No. 788,134. PATENTED APR. 25, 1905.

G. L. HARVEY.

SPRING.

APPLICATION FILED MAR. 2, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

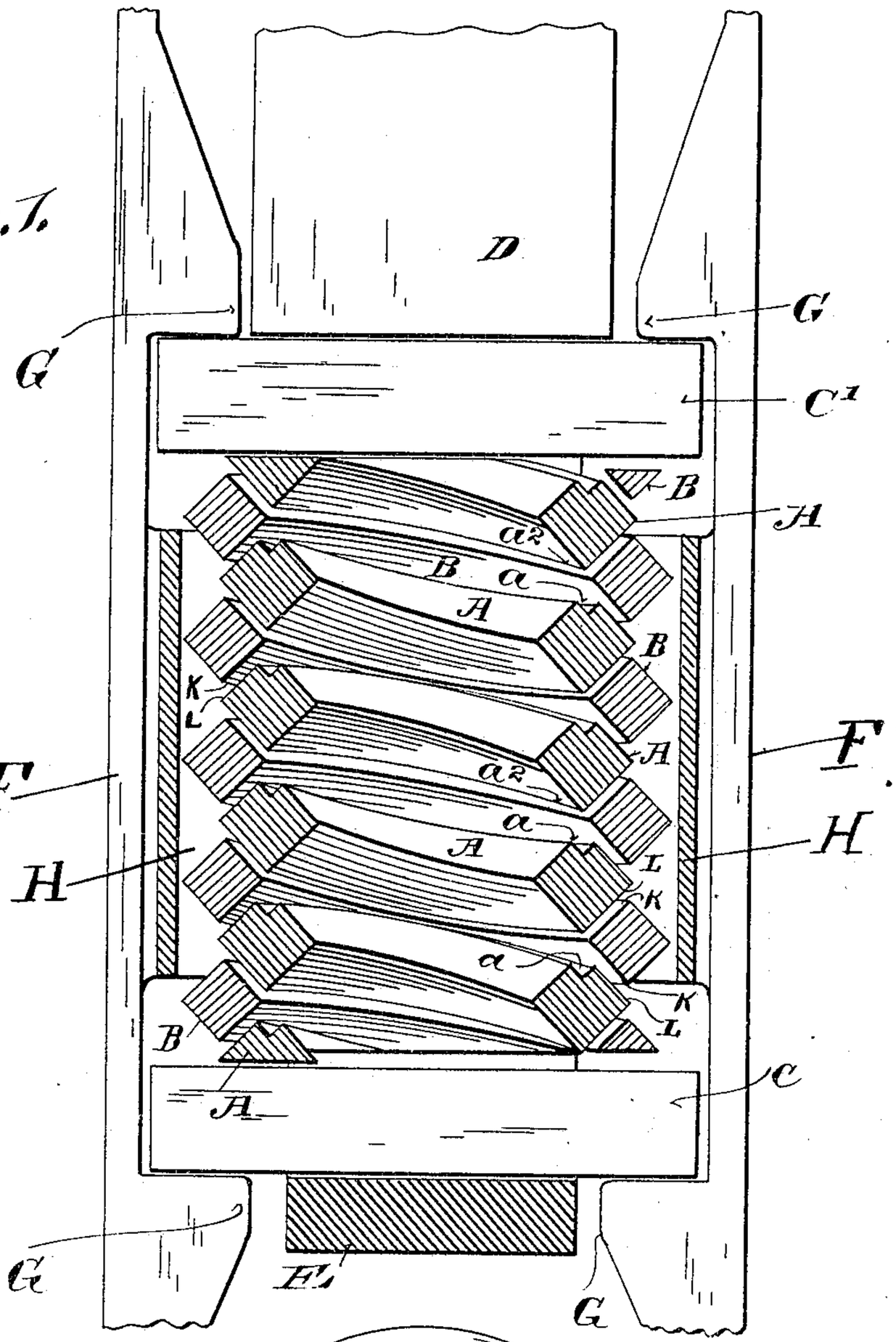
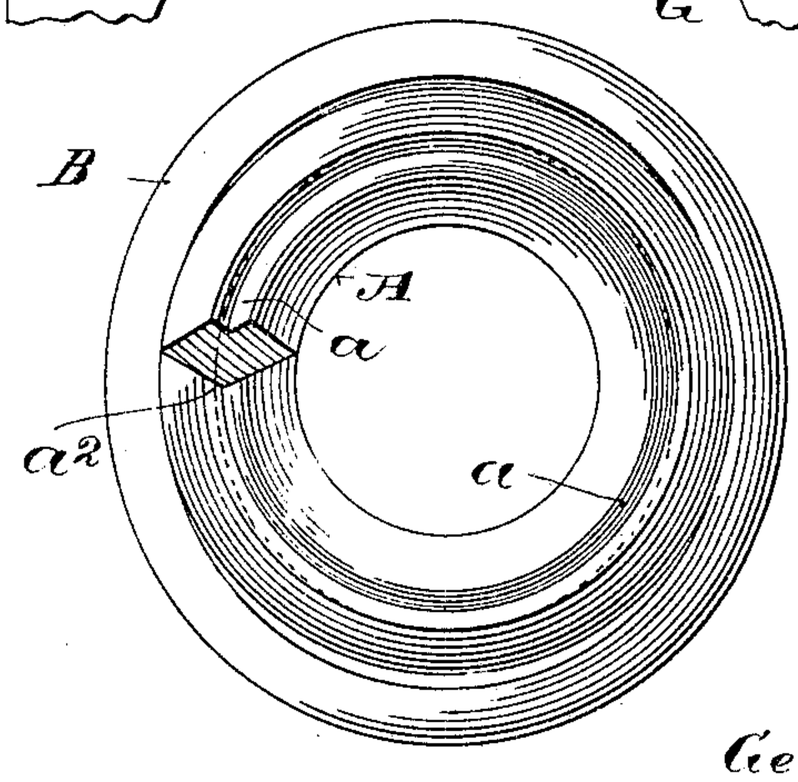


Fig. 5.



Witnesses
C. W. Benjamin
H. H. Berrigan

Inventor
George Lyon Harvey.
By His Attorneys
Betts Betts Sheffield Betts

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2 SHEETS—SHEET 2.

Fig. 2.

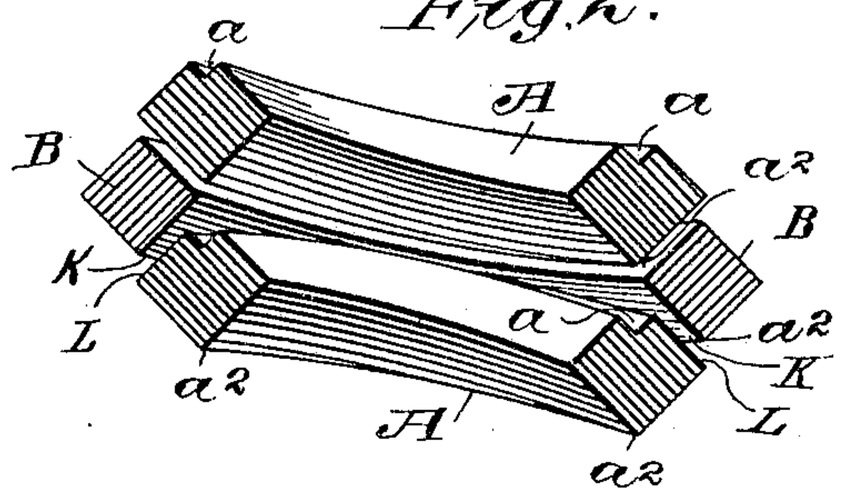


Fig. 3.

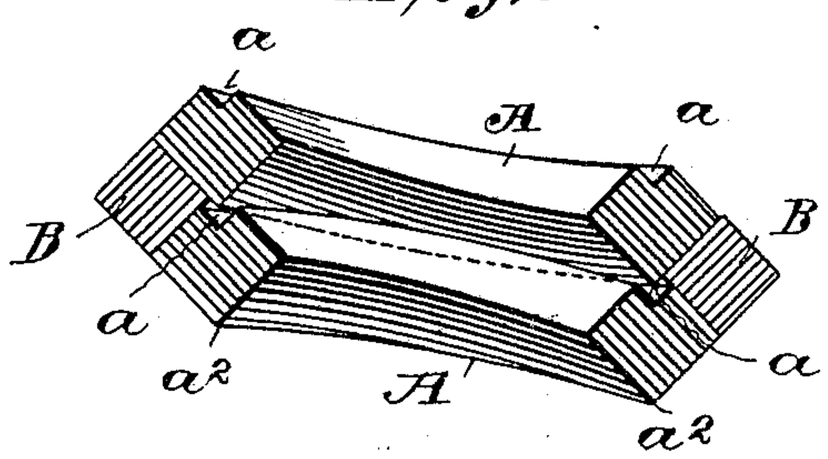
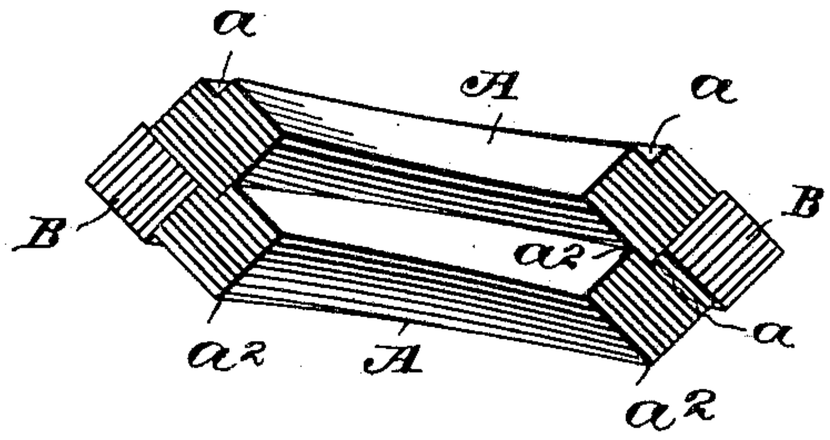


Fig. 4.



Witnesses
C. W. Benjamin
W. A. Berrigan.

Inventor
George. Lyon. Harrey.
By His Attorneys
Betts Betts Sheffield Betts

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UNITED STATES PATENT OFFICE.

GEORGE LYON HARVEY, OF CHICAGO, ILLINOIS.

SPRING.

SPECIFICATION forming part of Letters Patent No. 788,134, dated April 25, 1905.

Application filed March 2, 1904. Serial No. 196,236.

To all whom it may concern:

Be it known that I, GEORGE LYON HARVEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, (whose post-office address is 175 Dearborn street, Chicago, aforesaid,) have invented certain new and useful Improvements in Springs, of which the following is a full and true description, reference being had to the accompanying drawings, showing one embodiment of my invention.

The object of this invention is to provide a compression-spring, especially useful in connection with draw-gear or buffer apparatus for railway-cars, which is simple in construction and which will not "buckle" or "set" under load.

A distinctive feature of the present invention consists in providing the spring with means whereby when the successive loops or coils thereof are brought solidly together the coils cannot slip or slide with relation to each other. As stated in my pending applications, Serial Nos. 186,544 and 186,545, filed December 26, 1903, slipping or sliding of the successive coils or loops, resulting in "buckling" or bending of the spring under load, may be measurably prevented by providing the adjacent coils or loops with flattened contact-surfaces. The present invention relates to another way, which may be employed in addition to that described and shown in said applications, of securing the same result. In the accompanying drawings I have shown a simple and economical embodiment of this feature of my invention. This consists in providing the spring element or elements along one edge with a groove which receives a fitting part of the adjacent element or elements when the spring is compressed.

Another distinctive feature of my present invention is found in combining with the spring, when employed with draft-rigging of a railway-car, a tubular or cylindrical housing within which the spring is contained, and which housing restricts the movements of the follower-plates.

A third feature of my present invention is in forming the adjacent loops or coils of the notched spring so as to be non-parallel, as especially described and claimed in a companion application.

A fourth feature of the invention consists in employing a second coiled spring which surrounds or is surrounded by the notched spring and which frictionally engages the notched spring when the device is put under load.

The accompanying drawings show the inner and outer springs, each made of single elements. As described and shown in my pending application, Serial No. 186,544, filed December 26, 1903, either or both of the elements may consist of a succession of coils, and as described and shown in the same application the inner and outer springs may be concentric with respect to the axis of the friction device. I have, however, in the accompanying drawings shown one of the springs as being non-concentric with respect to the axis, thus combining with my present invention the especially novel feature of my application, Serial No. 186,545, also filed December 26, 1903.

In the accompanying drawings, Figure 1 represents a sectional view through one form of my new spring when employed in a draft-rigging for railway-cars. Fig. 2 is a sectional view through the form of spring of Fig. 1, the adjacent loops shown separated and a surrounding friction-spring being shown. Fig. 3 is a view similar to Fig. 2, showing the adjacent loops or coils of the spring in contact. Fig. 4 is a sectional view showing the relative position of adjacent loops or coils when the spring is fully compressed; and Fig. 5 is a top view of a friction device, showing inner and outer non-parallel springs.

An especially novel feature of my invention consists in providing a spring which may be either the sole or the principal spring of a draw-gear or buffing device with means whereby the adjacent loops or rings are interlocked or interfitted so as to prevent slipping or sliding of the loops or rings with relation to one another, and the spring, under maximum load, becomes the equivalent of a solid tube or block. To attain this result, each loop or ring A of the main spring may be provided with a groove *a* and with an edge

a^2. Thus, as shown in the drawings, the spring, which may be composed entirely of a series of connected coils or loops A, may have the groove a extending throughout the entire length of the spring and along the upper edge thereof, the contour of the groove corresponding with that of the successive loops or coils. The edge a^2 may be especially formed to engage and fit the groove or the groove especially cut so as to best engage the edge. Normally, as shown in Fig. 2, adjacent loops or rings are out of contact or engagement. Upon the application of load to the spring the groove a of one loop is engaged by the edge a^2 of the adjacent loop, and when the spring is fully loaded the successive loops or coils are converted into a rigid tube by means of tongue-and-groove connections.

It will be obvious from an examination of Figs. 2, 3, and 4 that my new spring is broadly distinguished from the prior forms of springs composed of successive loops or coils by the fact that in my form the tendency to lock the loops or coils together begins when the load upon the spring is considerable and such tendency increases with the increase of the load until upon the application of the maximum load the adjacent loops or rings are so closely locked as to be substantially integral. The tendency, just above spoken of, of the successive loops or coils to interlock or interfit during the application of the load or upon light loads will be increased when the successive coils or loops are non-parallel. This feature of construction which constitutes the broad feature of invention of a companion application Serial No. 196,235, filed March 2, 1904, for improvements in friction devices, wherein its advantages in friction devices are set out in detail, is preferably embodied in the springs of my present invention.

By reference to the drawings it will be seen that while the successive loops or coils A are wound parallel with the axis of the spring, yet adjacent loops are sometimes bent or bowed to or from each other. This non-parallelism of adjacent loops or coils may be secured in any desired way, as by forming the spring from a bar which is wave-like in form or by winding the spring upon or in a mandrel which gives the bar the wave-like form during the winding.

As a result of the employment of the structure illustrated the grooves and tongues of successive loops or coils engage more rapidly during the loading of the spring than where the several loops or coils are parallel. A further result is that the loops or coils are brought into engagement gradually, though quite solidly, and the extent of this engagement is increased with the increase of load upon the spring by reason of the fact that the successive loops or coils tend to become parallel and will finally become so when the spring is fully loaded. As fully explained in my companion application for Letters Patent, Serial No. 196,235, aforesaid, the employment of non-parallel loops or coils results also in an increase of resistance due to greater distortion of the spring and greater frictional contact during the loading of the spring.

The main spring will usually be employed in conjunction with a second spring, shown as surrounding the main spring and itself consisting of a succession of coils or loops B. The successive coils or loops B of the outer spring may be parallel, or, as clearly shown in Fig. 1, they may be non-parallel. In the latter event, as hereinafter explained, the resistance will be increased.

Preferably the inner and outer springs shall be made of heavy bar-metal with the adjacent friction contacting faces K L of the members at an angle of forty-five degrees with respect to the axis of the friction device. The friction contacting faces K L may be substantially parallel entirely around the friction device or may be non-parallel. This non-parallelism may be secured by having one of the elements—either the main spring or the secondary spring—wound or formed non-concentrically with respect to the axis of the friction device. One such combination of non-parallel springs is set forth in United States Patent No. 758,067, granted to me and dated April 26, 1904, which shows and describes an inner concentric spring and a surrounding spring formed elliptically with respect to the axis of the friction device. As explained therein, the result of employing such a combination is that the frictional resistance of the springs is increased with the increase of the load, owing to the distortion of the springs in endeavoring to become parallel. Preferably, therefore, I embody my present invention in a form of friction device which employs a main spring (which is preferably notched or provided with interfitting or interlocking means) the successive coils or loops of which are non-parallel and a secondary spring the successive coils or loops of which are also non-parallel with each other as well as non parallel with the loops or coils of the other spring.

In the embodiment of my invention shown in Figs. 1 and 2 the adjacent coils or loops of both members may be frictionally engaged when the spring is in released position or may be separated, as shown, so that under initial compression of the friction device there will be no engagement of the coils. As this compression is continued, however, the adjacent friction contact-faces of the coils come into frictional engagement, as clearly shown in Figs. 3 and 4, with the result that upon the completion of the compression the springs in addition to the longitudinal compression are radially distorted or expanded, whereby the yielding resistance to the load is increased. As explained, the successive loops or coils of

each are also further distorted and the resistance is correspondingly increased in causing the bowed parts of the bars to become parallel.

The improvements of my present application are especially useful in connection with draft-rigging for railway-cars, and in Fig. 1 I have shown my new form of spring fitted between the follower-plates operated by a car-coupling draw-bar and its yoke. C and C′ indicate the follower-plates. They are spaced apart by the spring and are respectively engaged by the tail of the draw-bar D and by the yoke E, extending rearwardly from the draw-bar. The follower-plates are held in normal position—that illustrated in Fig. 1—by stops G, but are permitted to move toward each other, sliding between the draft-beams F F or between draft-plates fitted to said beams. It is desirable that the inward movements of the follower-plates C and C′ shall be stopped when great strains are put upon the draft-rigging in order that the springs shall not be broken. To provide for thus stopping the plates, I employ a tubular stop H and fit this, as shown in Fig. 1, directly to and between the draft-sills F or between draft-plates fitted to said sills. Such tubular stop will preferably be arranged midway between the follower-plates and will be sufficiently shorter than the normal space between the follower-plates to permit either follower-plate to move about two inches before reaching the end of the tube.

While I have herein shown and described one embodiment of my present improvements, I do not, of course, desire to be understood as confining myself thereto. Obviously other forms and combinations will readily suggest themselves to skilled persons.

What I claim is—

1. In a friction device, inner and outer frictionally-contacting springs, each comprising a succession of coils, and interfitting parts for preventing the buckling of the friction device under load, substantially as described.

2. In a friction device, inner and outer frictionally-contacting springs each comprising a succession of coils, and means, carried by one of said springs, for preventing the buckling of the friction device under load, substantially as described.

3. In a friction device, inner and outer frictionally-contacting springs, each comprising a succession of coils, one of said springs having its adjacent bearing-surfaces provided with means for preventing the slipping or sliding of the coils thereof under load, substantially as described.

4. In a friction device, inner and outer frictionally-contacting springs each comprising a succession of coils and one of which is wound non-concentrically with respect to the axis of the friction device, and means for preventing the buckling of the friction device under load, substantially as described.

5. In a friction device, inner and outer frictionally-contacting springs each comprising a succession of coils, the successive coils of one of said springs being non-parallel, substantially as described.

6. In a friction device, inner and outer frictionally-contacting springs each comprising a succession of coils, the successive coils of one of said springs being non-parallel, and the springs being disposed non-parallel with respect to each other, substantially as described.

7. A spring comprising a succession of non-parallel coils and provided with means for preventing buckling of the spring under load, substantially as described.

8. In a draft-rigging for cars, follower-plates, connections between the follower-plates and a draw-bar, and yielding means comprising inner and outer non-parallel springs each provided with a succession of coils, the successive coils of one spring being non-parallel, substantially as described.

9. In a draft-rigging for cars, follower-plates, connections between the follower-plates and a draw-bar, stops permitting limited movements of the follower-plates toward each other, and yielding means, comprising inner and outer frictionally-contacting springs normally separated from each other, substantially as described.

10. In a draft-rigging for cars, draft-beams, follower-plates movable between the draft-beams, connections between the follower-plates and a draw-bar, a tube fitted between and connected with the draft-beams, said tube permitting limited movements of the follower-plates toward each other, and yielding means surrounded by said tube and fitted between the follower-plates, substantially as described.

11. A spring made of a single piece, forming a succession of non-parallel connected coils and having a continuous groove along one bearing-surface of the several coils and an engaging edge, formed along the coöperating bearing-surface of said coils, substantially as described.

12. A spring comprising a succession of non-parallel coils, said coils being provided with coöperating grooves and edge parts upon the adjacent bearing-surfaces, substantially as described.

13. A spring comprising a succession of coils which are diamond-shaped in section, said coils being provided along one bearing-surface with a groove adapted to engage the edge of the other bearing-surface, substantially as described.

14. A spring comprising inner and outer frictionally-contacting coiled members, one of which is provided with coöperating grooves and edge parts upon its adjacent bearing-surfaces, substantially as described.

15. A spring comprising inner and outer frictionally-contacting members, one of which is made up of a succession of coils provided with coöperating grooves and edge parts upon

its adjacent bearing-surfaces, substantially as described.

16. A spring comprising inner and outer frictionally-contacting members, one of which is made up of a succession of non-parallel coils provided with coöperating grooves and edge parts upon its adjacent bearing-surfaces, substantially as described.

17. A spring comprising inner and outer frictionally-contacting members, one of which is made up of a succession of non-parallel coils, substantially as described.

In witness whereof I have hereunto signed my name the 27th day of February, 1904.

GEORGE LYON HARVEY.

In presence of—

GEORGE WILLIAM EDEN FIELD,
HAROLD CLINTON FENEE.