

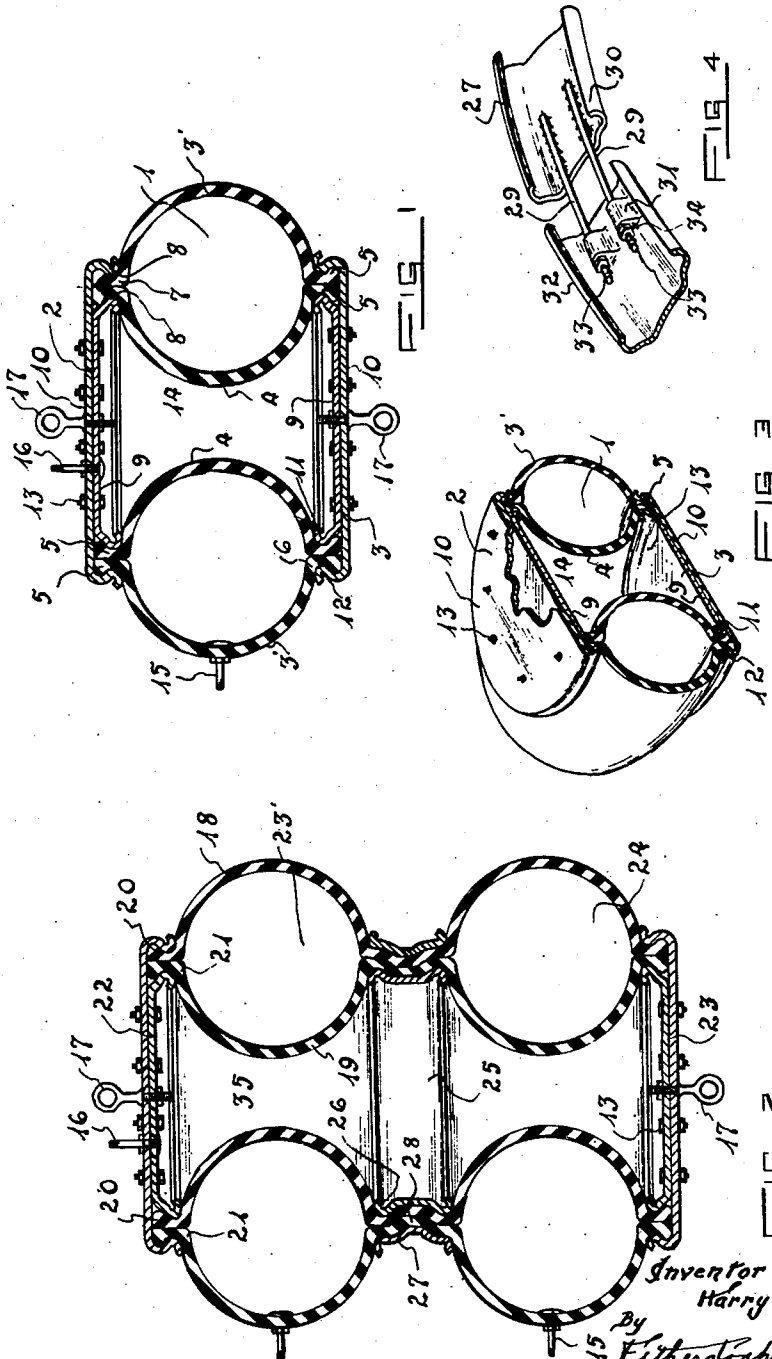
March 22, 1955

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2,704,665

PNEUMATIC SPRING ASSEMBLIES

Filed Jan. 19, 1953



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2,704,665

PNEUMATIC SPRING ASSEMBLIES

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Application January 19, 1953, Serial No. 331,923

5 Claims. (Cl. 267—65)

My invention relates to new and useful improvements in pneumatic spring assemblies, the principal object of my invention being to provide a device of the character herewithin described whereby a pneumatic spring is provided which is equally efficient in compression and in tension.

A further object of my invention is to provide a device of the character herewithin described which includes means whereby the stiffness of the air spring or pneumatic spring may be controlled readily and easily.

Still another object of my invention is to provide a device of the character herewithin described which is readily adaptable for use in all conditions requiring compression and tension spring control.

A still further object of my invention is to provide a device of the character herewithin described which is adaptable for use in motor vehicles and which, furthermore, practically eliminates any rolling tendency.

A still further object of my invention is to provide a device of the character herewithin described which can be utilized in either a single or multiple manner.

A further object of my invention is to provide a device of the character herewithin described which is extremely simple in construction, economical in manufacture and otherwise well suited to the purpose for which it is designed.

With the foregoing objects in view and such other objects and advantages as will become apparent to those skilled in the art to which this invention relates as this specification proceeds, my invention consists essentially in the arrangement and construction of parts all as hereinafter more particularly described, reference being had to the accompanying drawings in which:

Figure 1 is a vertical section through a single unit of my device.

Figure 2 is a vertical section through a multiple unit of my device.

Figure 3 is a fragmentary partly sectioned perspective view of a single unit in my device.

Figure 4 is an enlarged fragmentary perspective view showing the clamping means of the outer ring of the multiple device.

In the drawings like characters of reference indicate corresponding parts in the different figures.

Proceeding now to describe my invention in detail, it will be seen upon reference to the accompanying drawings that I have provided an annular air chamber collectively designated 1 clamped between two pairs of plates collectively designated 2 and 3. The air chamber 1 is in the form of an endless tube and is formed in two sections, an outer circumferential portion 3' and an inner circumferential portion 4, and it is desirable that these two sections be moulded from a material such as moulded rubber reinforced with nylon cord so that a tube is formed which, although flexible, is not resilient. The two portions 3' and 4 are concavo-convex when viewed in cross-section and are formed with anchoring beads 5 around the upper and lower perimetrical edges 6 thereof, said beads extending substantially at right angles from said edges.

These beads when viewed in cross-section will be seen to be secured to the portions 3' and 4 by a narrow throat 7 thus forming an annular groove or depression 8, the purpose of which will hereinafter become apparent.

When the portions 3' and 4 are placed together as illustrated in Figures 1 and 3, an endless, flexible-walled air chamber is thus provided. The pairs of plates 2 and

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3 which clamp the two portions 3' and 4 in position comprise an inner disc 9 and an outer disc 10, and each of these discs is provided with inturned gripping flanges 11 and 12 respectively, which are shaped to complement the configuration of the aforementioned beads 5 as clearly illustrated in Figure 1.

It will be seen from Figure 1 that the outer discs 10 are of a diameter larger than the inner discs 9 and that when in position, the discs 9 and 10 are in interfacial relationship and that the flanges 11 and 12 embrace and grip the beads 5 thus sealing the air chamber 1. The pairs of discs 9 and 10 are held together by a series of bolts 13 and when assembled the discs enclose and define a further air chamber 14 therebetween and bounded perimetrically by the inner circumferential portion 4 of the air chamber 1.

A conventional air valve 15 situated within the outer circumferential portion 3' of the air chamber 1 permits air under pressure to be introduced within said air chamber and a further air valve 16 extending through one of the pairs of discs 2 permits air under pressure to be introduced into the enclosed air chamber 14, but it will be understood that there is no communication between air chambers 1 and 14.

Finally, anchoring means in the form of eye bolts 17 are provided secured to the pairs of discs 2 and 3 whereby the assembly may be secured in the location in which it is to be used, but it will be appreciated that any other means may be provided for this securement.

Figure 2 illustrates a further development in my device in which a plurality of air chambers are formed and it will be seen that the construction thereof is similar to that hereinbefore described. Outer and inner circumferential portions 18 and 19 are formed from material similar to that utilized in the previous embodiment and anchoring beads 20 are provided on the upper and lower perimetrical edges 21 thereof.

Pairs of anchoring plates 22 and 23 similar in all respects to the anchoring plates 2 and 3 hereinbefore described, hold the sections together in a similar manner.

However, in this embodiment it will be seen that two air chambers 23' and 24 are formed, although it will be appreciated that any number may be formed in a similar manner. These air chambers 23' and 24 are separated by an annular clamp assembly collectively designated 25, which consists of an inner annular ring 26 having a cross-section clearly illustrated in Figure 2 and an outer annular ring 27 having a complementary cross-section also illustrated clearly in Figure 2.

The inner ring 26 nests within the outer ring 27 with the parts 28 of the portions 18 and 19 clamped therebetween. Figure 4 illustrates a conventional clamp utilized with the outer ring 27 in order to clamp the assembly tightly together and prevents air passing from the chamber 23' to the chamber 24. This clamp consists of bolts 29 secured to the end 30 of the ring 27, said bolts passing through lugs 31 secured on the end 32 of the ring 27. The end 33 of these bolts are threaded and are engagable by clamp nuts 34 thus permitting the ends 30 and 32 to be drawn up closely together.

In operation, the unit is secured by means of the eye bolts 17 or other means provided between the two parts requiring spring control such as the chassis and axle assemblies of a motor vehicle (not illustrated).

The air chambers 1 and 14 are inflated to the desired pressure and it will be appreciated that if the device is loaded under compression, the air will compress and resist said compression. Alternatively, if the parts separate thus placing the pneumatic spring assembly under tension, then due to the reinforced moulded construction of the air chamber, the air therein will still be under compression as the walls thereof are not resilient.

The air pressure in the inner chamber 14 will control the stiffness or softness of the spring, the higher the pressure therein, the greater the resistance to movement of the spring assembly.

A similar situation occurs with respect to reconstruction shown in Figure 2, as once again the pairs of plates 22 and 23 enclose and define an inner air chamber 35, also inflatable as desired through an air valve 16.

In conclusion, the perimetrical or annular construction

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of this device practically eliminates any rolling tendency when in use, as if one side of the device compresses, then the other side must be under tension and, due to the non-resiliency of the construction, this separating or tensioning motion will be resisted by the air pressure therewithin.

Since various modifications can be made in my invention as hereinabove described, and many apparently widely different embodiments of same made within the spirit and scope of the claims without departing from such spirit and scope, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

What I claim as my invention is:

1. A pneumatic spring assembly comprising in combination an annular flexible-walled, air chamber, diametrically positioned annular anchoring beads formed on the walls of said chamber, a pair of anchoring plates attached to each of said beads, one pair being on the upper side walls of said chamber and the other pair being on the lower side walls thereof when in situ, means securing the plates of each pair together, said pairs of plates enclosing and defining an inner air chamber within said annular air chamber, said pairs of plates including an inner disc and an outer disc, said inner disc having an in-turned gripping flange around the perimeter thereof, said outer disc also having an in-turned gripping flange around the perimeter thereof, said discs, when in situ, being secured together in interfacial relationship with said gripping flanges embracing and holding said anchoring beads.

2. The device according to claim 1 in which said flexible-walled, air chamber consists of an outer circumferential portion and an inner circumferential portion, said portions being concavo-convex when viewed in cross-section, said anchoring beads being formed on the upper and lower perimetrical edges of said portions.

3. The device according to claim 2 which includes

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valve means extending through the wall of said outer portion and further valve means extending through one of said pairs of plates.

4. A pneumatic spring assembly comprising in combination a plurality of annular flexible-walled air chambers one above the other, diametrically positioned annular anchoring beads formed on the upper wall of the uppermost air chamber and on the lower wall of the lowermost air chamber, a pair of anchoring plates attached to each of said beads, means securing the plates of each pair together, said pairs of plates enclosing and defining an inner air chamber within said annular air chambers, and means to separate said air chambers one from the other, said plurality of air chambers comprising an outer circumferential portion and an inner circumferential portion, said means to separate said air chambers one from the other comprising a pair of annular clamp assemblies, said clamp assemblies including an inner annular ring and an outer annular ring, said outer annular ring incorporating clamping means clamping the flexible walls around said inner annular ring.

5. The device according to claim 4 which includes valve means extending through the wall of each of said outer portions and further valve means extending through one pair of said plates.

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