

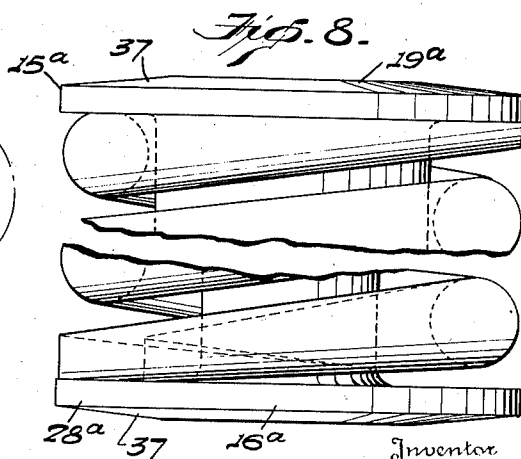
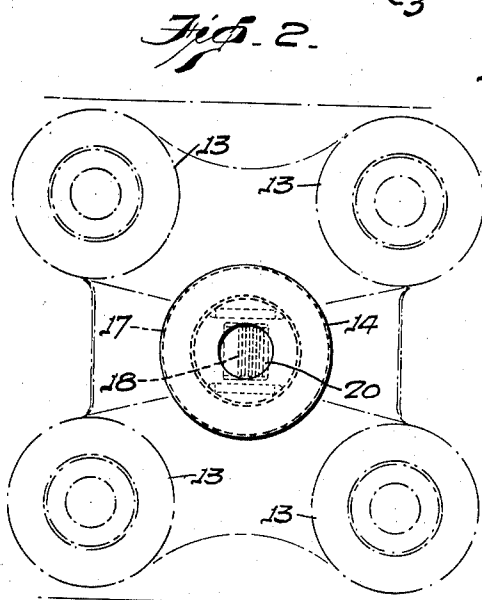
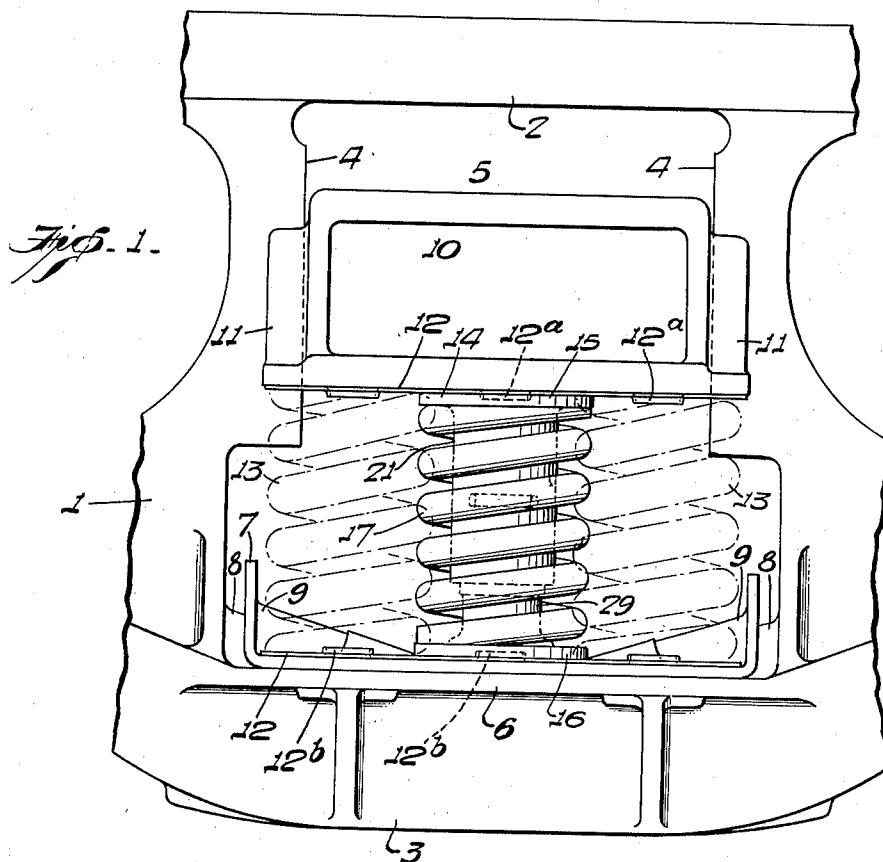
April 23, 1940.

D. S. BARROWS ET AL
RAILWAY TRUCK SPRING UNIT

2,198,261

Filed Nov. 30, 1936

2 Sheets-Sheet 1



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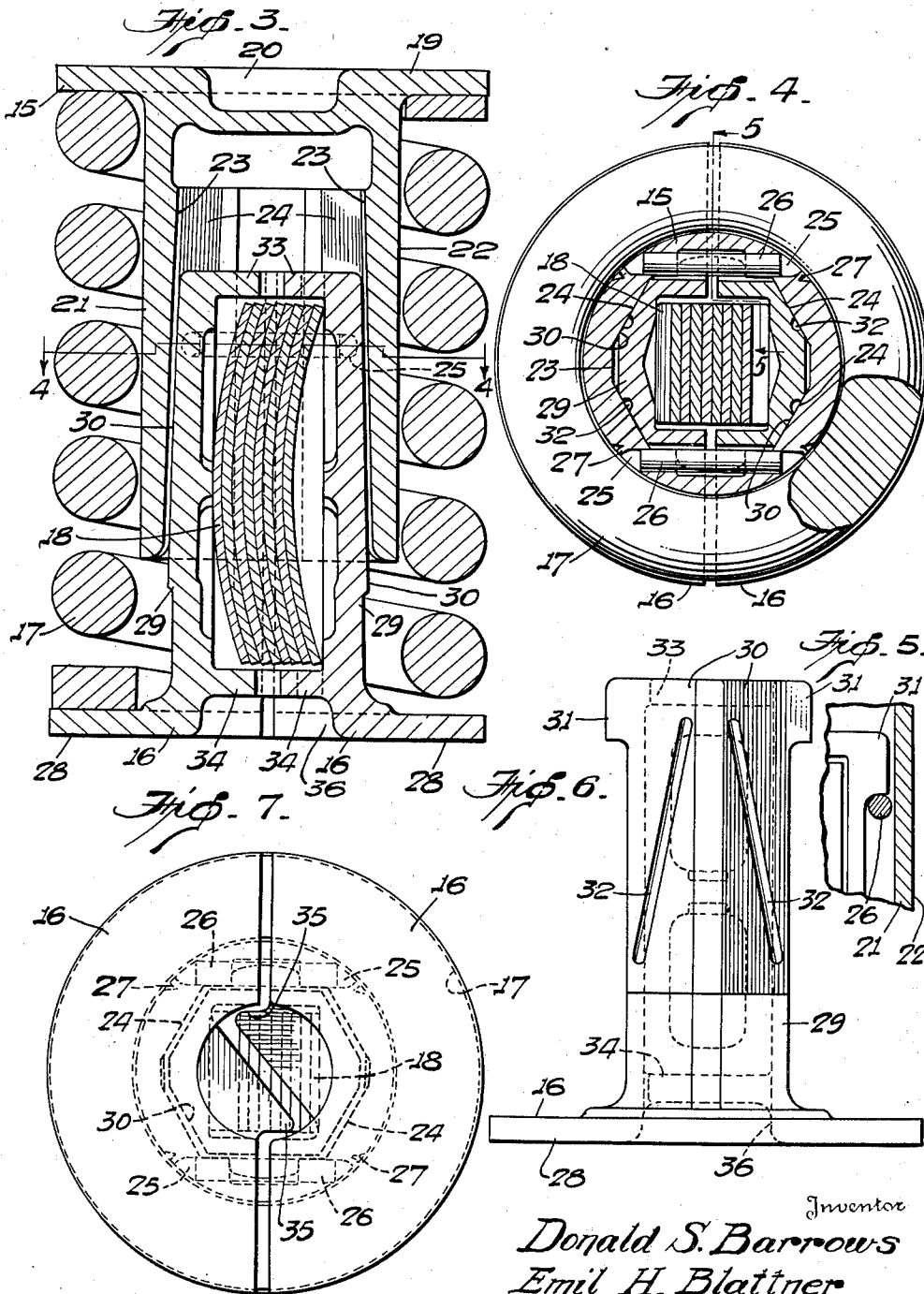
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UNITED STATES PATENT OFFICE

2,198,261

RAILWAY TRUCK SPRING UNIT

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Application November 30, 1936, Serial No. 113,495

24 Claims. (Cl. 267—9)

The present invention pertains to railway trucks with specific reference to the resilient support of a truck bolster by its associated side frames, and the substitution of a friction unit for one or more of the usual helical springs of each bolster spring group.

The principal object of the invention is the provision of a friction unit to be used in combination with a plurality of conventional bolster springs, said friction unit having a snubbing or dampening effect upon the vibration period of the conventional springs with which it is grouped.

It is well known that conventional springs of a certain size have a substantially uniform period of vibration and that at certain speeds of a railway vehicle, external impulses, as from track joints or other regularly recurring irregularities in track or roadbed, will synchronize with the normal vibrations of the conventional spring group tending to amplify progressively the vertical movement of such springs, which amplification, if continued, causes the springs to go solid under compression and, on recoil, to expand beyond their normal height under the load being carried. This excessive spring movement tends to damage the springs themselves as well as all parts of the car structure and lading. It also results in severe impacts being delivered to the rails. If this excessive spring movement is alternating between the groups on either side, it also imparts a rocking or swaying motion to the superimposed bolster and the associated car body which, if continued, may cause derailment of the car or damage to lading.

With the foregoing in mind, the present invention provides for a combination bolster spring group including one or more friction units, the effect of such unit or units being to retard progressively the vibration period of the group and to break synchronism with the recurrent external impulses, thereby preventing the excessive spring movement above described.

Another object of the invention is to provide within the unit means of developing frictional resistance which means are not directly related to the movement of the helical spring surrounding and forming a part of such unit.

These and other objects will become obvious to those skilled in the art by referring to the accompanying drawings which form a part of the present description, wherein:

Figure 1 is a fragmentary side elevation of a railway truck embodying a form of the present invention.

Figure 2 is a plan view of the nest of bolster-supporting springs illustrated by Figure 1 which includes the friction unit of the present invention.

Figure 3 is a vertical cross-sectional view of the friction unit, illustrated in Figures 1 and 2,

being shown removed from the associated truck parts.

Figure 4 is a horizontal sectional view taken along the line 4—4 of Figure 3 in the direction of the arrows.

Figure 5 is a sectional view taken along the lines 5—5 of Figure 4 in the direction of the arrows.

Figure 6 is a side elevation of one of the friction shoes forming a part of the friction unit.

Figure 7 is a bottom view of the friction unit of Figure 3.

Figure 8 is a fragmentary elevational view of a modified form of the friction unit shown by Figures 1 to 7, inclusive.

Referring now in detail to the drawings, wherein like reference characters designate like parts, the numeral 1 generally designates a side frame of which a fragmentary portion is illustrated. The side frame preferably comprises an upper or compression member 2 vertically spaced from a bottom or tension member 3 and connected by bolster column guides 4 which, by uniting the intermediate portions of the compression and tension members, provides a window opening 5 for the reception of a portion of a truck bolster. The fragmentary portion of the side frame illustrated is of the integral "double truss" type, such as described and claimed in the Letters Patent numbered 1,652,808, granted to Donald S. Barrows on December 13, 1927, wherein the intermediate portion 6 of the tension member forms a seat for the spring plank 7. Projecting inwardly of the window opening 5 are diagonal reinforcing members 8 disposed along the longitudinal center line of the side frame. It will, however, be understood that the invention need not be limited to this particular design of side frame.

A spring plank 7 may be provided, as illustrated, said plank being supported by the intermediate portion 6 of the tension member, and provided with oppositely disposed corrugations 9 engaging the diagonal reinforcing members 8, thereby interlocking the spring plank 7 with the associated side frame. The end portion 10 of the bolster, extending within the window opening 5 of the side frame, is spaced vertically from the intermediate portion 6 of the tension member and has oppositely disposed lugs 11 overlying and in sliding engagement with the bolster column guides 4. If so desired, the railway truck may be provided with upper and lower spring plates 12 having properly spaced embossed portions 12^a and 12^b for the retention of the spring unit within the side frame, whilst the spring plates may be dispensed with and properly spaced retaining means formed on the bolster and on either the spring plank or side frame to retain the spring group within the window opening.

A group of conventional springs 13, shown in

Figures 1 and 2 by dot and dash lines to more clearly illustrate the present invention and which may be of either single or double coil design to suit the capacity of the truck and arranged in any desired combination, is positioned between the tension member 3 and the end portion 10 of the bolster to resiliently support the bolster from the associated side frame. In order to assist in resiliently supporting the bolster from the side frame and further to dampen the vibrations of the conventional springs 13, a friction unit 14 is introduced to function in combination with the conventional springs. If a single friction unit is employed in each spring group it is preferably located within the spring group on one side frame in balanced relation with the like friction unit on the opposite side frame, but it will be understood, however, that the position of the friction unit, as well as the number of units employed in combination with conventional springs, is entirely optional.

The friction unit 14 preferably comprises a sleeve 15, a plurality of friction shoes 16, coil spring 17 and a plurality of arcuate plates 18. The sleeve 15 comprises a substantially transversely extending flange 19 which, when in assembled position within a railway truck, is preferably in bearing relation with the bottom portion of the bolster end 10 or top spring plate 12. The central portion of the top flange is recessed, as at 20, to permit the entrance of the embossment 12^a of the spring plate therein and thereby retain the top portion of the friction unit in position.

Projecting from one side of the flange 19 is a tubular member 21 the outer surface 22 of which is preferably parallel with the vertical axis of the unit and circular in cross-section in a plane parallel to the horizontal axis of the unit. The inner surface 23 of the tubular member, which forms a part of the friction element of the unit, provides a plurality of pairs of bearing walls 24 oppositely disposed from one another and preferably converging toward the flange 19. In the particular embodiment of the invention illustrated the inner surface of the tubular member presents a substantially octagonal design in cross-section, it being understood that the invention need not be so limited to this particular design.

Apertures 25 are preferably provided in the tubular member intermediate the ends thereof for the reception of spaced horizontally disposed pins 26 which intersect the inner surface 23 of the tubular member. The outermost portions of the apertures are fouled, as at 27, thereby preventing accidental removal of the pins.

Arranged to form other portions of the frictional elements of the unit is a pair of counter-part friction shoes 16 each having substantially semi-circular flanges 28 which are, where the device is assembled within a railway truck, positioned on the spring plate 12 or intermediate portion 6 of the side frame. Stems 29, extending from one side of the semi-circular flanges to within the tubular member, have portions of the outer surfaces thereof presenting spaced walls 30 which are co-planar and adapted to engage bearing walls 24 of the tubular member. Shoulders 31 projecting outwardly of the stems, preferably adjacent the ends opposed from the semi-circular flanges, are arranged to engage the pins 26, thereby restricting the movement of the stems outwardly of the sleeve to maintain the parts of the unit in assembled relation.

The walls 30 of the stems may be, if desired,

provided with diagonally disposed grooves 32 recessed therein to accommodate inserts formed of lead or any other desirable metal so that the engaging walls 24 and 30 may have the lead distributed therebetween in order to fill any irregularities on said walls and permit the frictional resistance to be more uniform.

The stems 29 have, adjacent the extremities thereof, spaced webs 33 and 34 which, together with the stems, form a housing for the reception of a plurality of vertically disposed, transversely acting precurved plates or leaf spring 18 when the shoes are assembled. The spring 18 is adapted to engage the inner portion of one of said stems adjacent the ends of said spring and the opposite stem adjacent its center to force the friction shoes apart, thereby urging the walls 30 of the stems against the walls 24 of the sleeve. It will be observed that, with walls 30 and 24 angularly disposed as shown with respect to the vertical axis of the unit, the friction shoes will move toward one another upon the reduction in height of the unit along its vertical axis which will result in the leaf spring 18, interposed between the stems, being additionally energized. The built-up energy within the leaf spring 18 forces the friction shoes apart and into contact with the bearing walls of the sleeve, and since, in the form of invention illustrated, the compression of the leaf spring 18 is but slightly augmented on the compression of the unit, the frictional resistance will be substantially constant throughout the range of movement of the unit. The webs 33 forming the top wall of the spring housing and the webs 34 forming the bottom wall of the leaf spring housing have portions 35 overlapping each other in spaced relation, thus positioning the opposing edges of the webs 33 and 34 respectively, at an angle to the plane of the plates or leaves forming the spring 18, as disclosed in Figure 7 of the drawings, in order to prevent the accidental displacement of the leaf spring. The webs 34 are located in a plane removed from the plane of the semi-circular flanges 28, thereby forming a recess 36 in the shoes to receive the embossment 12^b in order to retain the friction shoes or the bottom portion of the friction unit within the window opening.

A spring 17 surrounds the tubular member and partially encloses the stems in spaced relation thereto and bears against the flange 19 of the sleeve and the semi-circular flanges 28 of the friction shoes, thereby providing a resilient means adapted to assist the conventional springs 13 in supporting the bolster from the associated side frame as well as maintain the friction unit 14 in expanded position, so that the overall height of the unit, along its vertical axis, will correspond to the height of the conventional springs. The spring 17 also performs the function of overcoming the frictional resistance between the friction shoes and sleeve in order to return the parts to normal upon release of a compressive load, thereby changing the height of the friction unit to agree with the height of the associated conventional springs.

In the modified form of the present invention, a fragmentary portion of which is illustrated by Figure 8 of the drawings, the top flange 19^a of the sleeve 15^a and the semi-circular flanges 28^a of the friction shoes 16^a gradually reduce in thickness from adjacent the center portions thereof to their peripheral edges. This gradual reduction in thickness presents tapered bearing

surfaces 31 normally spaced from the adjacent spring plates to allow the friction unit to freely rock about its vertical axis in accordance with the transverse and lateral movement of the bolster end within the window opening.

It will, of course, be understood by those skilled in the art that various changes may be made in the construction disclosed by the accompanying drawings and described by the present specification without departing from the scope of the appended claims as this construction was shown and described merely as a means of exemplification.

We claim:

1. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes fitting within the said tubular portion, each of said shoes being provided with a flange portion adjacent one end, spring means interposed between the flange of the first-named member and the flange portions of the friction shoes, friction spring means interposed between the friction shoes and directly contacting both shoes for maintaining the same in frictional contact with the interior of said tubular portion during relative movement of said tubular portion and said friction shoes, and lugs on one of said members for engagement with means removably associated with the other of said members so as to retain the members in assembled relation.

2. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange the inner portion thereof presenting a plurality of spaced pairs of angularly disposed walls, said other members comprising a pair of counterpart friction shoes fitting within said tubular portion, each of said shoes being provided with a flange portion adjacent one end, spring means interposed between the flange of the first-named member and the flanges of the friction shoes, and longitudinally arranged and transversely acting means for maintaining each shoe in frictional contact with an adjacent pair of said angularly disposed walls of said tubular portion during relative movement of said tubular portion and friction shoes, said shoes having inwardly directed webs provided with opposing edges arranged at an angle to the normal juncture between said shoes for retaining the transversely acting means in assembled relation.

3. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes fitting within said tubular portion each of said shoes being provided with a flange portion adjacent one end, spring means interposed between the flange of the first-named member and the flange portions of the friction shoes, vertically disposed, transversely acting spring means interposed between the friction shoes for maintaining the same in frictional contact with the interior of said tubular portion during relative movement of said tubular portion and said friction shoes, and means on said flanges to allow the unit to rock about its vertical axis.

4. In a railway truck, the combination with a

spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes each of which is provided with a flange portion having a stem projecting from one side thereof to within the tubular portion, a coil spring interposed between the flange of the first-named member and the flanges of the friction shoes, spring means interposed between the stems of the friction shoes for maintaining the same in frictional contact with the tubular portion during relative movement of said friction shoes and tubular portion, and transversely extending means for maintaining said friction unit in assembled relation.

5. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes fitting within said tubular portion, each of said shoes being provided with a flange adjacent the lower portion thereof, spring means interposed between the flange of the first-named member and the flange portions of the friction shoes, a leaf spring interposed between and directly contacting the friction shoes for maintaining the same in frictional contact with the tubular portion during relative movement of said tubular portion and said friction shoes, and removable means associated with one of said members for engagement by the other of said members so as to retain the unit in assembled relation.

6. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes each of which is provided with a flange adjacent the lower portion thereof, spring means interposed between the flange of the first-named member and the flange portions of the friction shoes, a plurality of curved spring plates having their major axes disposed longitudinally of said shoes and interposed therebetween for maintaining the same in frictional contact with the tubular portion during relative movement of said tubular portion and said friction shoes, and means removably associated with said tubular portion for engagement by each shoe so as to limit the expansive movement of said unit.

7. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes each of which is provided with a flange and a stem portion projecting within the tubular portion from one side only thereof, helical spring means interposed between the flange of the first-named member and the flange portions of the friction shoes, arcuate spring plates adapted to engage both friction shoes for maintaining the same in contact with the interior of said tubular member, coacting means spaced from said springs and formed on the tubular portion and on the friction shoes to further energize the said arcuate plates during relative movement of said members toward each other, and means on said flanges to permit the unit to rock about its vertical axis.

8. In a railway truck, the combination with

a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members
 5 comprising a pair of counterpart friction shoes each of which is provided with a flange portion having a stem projecting from one side thereof to within the tubular portion, a coil spring interposed between the flange of the
 10 first-named member and flanges of the friction shoes, a leaf spring interposed between the stems of the friction shoes for maintaining the same in frictional contact with the tubular portion during relative movement of the friction
 15 shoes and tubular portion, and means secured to the tubular member adapted to be engaged by the friction shoes for maintaining said friction unit in assembled relation.

9. In a railway truck, the combination with a
 20 spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange having a transversely disposed pin extending therethrough, said other members
 25 comprising a pair of counterpart shoes having portions fitting within and frictionally engaging said tubular portion and a flange adjacent one end of said shoes, said shoes also having a shoulder adapted to engage said pin for limiting rela-
 30 tive movement in one direction between said shoes and tubular portion, spring means interposed between the flange of the first-named member and the flange portions of the friction shoes, the pair of friction shoes providing a
 35 housing to secure the means for maintaining said shoes in frictional contact with the interior of said tubular portion during relative movement of said tubular portion and friction shoes, said last-named means comprising a plurality of
 40 nested spring plates.

10. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion having a cylindrical outer surface and an angularly disposed inner surface projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes having angularly disposed outer surfaces in bearing relation with the inner surfaces of said tubular portion, each shoe being provided with a flange portion, coil spring means interposed between the flange of the first-named member and the flange portions of the friction shoes, the pair of friction shoes including
 45 spaced webs having closely associated opposing edges to form a housing for a leaf spring, said leaf spring maintaining said shoes in frictional contact with the interior of said tubular portion during relative movement of said tubular portion and friction shoes.
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11. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes each of which is provided with a flange portion, spring means interposed between the flange of the first-named member and the flanges of the friction shoes, spring means interposed between the friction shoes for maintaining the same in frictional contact with the interior of said tubular portion during relative movement of said tubular member and said friction shoes, and means provided on the flange of the first-named member and

flange portions of the friction shoes to permit the friction unit to rock about its vertical axis.

12. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes each of which is provided with a flange portion, a coil spring interposed between the flange of the first-named member and the flange portions of the friction shoes, the pair of friction shoes providing a housing for a leaf spring which maintains said shoes in frictional contact with the interior of said tubular portion during relative movement of said tubular portion and friction shoes, and means on the flange of the first-named member and the flange portion of the friction shoes permitting the friction unit to rock about its vertical axis.
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13. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes each of which is provided with a flange portion, a coil spring interposed between the flange of the first-named member and the flanges of the friction shoes, said flanges of the first-named member and of the friction shoes decreasing in thickness from adjacent the central portion thereof toward the outer edges to permit the friction unit to rock about its vertical axis.
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14. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes each of which is provided with a flange portion, a stem projecting from one side only of said flange portion having spaced web portions extending outwardly thereof, a coil spring surrounding the tubular portion in spaced relation thereto and interposed between the flange of the first-named member and the flange portions of the friction shoes, and a plurality of curved plates interposed between the stems and spaced webs of the friction shoes and in direct contact with said shoes for maintaining the latter in frictional contact with the tubular portion during relative movement of said tubular portion and said friction shoes, said spaced webs having opposing edges arranged at an angle to the plane of the curved plates to thereby retain the plates in position.
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15. In a railway truck, the combination with a spring group, of a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, the inner surface of said tubular portion presenting a plurality of pairs of spaced angularly disposed walls, said other members comprising a pair of counterpart friction shoes each of which is provided with a flange portion and a stem projecting from one side of the said flange portion, each of said shoes having a pair of spaced angularly disposed walls adapted to engage a pair of walls of the tubular portion, spring means interposed between and directly engaging the said stems for maintaining the same in frictional contact with the tubular portion, and additional spring means interposed between the flange of the first-named member and the flange portions of the friction shoes for resisting the approaching movement of said
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flanges, one of said members having a removable means associated therewith for engagement by the other of said members to thereby limit the expansive movement of said unit.

16. A friction unit comprising a barrel member open at one end and provided at its opposite end with an outwardly projecting flange, a pair of flanged counterpart members provided with portions adapted to fit within the said barrel member, a longitudinally extending transversely acting spring interposed between said portions of said counterpart members for maintaining the outer surfaces thereof in frictional engagement with adjacent surfaces formed on the interior of said barrel member, a spring surrounding said barrel member and engaging at its opposite ends the said flanges, and means on said flanges for allowing the unit to rock about its vertical axis.

17. A friction unit comprising a sleeve, a pair of counterpart friction members adapted to fit within said sleeve, a leaf spring interposed between said counterpart members, and means for retaining said spring in assembled position, said means involving webs formed on each of said members, said webs having opposing edges arranged at an angle to the plane of said spring leaves.

18. A friction unit comprising a sleeve, a pair of counterpart friction members having portions adapted to fit within said sleeve, a leaf spring housed within said sleeve and interposed between said counterpart members, means for maintaining said leaf spring against displacement involving webs having opposing spaced edges arranged at an angle to the plane of the spring leaves and formed on each of said counterpart members adjacent the ends of said leaf spring, portions of the opposing edges of the webs at one end of said leaf spring being adapted to underlie the adjacent end of said spring, and a spring surrounding said sleeve and portions of said counterpart members for resiliently maintaining the same in extended position.

19. In a cushioning unit, in combination, a tubular member, a pair of counterpart friction shoes having stem portions extending into said tubular member, spring means interposed between said stem portions for urging said stems into bearing relation with said tubular member, additional spring means acting between said tubular member and friction shoes for urging them apart, and means provided on said tubular member and shoes for allowing the unit to rock about its vertical axis.

20. In a cushioning unit, in combination, a tubular member, a pair of counterpart friction shoe members having stem portions extending into and in bearing relation with an inner surface of said tubular member, spring means interposed between said stem portions, additional spring means positioned outwardly of said tubular member and acting between said tubular member and shoe members for urging them apart, and means removably associated with one of the members and adapted to be engaged by the other of said members to retain the unit in assembled relation.

21. In a cushioning unit including a pair of relatively movable members, one of said members having transversely acting resilient means associated therewith for urging it into intimate contact with the other of said members, spring means interposed between said members for urg-

ing them apart, transversely extending removable means associated with one of said members for engagement by means directed outwardly of said unit from the other of said members to limit the expansive movement of said unit, and means provided on said members so as to allow the unit to rock about an axis thereof.

22. In a friction unit, in combination, a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a plurality of counterpart friction shoes fitting within said tubular portion, each of said shoes being provided with a flange portion adjacent one end, spring means interposed between the flange of said first-named member and the flange portions of said friction shoes, and vertically disposed transversely acting spring means interposed between the friction shoes for maintaining the same in frictional engagement with the interior of said tubular portion during relative movement of said tubular portion and said friction shoes; said last-named spring means being adapted to move relative to at least one of said shoes during a compressive movement of said unit to thereby frictionally engage said shoe and increase the capacity of said unit.

23. In a friction unit, in combination, a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a plurality of counterpart friction shoes fitting within said tubular portion, each of said shoes being provided with a flange portion adjacent one end, spring means interposed between the flange of said first-named member and the flange portions of said friction shoes, vertically disposed transversely acting spring means interposed between the friction shoes for maintaining the same in frictional engagement with the interior of said tubular portion during relative movement of said tubular portion and said friction shoes, said last-named spring means being adapted to move relative to at least one of said shoes during a compressive movement of said unit to thereby frictionally engage said shoe and increase the capacity of said unit, and means on all of said flanges to allow said unit to freely rock about its vertical axis.

24. In a railway truck, in combination with a spring group, a friction unit comprising a plurality of members, one of said members having a flange, a tubular portion projecting from one side of said flange, said other members comprising a pair of counterpart friction shoes fitting within said tubular portion, each of said shoes being provided with a flange portion adjacent one end, spring means interposed between the flange of the first-named member and the flange portions of said friction shoes, vertically disposed transversely acting spring means interposed between the friction shoes for maintaining the same in frictional contact with the interior of said tubular portion during relative movement of said tubular portion and said friction shoes, and means formed in all of said flanges of said members for the reception of additional means for maintaining said unit in a predetermined position in said spring group.

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