March 16, 1954 A. C. DAVIDSON 2,672,102

CONTROL FOR RAILWAY TRUCK BOLSTER SPRING ACTION

Filed Oct. 29, 1949

3 Sheets-Sheet 1

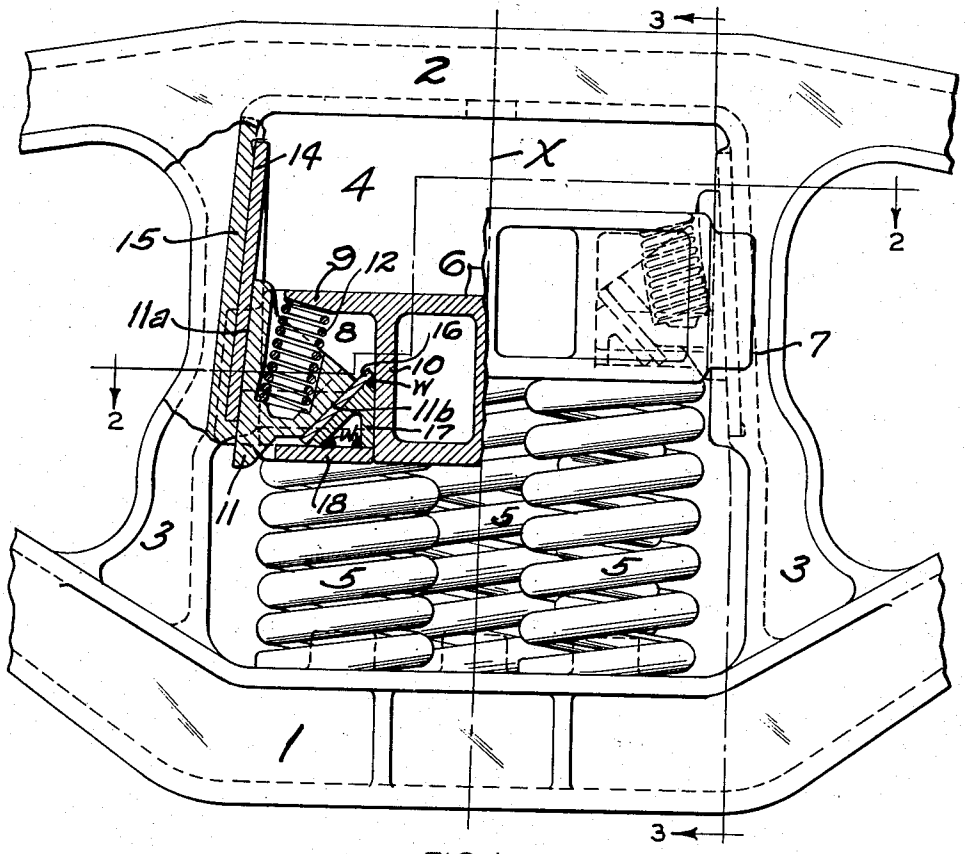

FIG. 1.

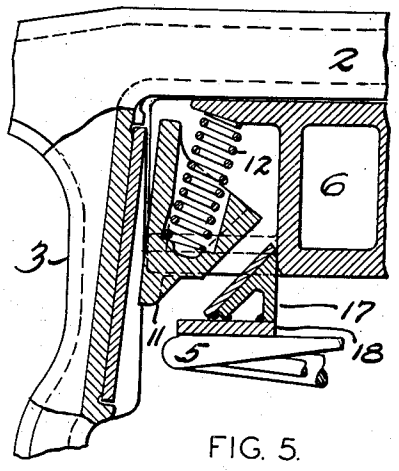

FIG. 5.

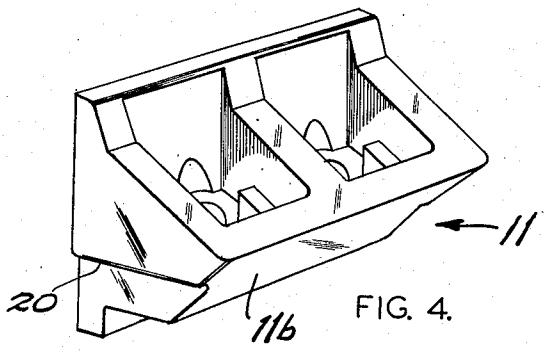

FIG. 4.

INVENTOR:
ARTHUR C DAVIDSON

BY Rodney Bedell
ATTORNEY.

March 16, 1954 A. C. DAVIDSON 2,672,102

CONTROL FOR RAILWAY TRUCK BOLSTER SPRING ACTION

Filed Oct. 29, 1949

3 Sheets-Sheet 2

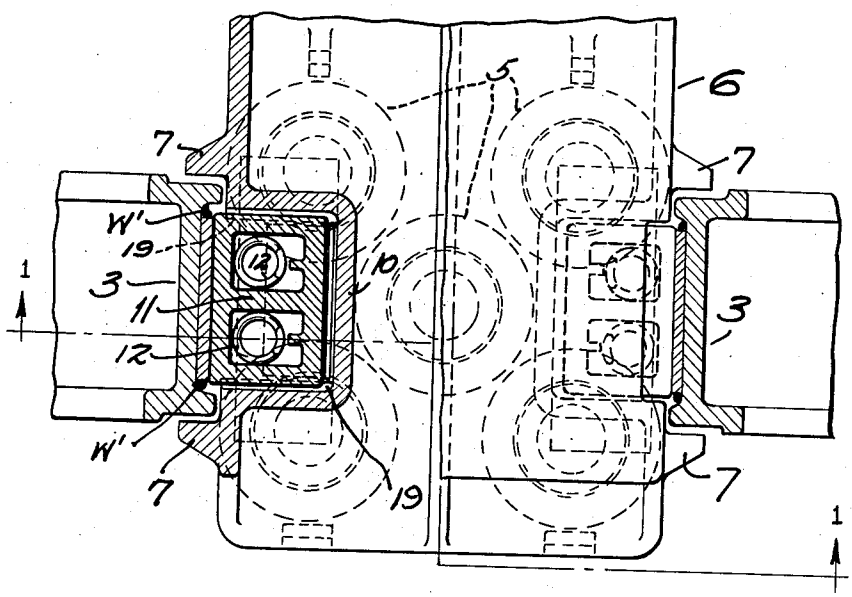

FIG. 2.

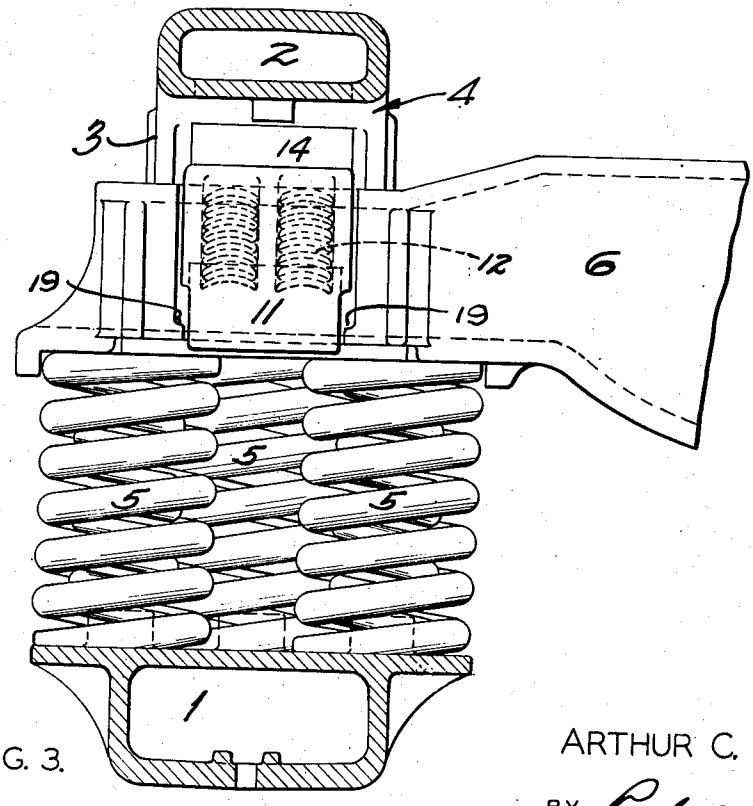

FIG. 3.

INVENTOR:
ARTHUR C. DAVIDSON

BY Rodney Bedell
ATTORNEY.

March 16, 1954 A. C. DAVIDSON 2,672,102

CONTROL FOR RAILWAY TRUCK BOLSTER SPRING ACTION

Filed Oct. 29, 1949

3 Sheets-Sheet 3

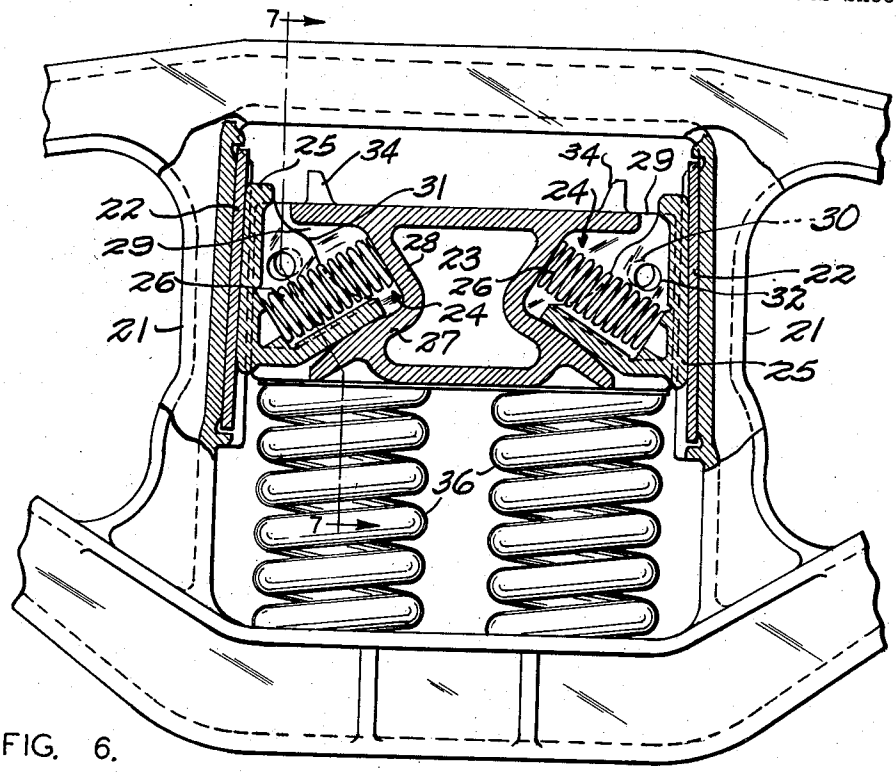

FIG. 6.

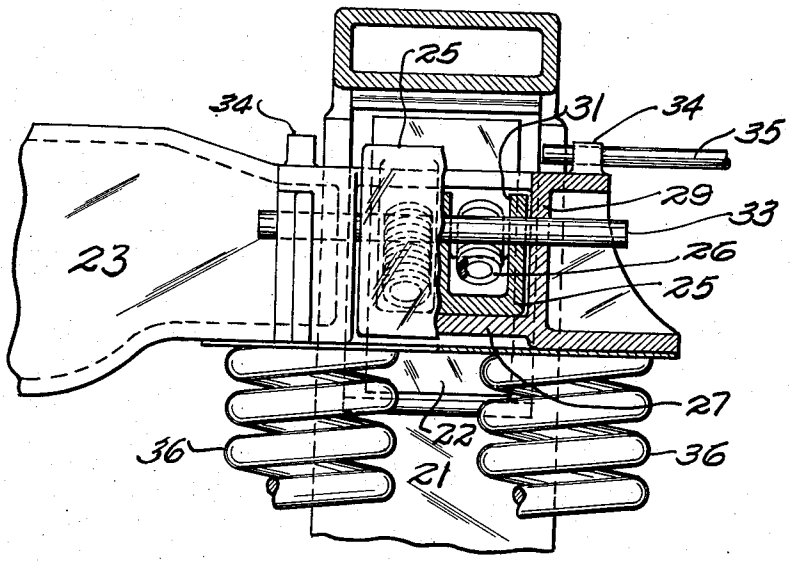

FIG. 7.

INVENTOR:
ARTHUR C. DAVIDSON

BY Rodney Bedell
ATTORNEY.

Patented Mar. 16, 1954

2,672,102

UNITED STATES PATENT OFFICE

2,672,102

CONTROL FOR RAILWAY TRUCK BOLSTER SPRING ACTION

Arthur C. Davidson, Chicago, Ill.

Application October 29, 1949, Serial No. 124,382

13 Claims. (Cl. 105—197)

1

The invention relates to railway trucks and more particularly to the control of the bolster spring action and consists in friction wedge structure between the bolster and adjacent truck framing. The application is a continuation in part of an application filed by the present inventor June 4, 1947, Serial No. 752,406, now abandoned.

The main object of the invention is to progressively snub the bolster spring action during the upward movement of the bolster upon spring rebound without materially affecting the downward movement of the bolster when the springs compress to cushion vertical shocks due to rail joints, uneven track or other causes.

Another object is to construct a bolster with spring snubbing structure which may be handled readily as a unit irrespective of the assembly with the truck side frame and bolster supporting spring, thereby facilitating assembly and disassembly of the truck.

Additional objects are to simplify bolster spring snubbing structure without materially affecting bolster or truck frame design, thus minimizing the expense of including a satisfactory snubbing structure in a railway truck.

The invention relates to controls of the general type illustrated in earlier patents issued to the present applicant, Nos. 2,129,408, 2,257,109 and 2,352,693, but the different construction of the wedges and wedge-engaging faces disclosed herein creates a substantially greater difference in the friction during down and up movement of the bolster than is possible in any of the earlier structures.

In the accompanying drawings illustrating the invention,

Figure 1 is in part a side elevation of and in part a longitudinal vertical section, taken on the line 1—1 of Figure 2, through the intermediate portion of a truck side frame and associated parts. The right hand half of the figure shows the corresponding portion of the bolster and associated parts in normal position. The left hand half of the figure shows the bolster and associated parts in the position assumed when the bolster supporting springs are under maximum operating compression.

Figure 2 is a horizontal section taken on the line 2—2 of Figure 1.

Figure 3 is a vertical transverse section taken on the line 3—3 of Figure 1.

Figure 4 is a detail perspective of a wedge forming a portion of the wedge structure.

Figure 5 is a detail section corresponding generally to the left hand side of Figure 1 but showing the bolster, wedge and wedge spring in position assumed during assembly and disassembly of the bolster and truck frame.

2

Figure 6 corresponds to Figure 1 but illustrates another form of the invention.

Figure 7 is in part a side view of the bolster and wedge and in part an upright section taken on the line 7—7 of Figure 6.

The truck side frame shown in Figures 1, 2, 3, and 5 includes a tension member 1 and a compression member 2 merging in journal box or journal box receiving portions (not shown) in the usual manner and having upright columns 3 spaced apart transversely of the truck and forming with the tension and compression members a bolster window 4. Bolster springs 5 are mounted on the tension member and a box section bolster 6 extends from side to side of the truck with its end portions passing through each window 4 and resting upon springs 5.

Ears 7 on the sides of the bolster oppose the inner and outer faces of the columns to limit the lateral movement of the bolster relative to the side frame, but normally there is no engagement between ears 7 and the side frame columns. Between each pair of ears 7 the bolster is provided with a recess or pocket 8 having a top wall 9 and an inner upright wall 10, the pocket facing downwardly and laterally outwardly of the bolster directly abreast of the adjacent column.

A wedge 11 is associated with each pocket 8, being slidably received therein, and is thrust downwardly by a pair of coil springs 12 received within the wedge and projecting upwardly therefrom and seated against the underface of the pocket top wall 9. Each wedge 11 has working, friction or wedge surfaces 11a and 11b arranged to engage friction elements 14 and 16 associated with the adjacent column and bolster, respectively. Element 14 is applied to the column web as indicated at W' (Figure 2). Element 16 is applied to a bearing block 17 seated against the bolster pocket inner wall 10 and supported by a spring plate 18 resting on the outer springs 5 of the bolster supporting spring group. Element 16, block 17 and plate 18 may be welded to each other as indicated at W (Figure 1). Whether or not these parts are welded together, they form a unit and move with the bolster when the latter is spring supported.

A significant feature of the structure is that the friction faces 11a and 11b of wedge 11 and the wedge engaging surfaces on the friction elements 14 and 16 are inclined downwardly and away from

the vertical center line X of window 4 and the bisector of the angle between the friction faces is also inclined downwardly and away from the vertical center line X of window 4. Preferably the axes of wedge springs 12 are similarly inclined.

The structure described above is effective for the intended purpose of accommodating, without substantial resistance, the downward movement of the bolster, when subjected to forces tending to compress the bolster springs, and progressively increasing frictional resistance to the upward movement of the bolster as the bolster springs rebound. When a force is encountered which moves the bolster downwardly relative to the columns, elements 14 and 16 tend to move away from the wedges and there is little or no frictional resistance to the forces compressing bolster springs 5. Wedge springs 12 expand and the wedges move downwardly more rapidly than the bolster.

Conversely, when such force is expended and the bolster moves upwardly relative to the columns, the wedge opposing surfaces of elements 14 and 16 approach each other so that the wedges must move upwardly more rapidly than the bolster and, in so doing, compress springs 12. This results in substantial and increasing frictional resistance to the rebound action of the bolster springs. The inclination of these wedge-opposing surfaces provides for the desired freedom of downward movement of the bolster and frictional resistance to the upward movement of the bolster without necessitating pressure from wedge-positioning springs 12. Hence, the wedge springs may be of relatively light capacity.

The contour of the bolster pocket is such that the casting of the bolster is simplified. The assembly of the bolster bearing block 17 and the spring plate 18 makes it unnecessary to do any machine work on the bolster to accommodate the wedge structure. The housing and support of wedge springs 12 make it unnecessary to provide additional elements for securing these springs in assembled relation with the other parts. Bearing block 17 is held in its position by the bolster pocket walls and the wedge without being secured to the bolster and is readily replaced in the event of wear. This absence of attachment of bearing block 17 to the bolster provides some flexibility in the assembly so that all the friction surfaces may contact as desired without machining of the bolster.

The side walls of bolster pocket 9 have upwardly facing shoulders 19 (Figure 3) and the ends of wedge 11 have downwardly facing shoulders 20 (Figure 4). These shoulders do not engage in normal operation of the truck, but at any time during assembly and disassembly when the bolster is not supported by the truck springs, wedge springs 12 will thrust wedge 11 downwardly until shoulders 19 and 20 interengage (Figure 5). Since these shoulders are disposed substantially horizontally, the thrust of springs 12 will seat the wedge on the bolster shoulders 19 but will not thrust the wedge laterally outwardly of the pocket. Hence, the bolster, wedges 11 and the wedge springs may be handled as a unit. This facilitates the assembly and disassembly of the bolster, side frames and snubber parts.

In the arrangement shown in Figures 6 and 7, the truck side frame, including its columns 21 and the wear plates 22 applied thereto, is substantially the same as shown in the structure previously described. The bolster 23 corresponds generally to the bolster previously described, but the pockets 24 therein for receiving the wedges 25 and the wedge springs 26 are deeper, transversely of the bolster, and include integral lower walls 27 facing upwardly and outwardly of the bolster and having surfaces, preferably convex, supporting the wedges. Wedge springs 26 are disposed at an angle of approximately 35° to the horizontal and substantially parallel with or tangent to bolster walls 27, the upper ends of the springs being seated against downwardly and inwardly inclined walls 28 of the bolster pockets extending normal to lower walls 27. Springs 26 thrust the wedge blocks outwardly of the bolster pockets and into normal operating position as shown in Figure 6.

The opposite side walls 29 of each bolster pocket 24 have aligned apertures 30 and the upright side webs 31 of each wedge have similar aligned apertures 32. When the wedges are moved inwardly from the projected functioning position sufficiently to align apertures 30 and 32, a pin 33 may be inserted through all of the aligned apertures to retain the wedge and springs assembled with the bolster and thus facilitate the insertion and removal of the bolster as a unit into and out of the side frame window. The bolster top wall has integral upstanding lugs 34 which serve as fulcrums for a crowbar 35 or similar tool by which the bolster may be forced towards the column at the opposite side of the bolster to compress one set of wedge springs 26 until the corresponding apertures 30 and 32 are aligned to receive a pin 33. Then the crowbar may be transferred to the other side of the bolster with the corresponding lugs 34 used as fulcrums and the bolster forced in the opposite direction to compress the other set of springs 26 and permit the insertion of a pin 33 between the corresponding apertures 30 and 32.

With this arrangement the bolster will be more definitely centered between the columns because of the reduced angle between the horizontal and the axes of springs 26.

With this arrangement the bolster may be inserted readily in a shallower bolster window than may the bolster shown in Figures 1 and 5 in which the wedges project downwardly below the bottom of the bolster. Hence, the arrangement of Figure 6 accommodates the use of bolster springs 36 having a greater free height than the bolster springs shown in Figures 1 and 5 without increasing the height of the bolster window in the side frame or decreasing the vertical depth of the end of the bolster.

This arrangement permits the use of longer wedge springs without increasing the vertical depth of the bolster. Hence, the wedge springs can be of satisfactory capacity without overstressing the springs and greater spring travel is permitted.

With this arrangement, the bottom of the bolster may form a seat for the entire area of the upper ends of the bolster springs, thus making it easier to insert shims between the bolster and the bolster springs when adjusting bolster center plate heights.

The details of the construction may be varied substantially from the arrangements shown without departing from the invention which involves relative movements of the parts differing from those previously used and providing an effective snubbing of the upward movement of the bolster without affecting the desired free spring compression of the bolster supporting springs during the downward movement of the bolster. The exclusive use of those modifications of the invention

coming within the scope of the claims is contemplated.

What is claimed is:

1. In a railway truck, a side frame with spaced columns forming the sides of a bolster window, truck load-supporting springs mounted on said frame, a bolster with a portion extending through said window and supported on said springs, a wedge between said bolster and at least one of said columns with spaced apart downwardly converging faces both extending substantially the full width of the column and being inclined downwardly away from the vertical center line of said window, similarly inclined wedge engaging elements associated with the bolster and said column and slidably engaging opposite faces of said wedge, there being a pocket in said wedge between said spaced apart converging wedge faces, and yielding means in said pocket thrusting said wedge block downwardly.

2. In a railway truck, a side frame with spaced columns forming the sides of a bolster receiving window, truck load-supporting springs mounted on said frame, a bolster with a portion extending through said window and supported on said springs, said columns having opposing friction elements diverging downwardly, there being friction elements associated with the opposite sides of said bolster and diverging downwardly and converging towards respective column friction elements, a wedge shaped block between each column friction element and the adjacent friction element associated with the bolster and slidable along the latter friction element, a spring seated on the bolster and thrusting each wedge shaped block downwardly and outwardly and along its associated friction elements so that upward movement of the bolster relative to the side frame forces said blocks to move upwardly more rapidly than the bolster and against the thrust of the wedge engaging spring.

3. In a railway truck, a side frame with spaced members opposing each other longitudinally of the truck, truck load supporting spring structure mounted on said frame, a bolster supported on said spring structure with a portion extending between said members, wedge structure between at least one of said members and an opposing side of the bolster and including friction surfaces facing towards said member and the bolster respectively, each of said surfaces being inclined downwardly towards the other and towards said member, friction elements associated with said member and the adjacent side of the bolster, respectively, and having opposing faces converging downward'y and inclined to the vertical, the bisector of the angle between said faces being inclined from the vertical downwardly and towards said member, and a coil spring seated on the bolster and thrusting said wedge structure downwardly, the axis of said spring being also inclined downwardly and towards said member.

4. In a railway truck, a side frame with spaced columns forming the sides of a bolster window, a truck load-supporting spring structure in said window, a bolster with an end portion extending through said window and supported on said spring, the side of said bolster having a pocket opening outwardly and downwardly above said spring structure and towards the associated column, said pocket having an upper wall and an upright inner wall, a bearing block in said pocket supported on the spring structure and seated against said inner wall and having an inclined

friction face extending downwardly away from said inner wall, the adjacent column including a friction face similarly inclined but converging downwardly toward said block inclined face, a wedge fitting between said friction faces, and a spring compressed between said wedge and said pocket upper wall.

5. In a railway truck, a side frame, load-supporting spring structure mounted thereon, a bolster carried by said spring structure with recesses at opposite sides facing laterally and downwardly, each recess having an inner wall with an associated bearing element having an upwardly facing friction surface inclined laterally and downwardly, a wedge element in each of said recesses with one of its wedge faces slidably engaging the corresponding bearing element and with its other wedge face inclined laterally and downwardly from the corresponding recess, springs thrusting said wedges downwardly, and fixed friction surfaces on the side frame slidably engaged by said latter mentioned wedge faces.

6. In a railway truck, a side frame with spaced columns forming the sides of a bolster window, a truck load-supporting spring mounted on said frame, a bolster with a portion extending through said window and supported on said spring, a wedge between said bolster and at least one of said columns, said wedge having opposite faces converging downwardly and both inclined from the vertical and defining the sides of a pocket between them, opposing wedge engaging elements associated with the bolster and said column, and yielding means seated in said pocket seated against the bolster and thrusting said wedge block downwardly.

7. In a railway truck, a side frame with spaced columns forming the sides of a bolster receiving window, said columns having opposing friction elements diverging downwardly, truck load-supporting springs mounted on said frame, a bolster with a portion extending through said window and supported on said springs, there being pockets in the opposite sides of said bolster, said pockets opening towards said columns, each pocket having a lower wall inclined outwardly and downwardly of the bolster and having an inner wall inclined upwardly and outwardly of the bolster from the inner end of said lower wall, a wedge-shaped block in each pocket having a lower face sliding along the lower wall of the pocket, and having an outer face opposing the adjacent side frame column, and a spring seated against each pocket inner wall and thrusting the associated wedge block against the adjacent side frame column.

8. A railway truck as described in claim 7 in which each wedge block and the side walls of the associated bolster pocket have apertures adapted to be aligned, when the wedge spring is partially compressed, to receive a pin for holding said wedge and spring assembled with the bolster.

9. A truck as described in claim 7 in which the bolster is provided with lugs spaced from the side frame columns and forming fulcrums against which a lever may be placed to force the bolster longitudinally of the frame to compress the springs in the bolster pockets, the side walls of the associated bolster pocket having apertures adapted to be aligned, when the wedge spring is partially compressed, to receive a pin for holding said wedge and spring assembled with the bolster.

10. In a railway truck, a side frame with spaced

columns forming the sides of a bolster receiving window, said columns having opposing friction elements diverging downwardly, truck load-supporting springs mounted on said frame, a bolster with a portion extending through said window and supported on said springs, said bolster portion including a substantially horizontal bottom wall resting on said springs, and a substantially horizontal top wall, there being a pocket formed in each side of the bolster between said walls, each pocket having an inner wall inclined downwardly from the bolster top wall and towards the longitudinal center line of the bolster, and having a bottom wall inclined outwardly and downwardly from the lower end of said inner wall towards the bolster bottom wall, a wedge block received in each of said pockets, a wedge spring seated against the inner wall of each pocket and thrusting the wedge block outwardly and downwardly therefrom, the lower edge of the wedge block being positioned above the bottom face of the bolster bottom wall.

11. A railway truck as described in claim 10 in which the axes of the wedge springs are inclined at angles of approximately 35° to the horizontal and the faces of the frame column friction elements are inclined slightly from the vertical downwardly and away from the bolster.

12. In a railway truck, a side frame with spaced column members with downwardly diverging surfaces opposing each other longitudinally of the truck, truck load-supporting spring structure mounted on said frame, a bolster supported on said spring structure with a portion extending between said members, the side of said bolster being recessed to form a pocket facing downwardly and outwardly of the bolster and including a lower wall with an upwardly facing surface inclined downwardly and outwardly of the

pocket, and an inner wall normal to said lower wall surface, a wedge block having diverging walls, one slidable along said pocket lower wall surface and the other opposing the adjacent column member surface, said wedge block having webs extending longitudinally of the side frame between said diverging walls and forming therewith a pocket facing upwardly and towards the bolster, and spring means housed in said pockets and seated against said bolster pocket inner wall and thrusting the wedge block against the adjacent column member in a direction substantially parallel to said bolster lower wall.

13. A truck as described in claim 7 in which the bolster is provided with a lug projecting substantially vertically from the remainder of the bolster and opposing but spaced from an adjacent portion of a side frame column to receive between them a lever, said lug forming a fulcrum about which the lever may be pivoted with one arm bearing on said column portion to force the bolster longitudinally of the frame and compress the springs in the bolster pockets.

ARTHUR C. DAVIDSON.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,129,408	Davidson	Sept. 6, 1938
2,257,109	Davidson	Sept. 30, 1941
2,347,463	Couch	Apr. 25, 1944
2,352,693	Davidson	July 4, 1944
2,378,414	Light	June 19, 1945
2,444,011	Lehrman	June 22, 1948
2,449,305	Lehrman	Sept. 14, 1948
2,485,013	Pierce	Oct. 18, 1949
2,615,403	Orr et al.	Oct. 28, 1952