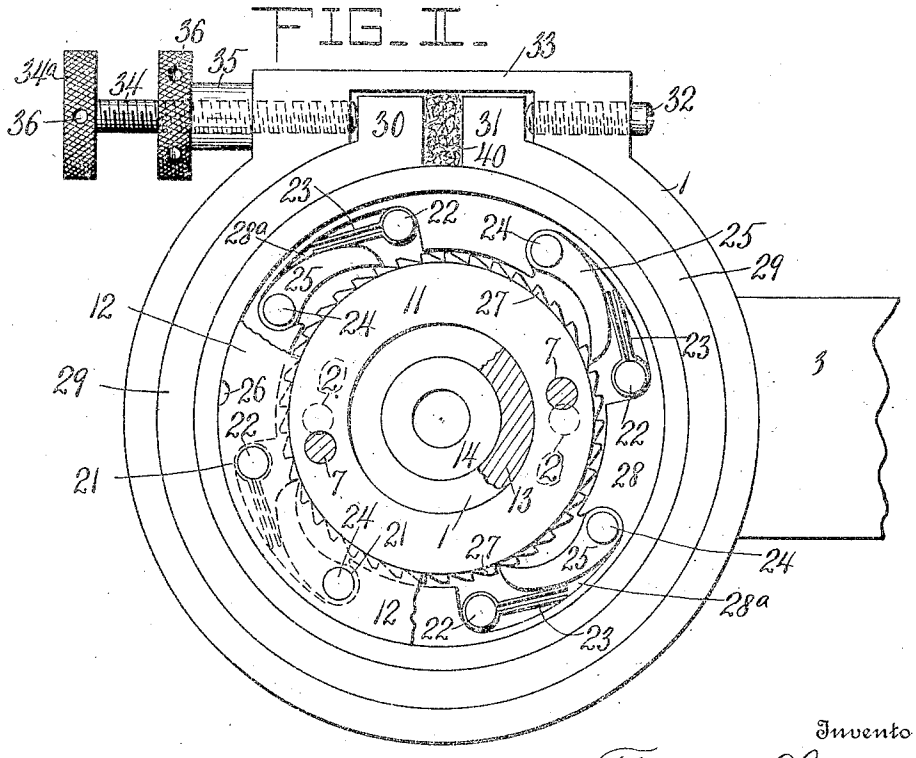


FIG. II.



Witnesses

W. E. Allen

Charles Lovell Howard.

Inventor

Thomas Lea.

By Walter Allen

Attorney

T. LEA.

SHOCK ABSORBER FOR VEHICLES.

APPLICATION FILED DEC. 8, 1909.

958,510. Patented May 17, 1910.

2 SHEETS—SHEET 2.

FIG. III.

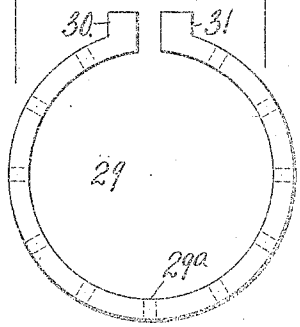


FIG. IV.

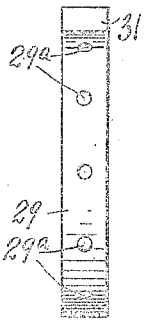


FIG. V.

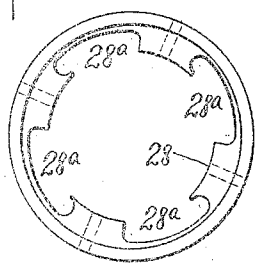


FIG. VI.

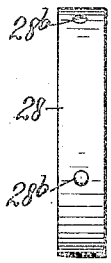


FIG. VII.

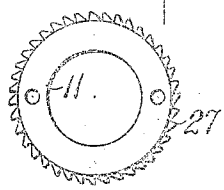


FIG. VIII.

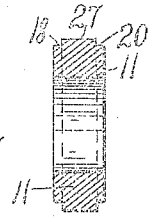


FIG. IX.

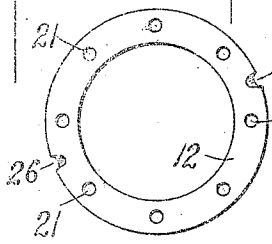


FIG. X.

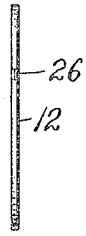


FIG. XI.

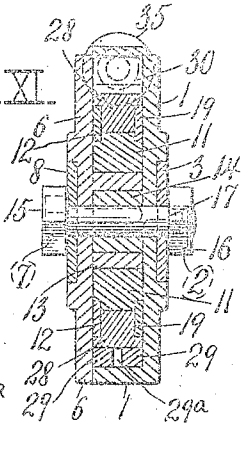


FIG. XII.

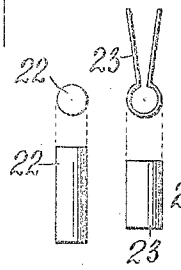


FIG. XIII.

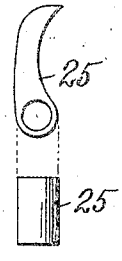
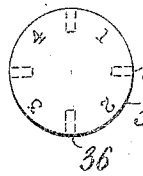


FIG. XIV.



Witnesses

W. E. Allen.

Charles Lucas Howard.

Inventor

Thomas Lea.

By Walter Allen

Attorney

UNITED STATES PATENT OFFICE.

THOMAS LEA, OF NEW BRUNSWICK, NEW JERSEY.

SHOCK-ABSORBER FOR VEHICLES.

958,510. Specification of Letters Patent. Patented May 17, 1910.

Application filed December 6, 1909. Serial No. 531,966.

To all whom it may concern:

Be it known that I, THOMAS LEA, a citizen of the United States of America, and a resident of New Brunswick, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Shock-Absorbers for Vehicles, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The invention relates particularly to that class of shock absorbers distinguished by being made of all metal, in which the shock absorbing mechanism is inclosed in a case, generally circular, and communicates with relatively movable portions of the vehicle through two levers or arms one of which is secured to the axle or lower member of a spring while the other is secured to the load carrying upper body or upper member of a spring, the approach or separation of the ends of the arms transmitting to the mechanism inclosed in the case certain movements for control by said mechanism, or modification by said mechanism as the case may be.

The object of my invention is to provide a construction of shock absorbing means which will allow the upper body to drop against the resistance of the usual outfit of springs or spring supporting means, and which will effectually resist or absorb the upward bound or rebound of the upper body, permitting it to rise with a comparatively slow movement, thus obviating the tossing usually incident to travel of vehicles on uneven surfaces. This I accomplish through my invention.

Figure I is an elevation of my invention ready to be applied to a vehicle. Fig. II is a view of the mechanism contained in the case, one plate of the case and its attached arm being removed. Fig. III is an elevation of the friction ring. Fig. IV an edge view of the same. Fig. V is an elevation of the pawl ring. Fig. VI is an edge view of the same. Fig. VII is an elevation of the ratchet disk. Fig. VIII is a vertical transverse section of the same. Fig. IX is an elevation of a retaining ring. Fig. X is an edge view of the same. Fig. XI is a vertical transverse section of the case and the inclosed mechanism on the line XI—XI of Fig. I. Fig. XII is a detail of a spring and its pivot pin. Fig. XIII is a detail of a pawl and its pivot pin. Fig. XIV is a face view of the head of secondary adjusting screw, for regulating the tension of the friction ring.

1 is the back plate of the inclosing case having removably secured thereto by suitable fastenings 2 the lever or arm 3 which carries at its farther end a perforated head 4 and wear pieces 5 suitable for attachment to an axle or a lower member of a vehicle spring supporting means not shown.

6 is the front plate of the inclosing case having removably secured thereto by suitable fastenings 7 the lever or arm 8 which carries at its farther end a perforated head 9 and wear pieces 10 suitable for attachment to a load carrying body or the upper member of a vehicle spring supporting means not shown.

The fastening means 2 is flush with the inner side of the back plate, while the fastening means 7 extend inward through the front plate and into the ratchet disk 11 securing to the arm 8, the front plate, the ratchet disk 11 and the interposed spacing and retaining ring 12.

The ratchet disk is centered on a projecting hub or boss 13 of the front plate, which hub, when the mechanism is assembled, encircles a smaller hub or boss 14 formed on the back plate 1, the two plates being secured loosely together by a bolt 15 which has a nut 16 screwed home to a shoulder 17 on the bolt. This shoulder is located at a proper point on the bolt to allow of a dust tight fit between the plates and yet allow them to rotate relatively.

The spacing and retaining ring 12 is centered on the reduced edge 18 of the ratchet disk 11 and a companion spacing and retaining ring 19 is centered on a corresponding reduced edge 20 of the ratchet disk 11. Each of these spacing and retaining rings is preferably provided with an even number of holes 21 for the reception of the ends of the pivot pins 22 which hold the springs 23 in place and the pivot pins 24 which hold the pawls 25 in place. Each of these spacing and retaining rings is also preferably provided with two small nicks 26 whereby they may be easily raised from the remaining mechanism when desired.

The ratchet disk contains an odd number of teeth 27 so that in the operation of the device the pawls may stand in full, three-

quarter, one-half and one-quarter engagement with the teeth, one pawl being, by this arrangement, always ready to receive thrusts from the ratchet disk 11.

Each pawl 25 and its companion spring 23 is located in a cavity 28ª, in the pawl ring 28, the ends of the cavity being preferably shaped to fit the contour of the pawl and spring respectively, so that any thrust received by the pawls is transmitted directly to the pawl ring without appreciable lost motion.

The pawl ring 28 serves as the inner member of a friction device which may be regarded as a friction brake to check the sudden movement of the case plates with respect to each other in one direction. The outer member of the friction device is the friction ring 29, placed loosely between the casing 1 and the pawl ring, prevented from rotation with the case 1 by the ears 30 and 31 and having a certain amount of frictional contact with the pawl ring 28, the amount of the friction being regulated by a primary adjusting screw bolt 32 working in the offset 33 of the case 1, and the secondary screw bolt 34 working also in the offset 33 and secured in adjustment by the jam nut 35. The bolts are preferably fine threaded for close adjustment and the heads of the secondary adjusting screw bolt 34 and the jam nut 35 are preferably provided with small radial cavities 36 to allow of the use of tools when desired. The secondary adjusting screw bolt head 34ª is further provided with a series of numbers or similar indicating means on its face, to show its relative axial position. The pawl ring is preferably provided with small radial holes 28ᵇ and the friction ring 29 is provided with small radial holes 29ª both serving to either hold or pass lubricant to the frictionally engaged surfaces and interior parts.

In operation the mechanism having been assembled, the arm 3 through its suitably constructed end 4 is secured to the lower member of a vehicle or spring, and the arm 8 secured to the upper member of a vehicle or spring, the screw bolt 32 rotated until the proper amount of friction is secured between the friction ring 29 and the pawl ring 28 to overcome the initial rebound of the vehicle in unloaded condition. At this time the secondary adjusting screw bolt head 34ª should be in such a position that the "1" is up. If the vehicle is to carry three passengers, the head is rotated against the pressure of the friction ring until the numeral "3" is up. It is intended that this amount of extra pressure on the friction ring should offset the additional rebound caused by the added weight of three passengers and the construction of the adjustment feature is proportioned to that end.

When the moving machine strikes a pebble or other unevenness in the surface traveled on, the arm 3 moves up toward arm 8 with the contraction of the spring supporting means or approach of the upper and lower members of the vehicle, the pawls riding over the teeth of the ratchet disk. As the springs open again or the upper and lower members of the vehicle separate again, the arms 3 and 8 start to separate again, being retarded in their movement by the friction between the friction ring and the pawl ring, as the latter by the thrust given it by the ratchet disk through the medium of a pawl engaging a tooth, endeavors to turn in response to the pull exerted by the arms 3 and 8.

It should be noted that the friction ring 29 is practically rigidly connected to the arm 3 and has not any movement with respect to the case back plate 1, that the ratchet disk is rigidly connected to the arm 8 and has no movement with respect to the front plate 6, and that the only part which rotates is the pawl ring 28 with its pawls, springs, pivots and spacing and retaining rings 12 and 19, and that the rotating parts only move in one direction, the pawls sliding over the teeth when any movement is attempted in the other direction. The result is that there is no opposition to the approach of the arms 3 and 8 and a purely frictional resistance to their separation, the frictional resistance varying with the tension put on the friction ring by the adjusting screw bolts.

It is obvious that the parts, by reversing the pawl ring and attached parts, and the ratchet disk, may be made to reverse their action and resist the approach of the arms 3 and 8 instead of the separation of the arms. Such reversal is in line with my invention as cases may arise where the absorbing means may have to be applied to the vehicle through extra intervening levers or arms, which would reverse the effects of the movements of the vehicle on the absorbing mechanism. It is obvious also that by non-essential changes "lefts" can be converted to "rights" and serve either side of a vehicle.

The amount of friction between the friction ring and the pawl ring may be increased by various means known to the arts, but for my purpose I prefer the faces to be finished smooth and to depend on the tension put on the outer ring for the necessary friction. In actual practice this construction has been found practically indestructible and to offer little wear.

I prefer to fill the space between the lugs 30 and 31 with wool felt or similar substance filled with lubricant as indicated at 40.

Having thus described my invention the following is what I claim as new therein and desire to secure by Letters Patent:

1. A shock absorber for vehicles comprising a pivot bolt, two plates having loosely

engaging hubs mounted on the pivot bolt and providing a casing; one plate being formed with an offset, a ratchet wheel mounted on the hubs between the plates, a lever secured to one plate, a lever secured to the other plate and the ratchet wheel, a pawl ring carrying spring pawls and surrounding the ratchet wheel, a friction ring located between the casing and the pawl ring and having ears projecting into the offset, and a screw bolt working through the offset and bearing against an ear of the friction ring for controlling the frictional contact between the pawl ring and the friction ring.

2. A shock absorber for vehicles comprising a pivot bolt, two plates having loosely engaging hubs mounted on the pivot bolt and providing a casing; one plate being formed with an offset, a ratchet wheel mounted on the hubs between the plates, a lever secured to one plate, a lever secured to the other plate and to the ratchet wheel, a pawl ring carrying spring pawls and surrounding the ratchet wheel, a friction ring located between the casing and the pawl ring and having ears projecting into the offset, a screw bolt working through the offset and bearing against an ear of the friction ring for controlling the frictional contact between the pawl ring and the friction ring, and a jam nut mounted on the screw bolt and bearing against the offset.

3. A shock absorber for vehicles comprising a pivot bolt, two plates having loosely engaging hubs mounted on the pivot bolt and providing a casing; one plate being formed with an offset, a ratchet wheel mounted on the hubs between the plates, a lever secured to one plate, a lever secured to the other plate and to the ratchet wheel, a pawl ring carrying spring pawls and surrounding the ratchet wheel, a friction ring located between the casing and the pawl ring and having ears projecting into the offset and primary and secondary screw bolts working through the offset and bearing against the ears of the friction ring for controlling the frictional contact between the pawl ring and the friction ring.

4. A shock absorber for vehicles comprising a pivot bolt, two plates having loosely engaging hubs mounted on the pivot bolt and providing a casing; one plate being formed with an offset, a ratchet wheel formed with reduced edges and mounted on the hubs between the plates, a lever secured to one plate, a lever secured to the other plate and to the ratchet wheel, a pawl ring carrying spring pawls and surrounding the ratchet wheel, retaining rings mounted in the reduced edges of the ratchet wheel and in the pawl ring, a friction ring located between the casing and the pawl ring and having ears projecting into the offset and a screw bolt working through the offset and bearing against an ear of the friction ring for controlling the frictional contact between the pawl ring and the friction ring.

5. A shock absorber for vehicles comprising a pivot bolt, two plates having loosely engaging hubs mounted on the pivot bolt and providing a casing; one plate being formed with an offset, a ratchet wheel formed with reduced edges and mounted on the hubs between the plates, a lever secured to one plate, a lever secured to the other plate and to the ratchet wheel, a pawl ring having cavities, pawls and springs bearing against the ends of their respective cavities, retaining rings mounted in the reduced edges of the ratchet wheel and in the pawl ring, pivot pins extending across the pawl ring through their respective pawls and springs and into the retaining rings for holding the pawls and springs in place in their end bearings, a friction ring located between the casing and the pawl ring and having ears projecting into the offset and a screw bolt working through the offset and bearing against an ear of the friction ring for controlling the frictional contact between the pawl ring and the friction ring.

6. A shock absorber for vehicles comprising a pivot bolt, two plates having loosely engaging hubs mounted on the pivot bolt, and providing a casing; one plate being formed with an offset, a ratchet wheel mounted on the hubs between the plates, a lever secured to one plate, a lever secured to the other plate and to the ratchet wheel, a pawl ring having radial lubricant holes and carrying spring pawls and surrounding the ratchet wheel, a friction ring located between the casing and the pawl ring and having ears projecting into the offset, and a screw bolt working through the offset and bearing against an ear of the friction ring for controlling the frictional contact between the pawl ring and the friction ring.

7. A shock absorber for vehicles comprising a pivot bolt, two plates having loosely engaging hubs mounted on the pivot bolt, and providing a casing; one plate being formed with an offset, a ratchet wheel mounted on the hubs between the plates, a lever secured to one plate, a lever secured to the other plate and to the ratchet wheel, a pawl ring carrying spring pawls and surrounding the ratchet wheel, a friction ring having radial lubricant holes and located between the casing and the pawl ring and having ears projecting into the offset, and a screw bolt working through the offset and bearing against an ear of the friction ring for controlling the frictional contact between the pawl ring and the friction ring.

THOMAS LEA.

Witnesses:
GEO. S. SILZER,
ANTHONY SILZER.