Dec. 29, 1936. C. D. BARRETT 2,065,992

FRICTION UNIT FOR RAILWAY CAR TRUCKS

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FIG. II

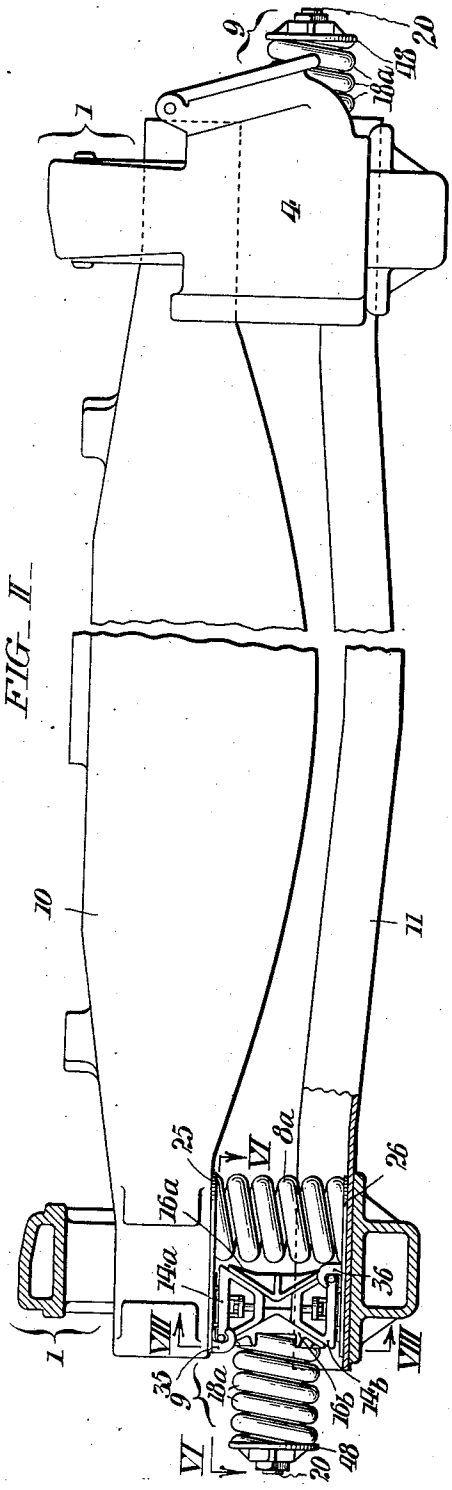
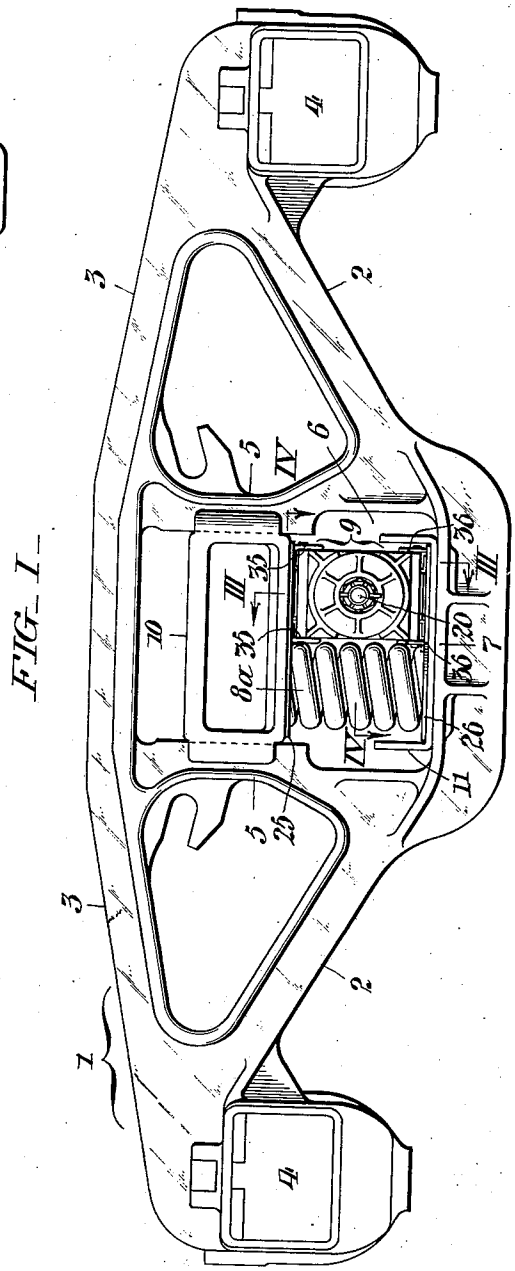


FIG. I



INVENTOR:
Charles D. Barrett,
BY Fraser & Paul
ATTORNEYS.

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FIG. III

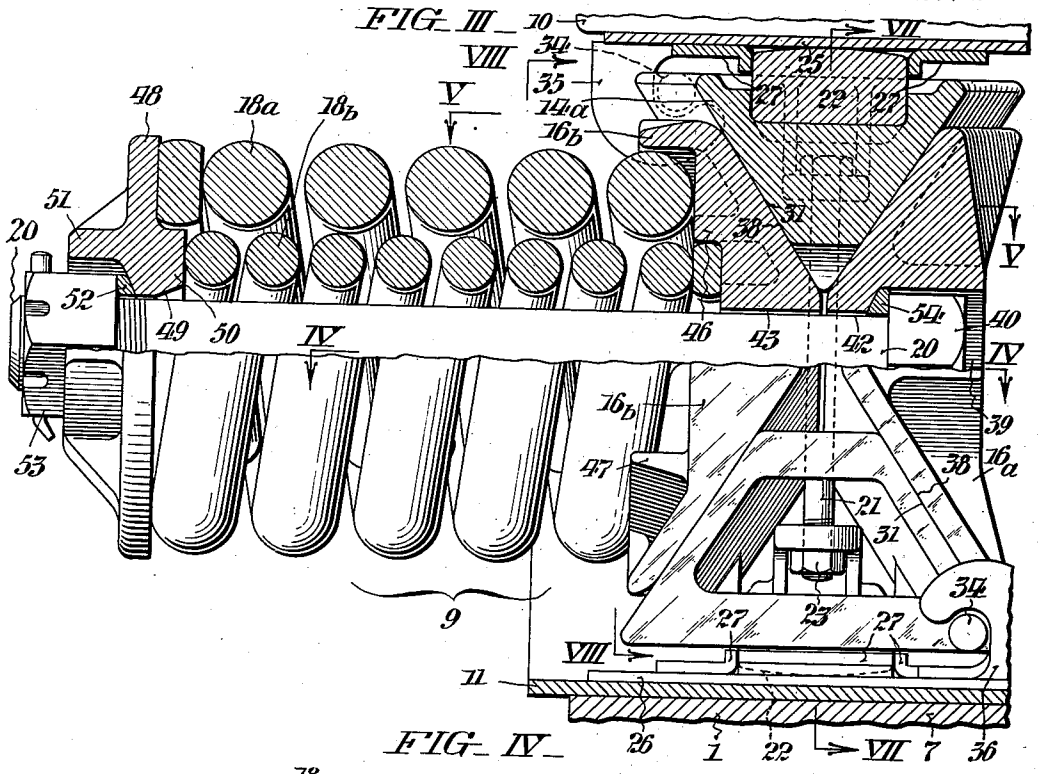
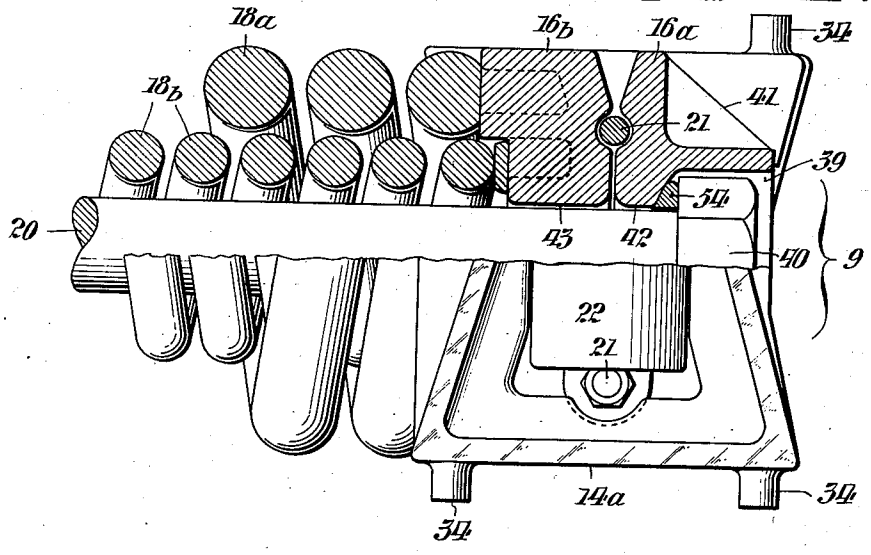


FIG. IV



WITNESSES:
Thomas W. Kerr, Jr.
Stanton W. Kerr

INVENTOR:
Charles D. Barrett,
BY Fraley & Paul
ATTORNEYS.

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FIG. V.

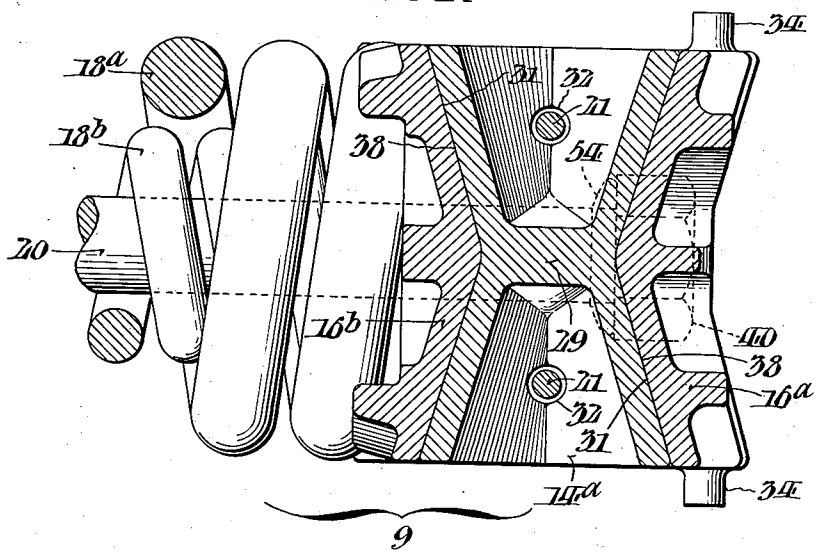


FIG. VI.

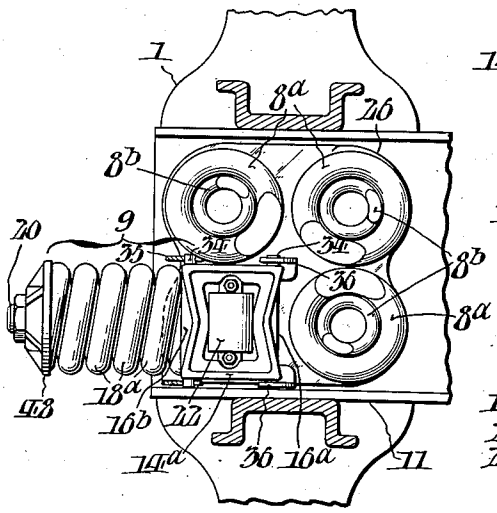
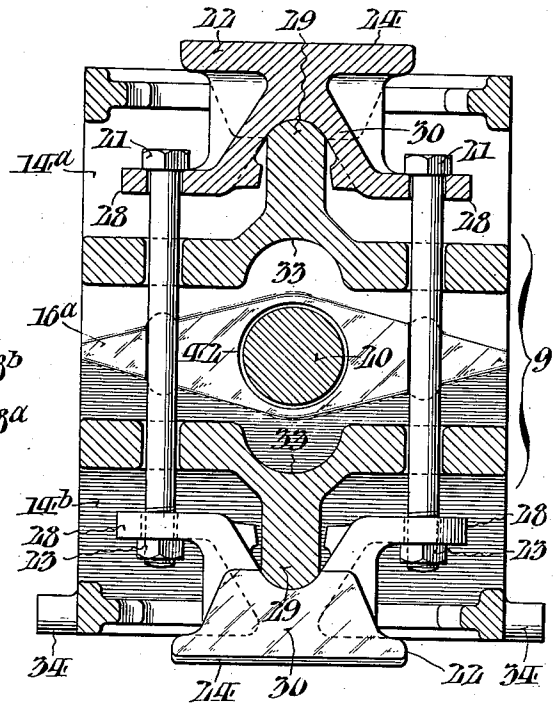


FIG. VII.



WITNESSES:
Thomas W. Kerr, Jr.
Stanton W. Kerr

INVENTOR:
Charles D. Barrett,
BY Fraley & Paul
ATTORNEYS.

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FIG. VIII

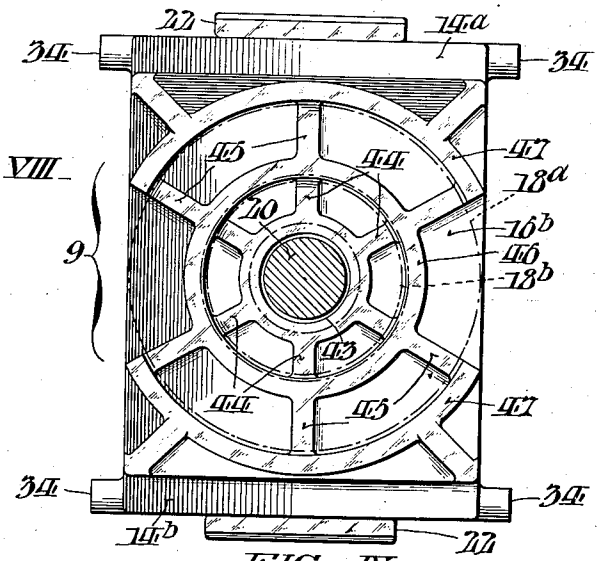
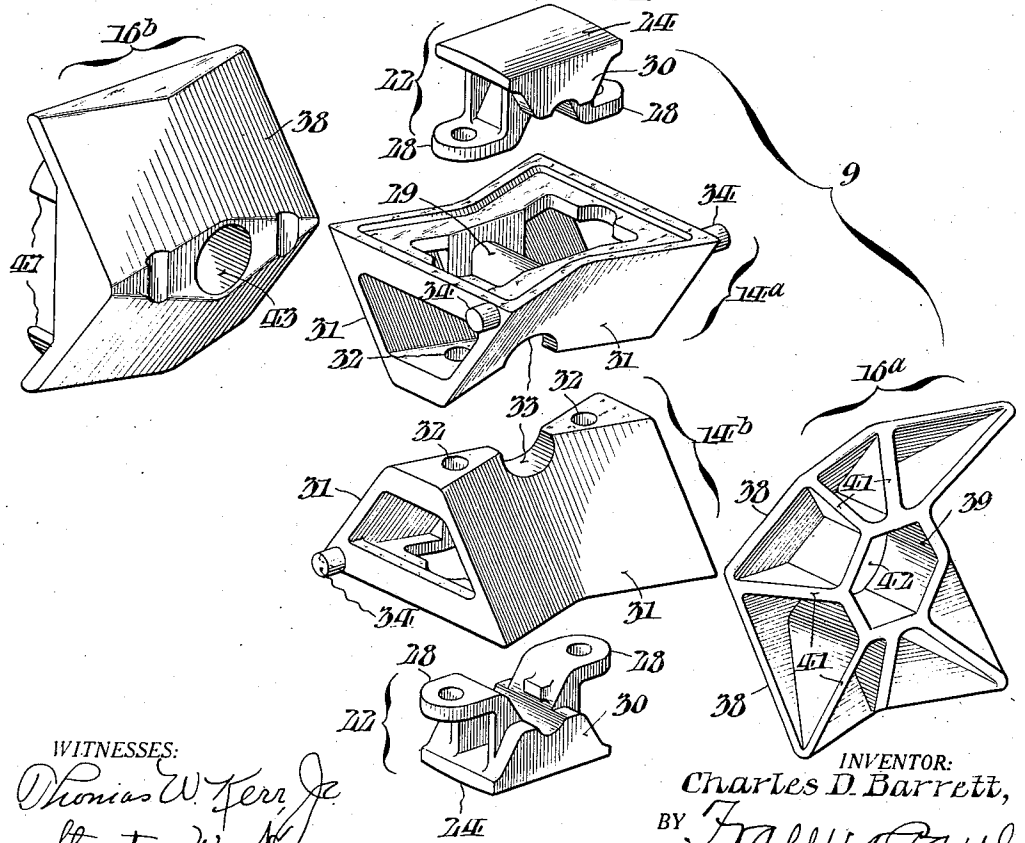


FIG. IX



WITNESSES:
Thomas W. Kerr Jr.
Stanton W. Kerr

INVENTOR:
Charles D. Barrett,
BY Fraser & Paul
ATTORNEYS.

Patented Dec. 29, 1936 2,065,992

UNITED STATES PATENT OFFICE

2,065,992

FRICTION UNIT FOR RAILWAY CAR TRUCKS

Charles D. Barrett, Altoona, Pa.

Application March 9, 1935, Serial No. 10,241

4 Claims. (Cl. 105—197)

This invention relates to railway car trucks and more particularly to a friction unit adapted for use in combination with springs for supporting the truck bolster.

Heretofore it has been proposed to increase the spring capacity of car trucks, as well as to improve their riding qualities, by the provision of various combinations of springs and shock absorbing devices. It has long been recognized that the helical springs customarily employed in freight car trucks produce a harmonic motion which causes the car body to rise and fall substantially equal distances above and below its static position, with this motion continuing over a relatively long period; and numerous attempts have been made to dampen such vibrations by providing additional springs of a different character or friction gears which serve to break up the harmonic motion of the helical springs.

Many of the proposed arrangements require radical changes in standard truck construction, such as the provision of new types of bolsters or side frames; others involve the use of relatively large and inefficient springs which are objectionable because of the limited space available in the windows of the side frames; and still other arrangements involve the use of friction units, in substitution for one or more spring units, which are characterized by friction elements having interengaging surfaces of relatively small area, and which can obtain a large load-carrying capacity only by employing friction elements which tend to stick if the coefficient of friction is high.

The object of the present invention is to avoid the above recited difficulties, and this end is accomplished by the provision of a novel form of shock absorbing unit which is adapted to take the place of a spring unit, and which thus may be inserted in trucks of standard construction without requiring changes in the form of the bolster or side frames. The shock absorbing unit of this invention is further characterized by friction elements having relatively large surfaces and a spring for opposing movement of the friction elements and preventing the device from sticking, the spring being disposed in such manner as to project outside the window opening of the side frame and thus not to interfere with the space desired for the insertion of the coil spring units.

Many other objects and advantages characterizing my present invention will become apparent from the description hereinafter set forth of one embodiment or example of the invention as applied to a conventional form of car truck, the description having reference to the accompanying drawings, whereof:

Fig. I represents a side elevation of a railway car truck embodying my invention.

Fig. II represents a view of the same, partly in end elevation and partly in section, showing the arrangement of the bolster, spring plank, and side frames.

Fig. III represents an enlarged cross section, taken as indicated by the line III—III of Fig. I, showing details of the friction unit and the manner in which it is seated in position in the side frame.

Fig. IV represents an enlarged cross section, taken as indicated by the line IV—IV of Figs. I and III, showing further details of a portion of the friction unit.

Fig. V represents a horizontal cross section, taken as indicated by the line V—V of Fig. III.

Fig. VI represents a cross section, taken as indicated by the line VI—VI of Fig. II and showing a plan view of the coil springs and friction unit of one side frame.

Fig. VII represents a vertical cross section of the friction unit, taken as indicated by the line VII—VII of Fig. III.

Fig. VIII represents a vertical cross section of the friction unit, taken as indicated by the line VIII—VIII of Figs. II and III; and

Fig. IX represents an exploded view of parts of the friction unit, showing the same in readiness for assembly.

With particular reference to Figs. I and II of the drawings, there is shown a railway car truck having side frames 1 of standard construction, each side frame including tension members 2, compression members 3, and journal boxes 4 formed integrally therewith. Guide columns 5 define windows 6 at the center of each side frame 1. The tension members 2 include a web or seat portion 7 upon which is mounted a group of shock absorbing elements comprising helical springs 8a, 8b and a self-contained friction unit comprehensively designated at 9. In the illustrated example there are three sets of coil springs and one friction unit for each side frame, and each set of coil springs comprises an inner spring 8b and an outer spring 8a. A bolster 10 extends between the side frames 1, with its ends supported upon the helical springs 8a, 8b and upon the friction units 9. A spring plank 11, or other connecting member of like nature, joins one side frame 1 with the other beneath the bolster 10.

It will be observed that the arrangement shown

in Figs. I and II represents a conventional form of railway car truck, with a self-contained friction unit 9 of this invention substituted for one set of coil springs in each side frame. As will be more fully apparent from the description hereinafter, this friction unit, though it is especially adapted for application to trucks of standard construction, may be applied to many different types of car trucks.

Each friction unit 9 is disposed vertically and flexibly mounted, in a manner similar to the coil springs 8a, 8b, with its base supported on the seat portion 7 of the side frame and with its top engaging the bolster 10. Each friction unit 9 comprises a series of wedge members in frictional engagement with each other and springs opposing relative movement of the wedge members. The wedge members include a pair of vertically movable members 14a, 14b and a pair of horizontally movable members 16a, 16b. The springs opposing relative movement of the wedge members conveniently comprise a relatively heavy outer spring 18a and a relatively light inner spring 18b. All of the springs and wedge members of the unit are held in assembled relation by means of a horizontal securing bolt 20 and a pair of vertically disposed bolts 21.

For transmitting the load of the bolster 10 to the wedge members 14a, 14b, 16a, 16b, bearing members 22 are desirably employed. The bearing members 22 are shown most clearly in Figs. VII and IX. They are preferably provided with a yoke-shaped body 30 and with crowned bearing surfaces 24 which engage rectangular retaining seats formed in the spring caps 25, 26, as shown most clearly in Fig. III. The retaining seats prevent relative shifting or turning of the friction unit 9 about its vertical axis. Conveniently these seats may be formed by welding to the spring caps 25, 26 pairs of spaced lugs 27 which accommodate between them the bearing members 22. Obviously other methods may be employed for seating the bearing members 22. One advantage of the rocker bearing here shown is that it insures that the load on the bolster will be imparted to the friction unit substantially along the vertical axis thereof, and it tends to prevent cocking or misalignment of the wedges. As shown most clearly in Figs. VII and IX, each bearing member 22 has projecting ears 28 which are perforated to accommodate the bolts 21, and the bolts are held in place by nuts 23.

The vertically movable wedge members 14a, 14b, as shown most clearly in Fig. IX, are hollow and are adapted to receive in the interior thereof the major portion of each bearing member 22. The vertically movable wedge members 14a, 14b are provided with central ribs 29, shown most clearly in Figs. VII and IX, which are rounded at the ends thereof and engaged by curved rocking surfaces of the yoke portions 30 of the bearing members 22. The wedge members 14a, 14b are substantially identical in construction, and each member has friction surfaces 31 which are inclined inwardly from the sides of the unit toward the center thereof, and which are also inclined inwardly from the top and bottom of the unit toward the center thereof. In other words, the friction surfaces 31 of the wedge members 14a, 14b are so inclined as to converge in a horizontal plane and in a vertical plane toward the center of the unit. Each wedge member 14a, 14b is provided with holes 32 through which the securing bolts 21 pass. Semi-circular recesses 33 are formed at the bottom of the upper member 14a and at the top of the lower wedge member 14b to accommodate the horizontal retaining bolt 20.

Preferably each wedge member 14a, 14b is provided with laterally extending pins 34 which engage brackets 35, 36 on the spring caps 25, 26 of the car truck, as shown in Fig. II, and form therewith connections which positively prevent displacement of the friction unit in the event that the wedge members fail to function properly or stick upon downward movement of the bolster 10. As shown in Figs. II and III, the pins 34 of the lower wedge member 14b are engaged by hook-shaped brackets 36. The pins 34 of the upper wedge member 14a are engaged by additional hook-shaped brackets 35. In the event of sticking of the wedge members, the spring caps 25, 26 may become distorted, but the friction unit 9 will be held in place by engagement of the pins 34 with the brackets 35, 36. While I prefer to utilize such connections as a safety device to prevent dislodgment of the friction unit 9 under any condition, I do not wish to imply that the friction unit of this invention has a tendency to stick, for one of the important advantages of the invention is that it improves upon older forms of friction units in that the device of this invention is designed to minimize the possibility of the wedge members 14a, 14b failing to return to normal position under the influence of the springs 18a, 18b.

The horizontally movable wedge members 16a, 16b are shown most clearly in Fig. IX. These members are substantially symmetrical and are provided with friction surfaces 38 which are complementary to the friction surfaces 31 of the vertically movable wedge members 14a, 14b. Like the friction surfaces 31, the surfaces 38 converge inwardly in a horizontal and in a vertical plane toward the center of the unit. Desirably, the wedge member 16a at the rear of the friction unit 9 is formed with a central socket 39, in the present instance of hexagonal contour, for accommodating and holding against rotation the head 40 of the bolt 20. Within the socket 39 and surrounding the bolt 20 there is provided a centering washer 54. From the socket 39 ribs 41 extend radially outward to the top and side edges. At the center thereof the wedge member 16a is formed with a circular opening 42 for the passage of the bolt 20.

The companion wedge member 16b is similar as to the formation of its inner face to the wedge member 16a. At the center thereof there is a circular opening 43 for the passage of the bolt 20. At the front or outer face there are provided radial ribs 44, 45 an annular rib 46, and arcuate ribs 47 concentric with the annular rib 46. As shown most clearly in Fig. III, the outer arcuate ribs 47 form a circular recess for the accommodation of the end of the outer spring 18a. Likewise the inner annular rib 46 provides a circular recess for the accommodation of the inner spring 18b. At their outer ends the springs 18a, 18b of the friction unit 9 bear against a disk 48 which surrounds the bolt 20 and has an opening 49 through which the bolt passes. Desirably the disk 48 is formed with an annular boss 50 which fits within and serves to center the outer coil spring 18a. Moreover, the disk 48 is desirably also provided with a circular hub 51 which houses a centering washer 52 and a lock nut 53 on the end of the bolt 20.

It will be noted that the bolts 21 maintain the vertically movable wedge members 14a, 14b in

assembled relation, and that the horizontal bolt 20 and disk 48 thereon maintain the springs 18a, 18b and the horizontally movable wedge members 16a, 16b in assembled relation. The bolts also serve to establish limits for the travel of the wedge members, such limits being adjustable by means of the nuts 23, 53. Moreover, the angles formed between the inclined surfaces 38 and between the inclined surfaces 31 are such that the wedge members 14a, 14b, 16a, 16b, tend to maintain wedging engagement and to preserve contact over the entire friction surfaces.

The friction unit 9 of this invention serves to break up the harmonic action of the coil springs 8a, 8b. Under deflection of the bolster 10, the vertically movable wedge members 14a, 14b move toward and away from each other in a vertical direction. Cocking of the wedge members is prevented or substantially minimized by the capacity of the bearing members 22 to rock, and by the rounded formation of the surfaces 24 of the bearing members 22. The bearing members 22 are so formed, as clearly shown in Fig. IX, that the vertically movable wedge members 14a, 14b are adapted to rock relatively thereto in a plane at right angles to the rocking plane of the friction unit. Vertical movement of the wedge members 14a, 14b produces horizontal movement of the wedge members 16a, 16b, the separation of the latter wedges being opposed by the springs 18a, 18b. Thus the line of action of the springs 18a, 18b, is at right angles to the line of action of the vertically movable wedge members 14a, 14b.

The parts of the friction unit 9 are characterized by relatively large friction surfaces, but are so designed as to reduce the tendency to stick to a minimum. Moreover, advantage is taken of the entire space between the bolster 10 and the window seat for the wedge members of the friction unit, and advantage is taken of space outside of the windows of the side frames, and normally not utilized for any useful purpose, for the springs of the friction units. Thus the invention makes it possible to obtain the desired load carrying capacity by the use of large friction surfaces and without substantial change in existing car truck construction. In fact, ordinary car trucks may be converted or adapted to my invention by mere substitution of a friction unit for one or more of the coil springs and by minor changes in the spring caps.

While I have described in some detail an example of the practice of this invention, it will be apparent that changes may be made in the form of the apparatus herein described and illustrated without departing from the spirit of the invention as defined in the annexed claims. Particularly, it will be apparent that the friction unit may be disposed in many different positions, and that I do not confine myself to the particular arrangement shown in the drawings. For example, it will be readily apparent that the friction unit may be substituted for any one of the outer springs of a group (using the word "outer" to designate proximity to either edge of the side frame seat, or remoteness from the central axis of the group) and it may project beneath the bolster of the car truck rather than away from the bolster.

Having thus described my invention, I claim:

1. In a car truck, a self-contained shock absorbing unit including a pair of vertically movable wedge members, a pair of horizontally movable wedge members in frictional engagement with the vertically movable wedge members, vertically movable bearing members in engagement with parts of the car truck for transmitting the load to said wedge members, said bearing members having laterally extending ears disposed within the vertically movable wedge members, bolts connecting the ears of one bearing member with the ears of the other bearing member, said bolts limiting the vertical separation of said bearing members and serving to maintain said vertically movable wedge members in assembled relation, and a spring opposing relative movement of said wedge members, said spring having a line of action at right angles to the line of action of said bearing members.

2. In a car truck, a self-contained shock absorbing unit including a pair of vertically movable wedge members, a pair of horizontally movable wedge members in frictional engagement with the vertically movable wedge members, top and bottom bearing members for transmitting the load to said wedge members, and a spring opposing relative movement of said wedge members, each of said bearing members having rocking engagement with a vertically movable wedge member, and each of said bearing members having a rocking surface for engagement with parts of the car truck.

3. In a car truck, a self-contained shock absorbing unit including a pair of vertically movable wedge members, a pair of horizontally movable wedge members in frictional engagement with the vertically movable wedge members, top and bottom bearing members for transmitting the load to said wedge members, and a spring opposing relative movement of said wedge members, each of said bearing members having rocking engagement with a vertically movable wedge member, and each of said bearing members having a rocking surface for engagement with parts of the car truck, the vertically movable wedge members being adapted to rock relatively to the bearing members in a plane at right angles to the rocking plane of the unit.

4. In a car truck, a side frame having a window therein, a bolster, and means for supporting the bolster on the side frame comprising coil springs disposed vertically beneath the bolster and a similarly disposed shock absorbing unit mounted between retaining seats on said bolster and side frame, and having movable wedge members in sliding frictional engagement, a spring opposing relative movement of said wedge members and projecting away from the window of the side frame in a substantially horizontal plane, and bearing members having rocking engagement with parts of the car truck within said retaining seats whereby incident to shifting of the bolster the load is transmitted substantially along the vertical axis of said shock absorbing unit, said retaining seats forming sockets for the accommodation of said bearing members and serving additionally to prevent said shock absorbing unit from turning about its vertical axis.

CHARLES D. BARRETT.