April 3, 1945. R. B. COTTRELL 2,372,936

FRICTION DEVICE

Filed Feb. 2, 1942 2 Sheets-Sheet 1

Fig. 1.

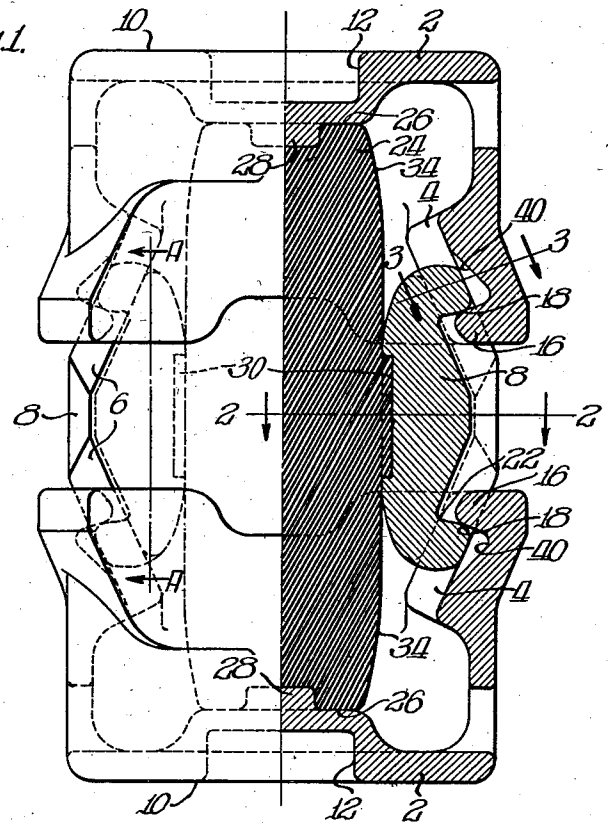
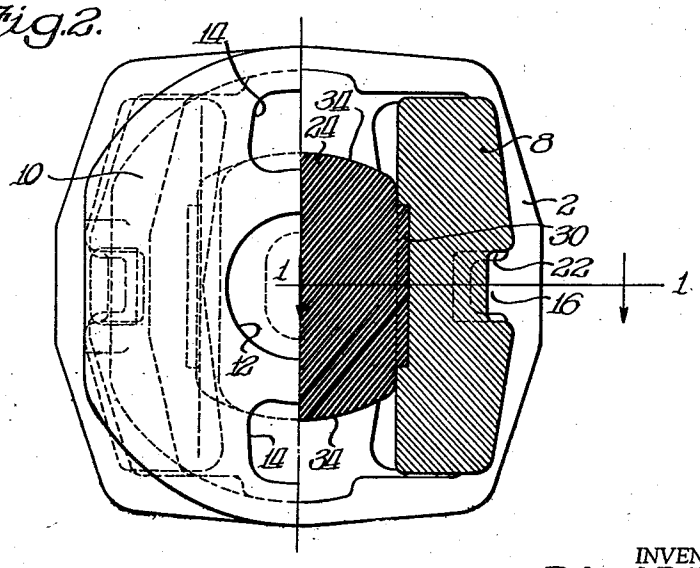


Fig. 2.



INVENTOR.
Robert B. Cottrell
BY Dean O'B Barnes
ATTORNEY:

April 3, 1945. R. B. COTTRELL 2,372,936

FRICTION DEVICE

Filed Feb. 2, 1942 2 Sheets-Sheet 2

Fig.3.

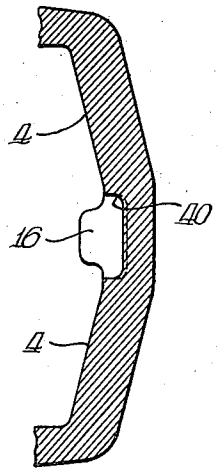


Fig.6.

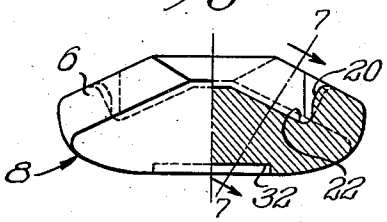


Fig.7.

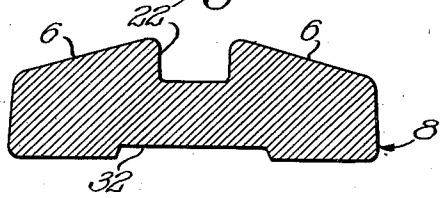


Fig.4.

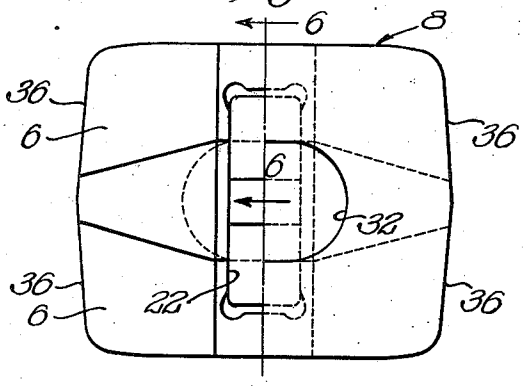


Fig.8.

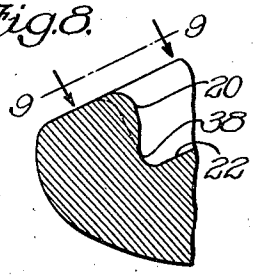


Fig.9.

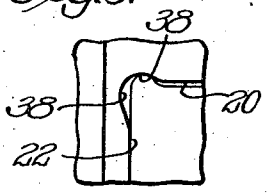


Fig.5.

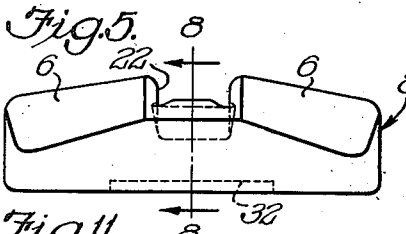


Fig.10.

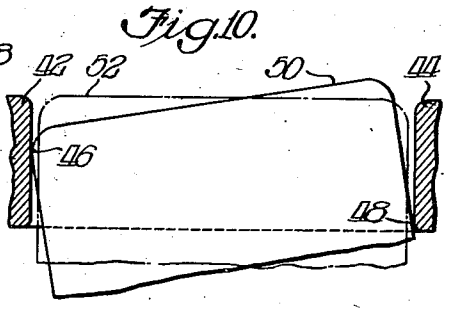
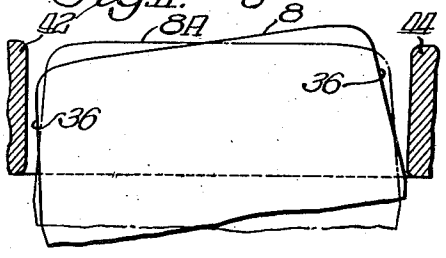


Fig.11.



INVENTOR.
Robert B. Cottrell

BY Orin O. B. Garner

ATTORNEY.

Patented Apr. 3, 1945 2,372,936

UNITED STATES PATENT OFFICE

2,372,936

FRICTION DEVICE

Robert B. Cottrell, Chicago, Ill., assignor to American Steel Foundries, Chicago, Ill., a corporation of New Jersey

Application February 2, 1942, Serial No. 429,161

7 Claims. (Cl. 267—9)

My invention relates to friction absorbing devices or snubbers such as are commonly used on railway equipment and are designed to eliminate harmonic vibrations such as commonly arise when coil springs only are used for support of load carrying members in railway rolling stock.

The general object of my invention is to devise an improved form of a well known design of a friction absorbing device, the original form of said device being described in detail in a copending application, Serial No. 245,946, filed December 15, 1938, in the United States Patent Office, in the name of David M. Light, now Patent No. 2,306,392, issued December 29, 1942.

In the snubber illustrated, a pair of identical opposed followers have frictional engagement at opposite sides of the device with a pair of identical side wedges, and housed within the followers and wedges is a single resilient element which affords a direct force path between each follower and side wedge to every other wedge or follower element.

In this device one follower is normally seated on a supporting member of a railway car truck such as a side frame, and the opposite follower is normally seated against a supported member of said truck such as a bolster. The bolster normally will also be supported by other resilient means such as coil springs which may be associated with the snubber in a spring group sometimes designated a ride control unit.

In such an arrangement it is well known that one follower of the snubber tends to follow the movements of the supporting member against which it is seated, while the opposite follower tends to follow the movements of the supported member against which it is seated. As a consequence and due to the fact that there are relative lateral and longitudinal movements between the supporting and supported members such as a side frame and bolster of a railway truck, the followers will likewise have lateral and longitudinal movement with respect to each other and these relative movements of the respective followers will occur at various positions in the stroke of the friction device due to the fact that the supported member will be moving upwardly and downwardly with whatever oscillations may be normal with respect to the supporting spring group and the load carried thereon. As a result of the several movements, certain twisting effects may be applied to one follower as compared with the other or tilting either laterally or longitudinally in such a device as I have described herein. These relative movements of the respective followers have a considerable bearing upon the manner in which the friction device may function.

In the devices illustrated and described in the above-referred to Light co-pending application, the followers are identical as are also the side wedges and each follower has a V-shaped friction surface at opposite sides thereof for cooperative engagement with complementary friction surfaces formed on the respective wedges. As normally constructed the side wedges have a relatively greater width as compared with their depth or height and as a result relative twisting or tipping action of the followers with respect to each other tends to cock or bind the side wedges in the followers in manner similar to that which occurs when a relatively wide shallow drawer binds or "seizes" when its position is out of square with the drawer cavity. Such cocking action may occur as a result of relative movements of the followers as above described.

A specific object of my present invention is to eliminate the above-mentioned difficulties in friction absorbing devices of the type illustrated.

Another object of my invention is to devise a snubber of the type above described wherein the side wedges may be tapered at the lateral top and bottom edges thereof to permit considerable misalignment with respect to the engaging followers while at the same time avoiding any binding action therebetween.

Yet another object of my invention is to devise a special form of tongue and groove engagement between each follower and the associated side wedges which will permit adequate bearing between the follower and wedges irrespective of such normal frictional wear as may occur therebetween.

In my novel arrangement the engaging stops or abutments on the followers or side wedges may operate consistently irrespective of the wear which will normally occur between their engaging surfaces.

In the drawings,

Figure 1 is a side elevation of my novel form of snubber, half in section, the section being taken substantially in the vertical plane bisecting the device as indicated by the line 1—1 of Figure 2.

Figure 2 is a top plan view half in section, the section being taken substantially in the horizontal plane bisecting the device and as indicated by the line 2—2 of Figure 1.

Figure 3 is a fragmentary sectional view through the friction side of one follower, the section being taken substantially in the diagonal plane indicated by the line 3—3 of Figure 1.

Figures 4 to 9 inclusive show various views of my novel form of side wedge, Figure 4 being a plan view thereof, the left half showing the outer face and the right half the inner face thereof; Figure 5 being an edge view thereof taken from the bottom as seen in Figure 4; Figure 6 being an end view as seen from the right of Figure 4 and half in section, the section being taken sub-

stantially in the middle or bisecting plane and as indicated by the line 6—6 of Figure 4; Figure 7 being a further sectional view taken in the diagonal plane through the friction surfaces substantially as indicated by the line 7—7 of Figure 6; Figure 8 being a further fragmentary sectional view taken in a plane bisecting the wedge as indicated by the line 8—8 of Figure 5; and Figure 9 being a fragmentary view of one end of the wedge slot for the follower lug, the view being taken substantially from the plane indicated at 9—9 in Figure 8.

Figure 10 illustrates the cocking or binding action which occurs in a friction device such as I have described when it does not embody my improved construction.

Figure 11 is a view comparable to Figure 10 illustrating how my improved construction avoids any such binding action as that described.

My novel structure comprises in detail spaced identical followers 2, 2 each being a hollow bell-like casting at opposite sides of which may be formed V-shaped friction surfaces 4, 4 having cooperative engagement with complementary friction surfaces 6, 6 formed on the adjacent wedge 8. Each follower 2 is formed with a substantially flat outer face 10 forming a seat and centrally of said seat may be formed the depression or cavity 12 within which may be received positioning means normally formed on the supporting and supported members of the car truck between which the device may be positioned. On the outer face 10 also may be formed other relieved areas 14, 14 which may serve to reduce the weight of the follower. Centrally formed with respect to the friction surfaces 4, 4 at each side of each follower and adjacent the outer edge thereof may be formed an inwardly projecting lug 16, presenting an arcuate face for abutment as at 18 with the arcuate lip 20 (Figure 8) at the extremity of the slot 22, centrally formed in the adjacent wedge 8.

Housed within the device is the rubber spring 24, a solid body of rubber composition, somewhat rectangular in section as may be seen in the view of Figure 2, the ends of which project within the respective followers and seat as at 26, 26 against the base walls thereof, being positioned thereagainst as at 28, 28 by the lugs on said walls projecting into recesses in the ends of the rubber spring 24. On the side walls of the spring 24 may be formed raised oval pads for interlocking engagement as at 30, 30 with the side wedges 8, 8, said oval pads being closely confined within recesses 32, 32 formed on said side wedges. This interlocking arrangement tends to maintain the side wedges in their normal position resisting any out-of-squareness which may tend to develop.

When the parts are assembled and in normal expanding position, as illustrated in Figure 1, the resilient pad or spring 24 is under some compression as may be seen from the bulging sides 34, 34 adjacent the tapering ends thereof, as seen in Figure 1, and this compression is even more apparent from the sectional view of Figure 2.

The detail of my novel side wedge 8 is shown in Figures 4 to 9 inclusive. It should be noted that while the wedge is a generally rectangular member as seen in the plan view of Figure 4, nevertheless the edges thereof both top and bottom are chamfered as at 36, 36, an important feature of my invention as will be more clearly set forth hereafter.

The detail at the end of the slot 22 which receives the interlocking lug of the follower is well shown in Figures 8 and 9. It should be noted that at the end of the slot 22 the wall against which the follower lug abuts at 18 as previously described projects in an arcuate formation described as the lip 20, and that inwardly of the lip 20 the slot is relieved both laterally and longitudinally as may be noted at 38, 38. As wear occurs along the friction engaging faces of the wedges and followers, the follower lugs 16, 16 will project further into the slots 22, 22 of the wedges and so the abutments at 18, 18 are shifted somewhat in position but by affording an arcuate face on each lug 16 and at the end of each slot 22 this shifting will not affect the operation of the device. In this connection, it may be noted also that inwardly of each lug 16 may be formed a relieved portion or throat 40 (Figures 1 and 3), said throat preventing the accumulation of metal particles which might otherwise interfere with operation, especially after considerable wear along the friction surfaces.

In Figure 10 I have illustrated a difficulty encountered in the operation of this type of snubber before the utilization of my improved form thereof. Figures 10 and 11 are fragmentary and somewhat diagrammatic, the view of Figure 11 being taken substantially in the transverse plane indicated by the line A—A in Figure 1 with the side wedge shown in elevation, and Figure 10 representing a comparable view of a similar snubber without the improvement I have described. As already indicated a friction device or snubber of this type encounters some misalignment in operation due to the fact that the respective followers are associated with members which normally have relative longitudinal and lateral as well as tipping movements with respect to each other. When such actions occur misalignment results in the parts of the snubber and a condition such as illustrated in Figure 10 has frequently been encountered wherein the opposite approximately parallel walls 42 and 44 of the follower may be engaged as at 46 and 48 by one corner and an opposite edge of the wedge 50 as shown in full lines. This departure of the wedge 50 from normal position as illustrated in phantom lines at 52 has sometimes occurred so forcibly as to tightly seize the wedge between the opposite walls 42 and 44 by the point or line engagements which occur at 46 and 48 thus preventing normal operation of the device. The manner in which I have overcome this difficulty is illustrated in Figure 11 wherein it may be noted that the wedge 8 is shown in full lines in its position of maximum possible misalignment, the normal position thereof being shown in phantom lines at 8A and the position of the follower walls 42 and 44 being the same as that illustrated in Figure 10. The chamfer 36 provided on the lateral edge both at top and bottom of the wedge 8 is sufficient to afford clearance of said wedge from the opposite walls of the follower and prevent the gouging or seizing effect which otherwise has occurred.

In other words, when the wedge 8 is in the position of maximum possible misalignment, as shown in full lines in Figure 11, each tapered edge 36 is approximately parallel with the adjacent side wall and a similar condition exists at the opposite end of the device where the diagonally opposite edge 36 of the wedge is approximately parallel to its adjacent side wall. Under these conditions, one or other of these diagonally disposed edges 36, 36 may have a flat bearing against the adjacent side wall and under certain conditions, as where the supporting and the sup-

ported member have moved laterally with respect to each other, both of said edges 36, 36 may bear against the adjacent follower side walls. This guiding engagement of the diagonally opposite edges 36, 36 of each wedge against approximately parallel walls of the respective followers permits the device to operate satisfactorily even when under such conditions of maximum misalignment. By this arrangement my improved structure avoids the development of such a binding or gouging condition, as illustrated in Figure 10.

It is to be understood that I do not wish to be limited by the exact embodiment of the device shown which is merely by way of illustration and not limitation as various and other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a snubber, identical top and bottom followers each presenting opposed V-shaped tapering friction surfaces and approximately parallel side walls therebetween, identical side wedges having means interlocking said followers and complementary friction faces in engagement with said surfaces, and a single resilient element compressed between said followers and wedges and affording a direct force path from each follower and wedge to every other follower and wedge, each of said wedges having a generally rectangular form and each lateral edge of each wedge being defined by two converging planes, the diagonally opposite planes of each wedge being substantially parallel to each other, said interlocking means comprising slots in said side wedges having undercut arcuate end walls and undercut lugs on said followers presenting crowned surfaces for abutment with said arcuate walls.

2. In a snubber, identical follower members each presenting approximately parallel side walls and intervening friction surfaces, identical wedge members having means interlocking with said follower members, and a single element compressed between all of said members and affording a direct force path from each member to every other member, said interlocking means comprising slots in certain of said members terminating in end walls with protruding abutments, and lugs in other of said members receivable in said slots and presenting arcuate faces for engagement with said abutments, each of said wedge members having a rectangular form of greater width than height, the upper and lower ends whereof are receivable between said side walls of the respective follower members, each lateral edge of each wedge member being defined by two planes converging at the middle of said edge, the plane along the upper portion of one edge being approximately parallel to the plane along the lower portion of the opposite edge.

3. In a friction absorbing device, a single resilient member having a plurality of sets of friction elements interlocked therearound in abutment therewith and urged into frictional engagement thereby, certain of said elements comprising followers each presenting opposed wedge-shaped friction surfaces with intervening approximately parallel side walls, and other of said frictional elements comprising side wedges with complementary friction faces engaging said surfaces, each of said wedges having its upper and lower ends received between the spaced side walls of respective follows, the lateral edges of each of said ends being defined by converging planes, the diagonally opposite planes at respective ends of each shoe being approximately parallel.

4. In a snubber, spaced identical followers each presenting opposed friction surfaces and intervening substantially parallel side walls, wedges having complementary friction faces engaging said surfaces, and a single resilient element compressed by and between said followers and wedges, each of said wedges having a generally rectangular configuration in plan with each lateral edge thereof defined by two planes converging adjacent the midpoint of said edge, the diagonally opposite planes at respective edges being approximately parallel, the plane surfaces thus defined along the lateral edges of each wedge affording seats for slidable engagement with the adjacent follower side walls.

5. In a snubber, identical top and bottom followers each presenting V-shaped tapering friction surfaces joined by approximately parallel side walls, identical side wedges having means interlocking with said followers and presenting complementary friction faces engaging said surfaces, and a single resilient element compressed between said followers and wedges and affording a direct force path from each follower and wedge to every other follower and wedge, said interlocking means comprising slots in said wedges terminating in end walls presenting protuberances, and lugs on said followers receivable in said slots, each of said lugs having a crowned portion for abutment with the adjacent protuberance, each lateral edge of each wedge having converging upper and lower plane faces, the upper face at one side lying in a plane approximately parallel to the lower face at the opposite side of the wedge, said upper and lower faces affording seats for slidable engagement with the adjacent follower side walls.

6. In a snubber, spaced followers each presenting opposed friction walls joined by approximately parallel side walls, wedges interlocked with said followers with complementary faces engaging said friction walls, and a resilient pad under compression between said followers and wedges and affording a direct force path from each follower to the opposite follower and both wedges and affording a direct force path from each wedge to the opposite wedge and both followers, each of said wedges having a generally rectangular form with greater width than height and each lateral edge thereof having diverging upper and lower plane faces, the upper and lower faces at opposite sides lying in planes approximately parallel, said upper and lower faces forming abutments for slidable engagement with adjacent side walls of respective followers.

7. In a snubber, spaced followers each presenting opposed friction surfaces with intervening approximately parallel side walls, wedges interlocked with said followers and engaging said surfaces, and a resilient pad compressed by and between said followers and wedges, each of said wedges having on each lateral edge thereof upper and lower faces converging at an obtuse angle, the upper and lower faces at opposite edges being approximately parallel and affording seats for said wedges against said follower side walls under conditions of misalignment between said followers and wedges.

ROBERT B. COTTRELL.