March 25, 1969 J. M. PARAMYTHIOTI 3,434,557

SELF-PROPELLED COMPACTOR ROLLER

Filed March 24, 1967 Sheet 1 of 5

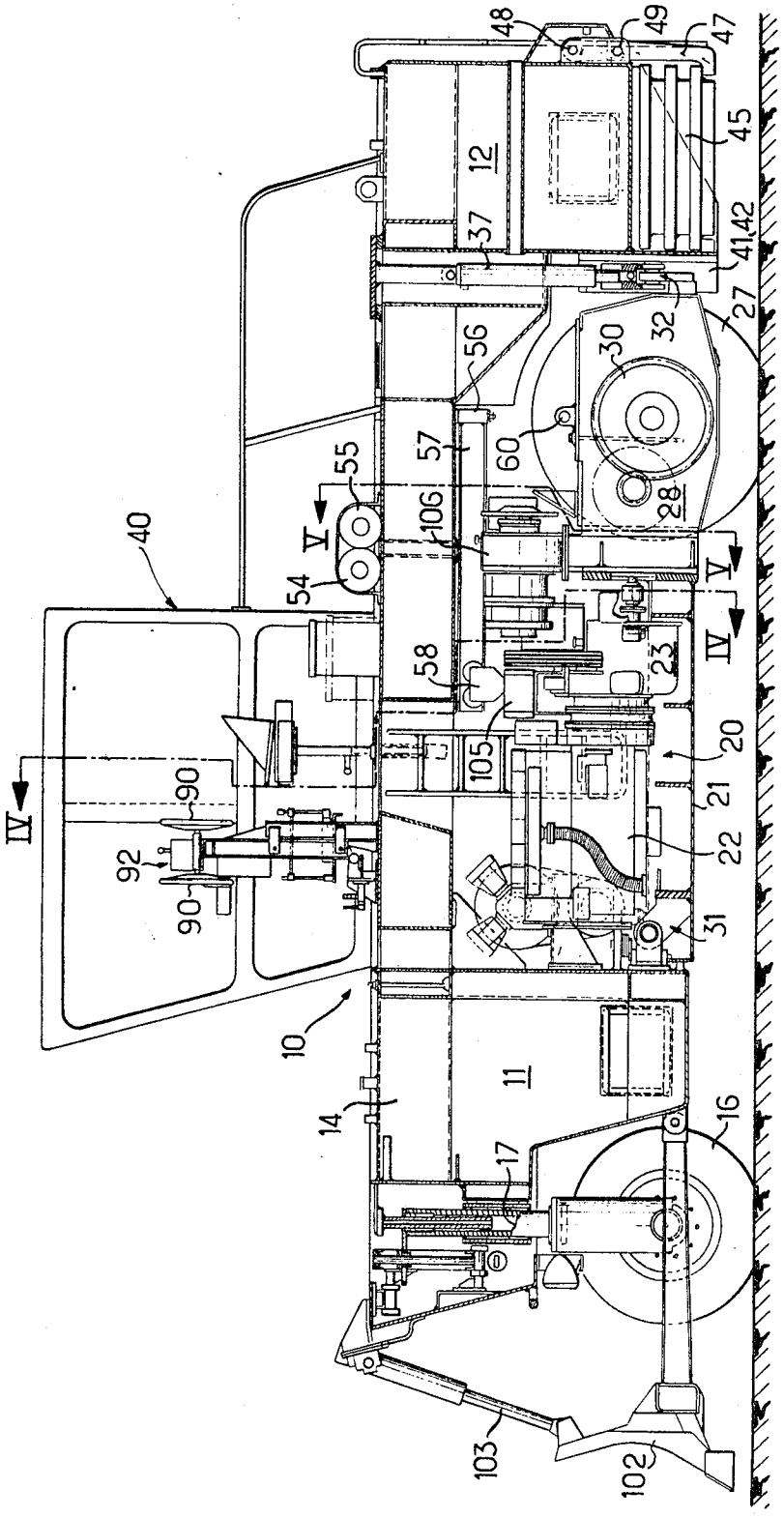


FIG. 1

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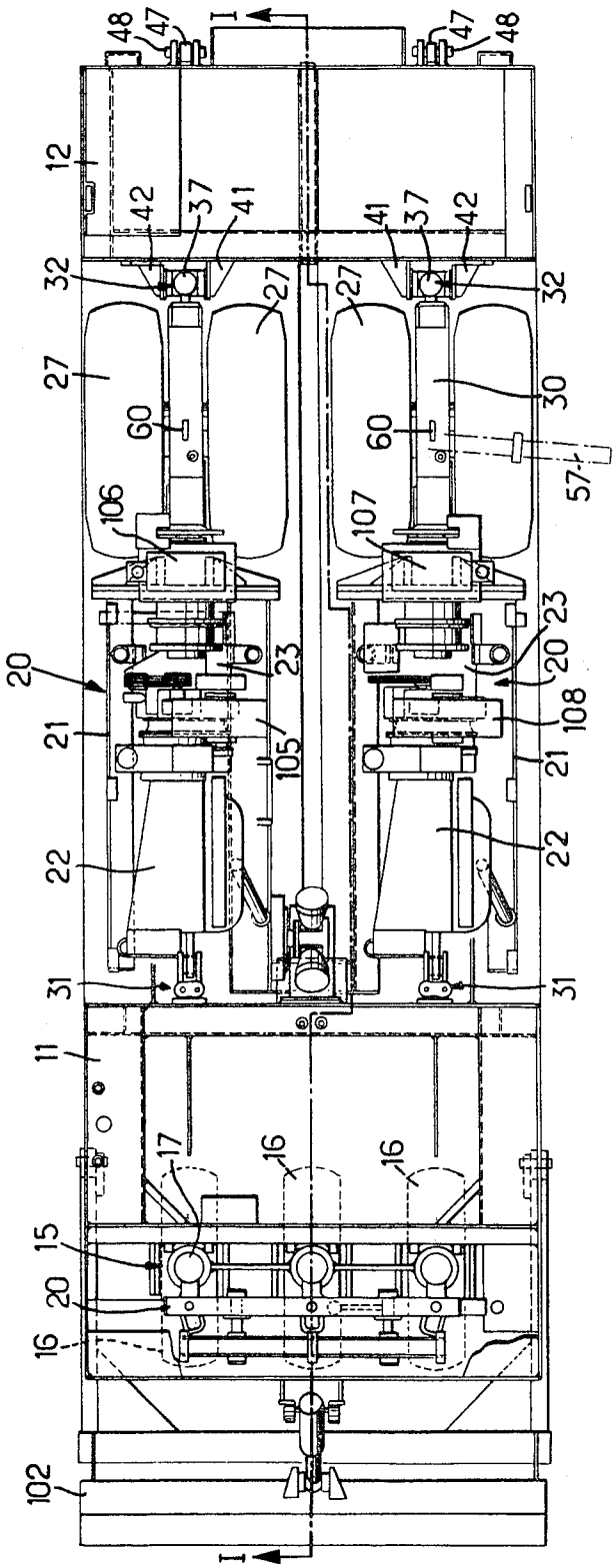


FIG. 2

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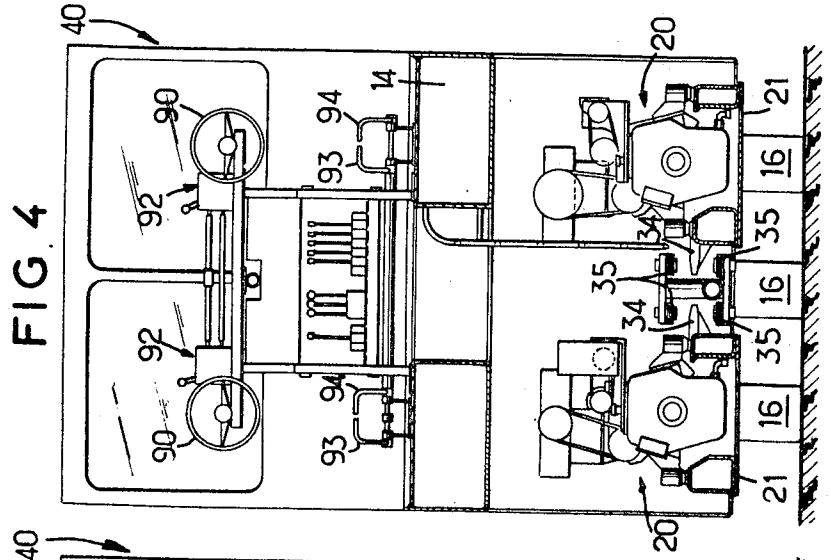


FIG. 4

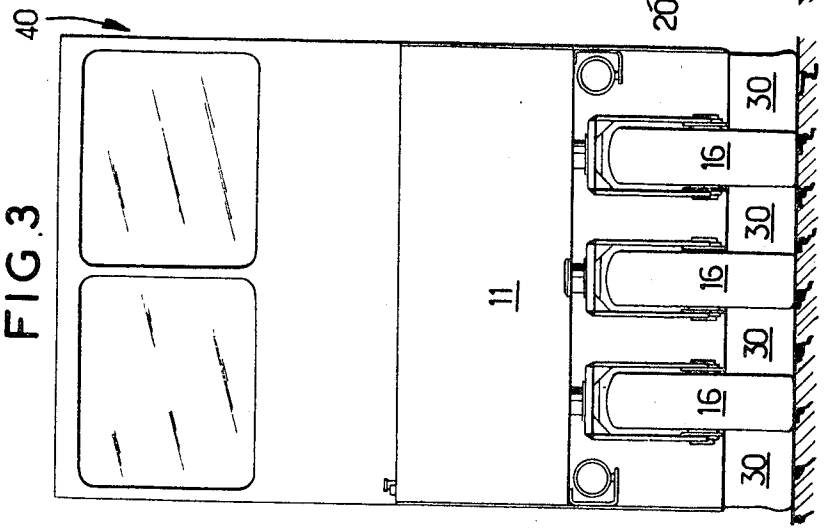


FIG. 3

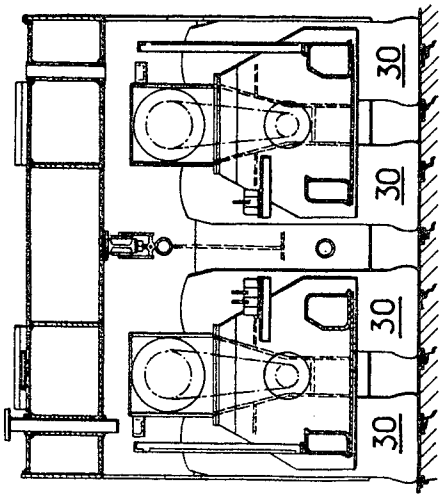


FIG. 5

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FIG. 6

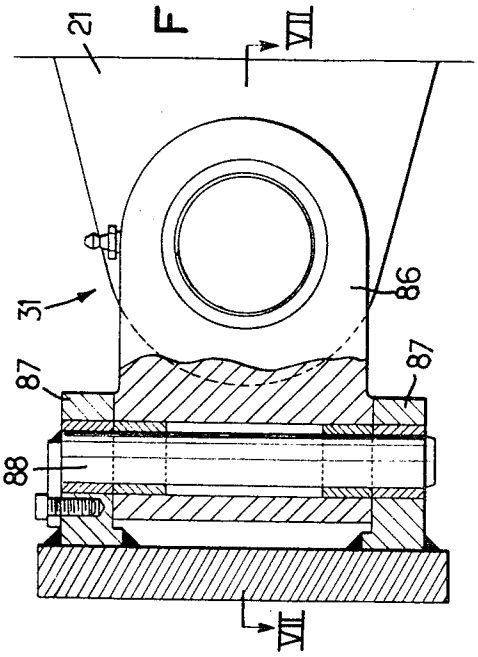


FIG. 7

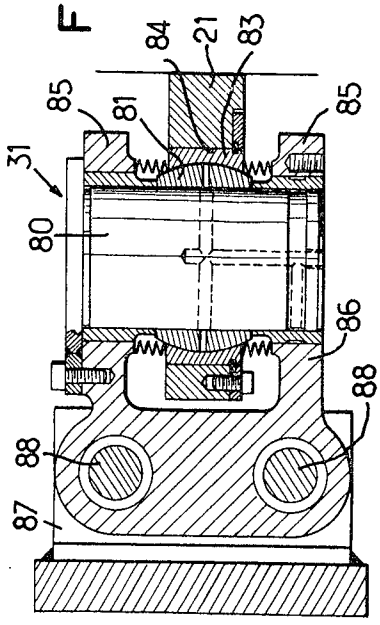
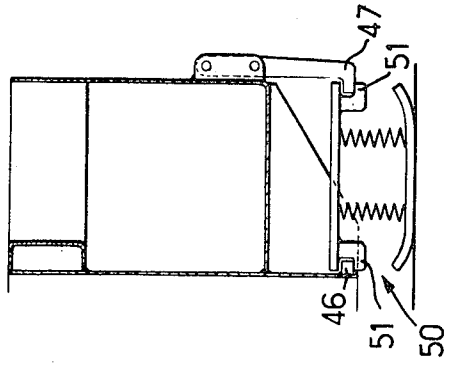


FIG 10



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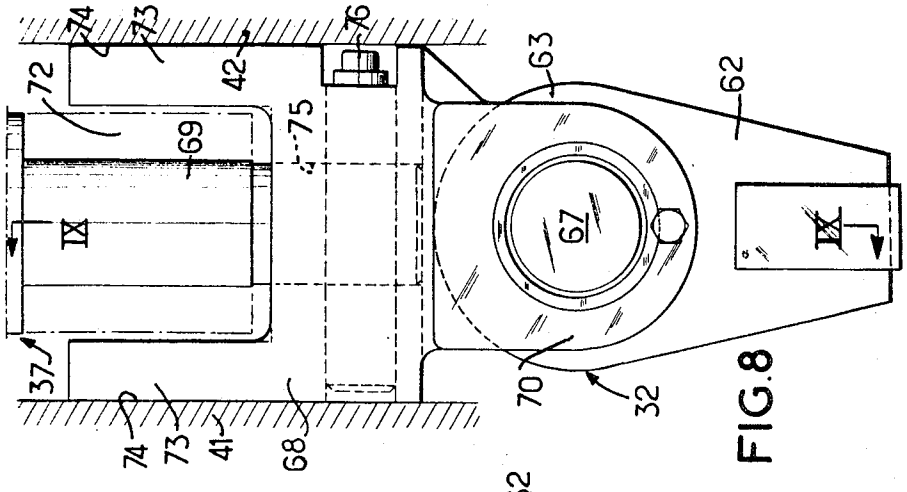


FIG.8

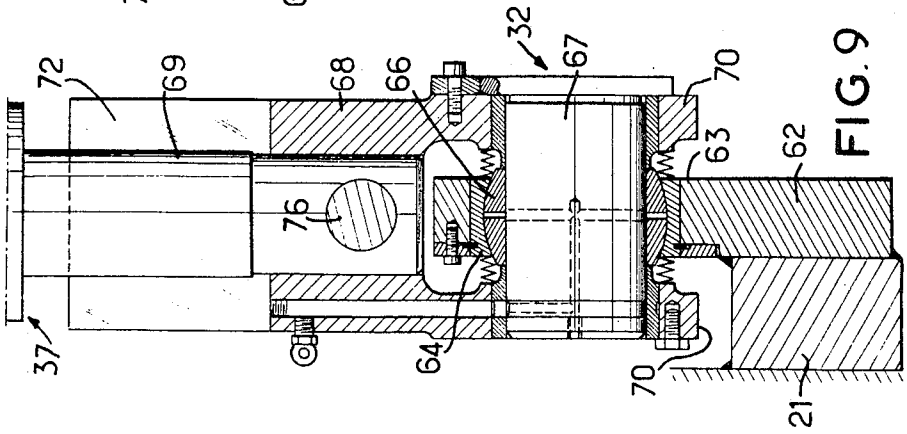


FIG.9

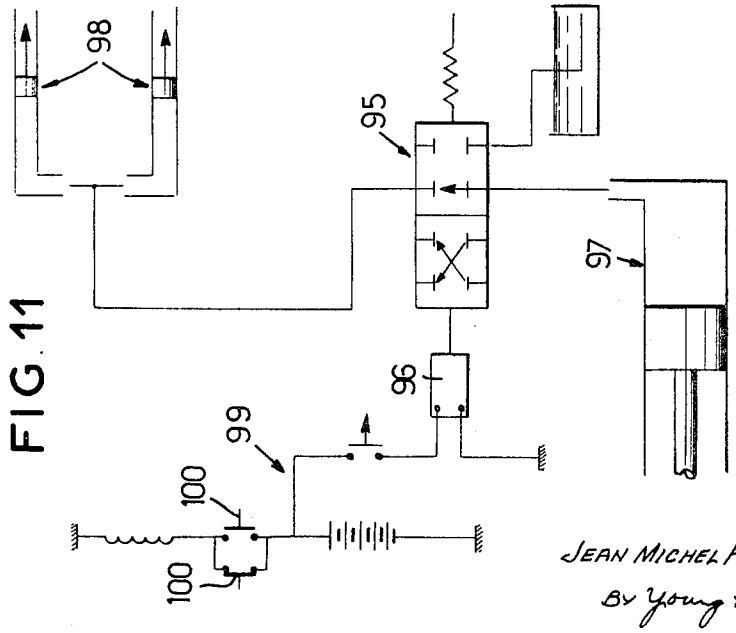


FIG.11

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Patented Mar. 25, 1969

3,434,557

SELF-PROPELLED COMPACTOR ROLLER

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Claims priority, application France, Apr. 5, 1966, 56,413
Int. Cl. B62d 11/04, 57/00
U.S. Cl. 180—6.48 11 Claims

ABSTRACT OF THE DISCLOSURE

A self-propelled compactor roller for both depth and finish compacting, having sets of steering and driving wheels with respect to which a chassis is supported by fluid-actuated jacks, two driving units being mounted to either side of the longitudinal axis of the chassis, each unit being articulated on the chassis about an axis parallel to said longitudinal axis, each unit having wheels constituting the driving wheels.

The present invention relates to a self-propelled compactor roller with pneumatic tyres.

The object of the invention is the construction of a roller of this kind which permits under good conditions, both compacting at a depth of thick layers of soil and the finish-compacting of surface layers.

The roller according to the invention, of the kind comprising a front set of steering wheels and a rear set of driving wheels, on which a chassis fitted with ballast carriers is supported by means of fluid actuated jacks, is characterized in that it comprises, on each side of the longitudinal axis of the chassis, two rigid groups each comprising an engine, a transmission and an axle carrying two twin wheels, each group being articulated on the chassis about an axis substantially parallel to the said longitudinal axis and the twin wheels of the two groups constituting the rear set of driving wheels.

This arrangement makes it possible to bring the driving wheels closer together and thus to obtain an overlap of the front and rear wheel-tracks, necessary for finish-rolling, even with narrow front wheels which are of smaller size than the rear wheels. For this reason, it also enables the load to be concentrated on the rear wheels, which facilitates compacting in depth. In this way, it is possible to achieve two functions which are often incompatible.

The invention will be more fully explained from the description which follows below, given solely by way of example, reference being made to the accompanying drawings, in which:

FIG. 1 is a side view in cross-section of a form of construction of the roller according to the invention;

FIG. 2 is a plan view with parts broken away of this same roller, the line I—I indicating the section line of FIG. 1;

FIG. 3 is a front view of the roller shown in FIGS. 1 and 2;

FIGS. 4 and 5 are two views of this roller in cross-section, taken respectively along the lines IV—IV and V—V of FIG. 1;

FIG. 6 is a view of a detail of this roller, with parts broken away;

FIG. 7 is a cross-section along the line VII—VII of FIG. 6;

FIG. 8 shows a further detail of the roller;

FIG. 9 is a cross-section taken along the line IX—IX of FIG. 8;

FIG. 10 illustrates an alternative form of equipment of the roller according to the invention;

FIG. 11 is a diagram of a safety device which is an optional fitting on the roller according to the invention.

The compactor roller according to the invention in the form of construction described and shown, comprises a chassis **10** composed of a casing **11** forming a ballast-carrier at the front, and a casing **12** forming a ballast-carrier at the rear, joined together by two horizontal girders **14** to which they are fixed by welding. The front casing **11** contains the suspension **15** of the steering wheels **16**, three in number in the present example, with each of which is associated a jack **17**.

This suspension and the steering which comprises in particular a coupling rod **19**, are constructed for example in the manner described in French Patent No. 1,188,145 of the present applicant, the three jacks **17** communicating with each other. Under the girders **14**, between the casings **11** and **12**, on each side of the longitudinal axis of the chassis **10**, are arranged two propulsion units **20** each comprising, in line on a frame **21**, a diesel engine **22**, a transmission **23** with torque converter and gear-box, driven by the said engine and transmitting the driving power from this latter to a pair of twin driving wheels **27**, by means of a bevel gear **28** and a reduction gear **30**.

Each of the units **20** is coupled to the chassis of the roller by two swivel joints, a front swivel joint **31** coupled to the casing **11** and a rear swivel joint **32** coupled to the rear casing **12**, and can therefore oscillate transversely to the chassis of the roller about an axis passing through the swivel joints and substantially parallel to the longitudinal axis of the roller. Each pair of wheels **27** thus constitutes a supporting point for the chassis of the roller. Furthermore, since the three hydraulic jacks of the front wheels **16** communicate with each other, these three wheels behave as a single supporting point, and it can be seen that the roller has three supporting points and an isostatic suspension.

These oscillating propulsion units permit the driving wheels to be brought very close to each other. In fact, these wheels oscillate with the frame **21** which they support and there is no risk of them coming into contact with it. In this way, the spaces between the tracks of the rear wheels are very narrow, and it is possible to obtain the overlapping of these tracks by the tracks of the front wheels, even with steering wheels which, as is the present case, are of much smaller size than the driving wheels, both in width and in diameter.

By this disproportion between the front and rear wheels, it is thus possible to cause the latter to carry a very high percentage of the total weight of the roller. This is of very great advantage for the compacting of thick layers of soil; in fact, on the one hand the adherence of the driving wheels is very high since it is proportional to the load carried by these wheels, and on the other hand the effectiveness of the roller, which as is well known is a function of the load per wheel, is increased.

The roller according to the invention can however also be employed for the finishing layers, for which it is necessary to obtain not only correct overlapping of the wheel tracks, which is ensured as has been seen above, but also a contact pressure between tyre and ground which is identical for all the contactor wheels, which is obtained form a firm ground, by the same inflation pressure of the front and rear wheels. For this finishing work, the part played by the load per tyre is reduced.

Abutments **34** fixed to the frames **21**, arranged between elastic steel washers **35** fixed to the roller chassis limit the transverse oscillation of each unit **20** both upwards and downwards (see FIG. 4).

Each rear swivel joint **32** is rigidly fixed to the rod of

a vertical hydraulic jack **37**, the body of which is fixed to the chassis of the roller. By means of a hydraulic distributor unit mounted in the control cabin **40** of the roller, the driver can cause the rods of the jack **37** to move inwards or outwards, together or separately. In this way, the rear of the chassis of the roller can thus be lifted or lowered or it can be inclined laterally. Similarly, the front of the chassis can also be raised or lowered by the action of the three hydraulic jacks **17** which form the suspension of the front wheels.

Slides **41** and **42** fixed to the roller chassis enclose the rods of the jacks **37** and ensure their vertical guiding, the outer parts **42** of the slides being removable.

These arrangements permit various operations to be carried out.

In particular, it is possible to lay-down or take-up in a short time a mass of metal ballast so as to obtain a rapid variation of the total weight of the roller.

In order to receive this weight **45**, the chassis comprises, under the rear casing **12**, a girder **46** on the front of which rests the weight **45**, while at the rear it is retained by pivoted hooks **47** articulated by shafts **48** on the said chassis and fixed by means of pins **49**.

It is also possible to lower a pair of driving wheels into a trench for widening a road for example. In this case, one of the front side wheels is also lowered into the trench, while the central front wheel is fixed to the chassis in its top position.

This roller can also work on slight slopes, perpendicularly to the line of greatest slope, for example on very highly banked turnings, embankments with slight slopes for protection against flooding. In this case, the jacks on the top side of the slope are much less extended than those located towards the bottom of the slope; the roller thus remains horizontal on the flank of the slope.

Instead of the ballast weight **45**, the roller according to the invention can also receive a vibrating plate **50** (FIG. 10) held in position by means of hooks **51** in the same way as the ballast, at the rear of the roller by means of the girder **46** and the hooks **47**. This vibrating plate is provided in the usual manner with a vibrator (not shown), the motor of which is supplied from a generator carried by the roller and mounted on one of the propulsion units of this latter.

In order to preserve the isostatic suspension of the roller and to load the vibrating plate with a definitely determined load, the rear hydraulic jacks **37** are then each coupled to one of two separate oleo-pneumatic accumulators **54** and **55**. Everything then takes place as if the chassis were suspended at the rear of two large springs with a considerable travel, mounted between the chassis and each of the two propulsion units at right angles to the jack **37**. The vibrating plate thus remains loaded even if it encounters fairly considerable irregularities of ground.

Various arrangements are also provided for the removal of the inner driving wheels in the event of puncture.

Above each propulsion unit there is articulated about a vertical shaft **56** under the girder **14** of the chassis, a pivotal arm **57** formed by an I-section member serving as a slide for a hook **58** provided with rollers, while a ring **60** is fixed to the frame **21** of the corresponding unit **20**, above the twin axle.

In addition, the rear swivel joint **32** of each unit **20** is coupled to its associated jack **37** in a detachable manner, as shown in FIGS. 8 and 9, in which FIG. 8 is a front view and FIG. 9 is a side view in section, the front of the roller being towards the left of this figure.

The rear of the frame **21** of the unit **20** considered carries a ring **63** fixed by welding by means of an extension **62**, in the bore of which ring is mounted a further ring **64** forming a spherical bearing. This latter ring receives a ring **66** with a spherical bearing surface surrounding a pivot **67** which serves as an articulation for a fork **68** fixed on the end of the rod **69** of the piston of the jack **37**. This fork is provided on the one hand at its lower portion with two parallel side plates **70**, normal to the longitudinal axis of the chassis, between which extends the pivot **67** and which permit the movement of the ring **62** in a vertical plane about the pivot **67**, and on the other hand at its upper portion with a groove **72** between two end-plates **73**, of which the outer faces **74**, flat and parallel to the longitudinal axis of the chassis, cooperate with the vertical slides **41** and **42** already referred to.

At the bottom of the groove **72** is formed a bore **75** which receives the extremity of the rod **69** of the jack piston, locked by a pin **76** which is removable from the exterior, passing at the same time through the fork **68** and the rod **69**.

The removal of an inner driving wheel is effected in the following manner.

The rear of the roller is raised by causing the pistons of the rear hydraulic jacks **37** to move outwards.

The rear of the roller on the side of the wheel to be removed is then chocked-up.

The piston of the jack which corresponds to the wheel to be removed is then drawn-in to the point at which the unit **20** to which this wheel belongs can be hooked by its hook **60** to the hook **58**. The arm **57** with its trolley carrying the hook **60** has been previously placed in the position shown in chain-dotted lines in FIG. 2.

The hydraulic jack **37** is then disconnected from its rear swivel joint by removing the pin **76**. The outer slide **42** is removed and the twin wheels remain suspended above the ground from the arm **57**.

It is then only necessary to pivot the whole of the unit **20** towards the exterior about the front swivel-joint **31** in order to obtain access to the inner wheel **27** which is to be removed.

In order to permit a pivotal movement of the unit greater than that which is normally permitted by the swivel-joint **31**, the invention provides a particular mounting of this latter shown in FIGS. 6 and 7, being respectively a side view with parts broken away and a cross-section taken in a horizontal plane.

The front part of the frame **21** is articulated about a spherical bearing composed of a horizontal pivot **80** on which is engaged a ring **81** having a convex spherical bearing surface, this ring being surrounded by a further ring **83** with a complementary bearing surface, keyed in a bore **84** of the front portion of the frame **21**. The pivot **80** is pivotally mounted between the two arms **85** of a forked member **86** fixed to the chassis of the roller. This fork is housed between two horizontal lugs **87** fixed to the chassis and is locked in these lugs by two vertical pins **88** which pass through both the said lugs and the said fork.

The frame **21** can thus pivot in a vertical plane about the pivot **80**, while the spherical bearing permits movements of limited amplitude in the horizontal direction, these movements being too small for the removal of the driving wheels.

In this latter case, one of the pins **88** is removed, the other then serving as a pivot for the fork **86** which can then be displaced towards the exterior, this enabling the inner wheel to be freed for its removal.

The invention also provides for particular arrangements of the control station **40**.

This station is provided at the upper part of the chassis, which gives excellent visibility for the driver, since the engine and the transmission are mounted underneath the chassis.

The driving station comprises four hand-wheels **90**, two on the right and two on the left, each pair of two hand-wheels comprising a hand-wheel for forward running and a hand-wheel for reverse running.

Two steering boxes **92** permit the acceleration control of the two diesel engines and also the reversal of running, the changes of gear, from the four positions of driving.

Each propulsion unit **20** is operated by one of these boxes, which are coupled together mechanically in such manner that the operation of one of the boxes causes a corresponding operation of the other box, which ensures

at every instant the same operating conditions of the two diesel engines and also the same gear ratio on the two transmissions.

There is provided the possibility of temporarily uncoupling these boxes for certain special work, in particular working with a vibrating plate as will be described below, the controls of the two engines being thus separated.

The braking of the roller is effected by means of four pedals **93**, **94** grouped together in pairs immediately below the steering hand-wheels.

Each pedal acts on a disc-brake mounted on one of the propulsion units, the pedals **93** located on the left-hand side of the pedals **94**, looking on the rear of the roller, acting on the left-hand unit of the roller while the pedals **94** act on the right-hand unit.

The arrangement of the pedals is such that the driver can depress two pedals **93** and **94** simultaneously, which ensures the simultaneous braking of the two units **20** and the four driving wheels, or on either of the said pedals, which effects the braking of the corresponding unit only and the right-hand or left-hand driving wheels, this facilitating the turning action of the roller to the right or to the left respectively.

A safety device is provided with the equipment of the roller according to the invention, arranged so as to block the roller wheels if the latter comes up against an obstacle either during forward or reverse running.

This device is shown in FIG. 11 and comprises a distributor **95** operated by an electrovalve **96** arranged so as to put the cylinder **97** of at least one suspension jack **37** or **17** into communication with two jacks **98** acting on the brake pedals, the operation of the electrovalve being controlled by a circuit **99** of the usual type, comprising two contacts **100** actuated by two safety cables (not shown) stretched at the front and at the rear of the roller at a certain height above the ground, for example 50 cm. If one of these cables encounters an obstacle, it actuates the corresponding contact **100**, which causes the operation of the electrovalve **96** and, through the action of the distributor, the operation of the jacks **98** and the locking of the brakes.

Various accessories advantageously form part of the equipment of the roller according to the invention, in particular an air compressor (not shown), which enables the pressure of the pneumatic tyres to be varied either during running or stationary, from the driving station.

A levelling blade **102** is mounted on the front of the roller and is adjusted in height either by a double-acting jack **103** or by varying the trim of the roller, which can be effected by means of the hydraulic suspension.

As has already been stated, the roller can be equipped with a vibrating plate. Its operation in this case involves the action of a hydrostatic transmission mounted on the roller and which permits extremely-slow movement of this latter.

This transmission comprises a hydraulic pump **105** driven by one of the engines **22**, which supplies two hydraulic piston motors **106** and **107**, each driving through a chain one of the bevel gears **28** which actuate the driving wheels. An interlock prevents the use at the same time of the torque-converter transmission and the above hydrostatic transmission.

When so required, a second hydraulic pump **108** driven by the second diesel engine, provides the supply of oil under pressure to the motor of the vibrating plate, if this plate is of the type with a hydraulic motor.

In the case of a vibrating plate driven by an electric motor, this pump **108** is replaced by an electric generator.

I claim:

1. A self-propelled compactor roller comprising a chassis, at least one ballast-carrier in said chassis, a front set of steering wheels, a rear set of driving wheels, fluid-operated jacks for supporting said chassis with respect to said wheels, two rigid units mounted to either side of the longitudinal axis of the chassis and each comprising an engine, a transmission, and an axle carrying two twin wheels, each said unit being articulated on the chassis about an axis substantially parallel to the said longitudinal axis, the twin wheels of the two units constituting the rear set of driving wheels.

2. A roller according to claim **1**, wherein the chassis comprises a platform under which extend transversely front and rear ballast carriers, said rigid units being mounted between these carriers.

3. A roller according to claim **1**, wherein the articulation of each unit is effected at the front and at the rear by a swivel-joint, the rear swivel-joint movable vertically between slides fixed on the chassis and being coupled to the rod of a hydraulic jack, which enables the said rear swivel-joint to be raised or lowered.

4. A roller according to claim **3**, wherein the swivel-joint articulation provided at the front of each rigid unit is fixed to the chassis of the roller by means of a hinge with a vertical axis.

5. A roller according to claim **1**, wherein the roller chassis is provided, above each said unit and towards the rear of the roller, with a pivoted lifting arm having a movable hook.

6. A roller according to claim **1**, wherein fixing hooks for a ballast weight, vibrating plate or other similar accessory are pivoted on the rear ballast carrier of the chassis.

7. A roller according to claim **1**, wherein the diameter and width of the steering wheels are substantially less than those of the rear driving wheels.

8. A roller according to claim **1** further having means for selectively establishing hydraulic connection between the jacks and for selectively supplying said jacks with actuating fluid independently of each other.

9. A roller according to claim **1**, wherein elastic abutments limit the movement of each rigid unit about its articulation axis, with respect to the chassis.

10. A roller according to claim **1**, wherein the driving station of the roller includes two steering boxes each for controlling an engine of one of the rigid units said boxes being mechanically coupled to each other by a removable coupling for joint operation.

11. A roller according to claim **1**, wherein each rigid unit is equipped with an independent braking device wherein said devices can be actuated independently or simultaneously.

References Cited

UNITED STATES PATENTS

2,725,109	11/1955	Bouvier	180—6.48
2,954,088	9/1960	Williamson et al.	180—20
3,161,250	12/1964	Gardner	94—50

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U.S. Cl. X.R.

180—20; 94—50