A. N. LUKENS.

SPRING.

APPLICATION FILED JUNE 6, 1908.

904,490.

Patented Nov. 17, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

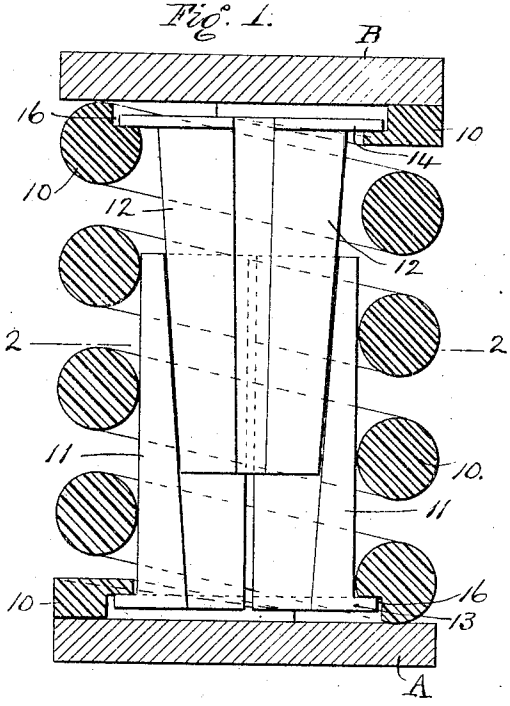


Fig. 4.

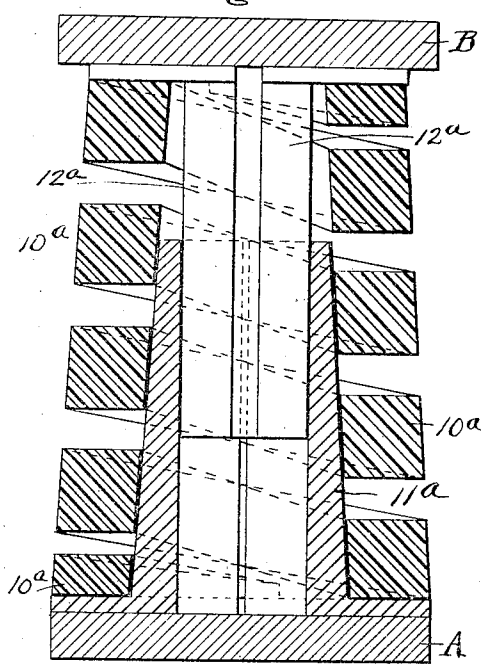


Fig. 2

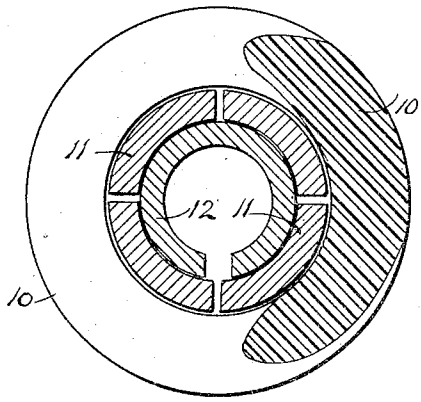
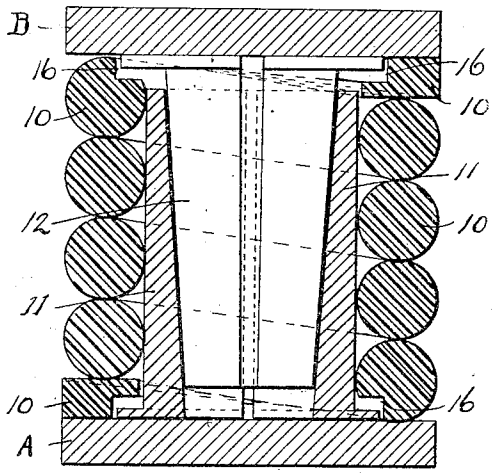


Fig. 3



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 5.

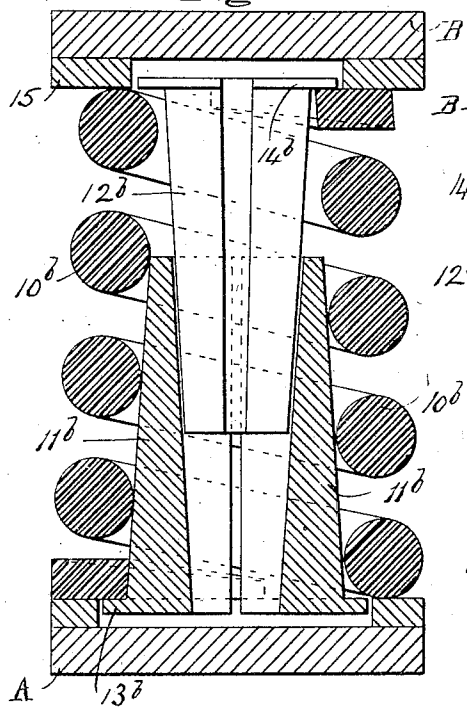


Fig. 6.

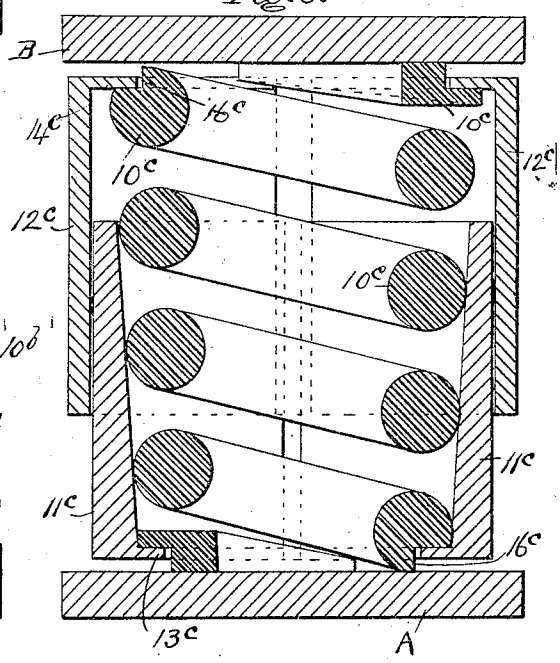
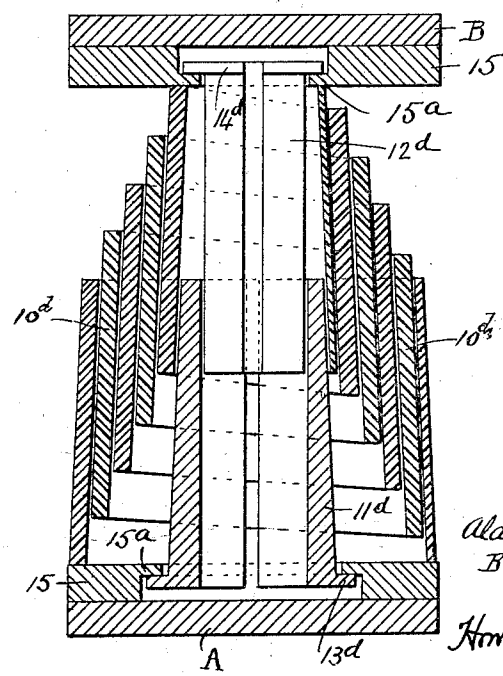


Fig. 7.



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SPRING.

No. 904,490. Specification of Letters Patent. Patented Nov. 17, 1908.

Application filed June 6, 1908. Serial No. 437,149.

To all whom it may concern:

Be it known that I, ALAN N. LUKENS, a citizen of the United States of America, and residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Springs, of which the following is a specification.

My invention relates to springs and particularly to friction springs and the object of my invention is to provide a simply constructed and efficient friction spring adapted for either draft or bearing uses.

More particularly the object of my invention is to produce a device that can be used in railway service with the same supporting and retaining devices as are now used with the ordinary standard springs, and that will act by friction to give an easy riding motion and a high resisting power with small recoil force.

In the accompanying drawings in which my device is illustrated, Figure 1 is a section of a steel coil spring to which my friction device in one form is applied; Fig. 2 is a cross section thereof on the line 2—2, Fig. 1; Fig. 3 is a section showing the position of the parts when the spring is compressed; Fig. 4 is a section showing my device applied to a bearing spring; and Figs. 5, 6 and 7 are sections showing various modified constructions in which my device is employed.

It is well known that a coiled or helical spring subjected to compression gives out as great a force on the recoil or expansion, as was absorbed in the compression. This is a great disadvantage when springs are applied to railway cars as bearing springs, and particularly so when applied as draft springs, as the sudden and powerful recoil produces shocks and jolts which are very disagreeable and unpleasant to the passengers, as well as damaging to the cars.

It is extremely desirable that a spring be capable of absorbing or deadening the ordinary shocks incident to travel, with a soft easy motion, and when called upon to absorb extraordinary or excessive shocks shall have a high resisting power and that the recoil shall be easy and gradual, not sudden and powerful, to the detriment of rolling stock or the annoyance of passengers. Several devices well known to those skilled in the art have recently been perfected, which successfully accomplish the object outlined, but which require for their use special shapes and sizes of supporting or retaining parts to keep them in place, necessitating great expense in the construction of the car and precluding their use entirely in cars already constructed. By my device I attain the desired results above mentioned and at the same time avoid a complicated or expensive construction which requires special construction of the car to receive the same.

To this end I provide, in combination with a coil spring 10, a frictional element which in Fig. 1 comprises four independent members 11, wedge shaped in cross section, adapted to abut against the follower plate A, and arranged axially in the bore of the spring and in frictional contact with the same. This frictional element may however, be of any convenient shape and comprise as many or as few members as may be desired. Coöperating with the frictional element I provide a resilient element which in Fig. 1 is shown as a truncated hollow cone 12, split to form a spring, which is adapted to abut at one end against the opposite follower plate B, while the other and tapered end enters the bore of the friction element 11. As the follower plates A and B approach each other, tensioning the spring 10, the conical resilient member 12 is forced into the bore of the friction element, spreading the same and pressing the members 11 with constantly increasing friction against the bore of the spring as the latter is brought under greater and greater tension.

The construction of the parts may be variously modified to secure this action. In Fig. 1 the coil spring 10 is of the cylindrical type, the outer faces of the frictional elements are parallel to correspond to the sides of the bore of the spring, while the inner face of the frictional element is inclined to correspond to the inclination of the outer face of the conical resilient member 12. In Fig. 4 this arrangement is reversed, the resilient member 12^a being cylindrical, as is also the inner face of the friction element 11^a, while the outer face of the latter is inclined to correspond to the inclination of the tapering coil 10^a. The action is seen to be precisely the same in effect however, since the upper members of the coil being of less diameter than the lower, tend, as the spring is compressed, to force the friction members in against the resilient member and the latter exerts precisely the same opposition to

the movement of the friction members as in the previous case it exerted in forcing these members outward against the spring. In Fig. 5 both of these types are combined by using a tapered spring 10^b, a friction element 11^b the inner and outer faces of which are both inclined, and a conical resilient member 12^b. The greatest possible friction is secured in this arrangement.

The spring 10^c may be arranged within the friction member 11^c as shown in Fig. 6, in which case the resilient member 12^c incloses the latter. The same principles of construction are employed, the spring in the example shown, being of the inverted conical type, and the inner face of the friction element being correspondingly inclined, the vertical outer face of the latter being spread against the inclosing cylindrical resilient member by the wedge action of the spring when the same is compressed.

In Fig. 7 a coi' spring of the volute type 10^d is employed, the inner conical coil of which embraces the inclined outer face of the frictional element 11^d. The inner face of the latter is vertical, corresponding to the resilient cylindrical member 12^d.

Other variations in the arrangement and construction of the various elements of the device will readily suggest themselves.

When this friction device is applied to a draft spring, it is advisable, though not necessary for its successful operation that the friction and resilient elements respectively be so mounted that their return after the compression of the spring, may be started by a slight blow. For this purpose the securing flanges 13 and 14 on the respective elements are loosely held between their respective follower plates and the spring 10 (Fig. 1) or supplemental cap plates 15 (Fig. 7), so that as the spring expands the parts are carried with it from their position against the follower plates (see Fig. 3) and the flanges thus receive a sudden blow against the spring or cap plates, which effectually breaks the frictional grip of the parts upon each other. When supplemental cap plates are used (Figs. 5 and 7) the flanges of the friction and resilient members may be held beneath flanges 15^a on said cap plates as shown in Fig. 7; or the cap plates may be used merely as a spacing means, the ends of the springs overlapping the edges thereof so as to form secondary abutments confining the flanges 13^b and 14^b as shown in Fig. 5. The cap plates may be altogether eliminated as shown in Figs. 1, 3 and 6 and the terminal coils of the spring offset at 16 to form abutments. It will of course be obvious that this loose seating of the elements 11 and 12 is not essential and that the device will operate successfully if the flanges are rigidly held against the follower plates. In fact this construction is preferred in the arrangement for bearing springs shown in Fig. 4. In this figure is also illustrated a spring with rectangular coils. This style of spring presents a greater friction surface for the member 11^a to bear against. The cross section of the bar from which the spring is made is not material in any form of the device, as any suitable bar may be used.

The simplicity of the devices which I employ will be recognized as a strong point in their favor. They can be practically produced at small cost and cannot become deranged when assembled. The frictional elements are designed to resist wear as much as possible, and the resisting element being resilient, automatically adjusts itself to what little wear may occur. The disagreeable vibration of the ordinary spring is effectually dampened and the recoil, after an excessive shock, is gradual, as the friction elements act when the spring moves in either direction. The amount of friction produced increases as the spring is compressed and decreases again as the spring is released, thus furnishing frictional or retarding force proportional to the load, the spring releasing gradually without sudden shock after being compressed.

Various modifications and applications of the device may be devised without departing from my invention and I do not limit myself to the constructions or applications shown.

I claim as my invention:

1. A friction spring comprising a coil spring and a friction member bearing against the same in combination with a resilient member tending to hold the latter in frictional engagement with the spring when the latter is under tension.

2. A friction spring, comprising a coil spring and a friction member bearing against the same in combination with a resilient member tending to increase the frictional engagement of the latter with the spring on an increase of the tension of said spring.

3. A friction spring comprising a coil spring and a friction device axially arranged with relation thereto, said device comprising a friction member bearing against the spring and a coöperating resilient member, said members being adapted to approach each other on the tensioning of the spring whereby the frictional engagement of the friction member with the spring is increased.

4. A friction spring, comprising a coil spring and a friction device axially arranged with relation thereto, said device comprising a friction member bearing against the spring and a coöperating resilient member, said members being adapted to approach each other on the tensioning of the spring whereby the frictional engagement of the friction member with the spring is increasingly

greater as the tension of the spring increases.

5. A friction spring, comprising a coil and a friction element bearing against the same, in combination with a resilient member to hold the friction member in engagement with the spring when the latter is under tension, said parts being shaped with relation to each other to produce a wedge action when the spring is tensioned, whereby the friction member is pressed with increasing friction against the spring on an increase of the latter's tension.

6. A friction spring, comprising a coil spring, a friction element adapted to be expanded or contracted in frictional engagement with said spring, in combination with a resilient element adapted to press said friction member against the spring.

7. A friction spring, comprising a coil spring, a flexible friction element in frictional engagement with said spring, in combination with a resilient element adapted to hold said friction element in a frictional engagement with said spring varying with the tension of the spring.

8. A friction spring, comprising a coil spring, a friction element having a plurality of members in frictional engagement with said spring, in combination with a resilient element adapted to hold said members in a frictional engagement with said spring varying with the tension of the spring.

9. A friction spring, comprising a coil spring, a friction member axially arranged with reference thereto and bearing against the surface of the coil, said member being wedge shaped in longitudinal cross section, in combination with a coöperating resilient member adapted to increase the frictional engagement of said friction member with said coil as the tension of the latter increases.

10. A friction spring, comprising a coil spring, a friction member axially arranged with reference thereto and bearing against the surface of the coil, in combination with a resilient member having an inclined face coöperating with said friction member to increase the frictional engagement of the latter with said coil as the tension of the latter increases.

11. A friction spring, comprising a conical coil spring, a friction member axially arranged with reference thereto and having inclined sides bearing against the surface of the coil, in combination with a coöperating resilient member having an inclined surface bearing against said friction member and adapted to increase the frictional engagement of the latter with the coil as the tension of the latter increases.

12. A friction spring, comprising a coil spring and a friction member bearing against the same in combination with a resilient member tending to hold the latter in frictional engagement with the spring when the latter is under tension, flanges on said friction and resilient members and means in connection therewith for securing said members with relation to the spring.

13. A friction spring, comprising a coil spring and a friction member bearing against the same in combination with a resilient member tending to hold the latter in frictional engagement with the spring when the latter is under tension, flanges on said friction and resilient members and means in connection therewith for securing said members with lost motion with relation to the spring.

14. A friction spring, comprising a coil spring, a friction element arranged within the base thereof, an opposed resilient element embraced thereby and adapted to hold said frictional element in engagement with the spring and means for securing said elements to oppositely moving parts.

15. A friction spring, comprising a coil spring, a friction element wedge shaped in longitudinal cross section arranged within the base thereof, an opposed resilient element embraced thereby and adapted to hold said frictional element in engagement with the spring and means for securing said elements to oppositely moving parts.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

ALAN N. LUKENS.

Witnesses:
WALTER ABBE,
L. H. GROTE.