607786

COMMONWEALTH OF AUSTRALIA

Patents Act 1952

CONVENTION APPLICATION FOR A STANDARD PATENT

I/WE, FRIED. KRUPP GESELLSCHAFT MIT BESCHRANKTER HAFTUNG
a limited liability company of Altendorfer Strasse 103,
D-4300 Essen 1, Federal Republic of Germany
hereby apply for the grant of a Standard Patent for an invention entitled:

Open-cut mining plant with an extraction device and a conveyor bridge

which is described in the accompanying complete specification.

This application is made under the provision of Part XVI of the Patents Act 1952 and is based on an application for a patent or similar protection made

in Federal Republic of Germany on 1 August 1987
No. (P37 25 595.9)

in on
No. (

My/Our address for service is:
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Balmain NSW 2041

Dated this 21st day of July 1988
FRIED. KRUPP GESELLSCHAFT MIT BESCHRANKTER HAFTUNG

001193 22/07/88 By: _____
Registered Patent Attorney

To: The Commissioner of Patents
COMMONWEALTH OF AUSTRALIA

SPECIFICATION ACCEPTED AND AMENDMENTS ALLOWED 14-12-90

Commonwealth of Australia
The Patents Act 1952

DECLARATION IN SUPPORT

In support of the (Convention) Application made by:
FRIED. KRUPP GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, Altendorfer Strasse 103, D-4300 Essen 1, Federal Republic of Germany

for a patent for an invention entitled:
Open-cut mining plant with an extraction device and a conveyor bridge

I (We) Ludger Frieling, and Artur Reiffer

of and care of the applicant company do solemnly and sincerely declare as follows:

a) I am (We are) the applicant(s) for the patent

or

b) I am (We are) authorised by the applicant(s) for the patent to make this declaration on its behalf.

Delete the following if not a Convention Application.

The basic application(s) as defined by section 141 (1)(2) of the Act was (were) made

on 1 August 1987 in Federal Republic of Germany

by the present applicant company

The basic application(s) referred to in this paragraph is (are) the first application(s) made in a Convention country in respect of the invention the subject of the application.

a) I am (We are) the actual inventor(s) of the invention.

or

b) Franz-Gunter Eschment, Eichendorffstr. 39, D-4100 Duisburg 14, Federal Republic of Germany
Peter Reinartz, Gubberatherstr. 55, D-4053 Juchen 7, Federal Republic of Germany
Werner Rixen, Haydnstr. 11, D-4005 Meerbusch, Federal Republic of Germany

is (are) the actual inventor(s) of the invention and the facts upon which
the applicant company
is (are) entitled to make the application are as follows:
the applicant is a person who would if a patent were granted upon an application made by the actual inventors, be entitled to have the patent assigned to it.

Declared at Essen this 18th day of May 19 88

FRIED. KRUPP GESELLSCHAFT MIT BESCHRANKTER HAFTUNG

Signed _____ Status 1. assessor 2. prokurist

Declarant's Name 1. Ludger Frieling 2. Artur Reiffer

F. B. RICE & CO PATENT ATTORNEYS
This form is suitable for any type of Patent Application. No legalisation required.

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OPEN-CUT MINING PLANT WITH AN EXTRACTION DEVICE AND A CONVEYOR BRIDGE

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(56) Prior Art Documents
AU 72077/81 B65G 41/02
AU 73191/87 E21C 47/04

(57) Claim

1. An open-cut mining plant, which is traversable on crawler trucks, consisting of a bucket wheel excavator or similar extraction device, a loader car and a conveyor bridge equipped with a length-adjustable belt conveyor, which conveyor bridge is pivotally connected about one vertical axis with each of the bucket wheel excavator and the loader car, said conveyor bridge being longitudinally adjustable by means of rails and support rollers, wherein the loader car is adjustable up to about the centre of the conveyor bridge, whereby the rails are mounted underneath the length-adjustable belt conveyor, with a detachable connection to the loader car.

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COMPLETE SPECIFICATION

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Complete Specification for the invention entitled:
Open-cut mining plant with an extraction device and a conveyor bridge

The following statement is a full description of this invention including the best method of performing it known to us/~~me~~:-

Description

This invention concerns an open-cut mining plant, which is traversable on crawler trucks, consisting of a bucket wheel excavator or similar extraction device, a loader car and a conveyor bridge equipped with a length-adjustable conveyor belt, all according to the description of claim 1.

In order to change the distance of the bucket wheel excavator from the conveyor, which transports the extracted material, the socalled face conveyor, the equipment used nowadays are either centrally supported belt conveyor carriages or compound conveyor bridges, which are supported on both ends. Even though belt conveyor carriages are more mobile, the use is restricted to lower extraction capacities, since the transfer of the extracted material at the joints causes difficulties. In contrast hereto, the transfer does not cause any problems with the compound conveyor bridges due to the fixed transfer points, this is the reason why compound conveyor bridges are used for higher capacities. The disadvantage of the compound conveyor bridges is, however, their reduced mobility, which is particularly noticeable at the end of the working face, where the open-cut mining plant must reverse its working direction. In order to enable reversal, a special recess must be cut into the working face with the bucket wheel excavator, which is extra work and means loss of time.

Apart from this, difficulties may be experienced in the traversing of the bucket wheel excavator with the compound conveyor bridge along narrow winding tracks, in particular with the coordination between drive of the excavator and the loader car, which are connected to each other with the compound conveyor bridge.

Purpose of the invention is, to construct an open-cut mining plant in such a way that manoeuvering, in particular reversal of the working direction is made easier and is also possible on a narrower space.

The solution of this task can be seen in the features of the characterizing part of claim 1.

The new open-cut mining plant permits the variation of the distance between the bucket wheel excavator and the loader car and thereby reduce the turning circle.

A further improvement of the manoeuvrability of the open-cut mining plant according to the invention is achieved in that the conveyor bridge may be detached from the bucket wheel excavator and can be moved independently through the loader car.

A compound conveyor device is already known (AU 72077/81) ~~(FR 30 24 180)~~, whereby the bridge is detachable from the open-cut mining device and can be shifted on its drive carriage up to its centre of gravity, however, this open-cut mining device is a spreader and the drive carriage is the track-bound undercarriage of a belt loop carriage.

Purpose of the mobility of the known bridge is, to use it as an auxiliary spreader if the spreader itself is out of service. The manoeuverability of the known plant is not affected by the travel of the bridge.

Further advantageous forms of construction of the invention are subject of the claims 3 to 9.

One example of the construction of the invention is shown diagramatically in the drawing and is explained in the following. It is shown in

Fig. 1 an open-cut mining plant in working position

Fig. 2 the open-cut mining plant in manoeuvering position

Fig. 3 the conveyor bridge detached from the bucket wheel excavator

Fig.4 section of the conveyor bridge in enlarged scale

Fig. 5 to 7 details of fig. 4 in enlarged scale

Fig. 8 cross section along the line VIII - VIII in fig. 4 in enlarged scale

Fig. 9 detail IX in fig. 3 in enlarged scale

Fig. 10 view in the direction of arrow X in fig. 9

Fig. 11 elevation of the connection between the bucket wheel excavator and the conveyor bridge

Fig. 12 section along line XII - XII in fig. 11 and

Fig. 13 section along line XIII - XIII in fig. 11.

As shown in fig. 1, end 1 of a conveyor bridge 2 is spatially hinged on the bogie 3 of a bucket wheel excavator 5 equipped with a crawler truck 4. The other end 6 of the conveyor bridge 2 is supported longitudinally adjustable through support rollers 7, which are formed through two links parallel to the axis, on a loader car 9 equipped with a crawler truck 8. The support rollers 7 are hereby arranged on both sides on a slewing ring 10, which pivots about the vertical axis of loader car 9. Loader car 9 shows further a conveyor bridge 11 transverse to its direction of travel, which at its discharge end is equipped with a transfer head 12, which may be connected to a face conveyor, not shown in the illustration.

In order to achieve the manoeuvering position of the open-cut mining plant shown in fig. 2, the loader car 9 moves forward from the position shown in fig. 1 towards the bucket wheel excavator 5 up to about the centre (relative to the centre of gravity) of the conveyor bridge 2, whereby the free end 6 of the conveyor bridge 2 is lifted by a corresponding amount.

In order to move, the loader car is turned about is central axis by means of the tracks of its crawler truck 8 and then turned back into the position shown in fig. 2 for manoeuvering.

In order to separate from bucket wheel excavator 5, as shown in fig. 3, two pairs of steering support rollers 13, 14 are brought into contact with the underside of conveyor bridge 2. Steering rollers 13 and 14 are each supported at the end of a lever 15 or 16, respectively, which with its other end is hinged parallel to the axis of support rollers 7 on the slewing ring 10. The steering support roller pair 14 is located on the side nearest to end 1 and steering support roller 13 on the opposite side, near end 6 of conveyor bridge 2. After lifting end 1 by means of the steering support rollers, the conveyor bridge 2, following the detachment of the connection, may be moved independently in all directions with the aid of loader car 9.

A length-adjustable belt conveyor 17, also called telescopic belt, is arranged within conveyor bridge 2, as can best be seen in fig. 4. The belt loop 18 of the belt conveyor 17 is lead around a deflector pulley 19 mounted in conveyor bridge 2 and is located underneath a belt carriage 20, which carries the discharge end 21 of the belt conveyor 17 and is supported through a pair of runner wheels 22 on a rail pair 23, which extend in the longitudinal direction of the conveyor bridge 2 in its lower region and underneath belt carriage 20. The belt loop 18 is guided on the inside through deflector pulleys 24, which are arranged on the end of the belt carriage 20 nearest to the bucket wheel excavator. The other end of the belt carriage 20 carries a transfer head 25, which can be connected to loader car 9.

A locking device 26 is mounted between the end of rails 23 and the transfer head 25, which, in the retracted position, locks belt carriage 20 onto conveyor bridge 2, as shown in fig. 4.

Figs. 5 to 8 show details of conveyor bridge 2, of belt carriage 20 and transfer head 25 in an enlarged scale. Fig. 5 shows the location of stop blocks 27 at the end of rails 23 on one side and stop blocks 28 at belt carriage 20, which serve as travel limits of the loader car. For safety reasons, additional electrical limit switches are installed as well. The locking device 26 at the other end of the belt carriage 20 consists of two downwards pointing centering cones 29, arranged on either side of belt carriage 20, which engage in a correspondingly shaped socket of form pockets 30 on belt bridge 2 (fig. 6). Fig. 7 shows the connection between belt carriage 20 and the slewing ring 10 of loader car 9. On either side of transfer head 25, into which the end 21 of the conveyor belt 17 engages, the belt carriage 20 shows downward pointing lugs 31, which carry one support roller 32 each at their lower ends. In the working position shown in fig. 1, the two axis-parallel support rollers 32 are each braced against a stop block 34 by means of a rocker lever 33, whereby the connection between transfer head 25 and loader car 9 is established. In this position, a chute 35 of the loader car 9 is located underneath the transfer head 25.

After the conveyor belt 17 has been retracted into the position shown in fig. 4, the connection between belt carriage 20 and loader car 9 is loosened by release of rocker lever 33.

This position also constitutes the limit of the positioning capacity of the loader car in working position. Furthermore, the truss of the conveyor bridge 2 is open in the lower part in this region, such that an opening 36 is established, as shown in fig. 8 and indicated in fig. 4. Also, the support rollers 7 arranged on slewing ring 10 can be recognized in fig. 8, which support themselves against one rail 37 each, which is arranged in longitudinal direction in the region of the adjustment on the underside of the conveyor bridge 2. Following the release of the rocker lever 33, the support rollers 32 roll downwards on an inclined rail 47, which is mounted in the region of the rocker lever, as soon as the loader car 9 moves towards the centre of the conveyor bridge, whereby the simultaneously aligned parts of the locking device 26 become engaged.

Following the release of the belt carriage 20 from loader car 9, the loader car can traverse in the direction of the bucket wheel excavator so far until the position shown in fig. 9 is reached, which is about the centre of the conveyor bridge 2. Hereby the conveyor bridge 2 supports itself on the support rollers 7 through its rails 37. In order to achieve a greater support width, the levers 15 and 16 are lifted up by means of attached hydraulic cylinders 15' and 16' so far until the steering support rollers 13 and 14 also contact the rails 37. For the purpose of tracking, the rollers 13, 14 and 7 are equipped with wheel flanges on each side. Pinions - not shown - which are provided with a drive and are connected to levers 15, are mounted parallel to the axes of the steering support rollers 13 and engage into toothed racks on the underside of the conveyor bridge 2, which run parallel to the rails 7. This permits a small displacement of the conveyor bridge 2, which is detached from the bucket wheel excavator, relative to the loader car 9.

However, instead of the toothed rack connection, a hydraulic shifting device, which may also serve as a connection security device, may be provided. For the release of the connection between the conveyor bridge 2 and the bucket wheel excavator 5, the end 1 of the conveyor bridge 2 is lifted with the hydraulic cylinders 16' so far, until the space-hinged connection is sufficiently separated from each other, after electrical and possibly other connections have been disconnected. In order to reconnect the conveyor bridge 2 with the bucket wheel excavator 5 at the end of the manoeuvering operation, an adjusting device 38 is provided for convenience, which is mounted in a known roller table carrier platform 39 in the region nearest to the conveyor bridge 2, and which is mounted pivotting about the vertical axis of the connection on the superstructure 3 of the bucket wheel excavator 5. The roller table carrier platform 39 has a guide track 40 on each side, which allows tilting of the conveyor bridge 2 about its longitudinal axis through rollers 41, which act together with the guide tracks 40. The adjusting device 38 is formed by a hydraulic cylinder 42, which is mounted on the underside of the conveyor bridge 2 and can be extended downwards and at its extendable end is equipped with a support roller pair 43, which engage into a rail 44 on the top of the roller table carrier platform 39. In order to make the engagement easier, the guide rail 44 is made wider towards the outside. Hydraulic cylinder 42 also serves preferably the lowering of end 1 of the conveyor bridge into the connection position with the bucket wheel excavator 5. Other means can be employed for the adjustment of the connection, such as electro-magnetic guiding devices.

Following the reattachment of the conveyor bridge to the bucket wheel excavator, the described operating cycles are carried out in reverse order, until the working position according to fig. 1 is reached. The extracted material can again be transferred from the bucket wheel excavator 5 through a chute 49, which is arranged at the end 1 of the conveyor bridge 2, through the belt conveyor 17 and the transfer head 25 onto the belt conveyor of the conveyor bridge 11 of loader car 9, in order to reach the face conveyor through discharge head 12. Conveyor bridge 2 shows one spillage belt 45 and 46 each under the two ends of conveyor belt 17.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An open-cut mining plant, which is traversable on crawler trucks, consisting of a bucket wheel excavator or similar extraction device, a loader car and a conveyor bridge equipped with a length-adjustable belt conveyor, which conveyor bridge is pivotally connected about one vertical axis with each of the bucket wheel excavator and the loader car, said conveyor bridge being longitudinally adjustable by means of rails and support rollers, wherein the loader car is adjustable up to about the centre of the conveyor bridge, whereby the rails are mounted underneath the length-adjustable belt conveyor, with a detachable connection to the loader car.

2. An open-cut mining plant according to claim 1, wherein the conveyor bridge is detachable from the bucket wheel excavator and independently traversable through the loader car.

3. An open-cut mining plant according to claim 2, wherein steering support rollers are mounted on the loader car at least on the side of the support rollers nearest to the bucket wheel excavator, the steering support rollers being height-adjustable and attachable to said rails.

4. An open-cut mining plant according to claim 2, wherein a drive arrangement comprising rack and pinion is mounted in the region of the centre of the conveyor bridge and can be engaged or disengaged.

5. An open-cut mining plant according to claim 4, wherein the pinion of the drive arrangement is connected coaxially with at least one coaxial pair of the steering support rollers.

6. An open-cut mining plant according to any one of the previous claims, wherein the conveyor bridge is constructed as a box-type truss, where the lower stringer is left open in the region of the traversing path of a transfer head of the conveyor.

7. An open-cut mining plant according to any one of the previous claims, wherein the conveyor bridge is flat on the underside.

8. An open-cut mining plant according to any one of the previous claims, wherein a transfer head of the length-adjustable belt conveyor is mounted at the end of a belt carriage for a belt loop of the belt conveyor, whereby the belt carriage is supported longitudinally adjustable on the conveyor bridge by means of at least one pair of running wheels.

9. An open-cut mining plant according to claim 8, wherein the belt carriage is lockable in its retracted position.

10 An open-cut mining plant according to claim 9, wherein the locking device is formed via two centering cones, which engage in corresponding sockets on form pockets located on the conveyor bridge.

11 An open-cut mining plant substantially as herein before described with reference to the accompanying drawings.

Dated this 21st day of July 1988

FRIED. KRUPP GESELLSCHAFT MIT BESCHRANKTER HAFTUNG

Patent Attorneys for the Applicant

F.B. RICE & CO.

FIG. 1

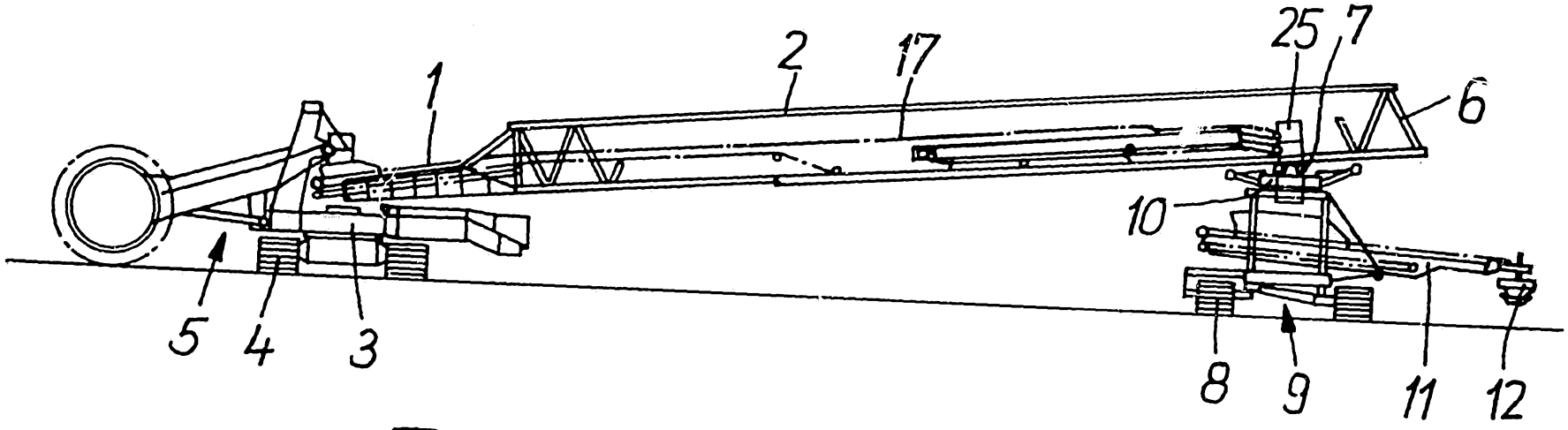

FIG. 2

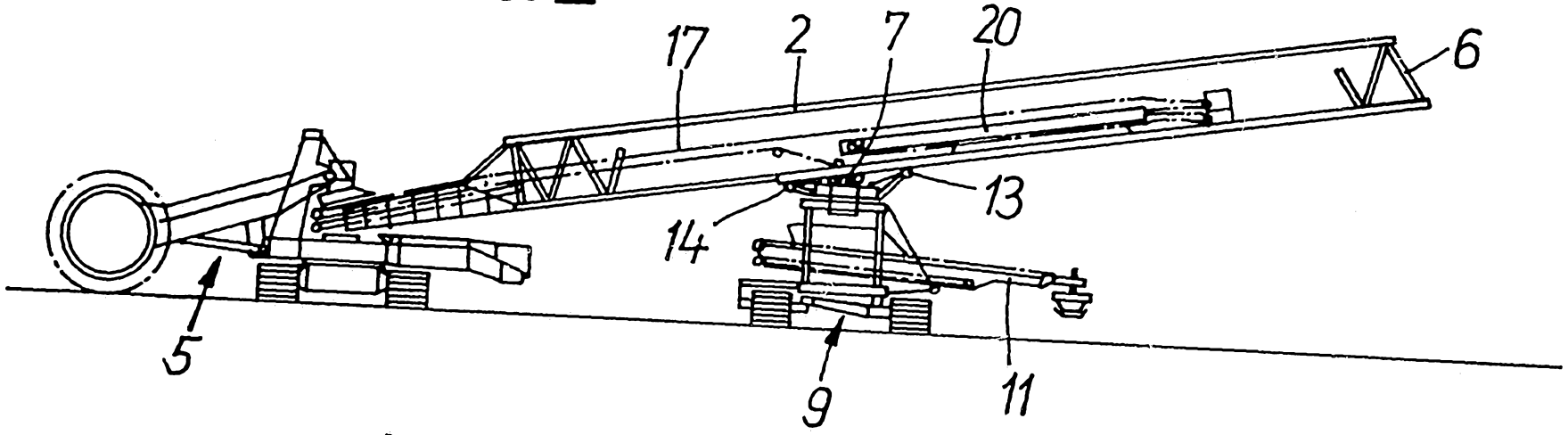

FIG.3

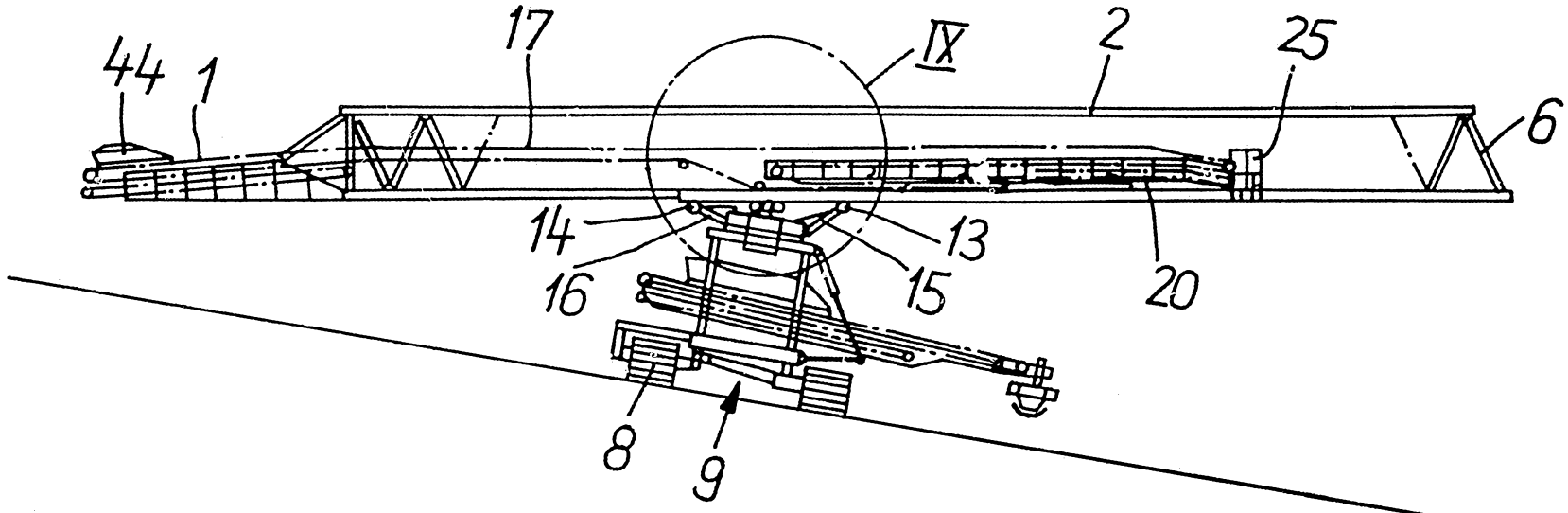

FIG.4

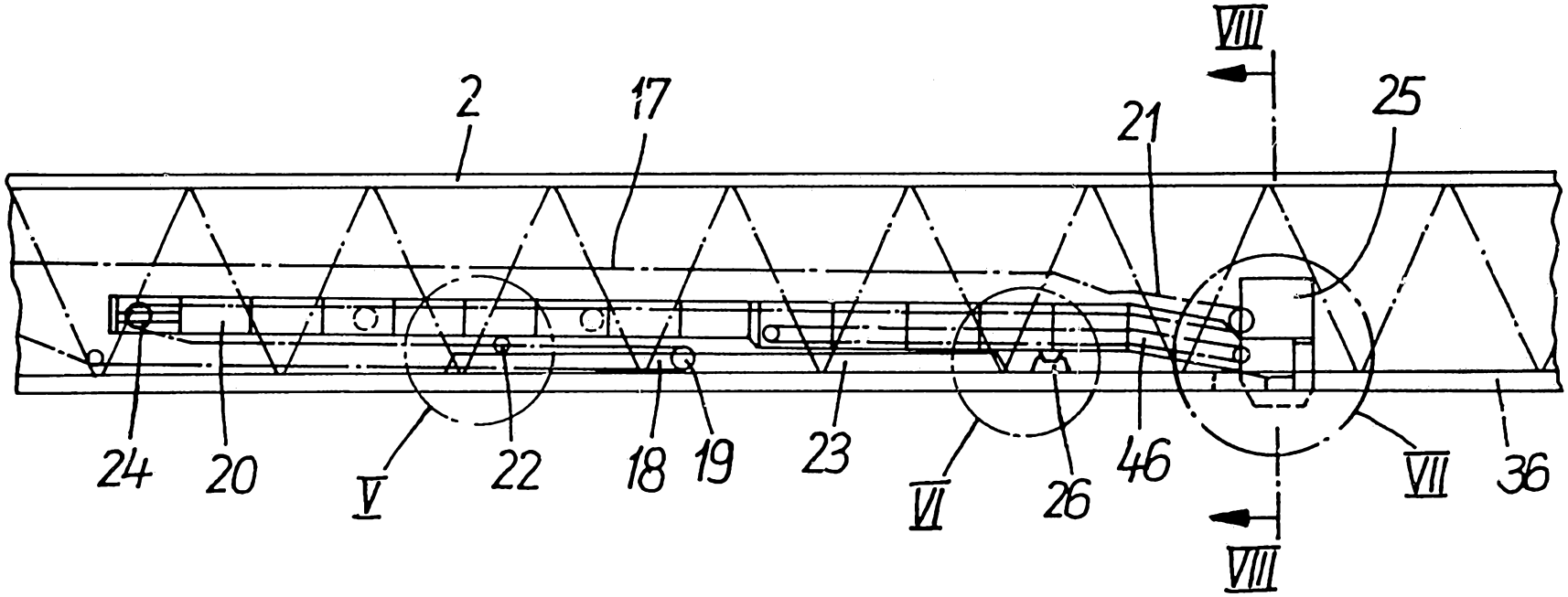

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FIG.5

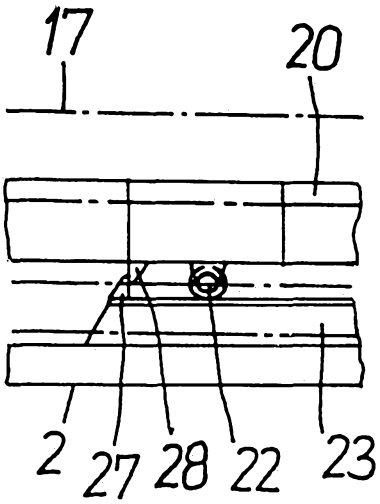

FIG.7

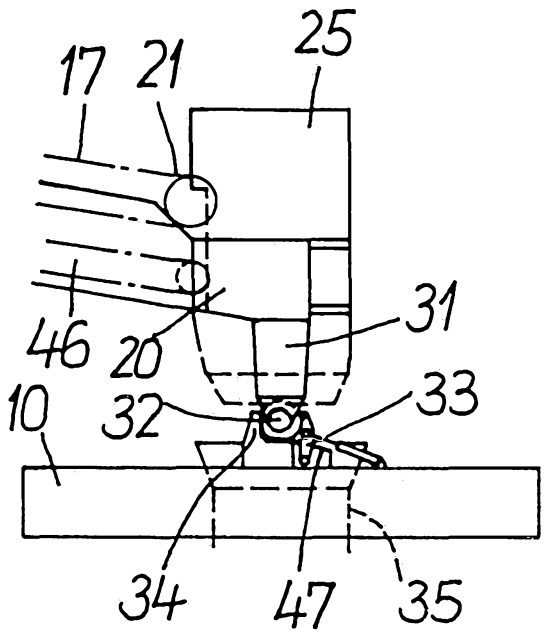

FIG.6

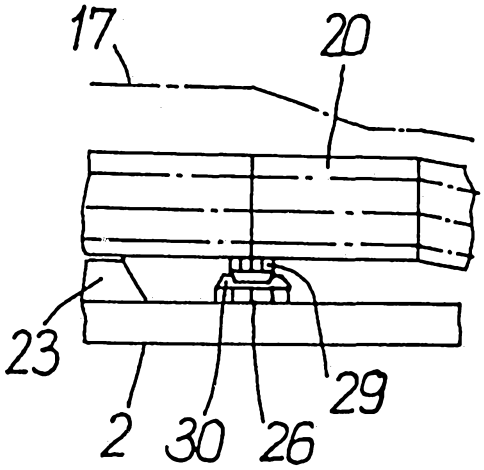

FIG.8

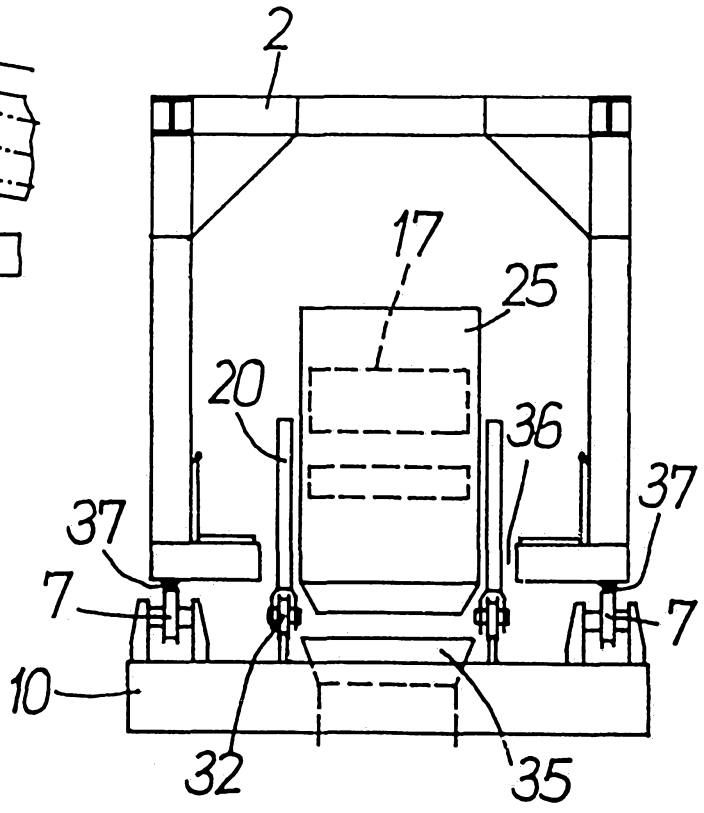

FIG. 9

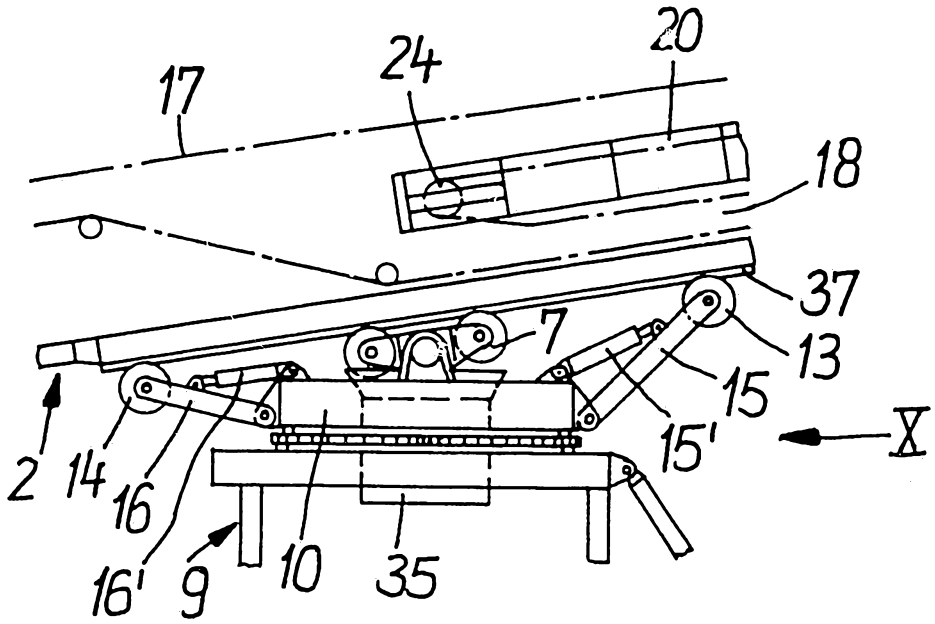

FIG. 10

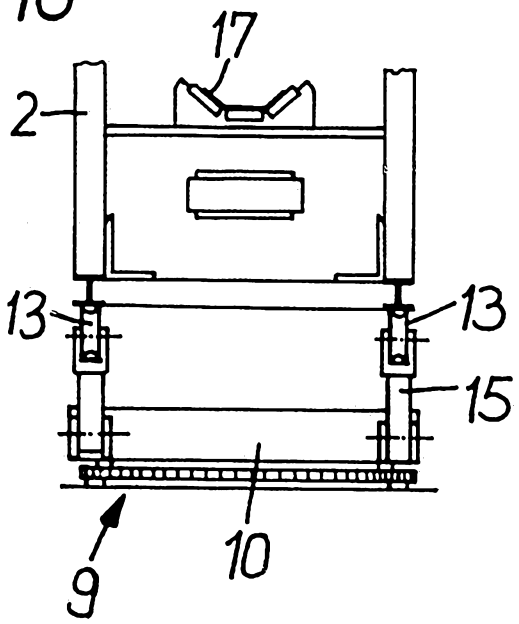

FIG. 11

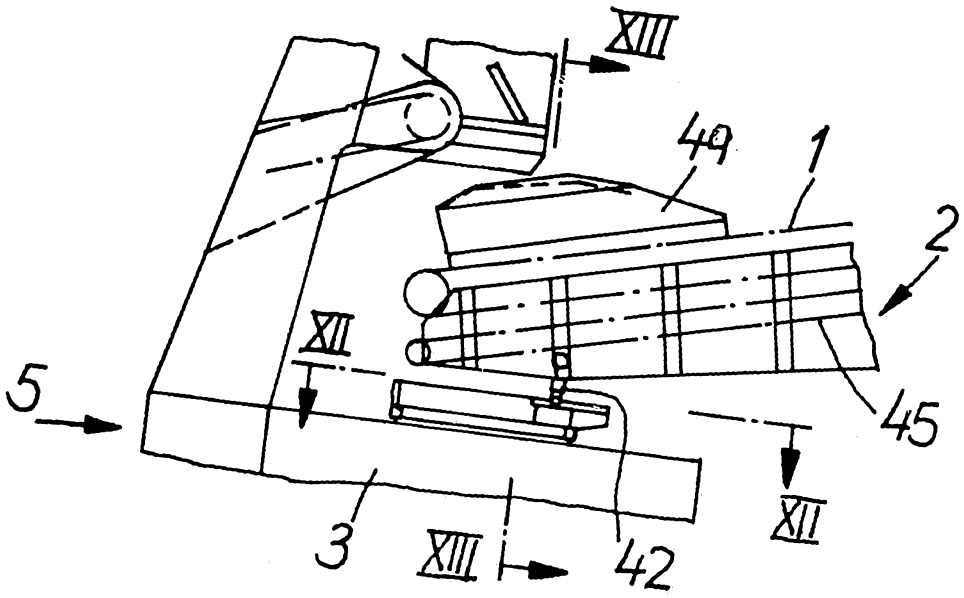

FIG. 12

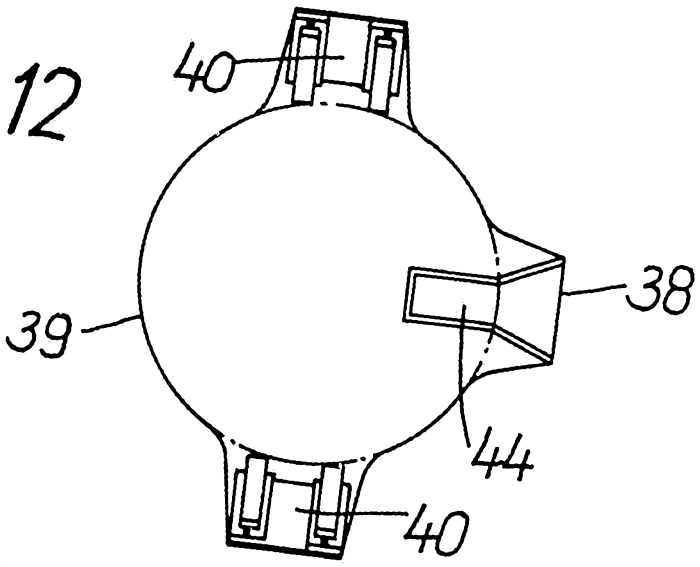

FIG. 13