

**(12) PATENT**  
**(19) AUSTRALIAN PATENT OFFICE**

**(11) Application No. AU 199351464 B2**  
**(10) Patent No. 701708**

(54) Title  
**Wheelset for a multitude of track gauges**

(51)<sup>6</sup> International Patent Classification(s)  
**B61F 007/00 B60B 035/10**

(21) Application No: **199351464**

(22) Application Date: **1993 .09 .06**

(87) WIPO No: **WO95/07202**

(43) Publication Date : **1995 .03 .27**

(43) Publication Journal Date : **1995 .05 .18**

(44) Accepted Journal Date : **1999 .02 .04**

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(56) Related Art  
**DD 286481**  
**SU 935357**  
**DD 76691**

OPI DATE 27/03/95 APPLN. ID 51464/93  
 AOJP DATE 18/05/95 PCT NUMBER PCT/BG93/00011



AU9351464

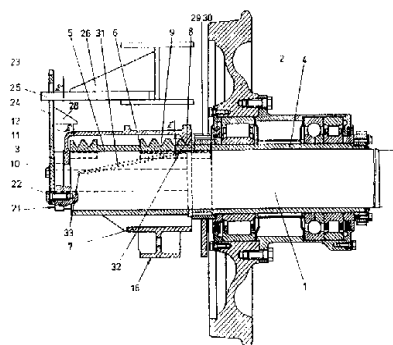
<p>(51) Международная классификация изобретения <sup>5</sup>:                  B61F 7/00, B60B 35/10</p>	<p>A1</p>	<p>(11) Номер международной публикации: WO 95/07202                  (43) Дата международной публикации: 16 марта 1995 (16.03.95)</p>
<p>(21) Номер международной заявки: PCT/BG93/00011</p>	<p>(81) Указанные государства: AU, BY, DE, ES, FI, KP, PL, RU, UA, европейский патент (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p>	
<p>(22) Дата международной подачи:                  6 сентября 1993 (06.09.93)</p>	<p>Опубликована                  С отчетом о международном поиске.</p>	
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(54) Title: WHEELSET FOR A MULTITUDE OF TRACK GAUGES

(54) Название изобретения: КОЛЕСНАЯ ПАРА ДЛЯ РЯДА РАЗМЕРОВ ЖЕЛЕЗНОДОРОЖНОЙ КОЛЕИ

(57) Abstract

The proposed wheelset is intended for rolling stock used on railway lines of different gauges. Use of this wheelset ensures protection for the components which serve the transfer stand without any need to increase the dimensions of the wheelset. It also simplifies the fixing and guidance of the axle box housing (6). All this is achieved by providing the wheelset (1), whose running wheels (2) are mounted independently on freely sliding bushings (4), with axle box housings (6) which at their crown each have a transverse prism (8) between the middle of the axle box housings (6) and the running wheel (2). The said prism (8) is accommodated in one of the associated channels (9) formed by the bushings (4). A spacing stop (11) is connected rigidly to the axle box housing (6) and one of its ends should be in at least one of the grooves (10) at the appropriate end of the axle (3). Between the spacing stop (11) and the axle box housing (6) is arranged a U-shaped component (12) which covers the transverse channels (9), runners (13) being provided in the horizontal space of the said component to guide the bushing (4). In the space between the running wheel (3) and the axle box housing (6), U-shaped components (29) are arranged on top of each other, the uppermost of these being held against the axle box housing by springs (31).



(57) Реферат

Колесная пара предназначена для использования ее в составе вагов на железных дорогах с различной шириной колеи. С ее помощью достигается надежная защита элементов, обслуживаемых стеном по переводу на другую колею без увеличения габаритов колесной пары, а также упрощено фиксирование и вождение буксовой коробки. Это достигнуто тем, что колесная пара /1/, использующая независимо закрепленные друг от друга на свободно скользящие гильзы /4/ ходового колеса /2/, снабжена буксовыми коробками /6/, которые в потолке имеют по одной поперечной призма /8/, расположенной между серединой коробки /6/ и ходовым колесом /2/. Эта призма /8/ находится в одном из соответствующих каналов /9/, оформленная гильзами /4/. Дистанционный фиксатор /11/ неподвижно связан с буксовой коробкой /6/ и конец его должен находиться хотя бы в одном из выработанных прорезей /10/ в соответствующем конце оси /3/. Между дистанционным фиксатором /11/ и буксовой коробкой /6/ сделан П-образный элемент /12/, покрывающий поперечные каналы /9/, при этом в горизонтальном пространстве у него имеются направляющие /13/ для вождения гильзы /4/. В пространстве между ходовым колесом /2/ и буксовой коробкой /6/ расположены одна на другой П-образные крышки /29/, причем самая верхняя из них прижата к буксовой коробке /6/ с помощью пружин /31/.

ИСКЛЮЧИТЕЛЬНО ДЛЯ ЦЕЛЕЙ ИНФОРМАЦИИ

Коды, используемые для обозначения стран-членов РСТ на титульных листах брошюр, в которых публикуются международные заявки в соответствии с РСТ.

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A B S T R A C T

The proposed wheelset is intended for rolling stock used on railway lines of different gauges. Use of this wheelset ensures protection for the components which serve the transfer stand without any need to increase the dimensions of the wheelset. It also simplifies the fixing and guidance of the axle box housing 6. All this is achieved by providing the wheelset 1, whose running wheels 2 are mounted independently on freely sliding bushings 4, with axle box housings 6, which at their crown each have a transverse prism 8 between the middle of the axle box housings 6 and the running wheel 2. The said prism 8 is accommodated in one of the associated channels 9 formed by the bushings 4. A spacing stop 11 is connected rigidly to the axle box housing 6 and one of its ends should be in at least one of the grooves 10 at the appropriate end of the axle 3. Between the spacing stop 11 and the axle box housing 6 is arranged a  $\pi$ -shaped component 12 which covers the transverse channels 9, runners 13 being provided in the horizontal space of the said component to guide the bushing 4. In the space between the running wheel 3 and the axle box housing 6,  $\pi$ -shaped shells 29 are arranged on top of each other, the uppermost of these being held against the axle box housing by springs 31.



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**EDITORIAL NOTE**

**APPLICATION NUMBER: 51464/93**

**THIS SPECIFICATION CONTAINS NO PAGE 1**

**WHEELSET FOR A MULTITUDE OF TRACK GAUGES**

FIELD OF THE INVENTION

The invention concerns a wheelset for a multitude of track gauges of railway lines for the traffic of rolling stock.

BACKGROUND TO THE INVENTION

A wheelset for different track gauges with running wheels mounted in a rotary way on bushings is already known. The bushings cover both of the axle ends which fit in axle boxes where the former are fixed in transverse direction by a pair of prisms connected rigidly to the crown of the axle box housing at equal distances from the middle of the axle box in such a way as to ensure that the prisms are accommodated in at least two pairs of channels formed by the bushing, the number of the channels corresponding to the number of the track gauges being served. When changing the track gauges some of the channels, that are not in use, are placed aside of the axle box, but there they are covered by appropriate canopies casted together with the axle box, in such a way as to protect these channels against dust, ice and other polluting substances that might impede the proper accommodating of the teeth in the channels during changing of the track gauge.

In order to keep a definite distance between the two axle boxes of a wheelset, spacing stops in the form of short binders are used, the spacing stops being situated crosswise to the axle and fastened by bolts to it such that both their ends fit in vertical axle box guides.

The above described solution satisfies successfully the requirements for the maintenance of several track gauges, which do not substantially differ from one another. However, in case of a necessity for servicing a greater number of track gauges, substantially differing from one another, the length of the bushings and axles becomes too big, which results in a considerable break of the vehicle's gauge, especially in the case of narrower track gauges.



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Besides, the need for big transverse travels of the wheels, and respectively of the bushings, leads to the impossibility for some of the channels of the bushing to be protected against dust by means of the axle box canopy.

On the other hand, the fixing of the spacing stops to the axle through binder bolts necessitates a precise assemblage, including a rigid fixing and observation for avoiding eventual loosening of these bolts during operation.

SUMMARY OF THE INVENTION

The present invention provides a wheelset for a multitude of track gauges including independently rotating running wheels mounted on bushings which are freely slidable along an axle, outer ends of the bushings extending into axle boxes and having transverse channels formed in their outer cylindrical surfaces for engagement with corresponding transverse prisms which are located at a crown of the axle boxes, the position of the axle boxes being determined by a spacing stop wherein one transverse prism at the crown of each axle box is situated in a half of each axle box which is adjacent the corresponding wheel and a second transverse prism is located in a groove formed in end regions of the axle, the spacing stop being connected to the axle box and formed by an  $\pi$ -shaped component which joins the two prisms, the  $\pi$ -shaped component having, in a horizontal plane passing through the axle centre, runners to guide the bushing and in the space between each axle box and the corresponding running wheel  $\pi$ -shaped shells are arranged on top of each other, the upper most of them being held against the axle box by springs.

In a preferred embodiment of the present invention, a wheelset for a multitude of track gauges is provided which does not require substantial off-gauge increase in the length of the axle and the bushings, guaranteeing, at the same time, a reliable covering of the channels of the bushings.



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Ribs may be arranged above each  $\sqcap$ -shaped component of each axle box, the ribs being welded to a vertical strap which is fastened detachably to ends of the axle, an opening being provided at each upper end of the vertical strap for insertion of a spike of a console which extends transversely of a portion of a frame of a railway vehicle to which the wheelset is attached.

It is preferred that the spike does not contact the strap.

Runners may extend laterally of the  $\sqcap$ -shaped component and lie in a substantially horizontal plane which passes substantially through the longitudinal axis of the axle and guide the bushing in such a way that rotation of the bushing relative to the axle is prevented.

The  $\sqcap$ -shaped shells may rest upon shelves that extend laterally of the bushings and may be telescopically contractable within one another against tension of the springs and locatable, in such a contracted state, in the space between each axle box and the corresponding running wheels.

Three  $\sqcap$ -shaped shells may be arranged on top of each other between each axle box and the corresponding wheel, the upper most and widest of the  $\sqcap$ -shaped shells touching the axle box and being held thereagainst by two springs.

The springs may be fastened at one of their ends to a front sheet of the  $\sqcap$ -shaped shell and at their other end, to lugs extending transversely, proximal end regions of the bushings, from outer cylindrical surfaces of the bushings.

It is preferred that when the  $\sqcap$ -shaped shells are used for a narrower track gauge, the  $\sqcap$ -shaped shells telescopically extend until contacting corresponding vertical elements of adjacent  $\sqcap$ -shaped shells where upon the channels of the bushings remain covered.

It is preferred that the shelves extend laterally of the bushings for the purpose of restricting access to the channels by the  $\sqcap$ -shaped components.



Wings may extend laterally of the axle box for supporting suspension springs of a railway vehicle to which the wheelset is attached.

5 A mechanically treated surface may be formed beneath the wings for supporting, via rolls having a lateral flange roll, a railway vehicle to which the wheelset is attached during adjustment of the track gauge of the wheelset.

10 The axle box may be fastened by axle box clamps which locate it relative to a frame of a railway vehicle to which the wheelset is attached.

15 Engagement of the prisms and channels occurs by insertion of the prisms into the channels by an amount which may be less than both the distance from the spike to the upper end of the opening of an unloaded vehicle and the distance between the ribs and the  $\pi$ -shaped component of the axle box, while the distance from the spike to the upper end of the opening may be approximately equal to or less than the static deflection of the primary spring suspension in an unloaded vehicle.

20 The wheelset of the present invention may be suitable for use with track gauges of 1000mm, 1067mm, 1435mm, 1520mm, 1600mm and 1676mm. A device for a reliable covering of the channels of the bushing may be applied when the channels jut considerably out of the axle box. Bolt linkage is preferably avoided in fastening of the spacing stop.

25 An indicative implementation of the invention, demonstrated on the drawings attached, clarifies better the structure and operation, namely:

30 Figure 1 shows a cross section of the wheelset in case of broadest track gauge;

35 Figure 2 shows a cross section of the wheelset in case of re-adjustment in the transition device to a narrower track gauge;

Figure 3 - a lateral semi-view of the bogie equipped with a wheelset for multitude of track gauges.



According to the invention wheelset 1 consists of independently rotating running wheels 2 mounted through bearings on bushings 4 stuck at both ends of the axle 3. The bushings could slide along the axle while each of their part 5 elongated sideways from the wheels 2 fits in axle box housing 6 of axle box 7 being connected to it by a transverse prism 8 located at the crown of the axle box housing 6 and accommodated in one of a number of transverse channels 9 located at the upper part of the bushing 4 and corresponding in number to the number of the track gauges served. The transverse prism 8 is located between the middle of the axle box and the wheel 2. Even in case of the broadest track gauge the axle 3 extends beyond the bushing 4. At least one transverse groove 10 is made in this part of the axle adjacent the end of the bushing 4. A spacing stop 11 specially projecting sideways from the axle box 7 is accommodated with negligible clearance inside the groove in such a way that between it and the main part of the axle box 7 is developed a  $\pi$ -shaped component which provides for the entire covering of the transverse channels 9, which are arranged laterally to the middle of the bushing. Additionally, runners 30 extend laterally of the  $\pi$ -shaped component and lie in a substantially horizontal plane which passes substantially through the longitudinal axis of the axle 3 and function to guide the bushings in such a way that rotation of the bushings relative to the axle 3 is prevented.

Two wings extend laterally of the axle box for supporting suspension springs of a railway vehicle to which the wheelset is attached. A mechanically treated surface is formed below the wings 14 and is suitable for supporting the weight of the railway vehicle to which the wheelset is attached, via rolls 17 having a lateral flange roll 18, during adjustment of the track gauge of the wheelset. The axle box 7 is fastened by axle box clamps 19 for the purpose of locating the axle box 7



relative to a frame 20 of a corresponding railway vehicle.

5 A vertical strap 23 is fastened by bolts 22 to the ends 21 of the axle 3. In the upper end of the strap there is an opening 24, which is entered by a spike 25 of a console 26 extending transversely of the frame 20, the spike being at a distance H2 from the upper end 27 of the opening 24. There are ribs 28 welded to the trap 23 at a distance H3 above the  $\pi$ -shaped component 12 of the axle  
10 box 7.

In the space between the axle box 7 and the wheel 2 there are three  $\pi$ -shaped shells 29 arranged on top of each other, the uppermost and widest of them 30 touching the axle box 7 and being held against it by two springs 31, fastened at one of their ends to the front sheet 32 of this component 30, and at the other end - to lugs 33 projecting laterally of outer ends of the bushing 4. The  $\pi$ -shaped shells 29 rest upon shelves that extend laterally of the bushings and are telescopically  
15 contractible within one another against tension of the springs and locatable, in such a contracted state in the space between each axle box and the corresponding running wheel, so that while using the device in narrower track gauges, the  $\pi$ -shaped shells 29 telescopically extend  
20 until contact between corresponding vertical elements of adjacent  $\pi$ -shaped shells 29, whereupon the channels 9 of the bushing 4 remain covered. The laterally extending shells 34 enable access to the channels of the bushings 4 to be restricted thereby preventing entry by the  $\pi$ -shaped  
25 components.

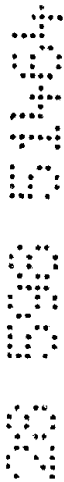
The change of the track gauges takes place while in motion in a transition device 35 located on the railway line, rolling track 17 supports form beneath the axle



boxes 7, taking over the load from them, and the complete set, comprising mainly of wheels 2, bushings 4 and an axle 3, moves on inclined rails 36 gradually downwards. During this process the prisms 8 get out of the channels 9, and, since the wheels 2 are moving sideways being guided in a chute 37, the prisms are shifted by force through sliding of the bushings 4 on the axle 3 to a position corresponding to the other track gauge. Upon leaving the transition device, by means of inclined rails 36 the wheels 2 are lifted upwards, whereupon the prisms 8 are accommodated in another pair of channels of the bushings and the axle boxes are detached from the rolling track, so that the load is transmitted again through wheels 2 on to the rails, whereupon the final adjusting to the track gauge takes place.

During the above described operation of the device the cross distance between the two axle boxes is obligatorily maintained constant due to the fact that the specially formed spacing stops 11 of the axle boxes 7 always remain accommodated in the transverse grooves formed at the ends of the axles 3, which is achieved by the depth of the groove H4 being greater than the distance H3 between the ribs 28 and the  $\pi$ -shaped component 12 of the axle box.

The locking mechanism of the device functions provided that the height H1 of the engaging of the prisms 8 in the channels 9 is smaller than the distance H2 from the spike to the upper end of the opening 24 when the vehicle is unloaded, and also smaller than the distance H3 between the ribs 28 and the  $\pi$ -shaped component 12 of the axle box 7, and if the distance H2 from the spike to the upper end 27 of the opening 24 is smaller or approximately equal to the static deflection of the primary spring suspension 15 in case of unloaded vehicle.



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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A wheelset for a multitude of track gauges including independently rotating running wheels mounted on bushings which are freely slidable along an axle, 5 outer ends of the bushings extending into axle boxes and having transverse channels formed in their outer cylindrical surfaces for engagement with corresponding transverse prisms which are located at a crown of the axle boxes, the position of the axle boxes being 10 determined by a spacing stop wherein one transverse prism at the crown of each axle box is situated in a half of each axle box which is adjacent the corresponding wheel and a second transverse prism is located in a groove formed in end regions of the axle, the spacing stop being 15 connected to the axle box and formed by an  $\pi$ -shaped component which joins the two prisms, the  $\pi$ -shaped component having, in a horizontal plane passing through the axle centre, runners to guide the bushing and in the space between each axle box and the corresponding running 20 wheel  $\pi$ -shaped shells are arranged on top of each other, the upper most of them being held against the axle box by springs.

2. A wheelset as claimed in claim 1 wherein above the  $\pi$ -shaped component of each axle box are arranged ribs 25 which are welded to a vertical strap fastened detachably to ends of the axle and at an upper end of the vertical strap there is an opening in which is situated a spike of a console which extends transversely of a portion of a frame of a railway vehicle to which the wheelset is 30 attached.

3. A wheelset as claimed in claim 1 or claim 2 wherein the  $\pi$ -shaped shells rest upon shelves that extend laterally of the bushings and are telescopically contractible within one another against tension of the 35 springs and locatable, in such a contracted state, in the space between each axle box and the corresponding running wheel.



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4. A wheelset as claimed in any one of claims 1-3 wherein engagement of the transverse prisms and channels occurs by insertion of the transverse prisms into the channels by an amount which is less than both the distance from the spike to the upper end of the opening of an unloaded vehicle and the distance between the ribs and the  $\pi$ -shaped component of the axle box, the distance from the spike to the upper end of the opening being approximately equal to or less than the static deflection of a primary spring suspension in an unloaded vehicle.

5. A wheelset substantially as herein described with reference to the accompanying drawings.

References:

1. Wheelset for Various Track Gauges, Author's Certificate No. BG 25275 of 15 September 1978;
2. Wheelset for Various Track Gauges, Author's Certificate No. BG 38064 of 18 April 1994

Dated this 13th day of October 1998

JELEZNODOROJNI ZAVOD-SOFIA

By their Patent Attorney  
GRIFFITH HACK



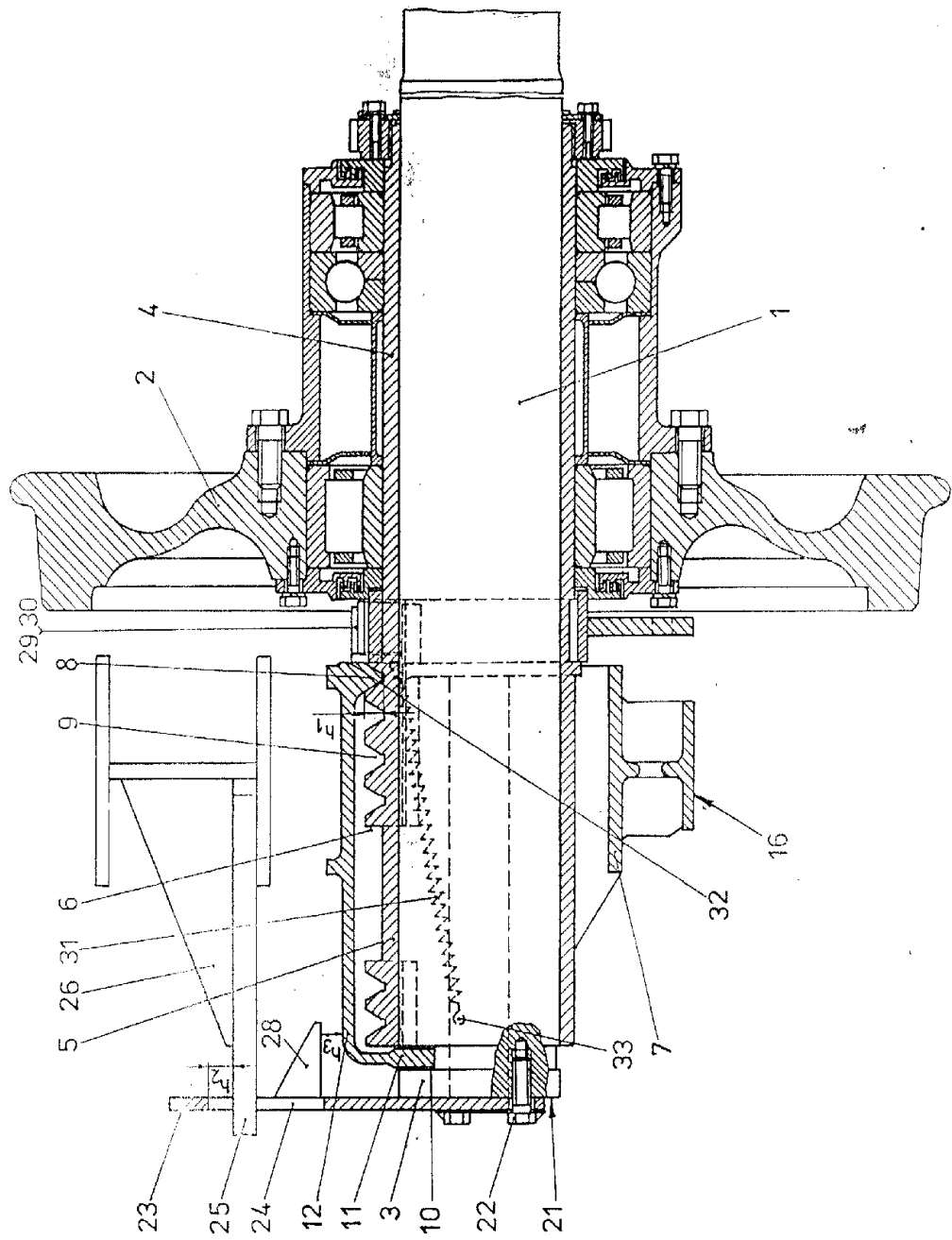


Fig. 1.

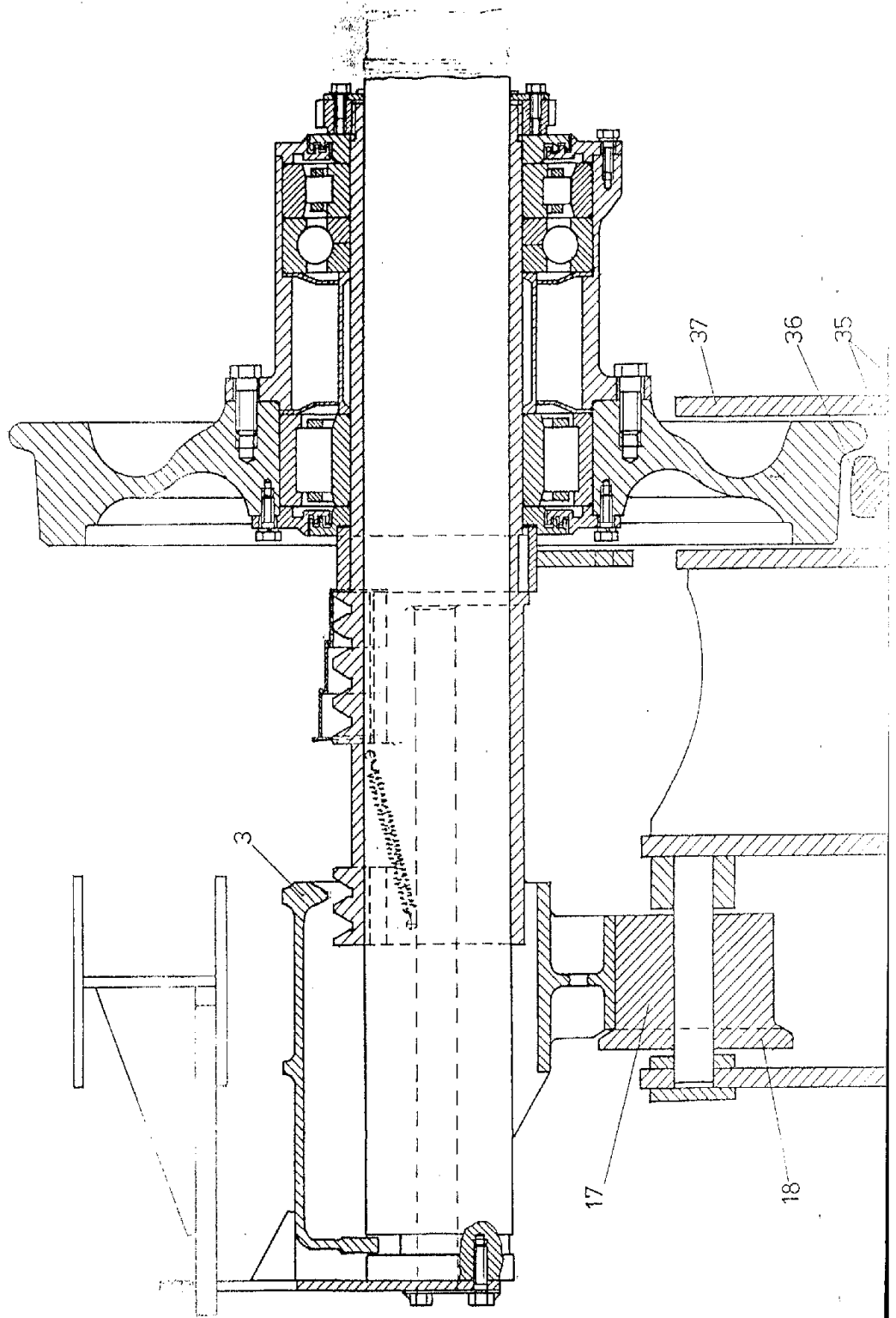


Fig.2.

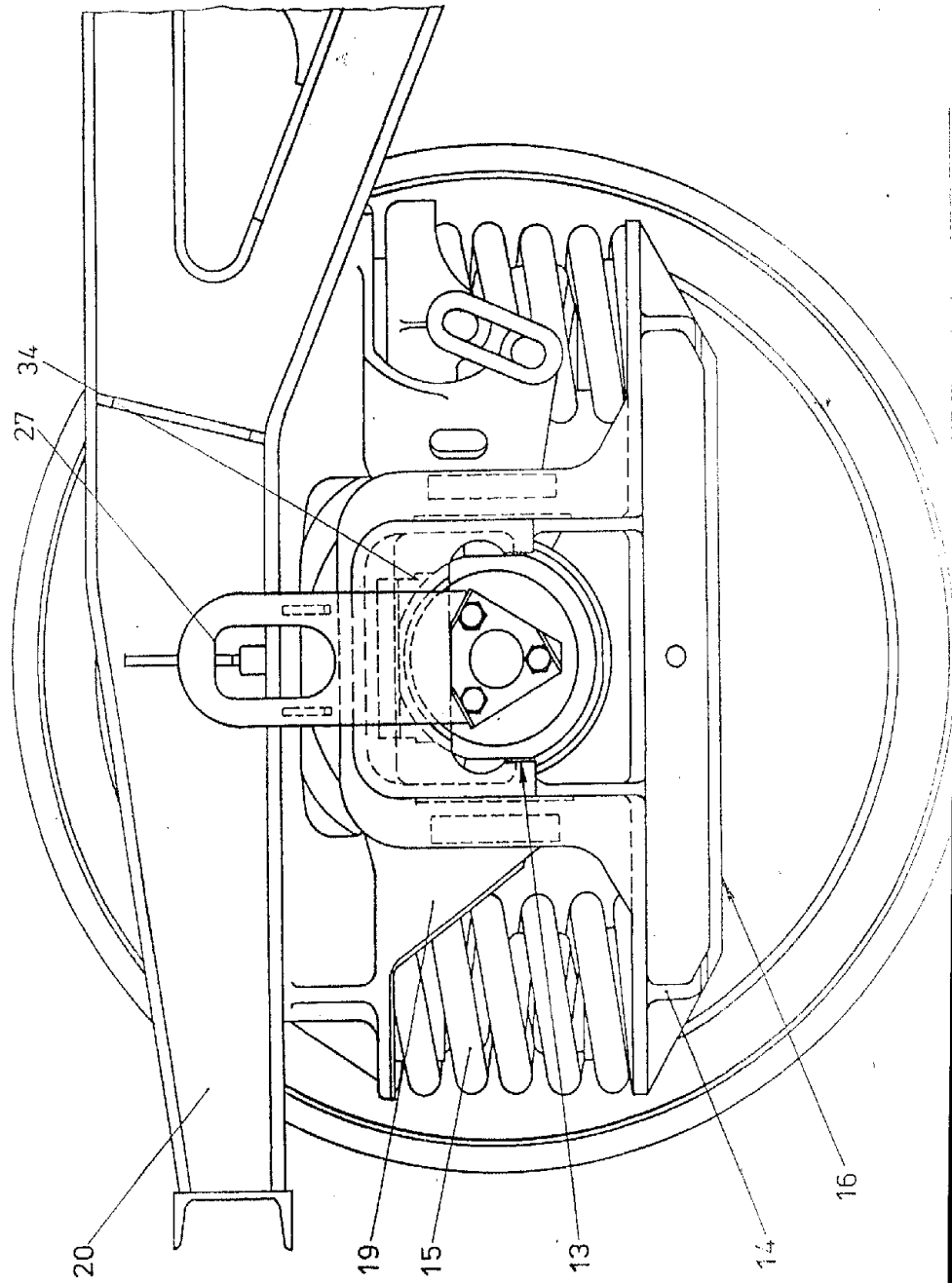


Fig. 3.