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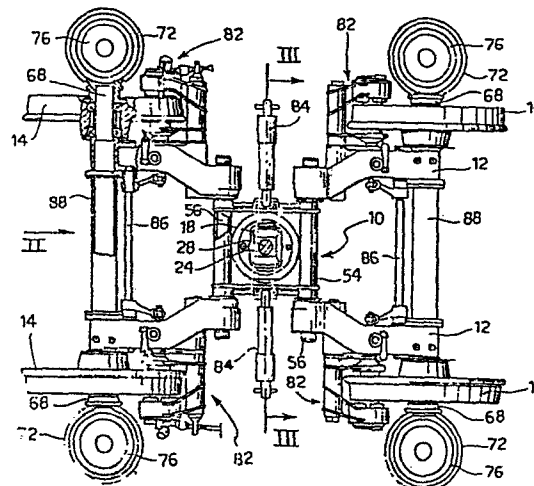
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(54) **Bogie for railway vehicles with independent wheels.**

(57) A bogie for railway vehicles comprises a central support structure (10) including two transverse tubular supports (54) between which are mounted, with the interposition of bushes of elastomeric material, two shafts (56) each of which supports at its ends a pair of substantially longitudinal arms (12) bearing the spindles (68) of the wheels (14). A tubular spacer member (88) aligned with the spindles (68) of the wheels (14) is interposed between the ends of the two longitudinal arms supported by each shaft (56). There are provided means for connecting the central support structure to the body of a railway vehicle in an articulated manner, and transverse and vertical suspension means between the bogie and the body.

FIG. 1



Bogie for railway vehicles with independent wheels

The present invention relates in general to bogies for railway vehicles.

In particular, the invention concerns a bogie of the type comprising a central support structure including
5 two transverse tubular supports between which are mounted, with the interposition of bushes of elastically-yielding material, two shafts each of which supports at its ends a pair of substantially longitudinal
10 arms bearing the spindles of the wheels at their free ends, and in which there are provided means for connecting the central structure to the body of a railway vehicle in articulated manner, and transverse and vertical suspension means between the bogie and the body of the vehicle.

15 A bogie of this type is known, for example, from the published Italian Patent Application No. 68110-A/79, to which the United States Patent No. 4 362 109 corresponds.

20 Due to its structure, this bogie has independent self-steering wheels, which results in a series of important advantages over conventional bogies, in terms of both simplicity of construction and improved functioning in use.

25 The present invention constitutes, in fact, an improvement in the one forming the subject of the patent documents dictated above, and its object is to simplify the construction while ensuring dimensional stability in use, particularly as far as the gauge is concerned.

According to the invention, this object is achieved due

to the fact that a tubular spacer member aligned with spindles of the wheels is interposed between the free ends of the two longitudinal arms supported by each shaft.

- 5 This characteristic permits the exact value of the gauge of the wheels to be obtained very easily during assembly of the bogie and also permits this value to be kept unaltered with time, without modifying the characteristics of independence and self-steering of the
10 wheels achieved as a result of the general structure of the bogie mentioned above.

- The arms of the two pairs situated on the same side of the bogie may be without any interconnection, as in the case of the prior patent documents cited above, or they
15 may be articulated to each other in correspondence with their facing ends.

- The central structure of the bogie may assume various arrangements intended to effect a direct connection with the body, as in the case of the prior patent documents
20 cited above, or an indirect connection with the arms uncoupled with respect to the body.

The invention will now be described in detail with reference to the appended drawings supplied purely by way of non-limiting example, in which:

- 25 Figure 1 is a plan view from above of a bogie for railway vehicles according to the invention,

Figure 2 is an elevational view along the arrow II of Figure 1,

Figure 3 is a partially-sectioned view taken on the line III-III of Figure 1,

Figure 4 is a sectional view taken on the line IV-IV of Figure 1,

5 Figure 5 illustrates a variant of Figure 1,

Figure 6 is an elevational view along the arrow VI of Figure 5,

Figure 7 is a sectional view taken on the line VII-VII of Figure 5, and

10 Figure 8 is a section taken on the line VIII-VIII of Figure 1.

The bogie illustrated in Figures 1 to 4 is substantially analogous to the one described and illustrated in the United States Patent No. 4 362 109 cited above.

15 Briefly, this comprises a central support structure 10 to which are articulated four arms 12 each bearing an idle wheel 14.

The support structure 10, which is obtained in a single piece, for example by the casting of aluminium,
20 comprises a horizontal quadrangular plate 16 having a rectangular aperture 18 the larger sides of which are directed parallel to the transverse axis A of the bogie. Within the aperture 18 is inserted a sliding block 24 of self-lubricating plastics material which has a
25 vertically-elongate parallelepipedal form with a square horizontal section and sides slightly shorter than the smaller sides of the aperture 18. The block 24 is mounted in the aperture 18 for sliding along the

transverse axis A of the bogie and is also free to make limited movements in the aperture 18 parallel to the longitudinal axis D of the bogie.

5 The sliding block 24 has a central cylindrical hole in which a vertical articulation pin 28 is rotatably engaged. This pin 28 is fixed at its upper end to an upper disc 34 intended to be bolted to the base of the body of a railway vehicle, and is clamped at its lower end to a lower horizontal disc 46.

10 Between the plate 16 and the upper disc 34 on the one hand and the lower disc 46 on the other are clamped respectively a first annular member 50 of elastomeric material and a second annular member 52 of elastomeric material, with vertical axes. The function of the
15 elastomeric annular members 50, 52 is to exert a resilient return force on the transverse and longitudinal movements of the sliding block 24 in the aperture 18 and on the rotations of the bogie about the articulation pin 28.

20 The transverse sides of the plate 16 are connected to a pair of transverse tubular supports 54 within which two shafts 56 are rotatably mounted. The end of each shaft 56 project from the respective tubular support 54 and each supports, through an elastic coupling, one of the
25 arms 12 bearing the wheels 14. Bushes of elastomeric material, not visible in the drawings, usually of the type sold under the trade mark "SUTUCO" by the Italian firm SAGA of Milan, are interposed coaxially between each of the shafts 56 and the respective tubular
30 support 54. The purpose of the bushes of elastomeric material is to permit a misalignment between the shafts 56 and the respective tubular spacers 88 so as to

effect the self-steering of the arms 12 bearing the wheels 14 during travel of the bogie around curves, and to allow rolling oscillations of these arms 12. In this manner, each shaft 56 connecting a pair of arms 12 is subject to simple bending stresses in use, and not to twisting actions.

Supported in a projecting manner at the free end of each arm 12 is a spindle 68 which, with the interposition of rolling bearings, serves as the support for rotation of the respective wheel 14. A horizontal support 72 projects from the free end of each spindle 68, against which bears a helical suspension spring 76 intended to react at its upper end against the base of the body of the railway vehicle. The four springs 76 constitute the only suspension of the bogie: in this way, the structural weight of the body passes directly to the wheels 14 through the springs 76, without stressing intermediate members.

Connected to the springs 76 are four vertical hydraulic shock-absorbers, each of which is interposed between the free end of one of the arms 12 and the body of the vehicle.

Each wheel 14 comprises a one-piece body of hot-rolled steel which has a rim of variable conicity and the outer faces of which co-operate with a brake caliper 82 supported by the respective arm 12.

The bogie also includes a pair of transverse hydraulic shock-absorbers 84 articulated to the sides of the plate 16 and intended to be connected to the body of the vehicle, and a pair of anti-roll bars, generally indicated 86, which connect the two pairs of arms 12

supported by the two shafts 56.

According to the invention, a tubular spacer member 88
aligned with the spindles 68 of the wheels 14 is
interposed between the free ends of the two arms 12
5 supported by each shaft 56.

The two tubular spacers 88, whose ends are rigidly
connected to the ends of the corresponding arms 12,
serve to maintain the wheels 14 at the prescribed gauge,
which is advantageous both during the assembly of the
10 bogie and when it is in use.

It should be noted that the connection between the bogie
and the body of the railway vehicle could be effected in
a manner different from that described with reference to
Figures 1 to 4, and particularly by means of indirect
15 connection solutions which allow the arms 12 to be
elastically uncoupled with respect to the body.

One possible solution of this type is illustrated in
Figures 5 to 8, in which parts identical or similar to
those described previously are indicated by the same
20 reference numerals.

The bogie illustrated in Figures 5 to 8 differs from
that described above with regard to the form of the
central support structure 10, and in that the arms 12 of
the two pairs located on the same side of the bogie are
25 articulated to each other in correspondence with their
facing ends. In fact, one arm 12 of each pair has a
longitudinal appendage 90 which extends towards the arm
12 of the other pair situated on the same side of the
bogie and is connected to that arm by means of a
30 transverse pin 92, with the interposition of members of

elastomeric material, not shown.

In this case, the central support structure comprises two lateral supports 94 rigid with the tubular supports 54 and defining with them a space 96 within which
5 extends a vertical-axis bush 98 in which is inserted the articulation pin 28 for the body.

The upper end of the pin 28 is integral with frusto-conical attachment member 100 intended to be secured rigidly to the base of the body and the opposing
10 sides of which are connected to the lateral supports 94 by two vertical connecting rods 102.

The bush 98 is surrounded at its upper end by a collar 104 and at its lower end by a collar 106, with the interposition of respective sleeves of
15 elastically-yielding material 108 and 110. The upper collar 104 is connected in turn to the two tubular supports 54 by a pair of substantially horizontal longitudinal connecting rods 112 arranged in a Z-configuration.

20 The lower collar 106 has two lateral buffers 114 of elastomeric material directed parallel to the transverse axis A of the bogie and having respective convexly-profiled ends 11a facing corresponding convexly-profiled ends 116a of a pair of similar buffers
25 116 protruding from the lateral supports 94. Each pair of buffers 114, 116 is surrounded by a helical compression spring 118 reacting between the collar 106 and the corresponding lateral support 94.

In practice, the buffers 114 and 116 and the springs 118
30 constitute a resilient system through which the arms 12

of the bogie are uncoupled with respect to the body.

Naturally, different variants of the system of connection between the bogie of the invention and the body of the railway vehicle may be envisaged, even a
5 type intermediate the direct type and the indirect type described above.

Moreover, it is clear that the details of construction and the forms of embodiment may be varied widely with respect to what has been described and illustrated,
10 without thereby departing from the scope of the present invention.

CLAIMS

1. Bogie for railway vehicles, comprising a central support structure (10) including two transverse tubular supports (54) within which are mounted, with the interposition of bushes of elastically-yielding material, two shafts (56) each of which supports at its ends a pair of substantially longitudinal arms (12) bearing the spindles (68) of the wheels (14) at their free ends, means for connecting the central structure of the body of the railway vehicle in an articulated manner, and transverse and vertical suspension means (76) between the bogie and the body, characterised in that a tubular spacer member (88) aligned with the spindles (68) of the wheels (14) is interposed between the free ends of the two longitudinal arms (12) supported by each shaft (56).

2. Bogie according to Claim 1, characterised in that the arms (12) of the two pairs situated on the same side of the bogie are articulated to each other in correspondence with their facing ends.

3. Bogie according to Claim 2, characterised in that one arm (12) of each pair has a longitudinal appendage (90) which extends towards the arm (12) of the other pair situated on the same side of the bogie and is connected to that arm (12) by means of a transverse pin (92).

4. Bogie according to any one of the Claims 1 to 3, characterised in that the central support structure (10) includes two lateral supports (94) rigid with the tubular supports (54) and defining with the latter a space (96) into which extends a bush (98) for a vertical pin (28) for articulation to the body of a railway

vehicle, resilient transverse centring means (114, 116, 118) being associated with the bush (98) and the bush (98) being connected on one side to one of the tubular supports (54) and on its other side to the other of the
5 tubular supports (54) by means of a pair of longitudinal connecting rods (112).

5. Bogie according to Claim 4, characterised in that the resilient centring means comprise two pairs of buffers of elastically-yielding material (114, 116)
10 which are located opposite each other, are fixed respectively to the lateral supports (94) and the bush (98) for the articulation pin (28), and have respective facing ends with convex profiles (114a, 116a), and a pair of helical springs (118) which are interposed
15 between the bush (98) and the lateral supports (94) and surround the buffers (114, 116).

6. Bogie according to Claim 1, characterised in that the arms (12) of the two pairs arranged on the same side of the bogie are not interconnected.

20 7. Bogie according to Claim 6, characterised in that the central support structure (10) includes, in a manner known in itself, a plate (16) having a quadrangular aperture (18) within which is mounted a sliding block (24) slidable in a transverse direction and able to make
25 limited movements in a longitudinal direction, the sliding block (24) having a hole for the insertion of a vertical pin (28) for articulation to the body of a railway vehicle, the ends of the pin (28) being fixed respectively to upper and lower discs (34, 46) located
30 above and below the plate (16), and annular members (50, 52) of elastomeric material with vertical axes being clamped between the discs (34, 46) and the plate (16).

FIG. 1

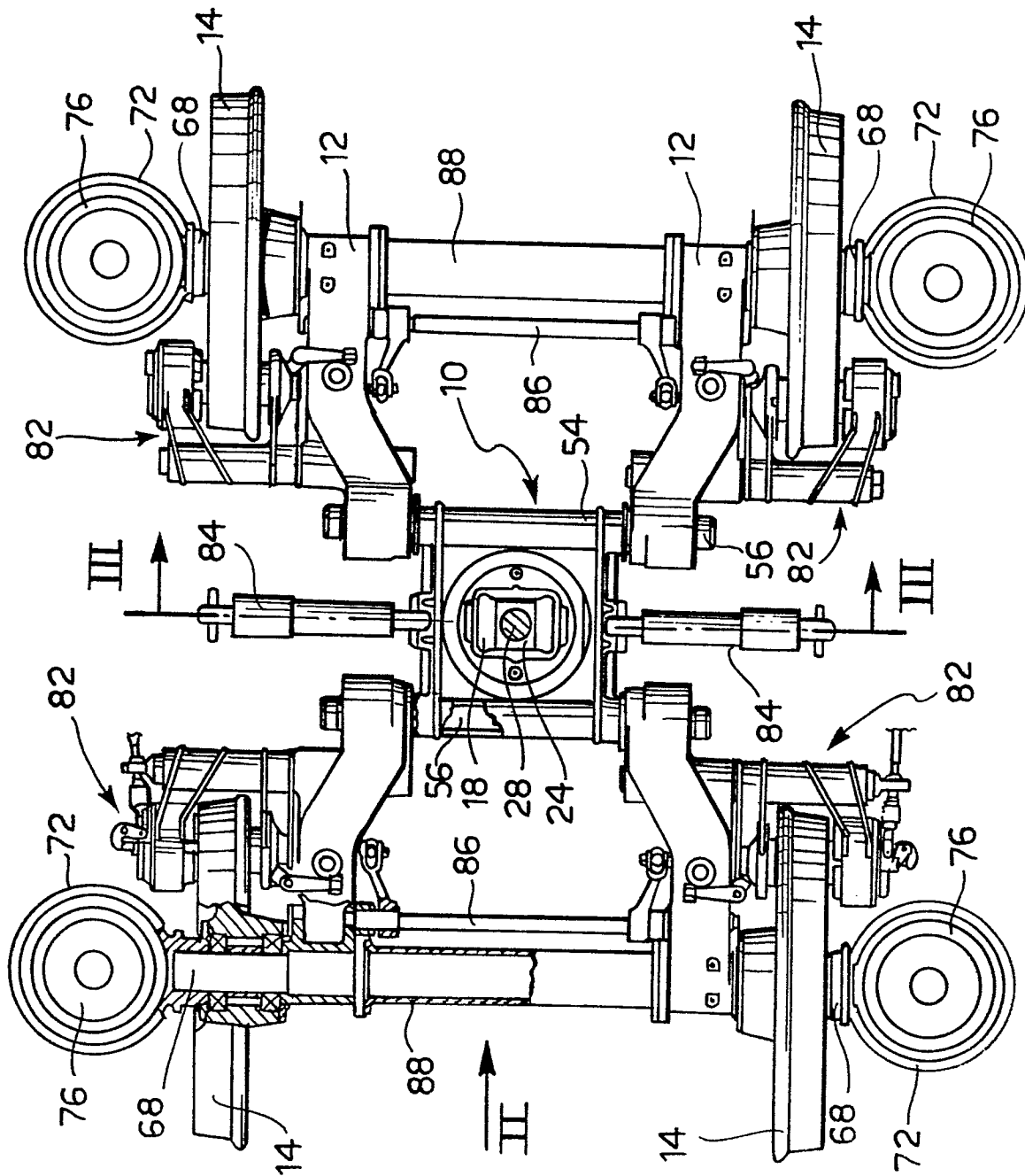
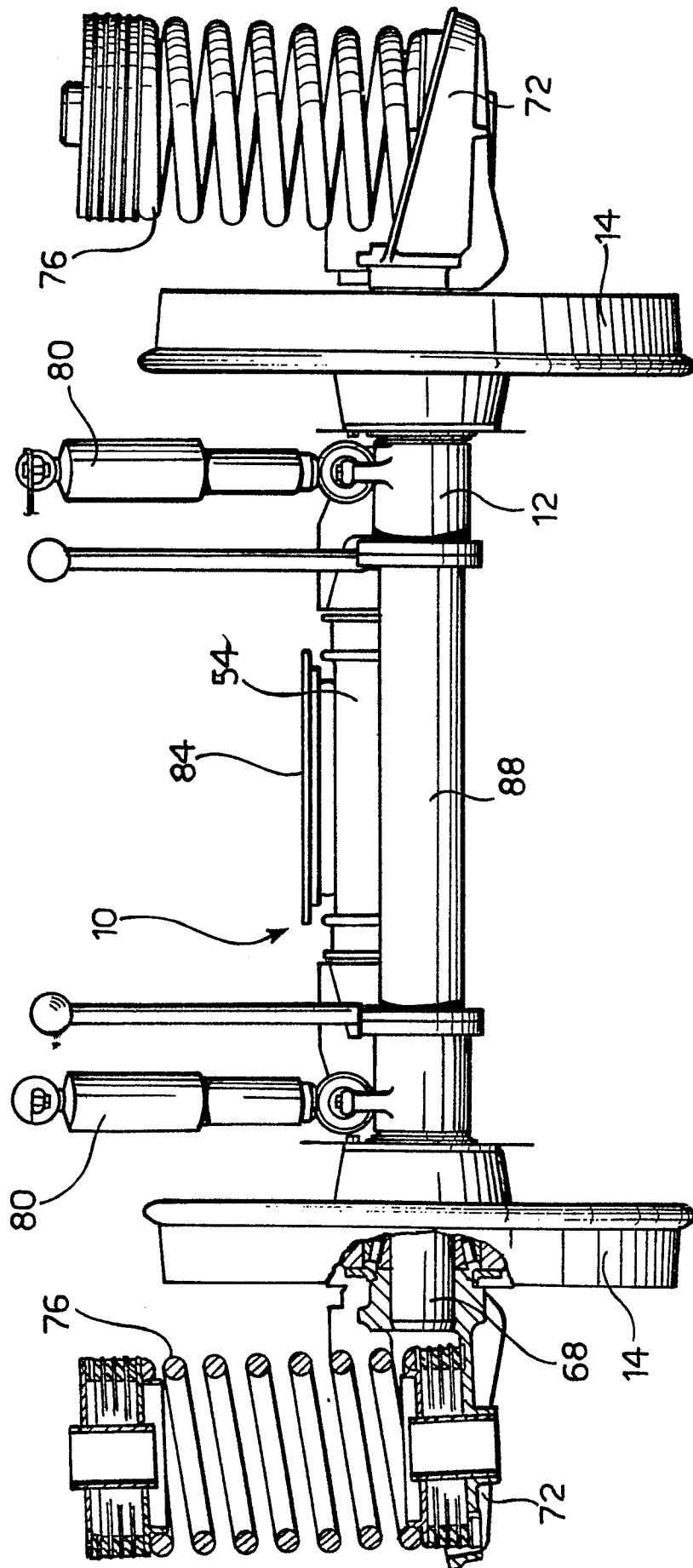


FIG. 2



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FIG. 3

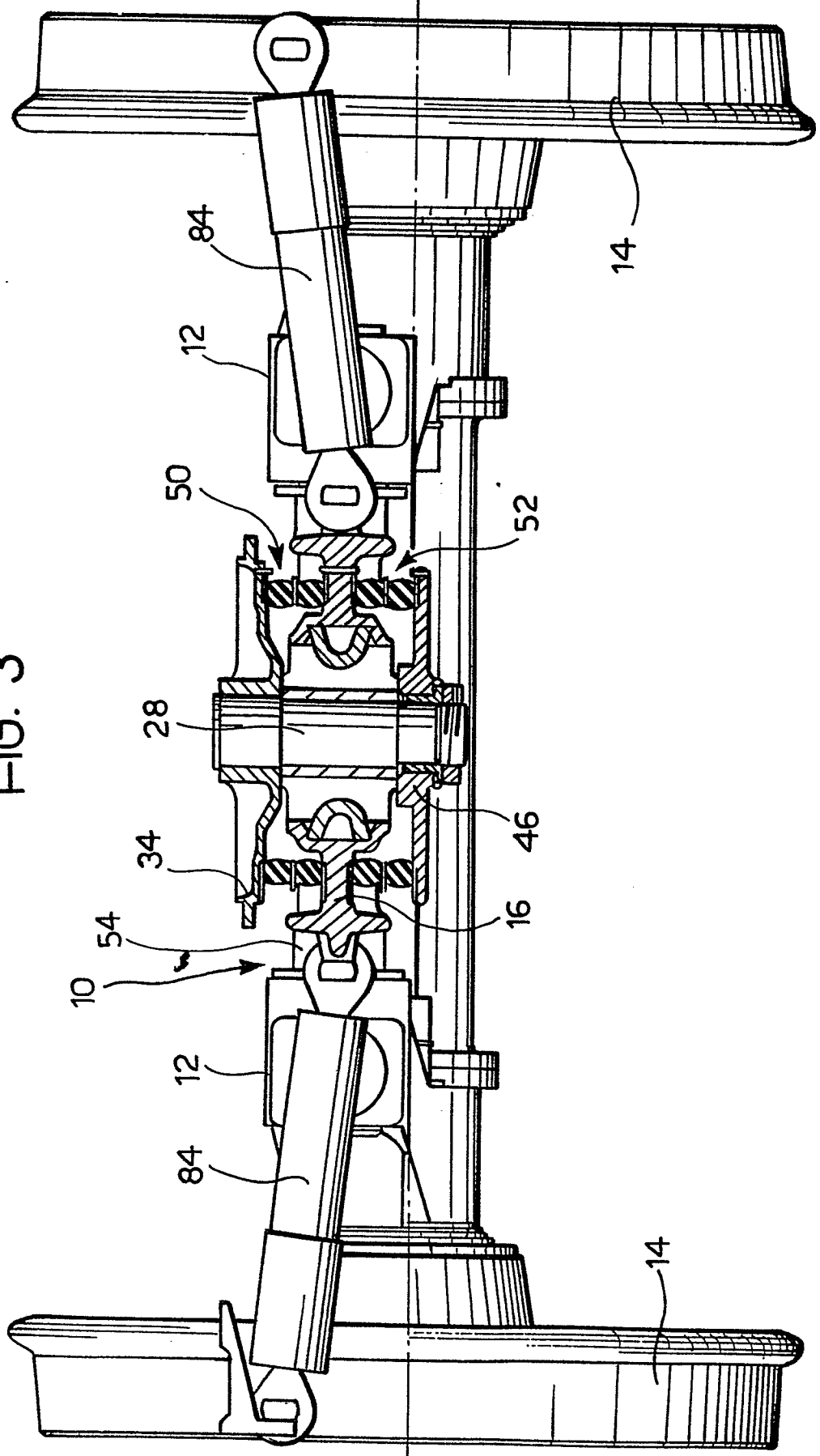
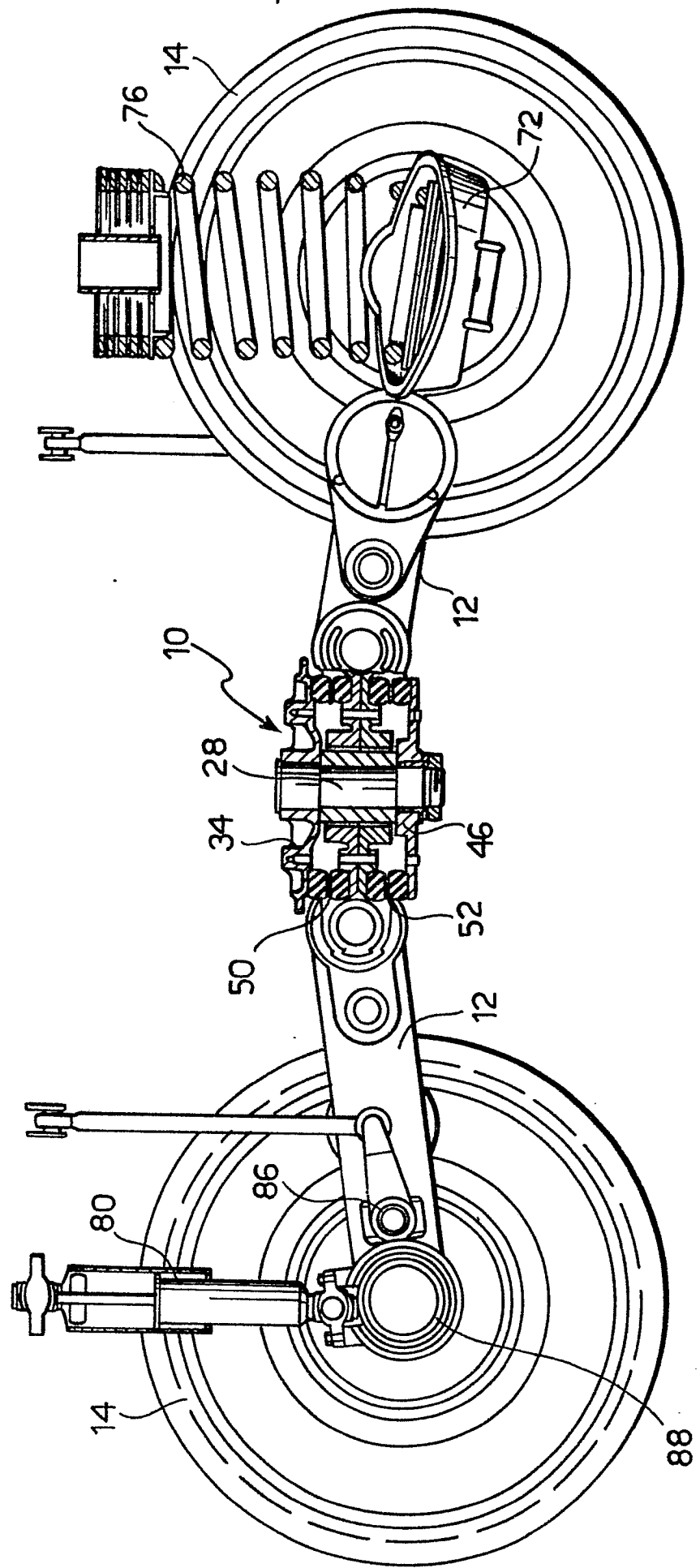


FIG. 4



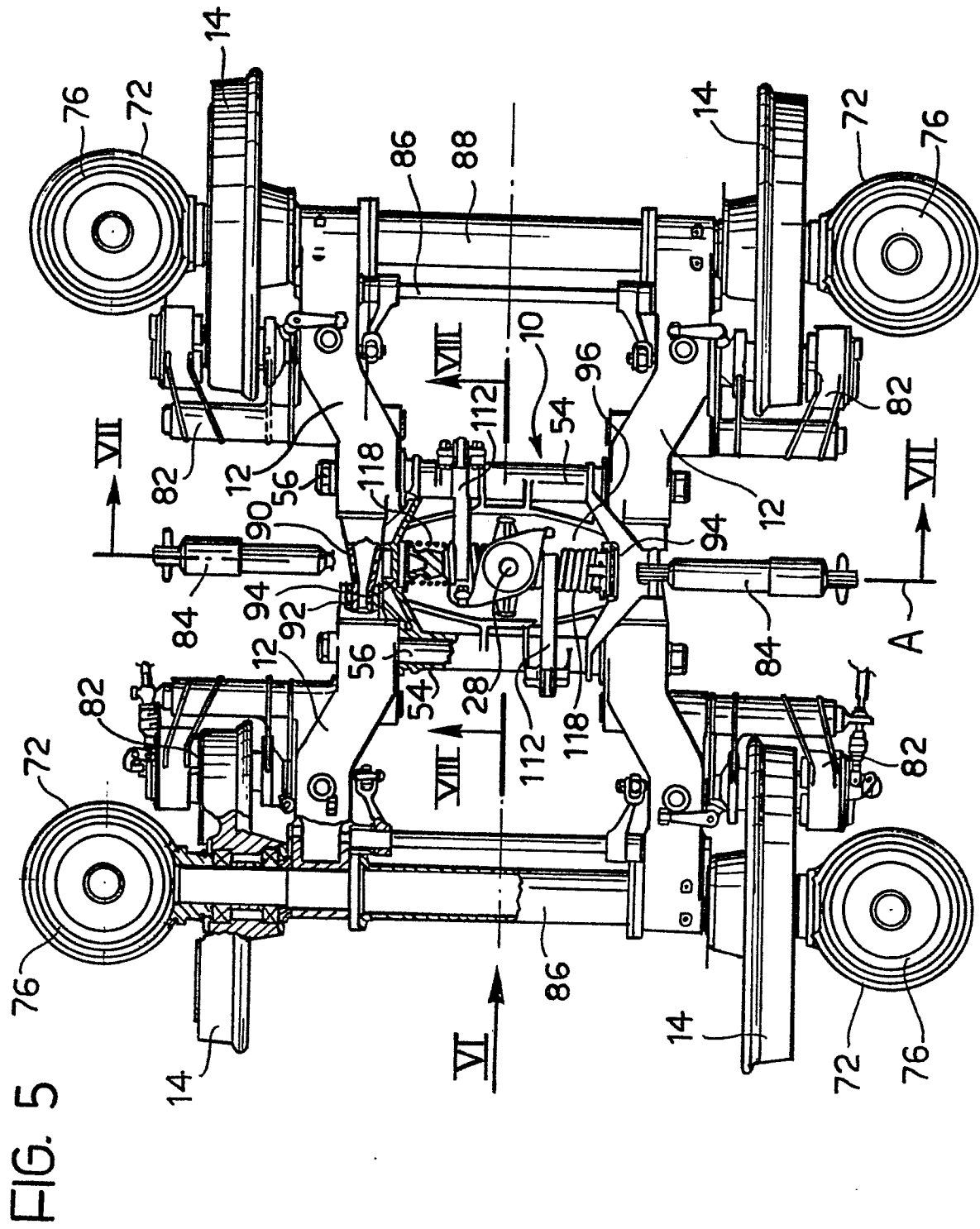


FIG. 6

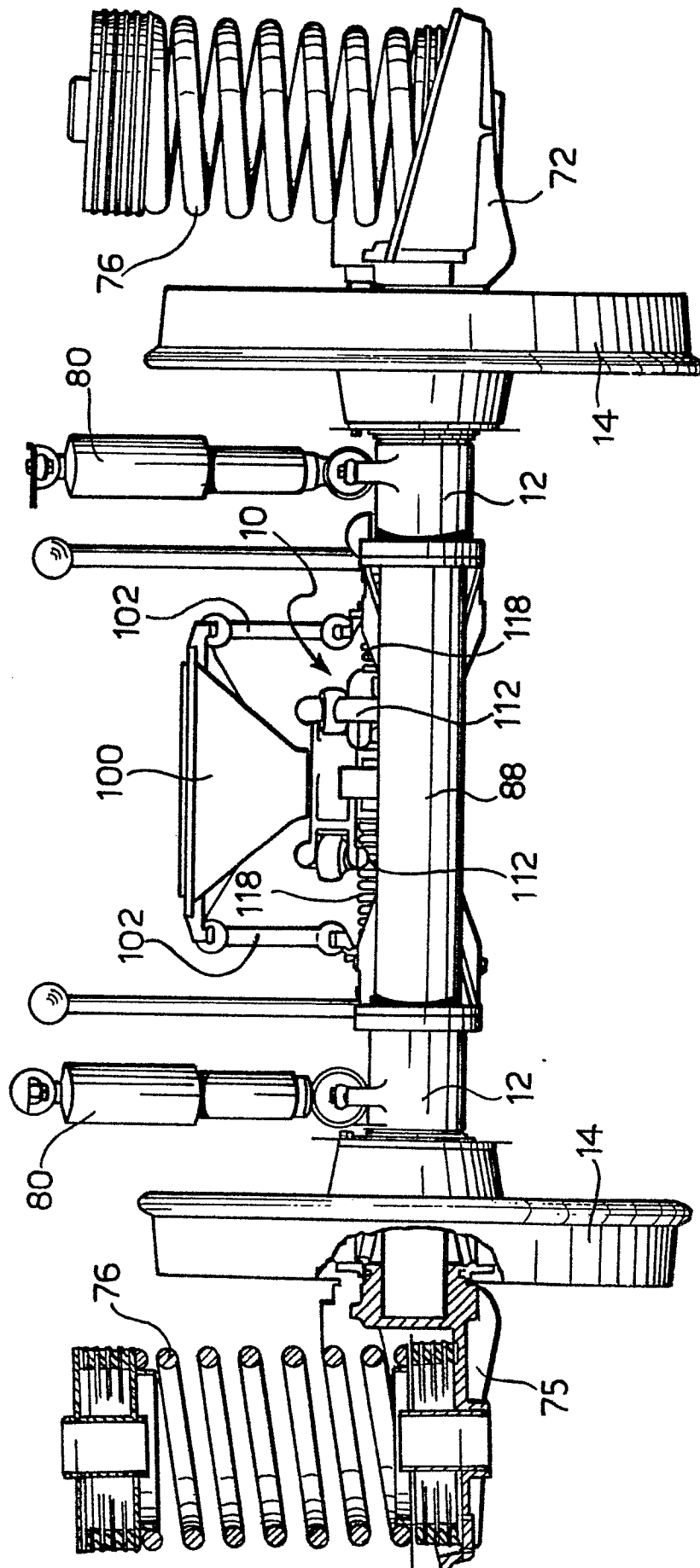


FIG. 8

