

[54] SUPPORT AND DRAWING DEVICE FOR ROTARY CONVERTERS AND ROTARY CONVERTERS SO OBTAINED

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[22] Filed: July 20, 1972

[21] Appl. No.: 273,588

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[30] Foreign Application Priority Data

Sept. 29, 1971 Italy 12955/71

[52] U.S. Cl. 266/36 P

[57] ABSTRACT

[51] Int. Cl. C21c 5/50

The invention aims to obtain a rotary converter about a vertical axis at high speed (70–100 turns per minute) for large quantities of steel per cast operation, said rotary converter though being of simple construction and sure working.

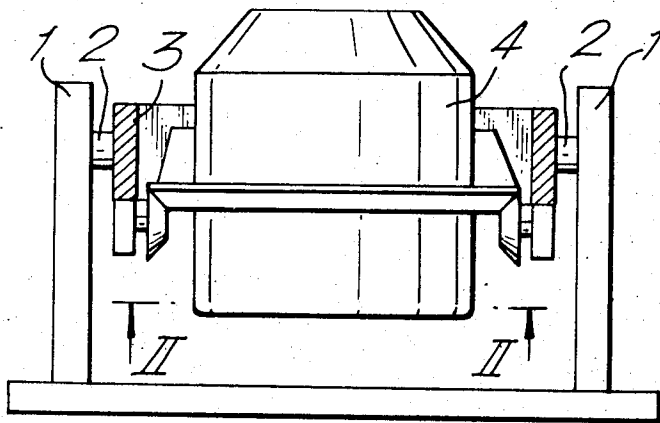
[58] Field of Search 266/35, 36 P

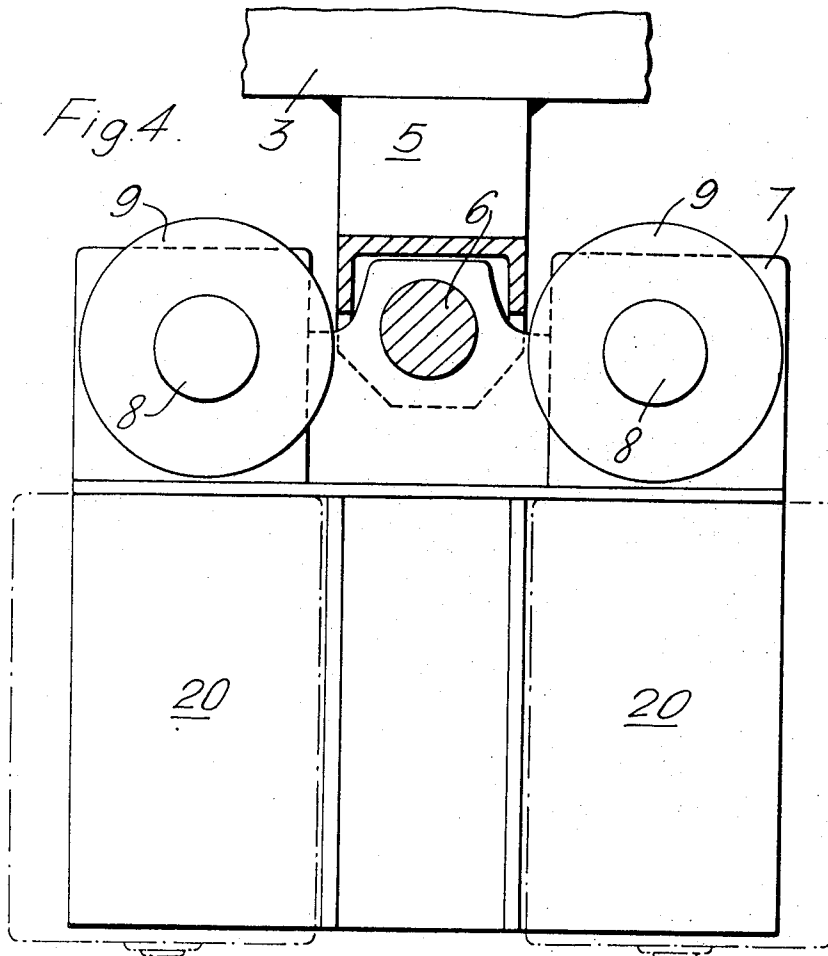
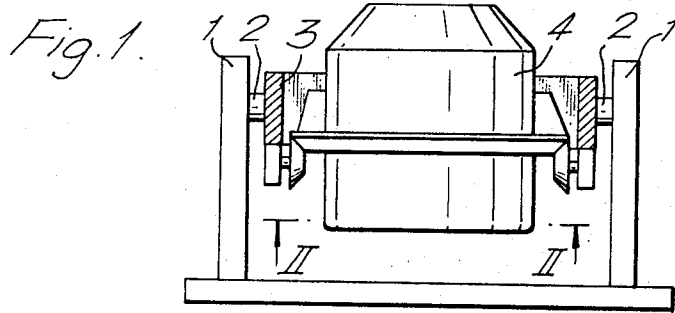
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5 Claims, 5 Drawing Figures





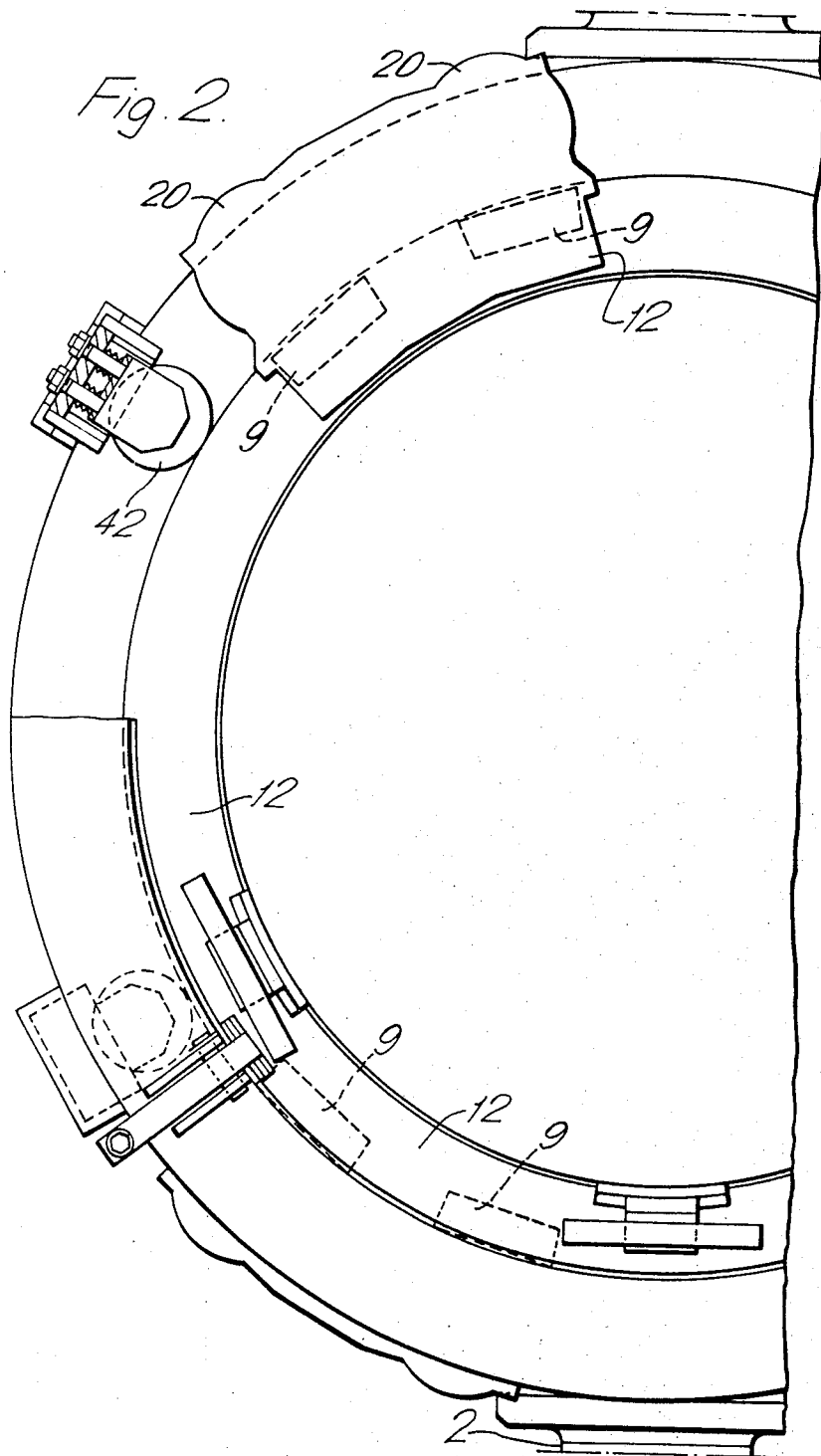


Fig. 3.

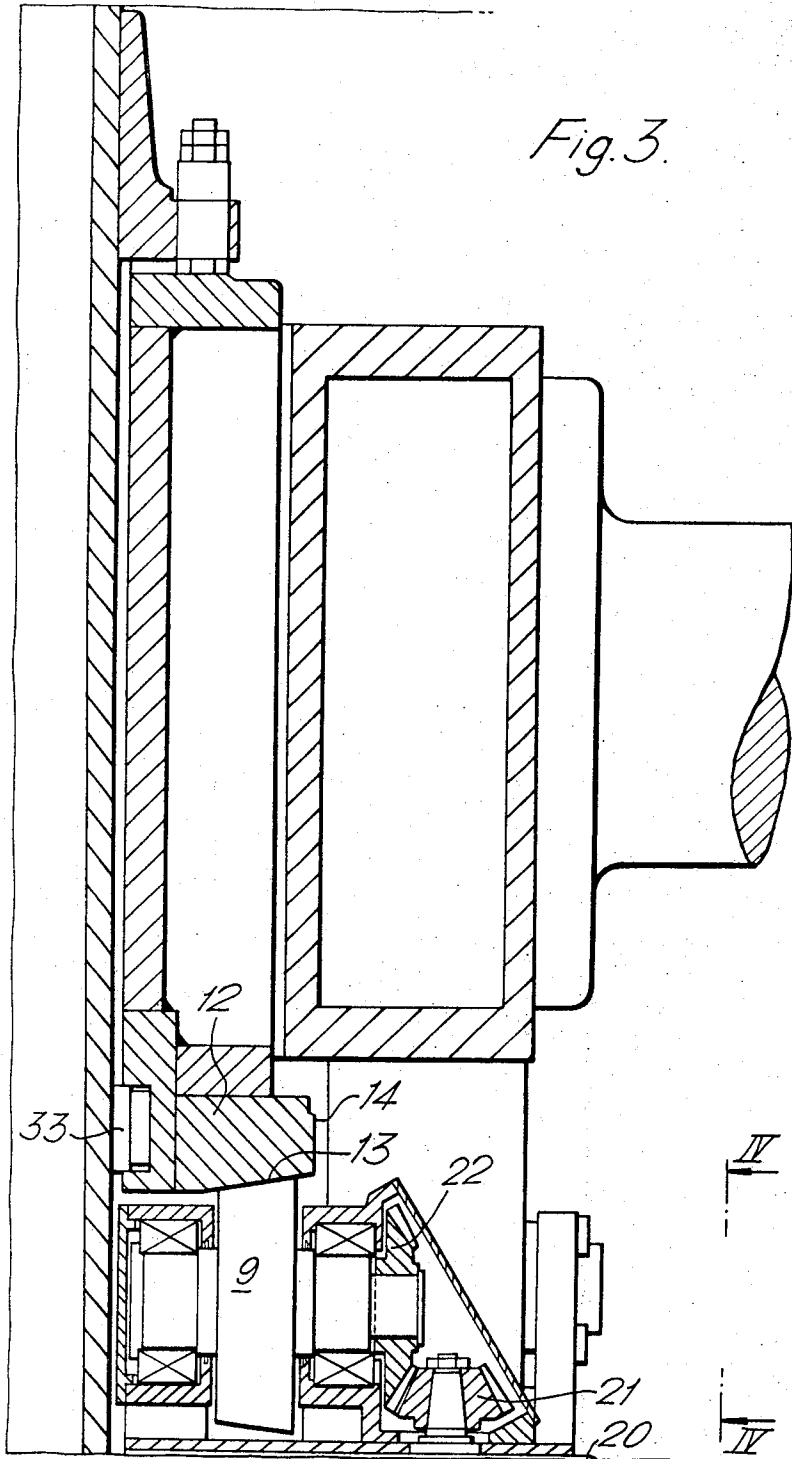
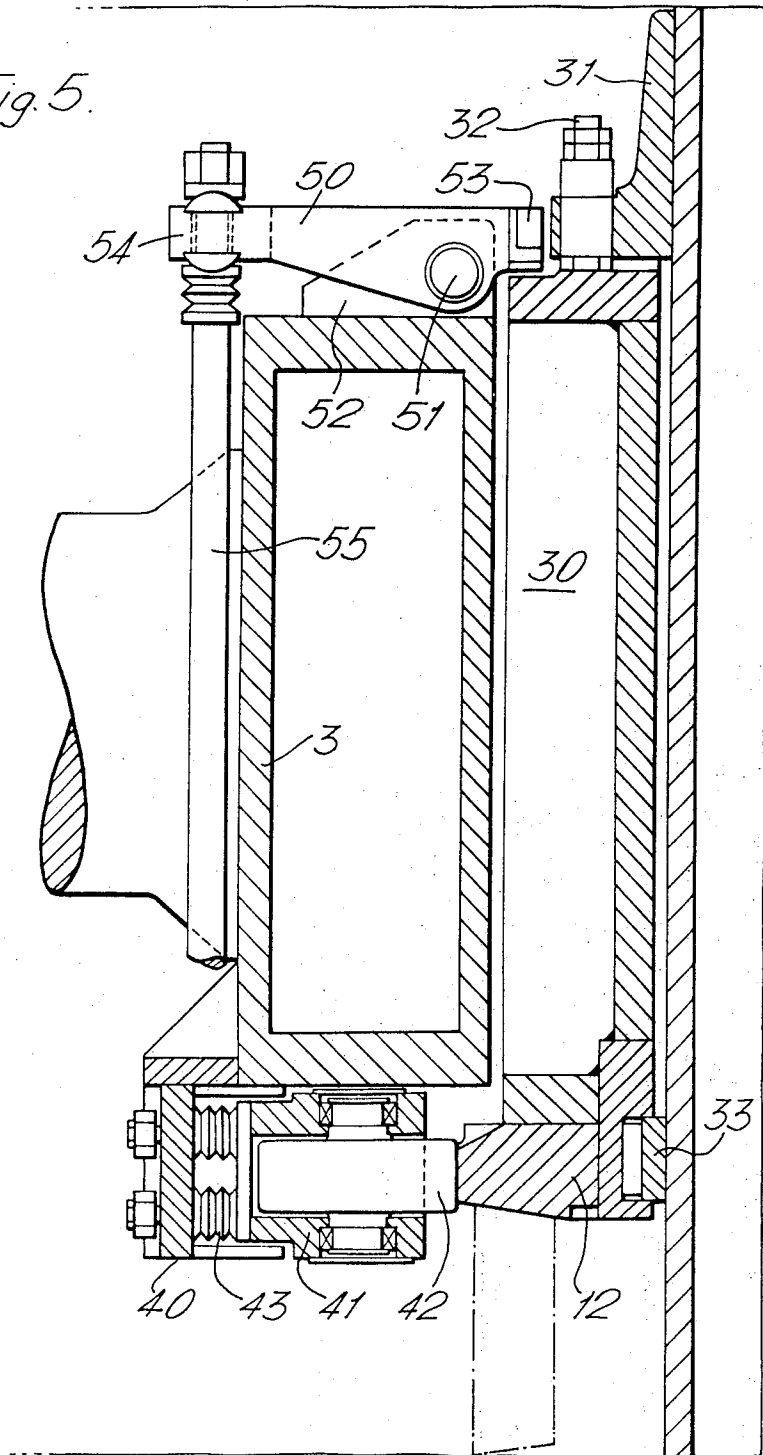


Fig. 5.



SUPPORT AND DRAWING DEVICE FOR ROTARY CONVERTERS AND ROTARY CONVERTERS SO OBTAINED

BACKGROUND OF THE INVENTION

The invention relates to a support and drawing device for rotary converters and rotary converters so obtained.

It is known that the conventional type converters are supported by two aligned pivots with horizontal axis, about which the converter is made to rotate, at the end of the conversion from cast-iron to steel, for discharging the material produced.

Lately, with the use of blowing oxygen onto the bath surface for accelerating the conversion process, it was found that the efficiency of such an operation is as higher as larger is the bath surface which comes into contact with the oxygen.

As it is not thinkable to increase said surface by changing the ratio of the converter height/width, it was devised, by now in experimental way, a rotary device of conversion wherein the surface of the molten metal arrange itself naturally according to a rotation paraboloid, increasing so in a considerable way, the contact area between oxygen and molten metal.

OBJECT OF THE INVENTION:

In view of the foregoing the invention aims at obtaining a rotary converter about a vertical axis at high speed (70-100 turns per minute) for large quantities of steel per each cast operation, said rotary converter though being of simple construction and sure working.

The drawing and support device for rotary converters of the type comprising two vertical columns arranged diametrically opposite to said converter, by said column being rotatably supported two coaxial pivots with horizontal axis for tilting the converter when the refining process is over, comprises an outer ring from which said two pivots project outwardly in a diametrically opposite position; wherein said outer ring comprises three inwardly projecting radial pivots, staggered for 120°, around each of which is mounted directly at least a support wheel, or in case of more wheels through one or more beams each of them supporting on its turn two or more equally charged wheels. The very converter resting on said wheels in a freely turnable way around its vertical axis, through a rolling ring projecting from the outer surface of the casing thereof.

The above device is then characterized in that on the three pivots inwardly projecting from the inside of said outer ring are mounted, in a freely rocking way, three beams, and that on both ends of said beams, equidistant from its central fulcrum, are mounted two wheels in a freely turnable way; said rolling ring being thus supported by six equally charged wheels.

Said device is further characterized in that the surfaces of mutual contact of said rolling ring and said six wheels supported by said three beams two by two, are conical surfaces with coincident peaks arranged in the rotation vertical axis of the converter.

Said converter is then characterized in that at least one of each pair of wheels supported by said three beams is a driving one. The motion of said wheel is obtained by an engine and suitable gears rigidly supported by the relevant beams.

The above device is also characterized in that said rolling ring is arranged fixedly correspondingly to the lower end of an annular support structure surrounding the converter casing, wherein the latter rests against said annular structure through a suitable number of brackets regularly distributed circumferentially, said brackets being fastened on the upper face of said annular structure by vertical axis bolts; wherein further said annular support structure rests against the converter casing correspondingly to its lower edge through radial catch elastic elements regularly distributed circumferentially.

The above device is further characterized in that said outer ring is lowerly provided with a set of wheels with vertical axis and a cylindrical side surface, regularly distributed circumferentially, said wheels being kept resting elastically against the cylindrical outer surface of said rolling ring.

The above device is also characterized in that said vertical axis wheels are mounted on radially sliding slides, with respect to the converter axis, within cavities arranged along the lower edge of said outer ring; wherein between the bottom of said slides and the bottom of said cavities within which said slides are slidable, are provided springs pushing said slides and thus said vertical axis wheels against the outer cylindrical surface of said rolling ring.

The above device is finally characterized in that it comprises locking means for fastening the outer ring to the annular support structure and thus to the converter, correspondingly to the tilting step of the converter about its horizontal axis; wherein said locking means consist of valve-actuating levers, controlled through suitable tie rods and regularly arranged circumferentially on the upper surface of said outer ring, said levers being rockingly mounted about horizontal pivots with respect to said outer ring; wherein the inner end of said levers, that is the one directed towards the converter, correspondingly to its locking position, is strongly pressed against the upper end of the annular support structure integral with the converter casing.

BRIEF DESCRIPTION OF THE DRAWINGS:

In order that the invention may be clearly understood, it will now be described, by way of example, with reference to the accompanying drawings, wherein:

FIG. 1 shows, in a very diagrammatically way, a side view of a converter according to the invention, parallelly to a plane passing through the tilting horizontal axis of the converter;

FIG. 2 is a diagrammatic view from the bottom along line II—II of FIG. 1;

FIG. 3 is a half-section of the claimed converter along line III—III of FIG. 2;

FIG. 4 is a broken view along line IV—IV of FIG. 3; FIG. 5 is a broken half-section of the claimed converter along line V—V of FIG. 2.

DESCRIPTION OF A PREFERRED EMBODIMENT:

With particular reference to the above drawings, numeral 1 denotes the supports carrying the converter, on said supports resting in relief position coaxial pivots 2 for the conventional tilting of the converter at the end of the refining operation for discharging the steel produced; said pivots 2 support on their turn a strong ring 3 heretofore called outer ring. Said outer ring 3 has a

diameter larger than the diameter of the very converter 4. As shown in details in FIGS. 2, 3, 4, from the lower face of said outer ring 3 project three supports 5, staggered for 120°, each of them carrying a pivot 8 having its axis arranged radially. On each of said pivot 6 is mounted rockingly a beam 7 on which are mounted on pivots 8, equidistant therefrom, two wheels 9 comprising a rolling conical surface whose peak 10 is on the vertical symmetry axis 11 of converter 4 and is common to all the three pairs of wheels 9.

On said three pairs of wheels 9 is resting a rolling ring 12 made integral, in the way herebelow described, to the outer annular support 30 of said converter 4. Said rolling ring 12 comprises in its lower portion a first conical rolling surface 13, having its peak coincident with the peak of the conical rolling surface of each of wheels 9. Said rolling ring 12 is provided on its outer part with a second cylindrical rolling surface 14.

Therefore, said converter 4, through the rolling ring 12 integral thereto, rests on the three pairs of wheels 9 and the weight weighing on each pair of wheels 9 is equal to a third of the weight of the converter and its contents, as said three pairs of wheels 9 are exactly staggered with respect to each other for 120°. On the other hand, as each pair of wheels 9 may rock freely about the corresponding pivot 6 together with the relevant beam 7, it results that the weight weighing on each wheel 9 will be always exactly equal to one sixth of the weight of the converter and its contents. That is true at any moment when the converter is still and vertical, even if owing to the thermal stresses of the converter the rolling surface 13 of the rolling ring 13 should not be an exactly conical surface with vertical axis.

It is to be appreciated that each pivot 8 could on its turn carry a second beam on its turn supporting two wheels. In such a case, each wheel would support a smaller portion of the converter weight. By such arrangement it is thus obtained that the converter weight is always distributed exactly in an equal way on wheels 9, pivots 6, supports 5 and thus the outer ring 3.

As said above, the rolling surfaces of wheels 9 and the ring 12 are carefully ground and the drawing into rotation of converter 4 on wheels 9 around the vertical axis 11 is performed by transforming into driving wheels at least three out of the six wheels 9 and by taking advantage of the adherence created by the converter weight on the three wheels 9 for originating the drawing of the inner ring 12 by the driving wheels 9.

According to a preferred embodiment, all six wheels 9 are driving wheels, to this end each beam 7 carrier in relief position a pair of independent engines 20 which, through a reducing gear consisting of a pair of conical wheels 21 and 22, make rotate the associated wheel 9.

It may be easily noted that the pairs of engines 20 rock about pivot 6 integrally with the beam 7 and the wheels 9, and that does not cause any disturbance in the mechanical movement transmission for engine 20 to the associated wheel 9.

As it appears particularly in FIGS. 5 and 2, the rolling ring 12 is supported by a support annular structure 30 which at its bottom is rigidly connected to the rolling ring 12. At its top said support annular structure 30 is connected to a set of brackets 31 fastened to the lateral surface of converter 4 through bolts 32. The inner surface of said annular structure 30 is not in contact with the casing of converter 4. However, the centering of

said converter with respect to said annular structure 30 is obtained through a set of elastic segments 33 arranged in suitable cavities on the lower edge of the inner surface of said annular structure 30. Said elastic segments 33 rest on one side against the annular structure 30 and on the other side against the outer surface of the casing of converter 4. Besides, the outer ring 3 comprises on its bottom a number of brackets 40 each of which is provided with a cavity, directed towards the converter axis, within which is radially movable a slipper 41 supporting rotatably a containing wheel 42, with vertical axis, whose rolling surface is cylindrical and rolls freely on the cylindrical rolling outer surface of ring 12.

Said slipper 41 and thus said wheel 42 are pushed elastically against ring 12 by springs 43 arranged on the bottom of the cavity within which said slipper 41 is slidable radially to the vertical axis of converter 4. The resilient elements 43 and 33 allow to absorb possible radial shocks to which is subject the converter at the end and beginning of its revolution about the vertical axis as well as during operation, said shocks being caused for instance by an irregular distribution of the load inside the converter.

In such a way are preserved, within wide limits, all the support stiff structure of the whole.

The containing wheels 42 have also the object of blocking converter 4, substantially resting through brackets 31 on said annular structure 30, during its tilting about the horizontal axis of pivots 2, when the refining process is over. To this end said annular structure 30 is temporarily made integral with the outer ring 3, through locking levers 50 mounted on pivots 51 which are supported by brackets 52 arranged on the upper surface of the outer ring 3. The locking levers 50 with their inner end 53 press onto the upper surface of said annular structure 30 when, correspondingly to the outer end 54 of levers 50, an upwardly directed force, for instance through rods 55, is exerted.

Obviously, said rods 55 will be blocked towards the bottom, so as to render not operating said locking levers 50, during the rotation of the converter about its vertical axis.

It is to be noted that with small converters, instead of beam 7, a single wheel 9 may be mounted directly on pivot 6; in this case too, the converter will be supported on three points in an evenly defined way.

Accordingly, for larger converters, beams 6 may support, by means of one or more secondary beams, three or four or more wheels 9, each of which carries a load equal to the one carried by the remaining ones.

In fact, in this case too, the converter would be supported in a statically defined way on the three pivots 3.

It is to be understood that the invention is not limited to the example shown. It is intended to cover all modifications and equivalents within the scope of the appended claims.

What we claim is:

1. A rotary converter comprising a circular sectioned container, a rolling ring defining a conical rolling surface the apex of which is coincident with the axis of said container and a cylindrical rolling surface coaxial with said container, bracket means for supporting said ring on said container, resilient means between said ring and said container maintaining said ring and container coaxial, a support ring encircling said container

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and being mounted upon diametrically opposed pivots for tilting said container, said support ring comprising three equiangularly disposed and radially inwardly projecting pivots each of which carries at least one support wheel, said support wheels being frustoconical, having their apices coincident with the apex of said conical rolling surface of said rolling ring, said wheels cooperating with said conical rolling surface to support said container during rotation thereof, drive means operatively connected to said support wheels to rotate those wheels and the container supported thereon, said support ring having spaced guide wheels thereon, said guide wheels being cylindrical and mounted for rotation about axes parallel to said container axis and cooperating with said cylindrical surface of said rolling ring, resilient means urging said guide wheels radially inwardly of said support ring and into engagement with said cylindrical surface of said rolling ring and lock means pivoted to said support ring and operable to secure said container to said support ring during tilting of

said container.

2. A rotary converter as claimed in claim 1 wherein said radially inwardly projecting pivots each support a beam, each of said beams having two support wheels thereon said support wheels being equally spaced from the pivot upon which the beam is mounted.

3. A rotary converter as claimed in claim 2 wherein driving means is associated with each of said support wheels.

4. A rotary converter as claimed in claim 3 wherein said drive means is mounted on said beam.

5. A rotary converter as claimed in claim 1 wherein said bracket means supporting said rolling ring are disposed at the top of said ring and said ring is suspended therefrom, said locking means comprising a lever pivoted to said support ring and means operable to press said lever into firm engagement with said rolling ring.

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