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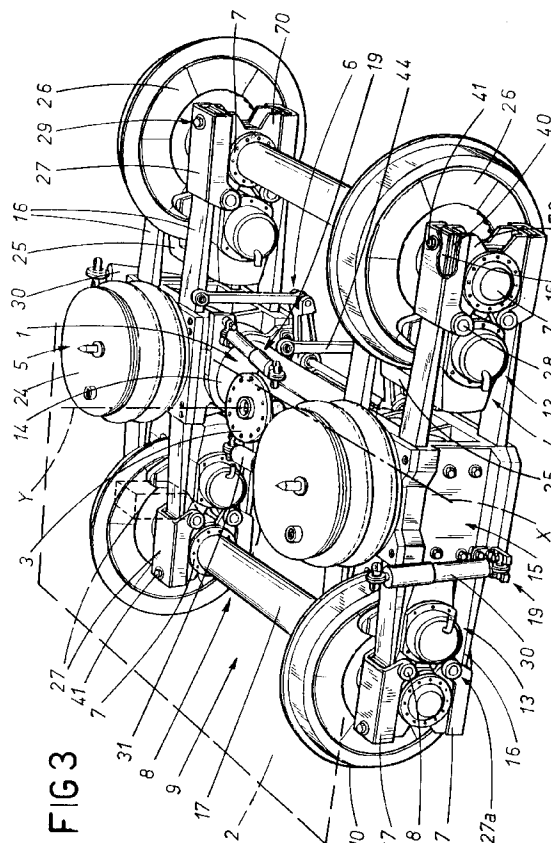
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(54) **A multipurpose rail bogie truck.**

(57) The chassis (1) of the truck comprises a tubular cross member (14) carrying a pair of blocks (15), associated one with each end and rotatable about the axis (X) of the cross member, which provide the anchorages for a secondary suspension (5) and the mountings for a primary suspension (4) consisting in pairs of horizontal leaf springs (16) by which the single wheels (10) of each axle (8) are flanked on both sides; the axle boxes (7) supporting each wheel are attached to the projecting ends of the springs (16) together with the relative brake caliper (13), and secured by way of quick-release clamp brackets (18) applied to each pair of springs in such a way that the bearings and brakes of the truck can be fitted and removed independently.



The present invention relates to a multipurpose rail bogie truck comprising a set of components and devices of which the features of construction and the arrangement one in relation to another are such as to allow a multipurpose capability in operation, that is, the same truck can be used to support a passenger carriage, or a locomotive with partial or total traction, operating in any given weight class and at the highest or lowest of running speeds.

The conventional type of bogie truck currently used in railway rolling stock is composed of an assembly of elements or devices, each designed to perform a specific function within the overall context of the truck.

The main components of the conventional bogie truck (of which a clearer understanding will be gained by referring to the flow diagram of fig 1), include:

- a chassis T substantially of "H" shape, viewed in plan, serving to unite the remaining components of the truck and interfaced with the supported coach or body C above by way of a connection consisting in a centrally located fifth wheel RC; in practice, the chassis T interconnects two suspension systems (referred to in the following paragraph), besides supporting the braking system F and, in the case of a locomotive, the final drive linkages and their relative mountings;
- a primary and a secondary suspension system, of which the primary system SP is interposed between the chassis T and a plurality of axle boxes B, and the secondary system SS between the body C and the chassis; the purpose of the two suspension systems, which consist essentially in springs and dampers, is to absorb all such stresses (typically vertical and lateral oscillations) as are generated by the movement of the coach or body;
- a pair of axles A, each composed of a transverse axle shaft At and two wheels R, each wheel keyed to a relative end of the shaft and flanked on either side by a relative pair of axle boxes B; the axle boxes afford bearings in which the axles are freely rotatable, and housings by way of which the axles are connected to the chassis T so that the chassis itself can either be drawn by or (in the case of a locomotive) draw other stock, and are associated with rigid or semiflexible positioning elements ensuring restraint in the vertical, lateral and longitudinal directions;
- a mechanical braking system F mounted alongside the axle boxes B, operating between the chassis T and the wheels R;
- antiroll bars B mounted adjacent to the central cross member of the chassis T and connected to the body C, of which the function is to attenuate the roll-induced oscillations of the body and

thus prevent any peripheral contact between body and truck as a result of the displacements which occur during their movement along the track;

- final drive linkages P, included only in the case of a locomotive, which are coupled to the axles A and associated with suitable mechanical reaction mountings afforded by the chassis T.

A bogie truck structured in this manner is suitable specifically for carriages and locomotives of older design, hence affording significantly lower levels of performance than rolling stock of present-day conception in terms both of speed along the track and of proportions and weight.

In effect, all components of the traditional bogie truck are associated with the chassis, such that most of the dynamic reactions generated in motion are directed through the one chassis structure: body roll, traction, suspension responses and, in the case of a locomotive, the reaction R_p of the final drive linkages P (as discernible clearly from the flow diagram of fig 1). When the brakes are applied, in particular, the reaction force from the braking system is taken up directly through the chassis, thus by-passing the primary suspension and generating considerable disturbance.

A further problem deriving from the increased speed of modern carriages is the proportionally greater degree of hunting occasioned by their bogie trucks.

At high speed, in fact, the amplitude and frequency of the hunting motion are accentuated by the bogie axle, with the result that a rapid knocking effect is generated between wheel and track; the forces unleashed under such conditions are considerable (as great as 5 g), leading swiftly to deterioration both of the railway line and of the truck itself.

One of the simplest expedients for correcting this problem is to lengthen the wheelbase of the truck; such a solution is disadvantageous when building carriages and locomotives of more recent design, however, as the weights of the conventional truck and body structures are increased, and the creation of additional space in the underframe of the body to accommodate the larger truck has the effect of compromising the aerodynamics of the vehicle.

Another drawback of the traditional bogie truck is that of the heavy sideways oscillations deriving from the centrifugal force generated around bends, which pose limitations on the transverse dimension of a carriage, hence also on its seating capacity, and are attributable to the design of the lateral stabilizers utilized; these consist in transversely disposed springs which, by reason of their very nature, produce a reaction in opposition to the lateral thrust which increases with the increasing sideways shift of the body, up to a maximum value that coincides with the maximum axial compression of the spring, at which

point the reaction is nil. The suspension then begins to slam, resulting in a sudden jolt through the body.

Accordingly, the object of the present invention is to overcome the aforementioned drawbacks through the embodiment of a multipurpose rail bogie truck of which the wheels are independently suspended, and of which the various components are arranged in such a manner as to create a compact assembly of interdependent functioning units adaptable to any given constructional requirement, and thus achieve a greater diversification and absorption of the reactions generated through the supported coach or body.

The stated object is realized in a multipurpose rail bogie truck as characterized in the appended claims.

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- fig 1 is a flow diagram showing the structural composition of a conventional type of bogie truck, and the relative reactions of the various elements during operation;
- fig 2 is a flow diagram showing the structural composition of a rail bogie truck according to the present invention, and the relative reactions of the various elements during operation;
- fig 3 is a lateral perspective of the bogie truck according to the present invention;
- fig 4 shows part of a bogie truck according to the invention fitted with a secondary suspension system of mechanical embodiment, seen in plan from above with certain parts omitted better to reveal others;
- fig 5 is the section through V-V, fig 4;
- fig 6 shows part of a bogie truck according to the invention fitted with a secondary suspension system of pneumatic embodiment, seen in plan from above with certain parts omitted better to reveal others;
- fig 7 is the section through VII-VII, fig 6;
- fig 8 is a lateral perspective of the central part of a bogie truck with a secondary suspension system of pneumatic embodiment, and with active lateral suspension, in which certain parts are shown in section better to reveal others;
- fig 9 is a block diagram reflecting the structure of the active lateral suspension of fig 8;
- fig 10 is the front elevation of a bogie truck as in the preceding drawings, also incorporating drive transmission means, which is seen partly in section and with certain parts omitted better to reveal others.

With reference to the accompanying drawings, the bogie truck to which the invention refers is of the type by which railway carriages and locomotives are supported and rendered capable of rolling along a track; the principal components of such a truck are illustrated in figs 2 and 3 (for convenience, fig 2 also shows letters from the flow diagram of fig 1 in order

to illustrate the differences between a conventional bogie truck and the truck according to the invention), where 1 denotes a chassis T (the letters are dispensed with for the remainder of the specification in the interests of greater clarity and simplicity) offered full face to the body or coach C denoted 2 (illustrated in part only, and in phantom line, being incidental to the invention), with which it is associated by way of a centrally located fifth wheel Rc1 denoted 3.

The chassis 1 is equipped with a primary suspension system SP denoted 4, a secondary suspension system SS denoted 5 and antiroll bars Ba denoted 6, all of which serving to absorb the oscillations of the body 2 generated by the irregularity of the track.

The primary suspension 4 constitutes an integral part of the chassis 1 and interconnects a plurality of axle boxes B denoted 7, whereas the secondary suspension 5 and the antiroll bars 6 are interposed between the chassis and the body 2. Each end of the chassis is associated with a corresponding axle A denoted 8, supported by the axle boxes 7, which in the example illustrated is composed of a transverse axle shaft At, denoted 9, and a pair of wheels R denoted 10 keyed one to each end of the shaft, such that the truck is able to roll along the rails 11 of a track. More exactly, each wheel 10 is anchored rotatably between a pair of axle boxes 7 by way of relative bearings 12, and subject to the action of braking means 13 positioned adjacent to the axle boxes 7 and forming part of the axle 8 as a whole.

The chassis 1 of the truck shown in figs 3 to 7 comprises a single element, appearing substantially as a tubular cross member 14, to which the primary suspension 4 and the antiroll bars 6 are attached; in effect, the cross member 14 takes the form of a cylindrical tube of which the opposite ends carry corresponding blocks 15 independently rotatable about the axis X of the cross member on respective friction bearings 15c (see figs 5, 7 and 8).

Each such block 15 affords support, uppermost, to a respective component of the secondary suspension 5, as well as providing an anchorage for the relative components of the primary suspension 4, namely, two pairs of horizontal leaf springs 16 disposed one on each side of the single wheels 10 and anchored at either end to the relative axle box 7. In practice, each axle box 7 is cradled in a supporting frame 70 interposed between the relative pair of springs 16 and affording a central seating by which one of two pivots 10p extending from the hub of the wheel 10 is accommodated together with its bearing 12.

More exactly, the secondary suspension 5 might be of mechanical embodiment, as shown in figs 4 and 5, consisting in vertically disposed coil springs 22 positioned one in association with each block 15 and interposed between the block and the body 2.

Each such spring 22 occupies a position outside

the dimensional compass of the truck and alongside the block 15, supported from beneath by a corresponding horizontal bracket 23 rigidly associated with the respective block 15 by way of screw means 23b.

Figs 3, 6 and 7 show a secondary suspension 5 of pneumatic embodiment consisting in air springs 24, one associated with each block 15 in the example illustrated, which are secured respectively at the top and the bottom end to the body 2 and to the block (this solution will be described at greater length in due course).

As discernible from the figures mentioned above, each axle assembly is made up of four axle boxes 7, and two half shafts 9a and 9b united by a tubular housing 17 (in practice, a length of cylindrical tube serving also to establish the distance between the wheels according to the gauge of the track), together with the braking means 13, which are anchored to the leaf springs 16 but in such a way as to operate directly on the relative wheels 10; such means 13 consist in a plurality of calipers 25 numbering one to each wheel 10, of which the jaws are positioned on either side of the rim and made to interact by way of conventional brake pads with relative disks 26, keyed one to each face of the wheel. Each caliper 25 is suspended between the corresponding pair of leaf springs 16 by means of relative transverse pins 28, shown in fig 3, which also form a part of quick-release clamping means 18 associated with the axle boxes 7 and serving to allow their swift fitment and removal independently of one another. More exactly, the clamping means 18 in question (clearly discernible in figs 4 and 6) consist in a plurality of brackets 27 arranged in matched pairs associated one with each axle box 7 (that is, each pair flanking the corresponding axle box from either side); each single bracket 27 is pivotably associated at one end 27a with a relative transverse pin 28, the selfsame pin by which the relative brake caliper 25 is supported, positioned between the opposing faces of the leaf springs 16.

With this type of arrangement the clamping means 18 are capable of movement between a non-operative limit position, in which the single bracket 27 is raised, distanced from the axle box 7 and disposed substantially vertical (see phantom line, fig 3), and a lowered operating limit position in which the bracket 27 is tightened against the relative axle box 7, restraining its movement within the three principal axes (that is, transverse, longitudinal and vertical); by interposing rubberized distance pieces 40 between the axle box 7, the bracket 27 and the end of the leaf spring 16 (see fig 10), the clamping action applied to the united components is enhanced with additional grip. The clamping action in question is produced by means 29 associated with the bracket 27 and the supporting frame 70, which take the form of bolts 41.

19 denotes damping means (see fig 3) interposed between the chassis 1 and the body 2, of which the

function is to attenuate vertical and/or lateral movements generated by the body when in motion.

Such means 19 consist effectively in a first pair of vertical hydraulic dampers 30 positioned outside the dimensional compass of the truck, one on each side, of which the bottom ends are secured to the relative blocks 15, and a second pair of hydraulic dampers 31, in this instance horizontally disposed and occupying the space between the two blocks 15, each secured by one end to a corresponding end of the relative block 15 in such a way as to extend transversely on either side of the fifth wheel 3.

The first and second pairs of dampers 30 and 31 are offset in relation one to another and in relation to the axis Y coinciding with the centre of mass of the truck, and in effect with the vertical axis of the fifth wheel 3, in such a way as to absorb the oscillations produced by the pitching and hunting motion of the truck.

Fig 8 and fig 9 illustrate active stabilization means 20 associated with the chassis 1 and acting on the body 2 by way of the secondary suspension 5, which are interlocked to external control means 21 and serve to attenuate the lateral excursions of the body 2 in real time.

More exactly, the solution of figs 8 and 9 can be adopted in conjunction with the pneumatic type of secondary suspension 5, in which case the active stabilization means 20 consist in a pair of lateral air chambers 32 located internally of the tubular cross member 14, disposed on opposite sides of the fifth wheel 3; each such chamber 32 is associated with a horizontally disposed reservoir 33, likewise positioned internally of the cross member 14, which is connected by way of relative pipelines 35 and 36 with, on the one hand, the respective component of the secondary suspension 5 (the air spring 24), and on the other, the corresponding chamber 32.

The two reservoirs 33 and the relative chambers 32 are controlled by the external means 21 mentioned above, which consist in a system of valves 37s and 37d (figs 8 and 9) connected one to each component of the secondary suspension system 5, in such a way as to permit of sensing any variation in internal pressure levels (that is, reflecting a departure of the body 2 from horizontal) and, as necessary, of maintaining or re-establishing a balanced pressure throughout the secondary suspension by piloting the operation of further valves 38 and 39 controlling the pipeline 36 between each of the reservoirs 33 and the relative air chamber 32.

In practice, the effect of an anticlockwise roll RL of the body 2 (as viewed in fig 9) caused by a bend in the railway track, and a consequent oscillation relative to an axis normal to the plane of fig 9, is to generate a downward vertical force F1 on one component of the secondary suspension 5 (on the air spring 24 to the left, in fig 9), and a laterally directed horizontal

force F2 proportional to the centrifugal force of the swerve.

In a conventional system, each air spring 24 is connected to a main high pressure pipeline 42 by way of a balancing valve 37 which, in the event of the body 2 shifting from horizontal, will direct air into the spring 24 under load in such a way as to create a reaction force FA proportional to the loading force F1; this occurs in response both to a right hand or left hand load, (valves 37d and 37s), and to a simple increase in dead weight of the body, such that the suspension is self-levelling.

According to the present invention, this very same self-levelling capability is exploited further to achieve a pneumatic compensation of the lateral force F2 generated through the body: conventional mechanical springs are replaced with the suspension reservoirs 33 as described above, which operate on either side of the fifth wheel 3 and are connected to the air springs 24 of the standard suspension system by way of the relative pipelines 35; thus, any increased pressure P+dP in the left hand side of the system 5 (air spring 24 plus reservoir 33) is counteracted not only by the vertical reaction force FA, but also by a lateral reaction force FL opposing the centrifugal force F2 and tending to limit the swing of the body toward the left. Given, however, that the forces acting on the body 2 are notable, whereas the internal surface area of the reservoir 33 is limited in size by reason of its position inside the cross member 14, the reaction force FL may be insufficient; it is for this reason that the two additional chambers 32 are provided, connected to the reservoirs 33 by way of valves 38 and 39 housed likewise within the cross member 14, and operated in exhaust mode. More exactly, and continuing the example outlined above, in response to a pressure increase dP in all chambers of the left hand side of the system 5 (and a decrease -dP on the right), the right hand valve 39 operates to bring about a decompression dP1 of the right hand chamber 32 such as will compensate the centrifugal force F2 more comfortably, if need be. Accordingly, any lateral shift of the fifth wheel 3, hence of the body 2, will be genuinely small, there is no slamming at the travel limits, and the dimensions of the body can be increased in proportion to the additional sideways travel gained as a result.

The antiroll bars 6, which are anchored at points beneath the tubular cross member 14, comprise a strut 43 disposed parallel to the cross member 14 and a pair of mutually parallel connecting rods 44, each supported at one end by the strut and attached by the remaining end to the body 2.

Fig 10 illustrates a solution in which the bogie truck functions as a drive component, and thus has either one or both axles 8 coupled to a prime mover remote from the chassis 1. Accordingly, at least one axle 8, or alternatively both (according to the type of

traction required, i.e. partial, with one live axle only, or total, with both axles coupled) will be equipped with drive transmission means 50 consisting in a conventional bevel gear pair and differential unit, connected to an external power source (in practice, a conventional railway engine not illustrated in the drawings). Each such drive unit 50 is positioned centrally on the axle 8, or rather interposed between the two half shafts 9a and 9b, which are encased within respective tubular housings 51a and 51b, rigidly associated with the opposite sides of the drive unit 50 and with the respective axle boxes 7, in such a way as to create a final drive P denoted 60. Thus, with the two half shafts 9a and 9b coupled to the bevel gear pair 50 and to the two corresponding inboard axle boxes 7, the wheels 10 can be driven in such a manner that neither the reaction forces from traction nor the reaction forces generated by the final drive will by-pass the primary suspension system 4.

The bogie truck described and illustrated affords a genuinely multipurpose unit, capable of carrying any kind of coach or body, thanks to an improved distribution of the functions performed by the various components, with the following advantages:

- the chassis assembly does not change in shape from its original configuration in response to a change in load on the body, being already proportioned to accommodate the increased weight of the vehicle; the only modifications required in respect of the body, where the body suspension is mechanical, are to alter the rigidity of the springs and adjust the brake calipers, whereas in the case of a pneumatic suspension it suffices to adjust the calipers;
- vertical and horizontal oscillations are absorbed by the two pairs of hydraulic dampers interposed between the blocks and the coach or body; the positioning of the dampers, offset in relation to the centre of mass, also helps to reduce pitching and hunting of the truck;
- utilizing leaf springs, the primary suspension system and the wheels and chassis assembly can be contained within the same dimensional compass, a feature not possible in the traditional truck;
- in solutions with the pneumatic type of secondary suspension system, the active lateral suspension can be activated in real time, thereby eliminating sideways drift of the body when rounding bends and allowing the construction of coaches or wagons to increased width dimensions, taking advantage of the fact that any lateral displacement attributable to centripetal or centrifugal forces is reduced to a minimum;
- the freedom of rotation afforded to the blocks in relation to the cross member permits of overcoming irregularities in the track without sub-

jecting the cross member itself to torsional stresses;

- traction and braking forces are transmitted by way of the fifth wheel, which is allowed a freedom of vertical movement corresponding to the excursion of the secondary suspension;
- the construction of the axle is such as to lighten the loads from braking-related reaction forces (Rf1 in fig 2), since braking torque reactions are taken up through the leaf springs, rather than by-passing the primary suspension and causing the suspension as a whole to stiffen;
- in like manner, reaction torque generated by the axle assembly is taken up through the two inboard axle boxes associated with the leaf springs;
- the clamp brackets provide a notably efficient means of securing the axle boxes and leaf springs in relation to the three major axes of inertia, besides affording a convenient and time-saving device by means of which to enable replacement of the axle boxes, calipers and brake disks.
- as intimated above, the axle assembly of the truck is less subject to stress than the traditional type of structure; this allows the use of components fashioned from lighter materials, thereby reducing those masses in the axle which feed the forces of inertia generated by any interruption in continuity of the railway line.

Claims

1) A multipurpose rail bogie truck for carriages and locomotives, comprising: a chassis (1) offered full face to the coach or body (2) of the vehicle and connected to the relative underframe by way of a centrally and vertically disposed fifth wheel (3); a primary suspension (4), a secondary suspension (5) and antiroll bars (6), interconnected by the chassis and serving to limit oscillations of the body generated as the result of its displacement when in motion, of which the primary suspension is interposed between the chassis (1) and a plurality of axle boxes (7) supporting the wheels (10) of the truck, and the secondary suspension and antiroll bars are interposed between the body (2) and the chassis; at least two axles (8), associated one with each end of the chassis (1), composed of a transverse axle shaft (9) and a pair of wheels (10) keyed one to each end of the shaft and associated rotatably with a corresponding pair of the axle boxes (7) by way of respective bearings (12), such that the truck is rendered capable of rolling on the rails (11) of a track; and braking means (13) associated with each pair of axle boxes (7) and interact-

ing at least with the relative wheel (10), characterized,

- in that the chassis (1) comprises a tubular cross member (14), and two blocks (15), associated one with each end and rotatable about the axis (X) of the cross member (14), functioning as mountings for the secondary suspension (5) and anchorages for a primary suspension (4) consisting in a plurality of horizontal leaf springs (16), numbering at least two to each wheel (10), of which the ends remote from the block are secured to the axle boxes (7);
- in that each axle (8) comprises two pairs of axle boxes (7) in conjunction with respective braking means (13) anchored to the leaf springs (16) and interacting with the relative wheels (10); and
- in that the single axle boxes (7) are secured to the ends of the relative leaf springs (16) by way of quick-release clamping means (18) allowing their fitment and removal independently one of another.

2) A rail bogie truck as in claim 1, wherein each of the wheels (10) is associated with four single leaf springs (16) arranged in pairs one on either side, and axle boxes (7) interposed one between each pair of springs.

3) A rail bogie truck as in claim 1, comprising damping means (19) associated with the chassis (1), interposed between the chassis and the body (2) and serving to attenuate vertical and/or lateral motion generated through the body.

4) A rail bogie truck as in claim 1, wherein the secondary suspension (5) is mechanical, comprising at least two vertically disposed coil springs (22), each associated with one of the two blocks (15) of the chassis and interposed between the block and the body (2), occupying a position to the side of the block outside the dimensional compass of the truck and supported from beneath by a corresponding horizontal bracket (23) rigidly associated with the block.

5) A rail bogie truck as in claim 1, wherein the secondary suspension (5) is pneumatic, comprising at least two air springs (24) each associated with one of the two blocks (15) of the chassis, anchored uppermost to the body (2) and at bottom to the block, and operates in conjunction with active stabilization means (20) incorporated into the chassis (1) and interlocked to external control means (21), in such a way that lateral excursions of the body (2) can be attenuated in real time.

6) A rail bogie truck as in claim 1, wherein each axle (8) comprises two half shafts (9a, 9b) united by a tubular housing (17) of which the ends are anchored to respective axle boxes (7) positioned within the dimensional compass of the truck.

7) A rail bogie truck as in claim 1, wherein braking means (13) consist in a plurality of calipers (25) num-

bering one to each wheel (10), of which the jaws are positioned to interact with relative disks (26) rigidly associated with the wheel (10) and of which the ends remote from the jaws are secured to the corresponding pair of leaf springs (16) by means of through transverse pins (28).

8) A rail bogie truck as in claim 1, wherein each axle box (7) is associated with quick release clamping means (18) consisting in a pair of brackets (27), between which the box is interposed, of which each bracket (27) is pivotably anchored at one end (27a) to a respective transverse pin (28) associated with the corresponding leaf spring (16) in such a way as to enable movement between a raised, non-operative limit position, in which the bracket is distanced from the axle box (7), and a lowered limit position of operation in which the bracket (27) is disposed substantially in contact with the axle box, thereby restraining the box within the three principal axes of inertia, and can be secured together with the remaining bracket of the pair through the agency of means (29) associated with the end remote from the pivoted end (27a), to the end of clamping the axle box stably in position.

9) A rail bogie truck as in claim 3, wherein damping means (19) consist in a first pair of vertically disposed hydraulic dampers (30) positioned outside the dimensional compass of the truck and associated respectively with two lateral blocks (15) afforded by the chassis, one on either side, and a second pair of hydraulic dampers (31) disposed essentially horizontal and occupying the space between the two blocks (15) on either side of the fifth wheel (3) of the truck, arranged in such a manner that the single dampers (30, 31) of each pair are disposed offset both mutually and in relation to a vertical axis (Y) coinciding with the centre of mass of the truck, and substantially with the vertical axis of the fifth wheel (3), so as to permit of attenuating the oscillations produced by vertical and lateral displacements of the body (2) mounted on the truck, and the pitching and hunting motion of the truck.

10) A rail bogie truck as in claim 5, wherein active stabilization means (20) are embodied as a pair of reservoirs (33), located internally of a tubular cross member (14) forming part of the chassis and extending into the corresponding blocks (15) from opposite sides of the fifth wheel (3) of the truck, connected by way of respective pipelines (36) to the corresponding components of the secondary suspension (5) and activated by external control means (21) consisting in a balancing valve (37s, 37d) connected on the one hand to the components of the secondary suspension (5) and on the other to a main high pressure pipeline (42), in such a way as to permit of maintaining or re-establishing the horizontal alignment of the body (2).

11) A rail bogie truck as in claim 10, wherein active stabilization means (20) further comprise a pair

of air chambers (32) occupying positions between the reservoirs (33) and the fifth wheel (3) internally of the cross member (14), each of which connected by way of a relative pipeline (36) to a respective reservoir (33), and further valves (38, 39) located one on each connecting pipeline (36), piloted to operate by the balancing valve (37s, 37d) in such a manner as to exhaust air into either chamber (32) from the corresponding reservoir (33) and thereby generate a lateral reaction force against the fifth wheel (3) designed to limit a lateral shift of the body (2) in the opposite direction.

12) A rail bogie truck as in claim 1, associated with the body of a locomotive, wherein at least one axle (8) is equipped with drive transmission means (50) coupled to an external prime mover and occupying a central position on the axle (8), interconnecting and rigidly associated with the innermost ends of a pair of tubular housings (51a, 51b) secured by the remaining ends to the inboard axle boxes (7) and coaxially encasing two respective half shafts (9a, 9b) coupled rotatably to the drive transmission means (50) and to the axle boxes (7) in such a way as to permit of driving the relative wheels (10).

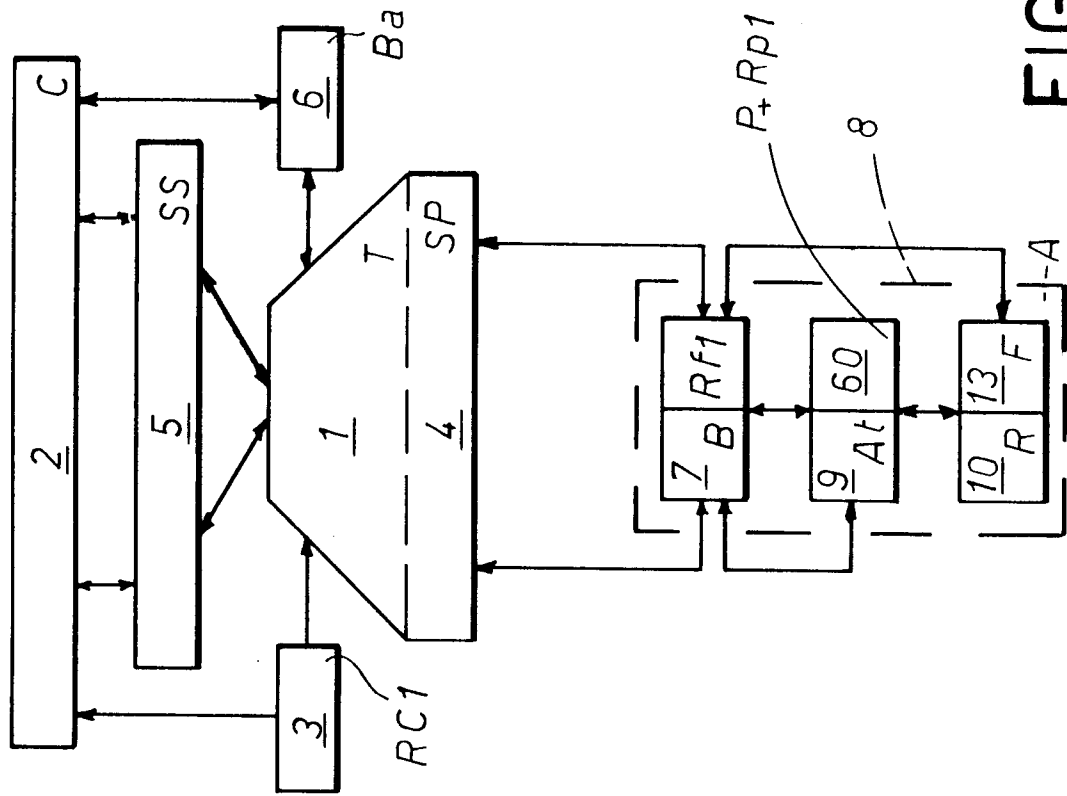


FIG2

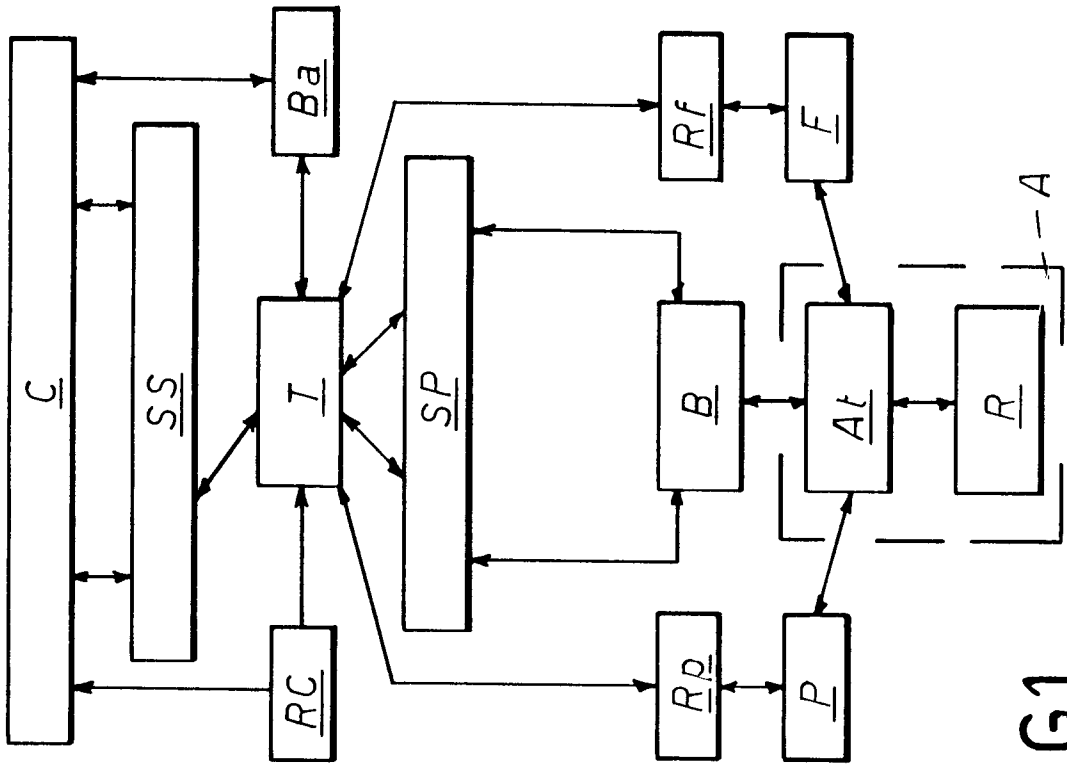
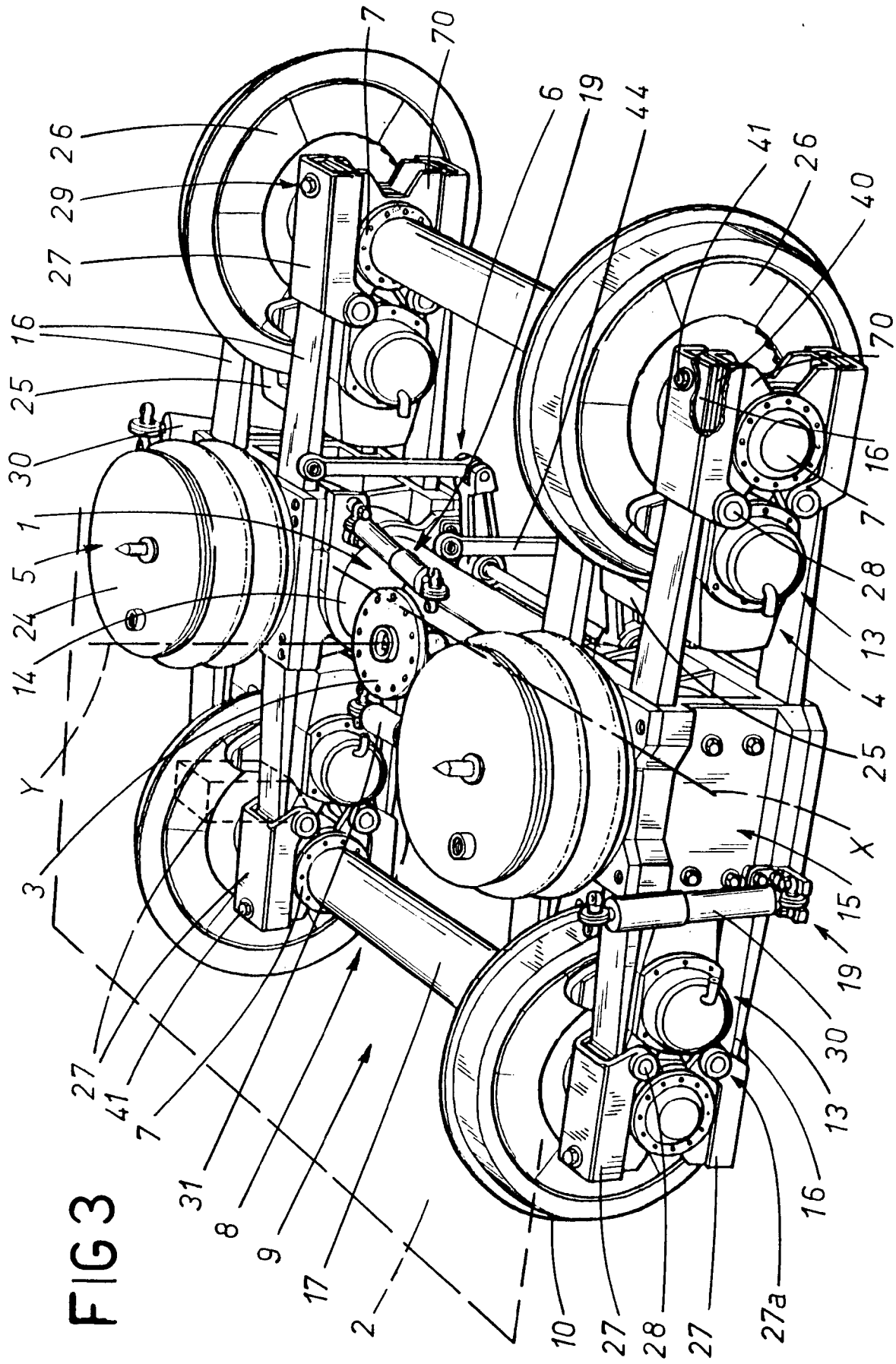
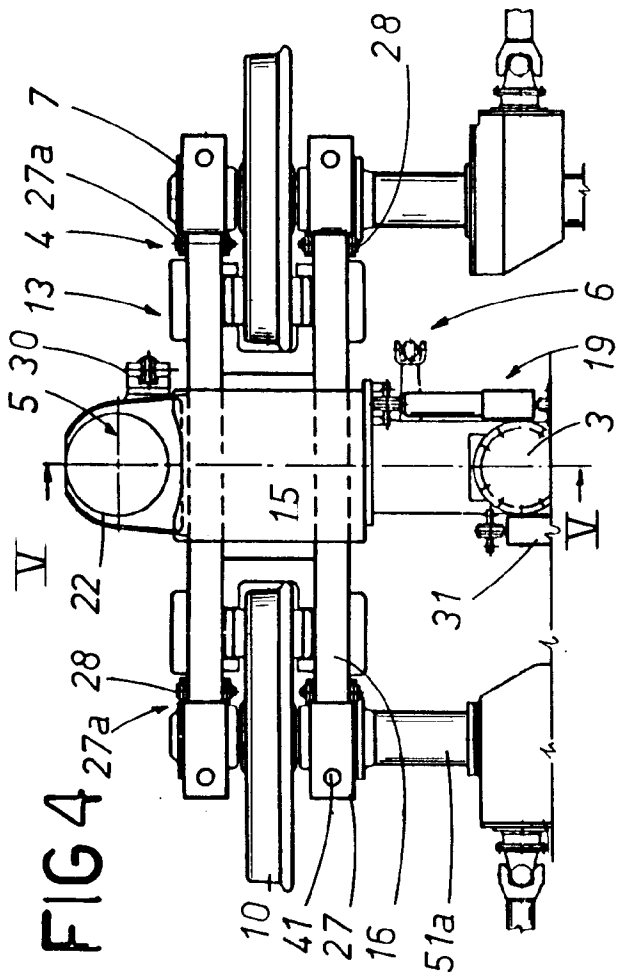
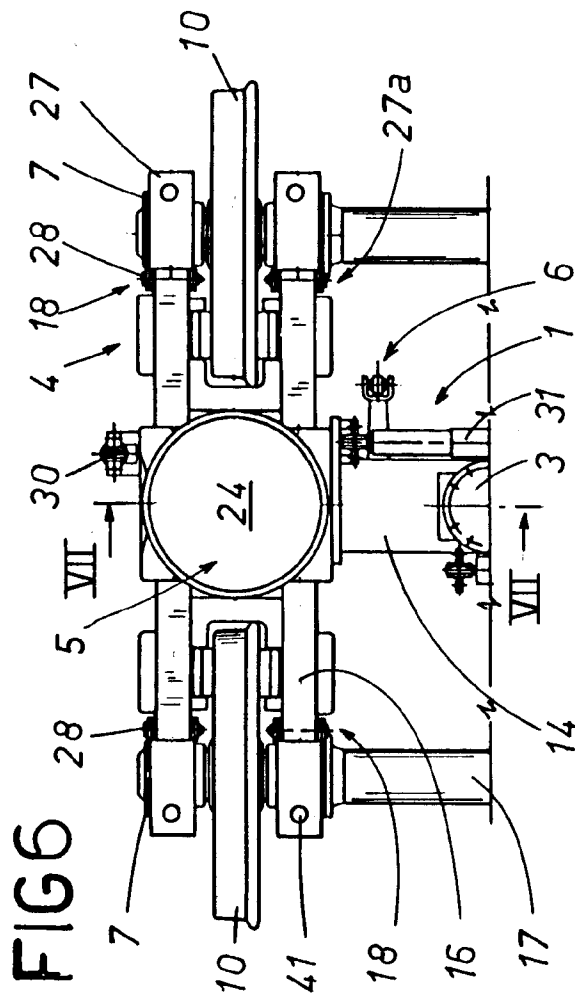
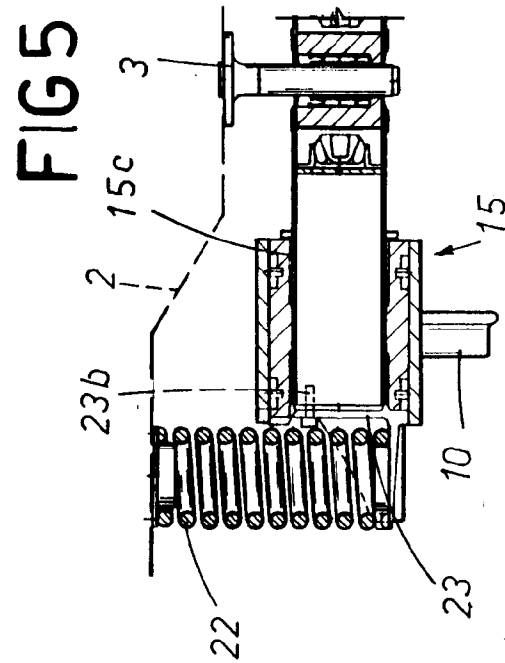
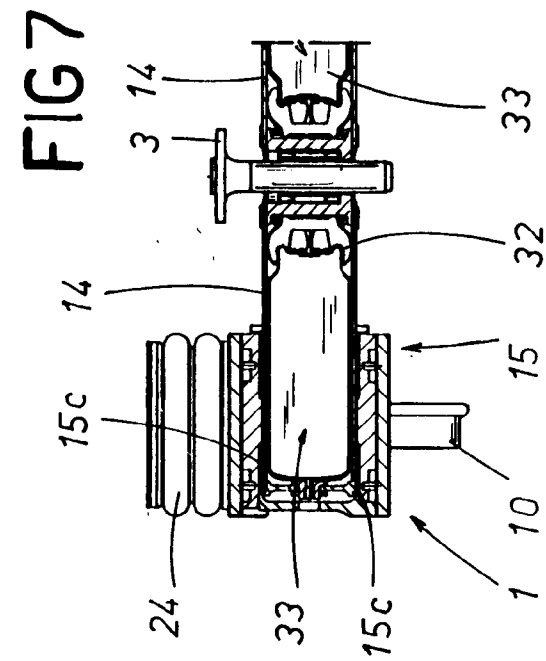
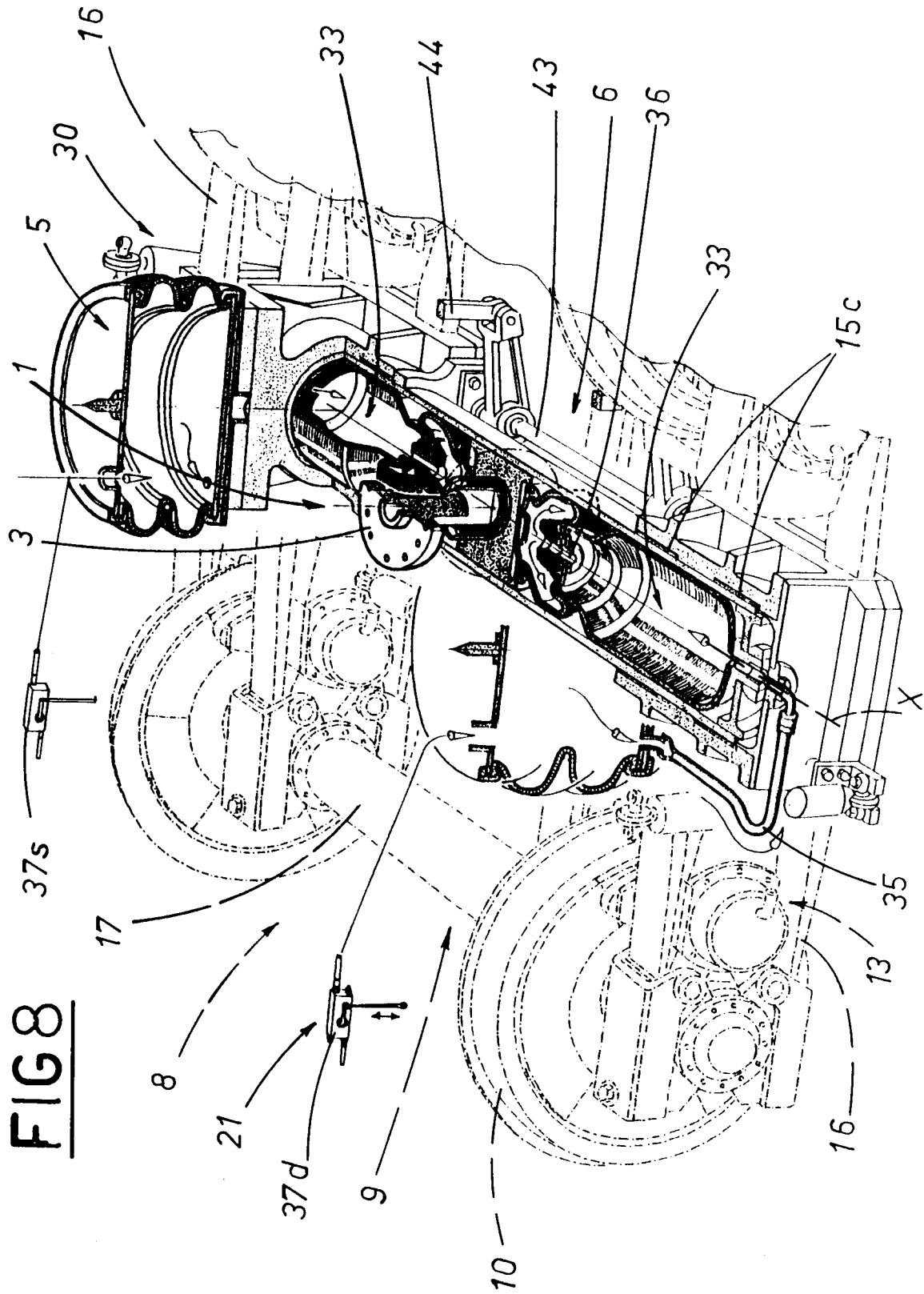
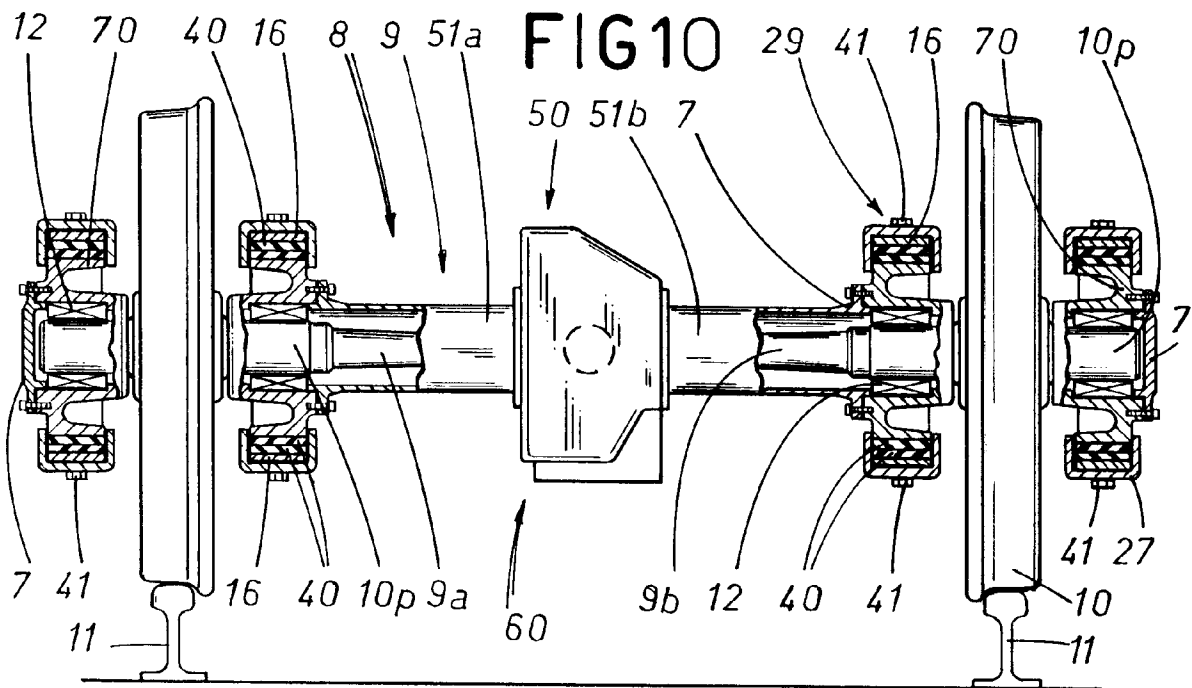
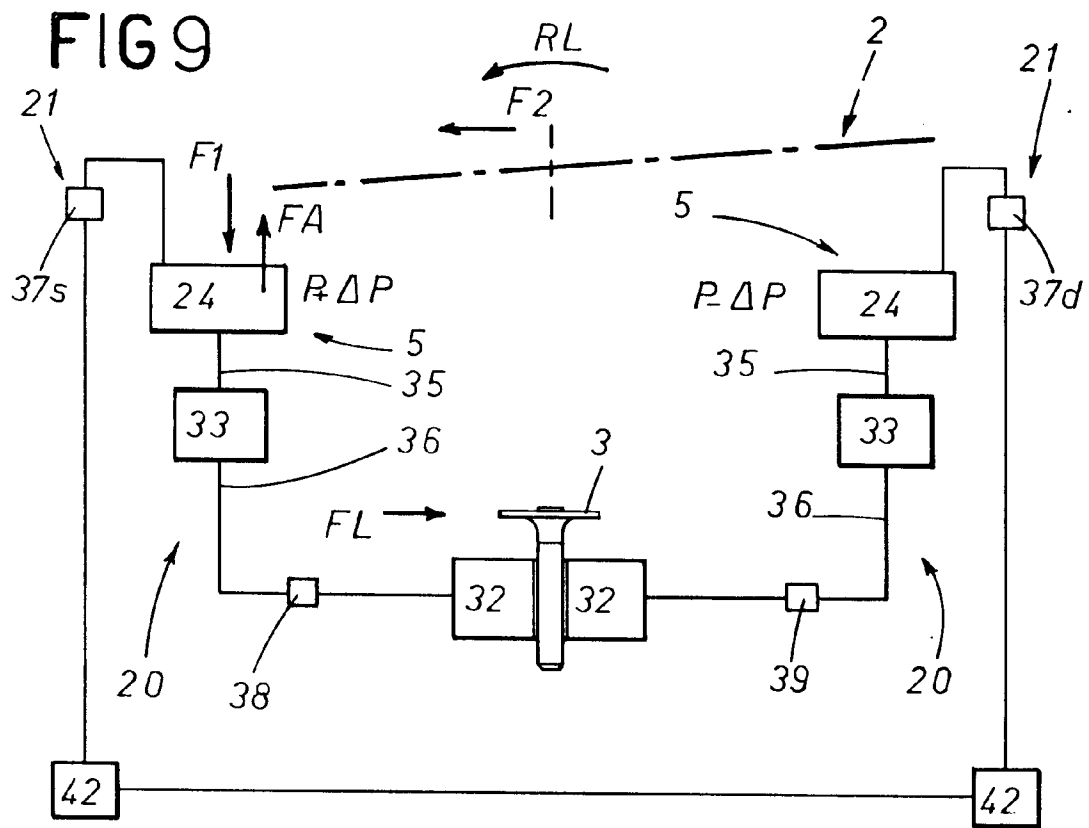


FIG1











European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0659

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	FR-A-1 113 354 (COMPAGNIE GENERALE DE CONSTRUCTION ET D'ENTRETIEN DE MATERIEL ETC.) * the whole document *	1	B61F5/52 B61F5/30 B61F5/32 B61F5/14
Y	FR-A-2 526 386 (THE BUDD CY) * claims 1-9; figures 1,2 *	1	
A	GB-A-2 091 660 (PULLMAN STANDART INC.) * abstract; figure 3 *	1	
A	FR-A-2 488 204 (DE DIETRICH ET CIE.) * the whole document *	1	
A	FR-A-2 336 265 (BRANDO) * claims 1-7; figures 1-6 *	1	
A	GB-A-475 625 (TATRA) * the whole document *	1,2	
A	DE-C-269 030 (KIEFER) * the whole document *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	DE-A-2 555 971 (LINKE-HOFMANN-BUSCH ET AL.) * the whole document *	4	B61F
A	DE-C-3 612 797 (M.B.B.) * figure 2 *	5	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 08 MARCH 1993	Examiner Schmal
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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