June 4, 1963 O. G. SHORT ETAL 3,092,042

RAILWAY CAR TRUCK

Filed June 27, 1960 3 Sheets-Sheet 1

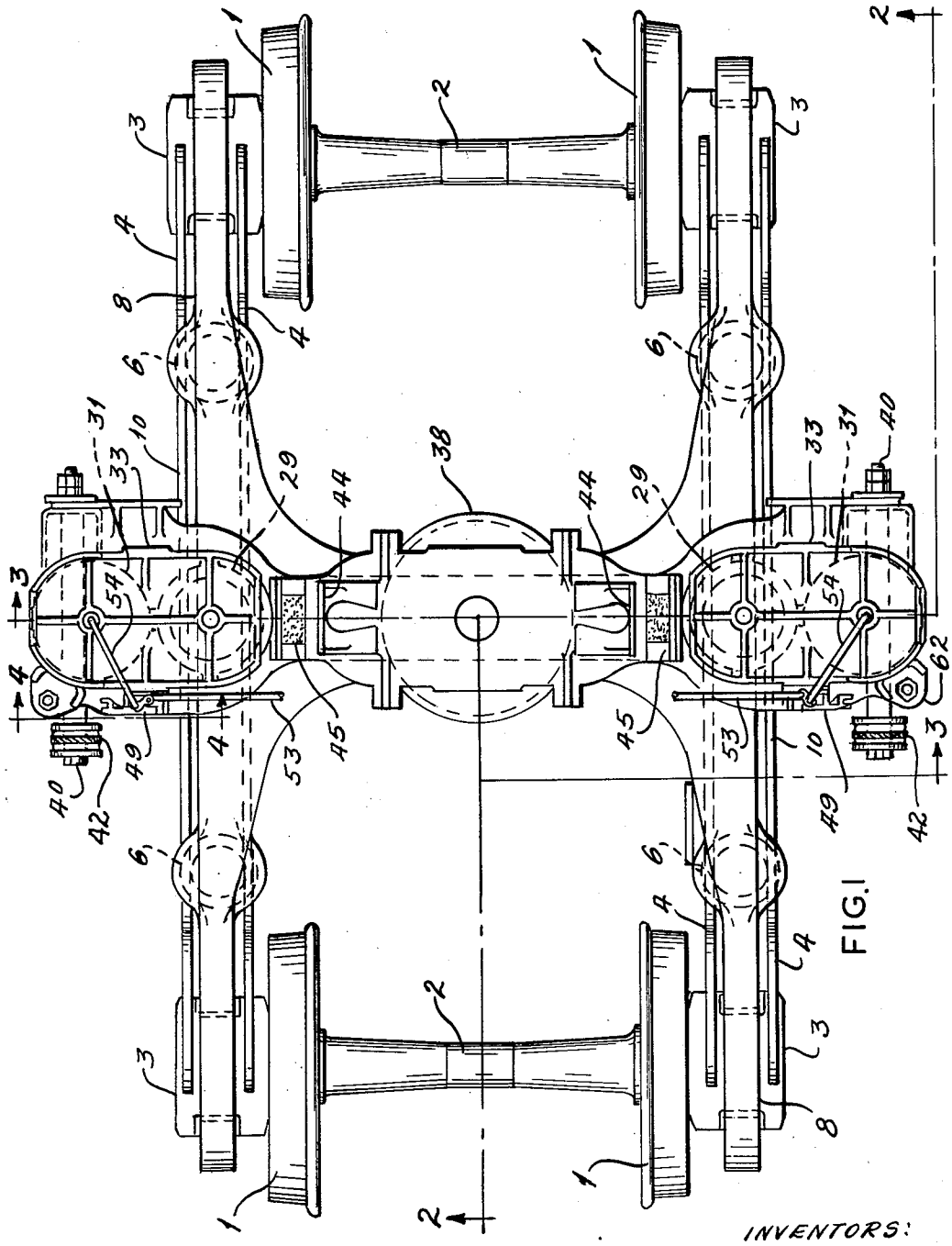

FIG. 1

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FIG. 2

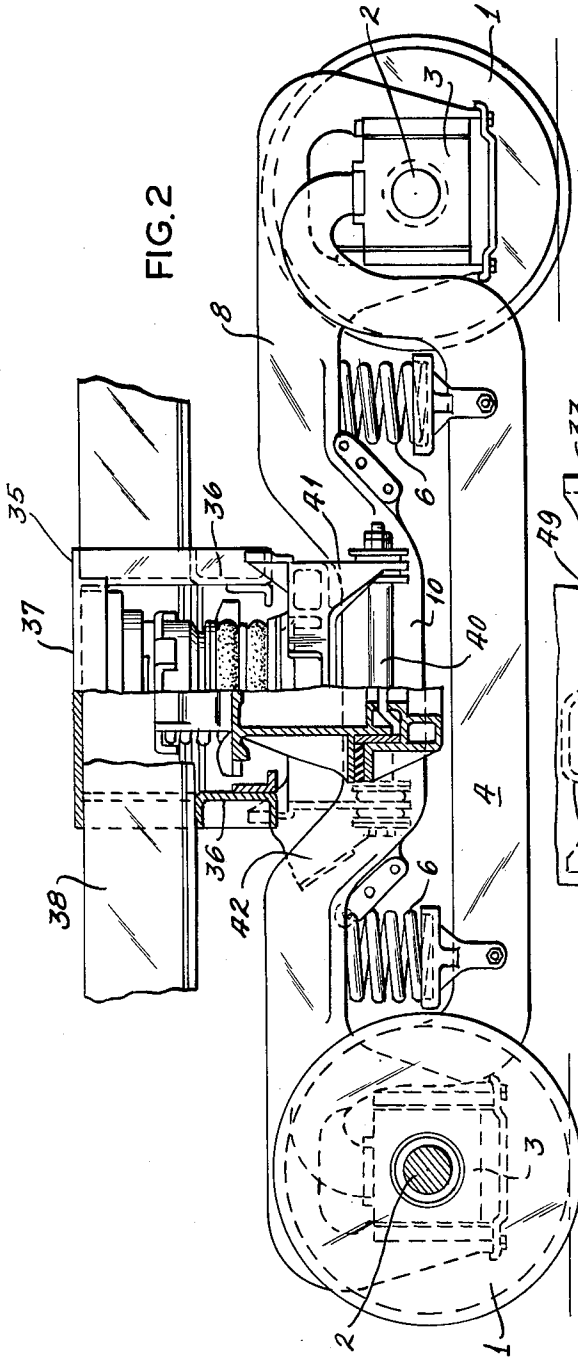
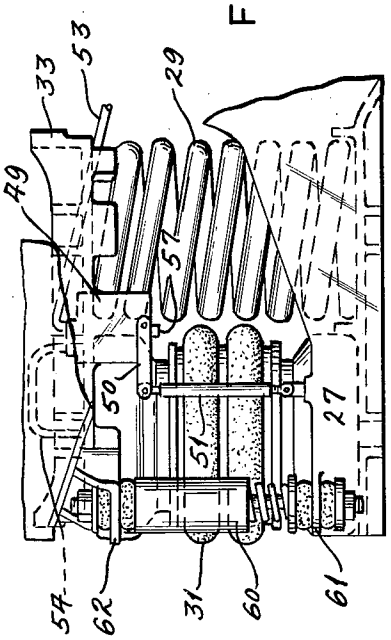


FIG. 4



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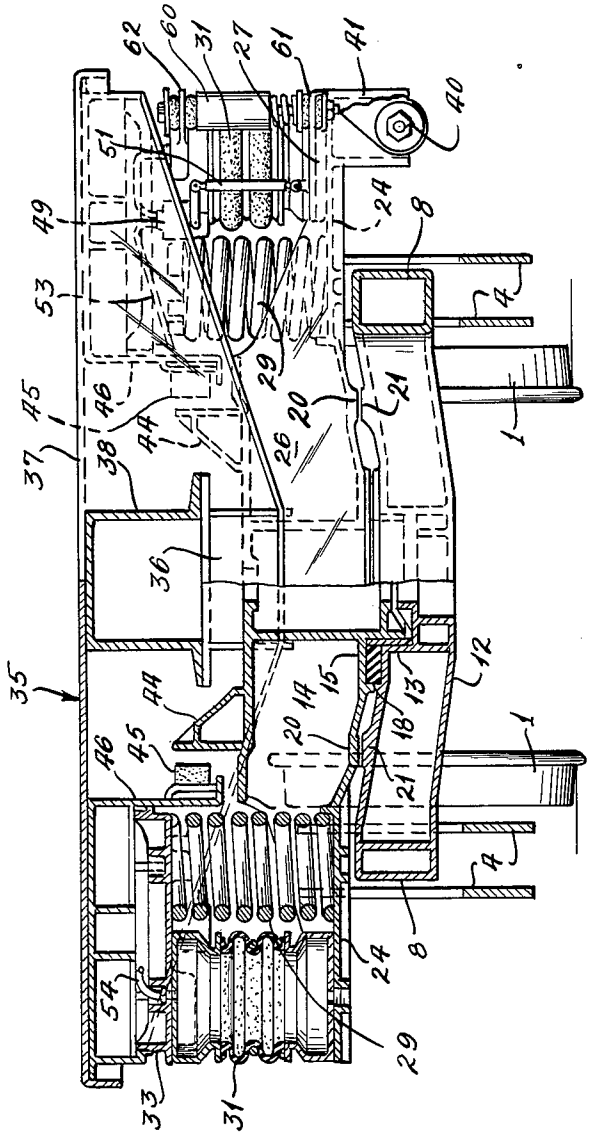

FIG. 3

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RAILWAY CAR TRUCK

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3 Claims. (Cl. 105—197)

The invention relates to railway rolling stock and consists particularly in an improved car truck arrangement.

In trucks of the type in which the bolster is swivelly supported on the truck frame and carries springs at its ends for supporting the car underframe directly, it is desirable that both flexible walled pneumatic springs and coils springs be used to support the car body. Coil springs may be used to support the light load of the car and as the sole support of the car in the event of failure of the air springs, and the air springs, the height and stiffness of which may be regulated responsive to changes in load, are used to provide the additional support required for varying pay loads.

It is a main object of this invention to provide the optimum arrangement of the air and coil springs both from the standpoints of efficiency in operation and ease of maintenance.

It is a further object to arrange the air and coil springs in such a manner that a lighter spring-supporting structure can be used than could be used with any other arrangement of the springs. It is a further object to locate the air spring such that it will be at all times easily accessible for inspection and maintenance.

It is an additional object to arrange the springs in such a way that the width of the bolster can be minimized, whereby to facilitate its swiveling relative to the supporting truck frame.

The foregoing and other objects and advantages of the invention will be apparent to those skilled in the art from a study of the following description and the accompanying drawings, in which:

FIGURE 1 is a plan view of a truck embodying the invention.

FIGURE 2 is a partial longitudinal vertical sectional view and partial side view taken along the line 2—2 of FIGURE 1.

FIGURE 3 is a transverse vertical sectional view taken along the line 3—3 of FIGURE 1.

FIGURE 4 is a fragmentary transverse vertical sectional view, slightly enlarged, taken along the line 4—4 of FIGURE 1.

Referring now to the drawings, the numerals 1 refer to flanged wheels arranged in spaced pairs on spaced axles 2, on the ends of which are rotatably supported the usual journal boxes 3. At each side of the truck the journal boxes 3 are connected by a pair of laterally-spaced drop equalizer bars 4, on each of which are carried longitudinally-spaced upstanding coil springs 6.

A rigid truck frame, preferably of one-piece cast steel construction, comprises spaced longitudinally-extending side members 8, supported directly on coil springs 6 and depressed therebetween as at 10, and a single transverse transom 12 connecting the depressed portions 10 of side members 8. It will be understood that the support of the frame on the equalizers is conventional and operates in the conventional manner.

Intermediate its ends, transom 12 is formed with a central bearing 13 comprising a vertical cylindrical recess surrounded by an annular upwardly-facing horizontal surface of substantially greater diameter than the recess. A bolster 14 is formed with a cooperating central bearing 15 comprising a downwardly-extending cylindrical projection intermediate its ends surrounded by a downwardly-facing horizontal annular surface, and an annular liner

18 of friction material is interposed between the opposing annular horizontal surfaces to form a support for the bolster on the truck frame and to provide frictional resistance opposing tendencies of the truck to shimmy relative to the bolster. While the mating central bearings are of sufficient diameter to provide the entire support of the bolster and its load on the truck frame under normal conditions, making unnecessary the usual side bearings, opposing vertically-spaced horizontal stops 20 and 21 are formed on the opposing surfaces of the bolster 14 and transom 12, respectively, at some distance outwardly from the central bearing, to prevent excessive tilting of the bolster relative to the frame in the event of the application of abnormal overturning moments to the supported car body.

The intermediate portion of the bolster is of box section, and its end portions 24 which extend across the depressed portions 10 of the frame side members and a substantial distance outwardly therefrom are substantially of channel section, the top wall of the bolster being eliminated in this area and the side walls 26 tapered downwardly from their maximum height inwardly of the frame side members to form a shallow upstanding rim 27 near the outer extremities.

The substantially channel-shaped end portions 24 of bolster 14 each form seats for a pair of upstanding springs, aligned transversely of the truck. The inner spring of each pair is a coil spring 29 calibrated only to sustain the light or empty load of the supported car body. Since this constitutes the major part of the maximum load to be supported by the trucks, the location of the coil spring relatively near to the reaction point of the bolster, that is, its point of support on the truck frame through cooperating central bearings 13 and 15, shortens the arm through which the load carried on the spring exerts a bending moment on the bolster, thereby making possible the use of a lighter bolster structure than would be necessary were coil springs 29 located at the extremities of the bolster.

Outwardly of the coil springs and at the extremities of the bolster are positioned upstanding air springs 31 of the flexible wall type. The coil springs 29 and the air springs 31 at each side support a common spring cap casting 33 on which is seated the car body bolster 35, which consists of a pair of spaced transversely-extending vertical walls 36, one at either side of the bolster, and a top cover plate 37. The car center sill 38 of conventional type extends through and is rigidly secured to the body bolster in a suitable manner.

Since swiveling movements of the car relative to the body are accommodated by the cooperating truck frame and bolster central bearings 13 and 15, bolster 14 is retained against swiveling relative to the car body by a pair of longitudinally-extending bolster anchors 40, of a type well-known in the art, which are secured at one end to a bracket 41 depending from bolster end portions 24 and at their other end to suitable bracket structure 42 depending from the supported car body. The end connections of the anchors accommodate limited pivoting of the anchors relative to the connecting bracket structures and hence permit relative transverse and vertical movements between the bolster and the supported car body.

For cushioning lateral shocks applied to the truck by track irregularities, the yieldability in shear of the coil and air springs 29 and 31 is utilized to permit and yieldingly resist relative lateral movements between the supported car body and the bolster 14. To limit the magnitude of these lateral movements, upstanding brackets 44 are formed on the top wall of the bolster 14, and resilient bumpers 45, preferably of rubber or rubber-like material, are supported on bolster web 46 and are normally spaced laterally of the car from upstanding brackets 44, being

adapted to engage members 44 when the maximum lateral movement is approached.

For controlling the admission of air into air spring 31, a normally closed three-position valve 49, of a type well-known in the art, is mounted on each spring cap 33 and is actuated by an arm 50 connected by a pitman 51 to rim 27 of bolster end portion 24. Valve 49 is connected by suitable piping 53 to a source of compressed air and by additional piping 54 to the adjacent air spring 31 and is adjusted so that when the load supported by the combination air and coil springs 29 and 31 exceeds a predetermined value, causing a compression of the springs below a predetermined height, pitman 51 will cause arm 50 to actuate the valve to provide communication between conduit 53 leading from a source of compressed air and conduit 54 leading to the adjacent air spring 31, whereby additional air under pressure is admitted to the air spring, causing its height to increase until pitman 51 returns arm 50 to the normal closed position. Upon a reduction in load, air spring 31, due to the increased amount of air contained by it, would elevate the supported part of the body above the predetermined normal height. When this occurs, pitman 51 causes arm 50 of valve 49 to rotate downwardly to provide communication between the air spring and an exhaust port 57 in valve 49, air being discharged therethrough until the spring returns to its normal height, whereupon pitman 51 and arm 50 cooperate to close the valve 49, sealing spring 31 against the admission or discharge of air.

Vertical oscillations of the springs are damped by snubbers 60, of conventional construction connected to their lower ends to the bracket 61 on the upstanding rim 27 of bolster end portions 24 and at their upper end to a similar bracket 62 on spring caps 33.

The location of the air spring outwardly of the coil spring has numerous advantages. Since the coil spring bears the major part of the load, its location near the point of support of the bolster 14 on the truck frame reduces the bending moment on the bolster resulting from this major part of the load and permits the use of a lighter bolster structure. Since body roll is critical when the car is occupied and of less importance when the car is operating light, the location of the air springs laterally outwardly of the coil springs provides a substantially greater roll-resisting moment due to the greater length of the arm through which the air spring acts to oppose body roll. The alignment of the springs longitudinally of the bolster (transversely of the truck) permits the use of a much narrower bolster than if the springs were concentric or were aligned transversely of the bolster, and this, in turn permits the bolster to be lowered substantially without undue restriction on swivel or elongation of the truck wheel base. This results from the fact that the narrow bolster requires a relatively narrow depression in the frame side members to accommodate swivel, and a narrow depression can be made deeper than a wider one without increasing the spacing of the equalizer springs. In addition, the outward location of the air springs makes them much more accessible for inspection and maintenance than if they were located inwardly of the coil spring.

The details of the arrangement may be varied substantially without departing from the spirit of the invention and the exclusive use of those modifications as come within the scope of the appended claims is contemplated.

What is claimed is:

1. A railway vehicle truck comprising wheels, axles, framing supported on said axles and including longitudinally extending side members each having relatively high portions spaced apart lengthwise of the truck and a portion depressed between said high portions, a bolster supported at its center on said framing to swivel about a vertical axis, said bolster extending transversely of the truck and having end portions extending outwardly through the depressions in said side members, a flexible wall air spring carried by each extremity of said bolster outwardly of said side members and coil springs carried by said bolster in alignment transversely of the truck with said air springs and in substantial vertical alignment with said side members inwardly of said air springs, said coil springs being of suitable capacity to support the light load of a supported car body whereby said air springs are required only to support increments of pay load in excess of the light load, and means for causing said air springs to provide support for such load increments in excess of the body light load, comprising normally closed valve means having exhaust outlets and connections with said air springs and a source of compressed air, said valve means being responsive to changes in the relative height of the bolster and a supported vehicle body resulting from variations in the pay load of the body for connecting said air springs with the air source when the height of the supported body decreases to less than a predetermined height and to connect the air springs with said exhaust outlets when the height of the body exceeds a predetermined height.

2. A railway vehicle comprising a body and a supporting truck, said truck including wheels, axles, framing supported on said axles and including longitudinally extending side members each having relatively high portions spaced apart lengthwise of the truck and a portion depressed therebetween, a transverse bolster swivelly supported at its center on said framing and having end portions extending outwardly through the depressions in said side members, air springs seated on the end portions of said bolster outwardly of said side members, coil springs seated on said bolster laterally inwardly of and in alignment transversely of the truck with said air springs, said vehicle body being mounted on said air and coil springs for movement vertically and laterally of said truck as may be accommodated by vertical and lateral deflections of said springs, said coil springs being of suitable capacity to support the light load of said supported car body whereby said air springs are required only to support increments of pay load in excess of the light load, and means for causing said air springs to provide support for such load increments in excess of the body light load, comprising normally closed valve means having exhaust outlets and connections with said air springs and a source of compressed air, said valve means being responsive to changes in relative height of the bolster and said body resulting from variations in the pay load of the body for connecting said air springs with the air source when the height of said body decreases to less than a predetermined height and to connect the air springs with said exhaust outlets when the height of said body exceeds a predetermined height, said body incluuding a transverse bolster member of generally inverted channel shape in cross section, said body bolster extending the full width of said body and partially receiving, between its longitudinally-spaced vertical webs, said springs and said truck bolster, means on said body and said truck bolster preventing relative longitudinal and swivel movements therebetween, and additional means resiliently limiting relative lateral movements between said body and said truck bolster.

3. A railway vehicle truck comprising wheels, axles, framing supported by said axles, a transverse bolster pivotally supported on said framing at the center thereof to swivel about a vertical axis, first upright springs seated on said bolster and spaced transversely of the truck from the pivotal support of said bolster at both sides thereof, upright air springs seated on said bolster outwardly, transversely of the truck, from said first springs, said first upright springs being of suitable capacity to support the entire light load of the vehicle body whereby said air springs are required only to support increments of pay load in excess of the light load, and means for causing said air springs to provide support for such load in-

crements in excess of the body light load, comprising normally closed valve means having exhaust outlets and connections with said air springs and a source of compressed air, said valve means being responsive to changes in the relative height of the bolster and a supported vehicle body, resulting from variations in the pay load of the body, for connecting said air springs with the air source when the height of the supported body decreases to less than a predetermined height and to connect the air springs with said exhaust outlets when the height of the body exceeds a predetermined height.

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