

[72] Inventor **Peppino Sechi**
5669 Upper Lachine Road, Montreal,
Quebec, Canada
[21] Appl. No. **818,688**
[22] Filed **Apr. 23, 1969**
[45] Patented **July 6, 1971**

3,192,839	7/1965	Vivier.....	94/50
3,283,679	11/1966	Rafferty	94/50
3,395,626	8/1968	Garis	94/50
3,411,420	11/1968	Martin.....	94/50
3,416,419	12/1968	Kronholm	94/50
3,437,019	4/1969	Peterson.....	94/50

Primary Examiner—Nile C. Byers, Jr.
Attorney—Pierre Lesperance

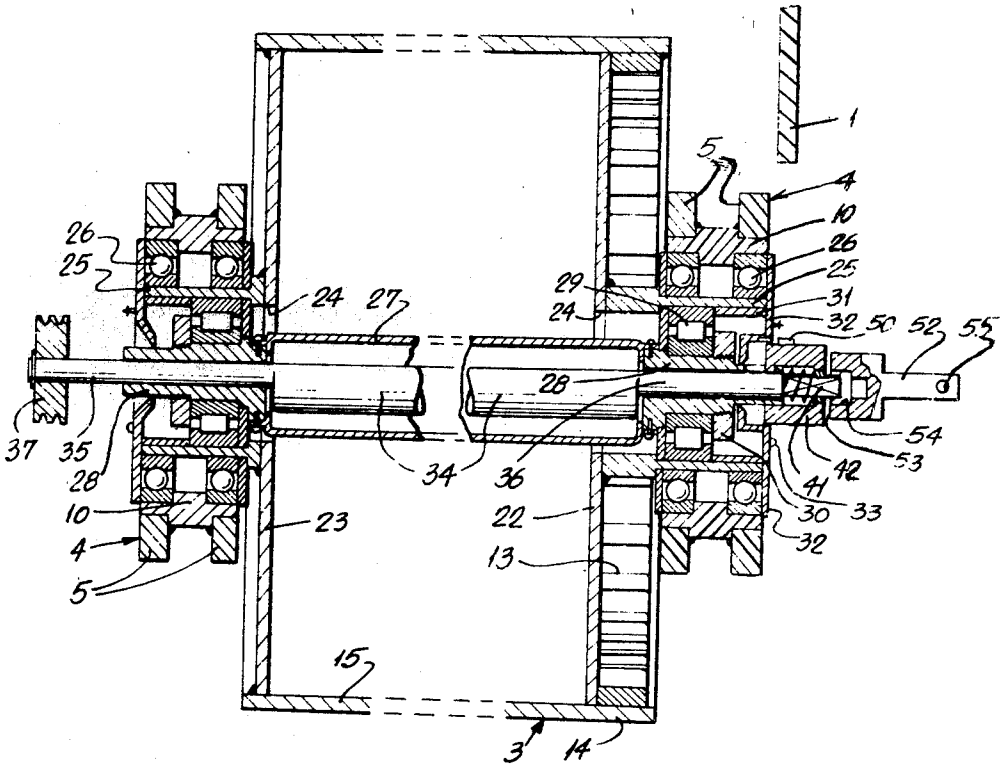
[54] **VIBRATORY ROLLER**
5 Claims, 9 Drawing Figs.

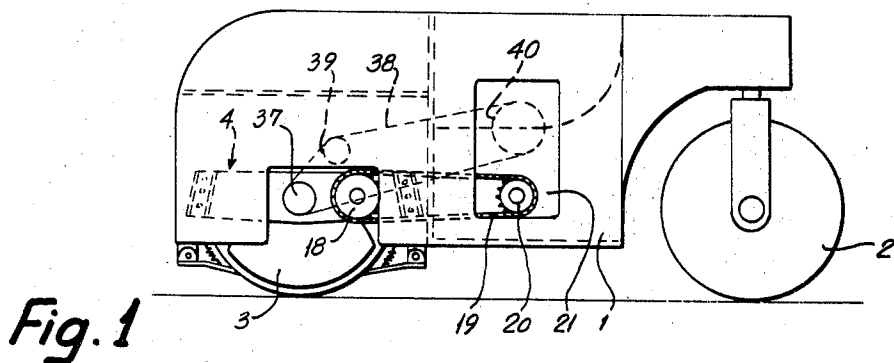
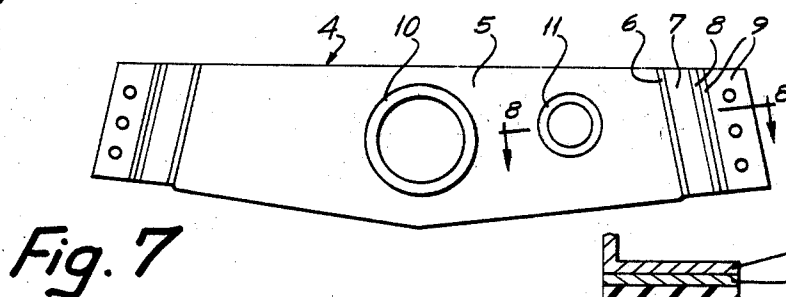
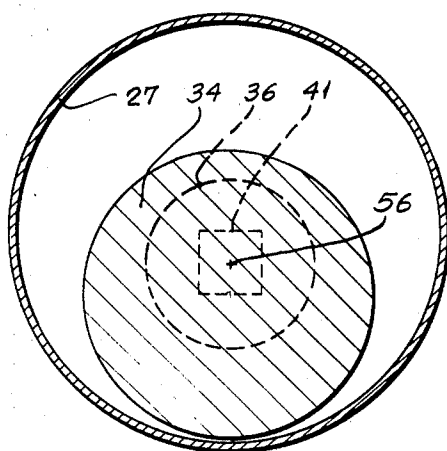
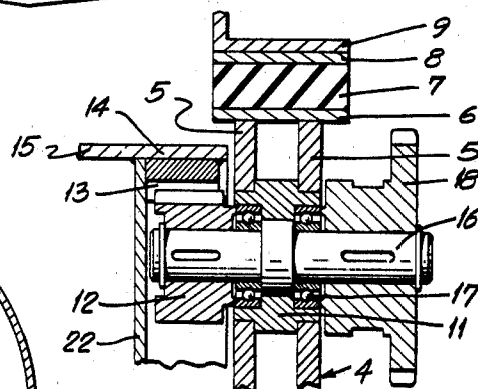
[52] U.S. Cl..... 94/50
[51] Int. Cl..... E01c 19/28
[50] Field of Search..... 94/50, 50 V

[56] **References Cited**
UNITED STATES PATENTS

2,954,726 10/1960 Kerridge..... 94/50
3,145,631 8/1964 Green..... 94/50

ABSTRACT: A vibratory roller machine in which the means for imparting vibrations to the roller body consist of two mutually angularly adjustable rotary eccentric masses, so as to vary the resultant eccentricity of the two masses, and of means to rotate the two masses as a unit, whereby amplitude of vibration can be varied for the same vibration frequency, thereby obtaining improved and faster compaction of asphalt, gravel and the like.





INVENTOR
Peppino SECHI
 BY *Pierre Laspérance*

AGENT

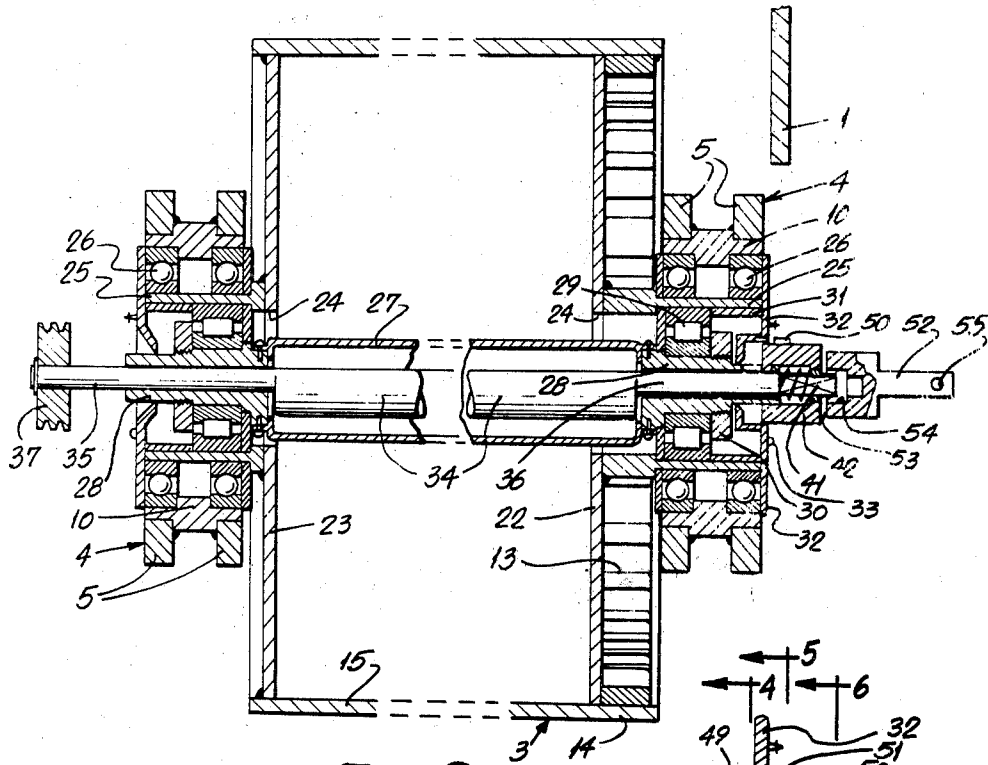


Fig. 2

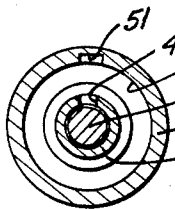


Fig. 4

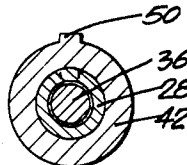


Fig. 5

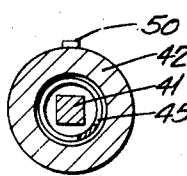


Fig. 6

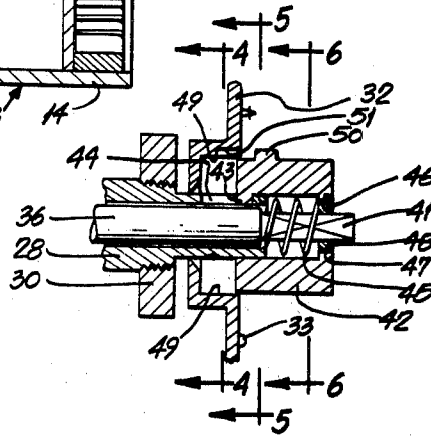


Fig. 3

INVENTOR
Peppino SECHI
 By *Pierre L'esperance*

AGENT

VIBRATORY ROLLER

The present invention relates to a roller for compacting road surfaces and the like, of the type having a vibratory roller body and comprising a rotary eccentric mass for imparting vibrations to the roller.

It is an object of the invention to provide a vibratory roller in which it is possible to vary the amplitudes of the vibrations of the roller body for the same frequency of vibrations and in which it is also possible to vary the frequency of vibrations, to thereby have greater flexibility in the adjustment of both the frequency and amplitude of vibrations of the roller body, resulting in better soil compacting.

A more specific object of the present invention resides in the provision of a roller of the character described, having two eccentric masses mounted in the roller body and mutually angularly adjustable and lockable in adjusted position, so as to vary the eccentricity of the center of gravity of the resultant rotary mass, in order to vary the amplitudes of the vibrations for an equal vibration frequency.

Another object of the present invention resides in the provision of a roller of the character described, having an improved suspension for the roller body to eliminate the transmissions of the roller body vibrations to the machine frame.

The foregoing and other objects of the present invention will become apparent during the following disclosure and by referring to the drawings, in which:

FIG. 1 is a schematic side elevation of a vibratory roller in accordance with the invention;

FIG. 2, shown on the second sheet of drawings, is a cross section of the roller body and of its suspension;

FIG. 3 is a section, on an enlarged scale, of the means for locking the two eccentric masses in angularly adjusted position;

FIGS. 4, 5, and 6 are cross sections taken along lines 4-4, 5-5, and 6-6 respectively of FIG. 3;

FIG. 7, shown on the first sheet of drawings, is a side elevation of one of the suspension supports for the roller body;

FIG. 8 is a plan section, on an enlarged scale, taken along line 8-8 of FIG. 7 and also showing the drive pinion for the roller body and part of the latter; and

FIG. 9 is a cross section, on an enlarged scale, of the two eccentric masses of the vibrating system.

In the drawings, like reference characters indicate like elements throughout.

The vibratory roller in accordance with the invention is generally shown at 1 and comprises a frame provided at the back with a steering roller 2 and at the front with a vibratory compacting roller body 3, which may be partially filled with water, if so desired.

Roller body 3 is rotatably mounted in suspension supports 4 on each side of the roller. Each support 4 comprises a pair of spaced parallel elongated plates 5 secured together at their ends by transverse plates 6, the latter upwardly converging and each adhering to one face of a rubber block 7, the opposite parallel face of which adheres to a transverse plate 8, parallel to plate 6, and secured to an angle iron bracket 9, which is rigidly bolted or riveted to the frame 1 of the vehicle.

Plates 5 are perforated at their center and a collar 10 is fitted in the resulting holes and serves as a journal for each stub axle of the roller body 3 and for the shaft of the vibratory system.

Moreover, a suspension support 4 on one side of the roller body 3 is provided with an additional collar 11 near one end of the plates 5 for receiving the shaft of the roller body drive pinion. More specifically, the drive pinion is shown in FIG. 8 at 12 and its teeth mesh with a relatively large play with the inwardly directed teeth of a crown gear 13 secured to the marginal portion 14 of the cylindrical wall 15 of vibratory roller body 3.

Pinion 12 is keyed on a shaft 16, journaled in bearings 17, mounted in collar 11.

A sprocket gear 18 is secured on the outer end of shaft 16 and, as shown in FIG. 1, is driven by a sprocket chain 19 trained thereon, and also on a sprocket gear 20 keyed on the output shaft of an internal combustion engine, shown at 21 and mounted on the vehicle chassis. Obviously, a transmission system may be interposed between gear 30 and the output shaft of engine 21 to drive the vehicle at various speeds.

Roller body 3 has lateral walls 22 and 23 with central holes 24.

Cylindrical sleeves, or hollow stub axles 25, are secured to walls 22 and 23 and extend outwardly of the roller body coaxially with said roller body and are journaled in collars 10 by bearings 26. The vibratory system in accordance with the invention is mounted within the roller body 3 and the hollow stub axles 25. This system includes a cylindrical tube 27 extending the entire length of the roller body 3 within the same and provided with bored stub shafts 28, which are eccentric with respect to tube 27. These bored stub shafts 28 are rotatably mounted within stub axles 25 with the interposition of needle bearings 29.

The inner race of each needle bearing 29 is maintained in position on stub shaft 28 by means of a nut 30 and a shoulder formed on stub shaft 28.

The outer race of each needle bearing 29 is maintained in position against a shoulder made at the inside face of stub axle 25, by a sleeve 31 secured to an antidirt ring 32, itself removably secured to stub axle 25.

Rings 32 are provided with lubricating zerks 33. A solid cylindrical rod 34 is positioned within tube 27 eccentrically thereof. Rod 34 is provided with end stub shafts 35 and 36, which are axially aligned but radially offset with respect to rod 34.

Stub shaft 35 is rotatable within and extends through one of the hollow stub shafts 28 of tube 27 and is provided with a driving grooved pulley 37 at its outer end. This pulley is adapted to be driven by internal combustion engine 21 through belts 38, shown in FIG. 1, trained on belt tensioning pulley 39 and driving pulley 40, itself driven by the engine 21 or by a separate motor.

Stub shaft 36 extends through the other hollow stub shaft 28 of tube 27 and is rotatably mounted therein and its outer end forms an extension 41 of square cross section.

A locking cap 42, having a through bore, is mounted for slidable longitudinal movement on stub shaft 28 of tube 27 and surrounds extension 41. This cap 42 is provided with at least one inwardly directed tooth 43 slidably engaging a longitudinal slot 44 made in stub shaft 28, whereby locking cap 42 will rotate with stub shaft 28 but can be axially displaced with respect to the latter.

A compression coil spring 45 surrounds extension 41 and is located within locking cap 42. Spring 45 abuts at one end against stub shaft 28 and at the other end against the bottom 46 of locking cap 42.

Bottom 46 has a central square-shaped hole 47 which, in the outer limit position of locking cap 42 under the action of spring 45, receives a square collar 48 secured to extension 41.

In the outer limit position of the locking cap, tooth 43 abuts the outer end of longitudinal slot 44 and locking cap 42 cannot turn with respect to rod 34.

The central portion of antidirt ring 32 is provided with an inwardly recessed portion 49 forming an outwardly opening cavity for receiving locking cap 42 when the latter is pushed towards the roller 3 against the action of spring 45.

In the inward limit position of locking cap 42 engaging cavity 49, an external tooth 50, carried by locking cap 42, engages a longitudinal groove 51 made at the periphery of cavity 49 in order to lock rotation of cap 42 with respect to ring 32 and, therefore, with respect to the roller 3 when the latter is stationary.

Tube 27 and rod 34 constitute two eccentric masses and their relative angular position is adjusted by using a key 52, shown in FIG. 2. This key has a flat face 53 and is provided with an axial blind bore 54 of square cross-sectional shape to

receive the square-shaped collar 48 while flat face 53 abuts the outer face of locking cap 42. In the outer limit position of the locking cap 42, as shown in the drawings, the external tooth 50 of the locking cap is free from groove 51 of cavity 49; but square hole 47 of cap bottom 46 engages square collar 48 of shaft extension 42 and, moreover, the internal tooth 43 of cap 42 is in engagement with the slot 44 of stub shaft 28. Therefore, cap 42 locks rod 34 and tube 27 against relative rotation and these two eccentric masses turn as a unit under action of pulley 37.

The relative angular position of tube 27 and rod 34 can be easily adjusted by using key 52 which is pushed against locking cap 42 until tooth 50 engages groove 51, thereby locking tube 27 against rotation.

At the same time, collar 48 moves out of engagement with hole 47, thereby releasing rod 34 which then can be rotated by means of key 52, collar 48 then engaging the square bore 54 of said key.

To rotate the key, any rod is inserted through transverse hole 55 in the key handle. Once the rod 34 has been rotated through 90° or a multiple thereof, cap 42 is released, whereby the two eccentric masses 27 and 34 are again locked against mutual rotation and they are free to rotate with respect to the roller body 3.

In the arrangement shown, the two eccentric masses may be rotated with respect to each other and locked at four different positions, 90° apart; but it is obvious that the arrangement can be such as to adjust the two eccentric masses at a greater number of positions.

Relative angular adjustment of the two eccentric masses serves to vary the eccentricity of the assembly of the two masses and, consequently, to vary the extent of the vibratory forces exerted on roller body 3.

Referring to FIG. 9, rod 34 and tube 27 have a common rotational axis indicated at 56. In the angular position of the two masses, shown in FIG. 9, the center of gravity of tube 27 is located vertically above rotational axis 56, whereas the center of gravity of rod 34 is disposed vertically below the rotational axis 56, thus the resultant of the two centers of gravity coincide with the rotational axis 56 when these centers of gravity are equally radially spaced from axis 56, and there is no vibration during rotation of the assembly of tube 27 and rod 34 if, as a further condition, the weight of tube 27 is equal to the weight of rod 34.

By turning rod 34 with respect to tube 27 in one direction or the other, the center of gravity of the rod 34 is displaced upwardly and, therefore, the center of gravity of the assembly is displaced upwardly. The center of gravity of the assembly becomes eccentric with respect to rotational axis 56. The resultant center of gravity can be displaced to a maximum corresponding to a position of rod 34 rotated 180° with respect to the position shown in FIG. 9. In this latter position, a maximum amplitude of vibration is obtained for a given speed of rotation of the assembly.

Thus, the assembly of the eccentric masses 27 and 34 can be not only rotated at different speeds by motor or engine 21, or by a separate motor, to obtain variation in the frequency of vibrations or oscillatory forces, but also the amplitude of the vibrations can be varied independently of the speed of rotation of the assembly of masses 27 and 34. This enables great flexibility in the use of the vibratory roller for compacting different materials with great efficiency.

The vibrations transmitted to the roller 3 are practically not transmitted to the vehicle chassis, due to the presence of the rubber or other resilient blocks 7 incorporated within the suspension supports 4.

It is obvious that the cross-sectional shape and wall thickness of tube 27 can be varied and also the cross-sectional shape of rod 27.

What I claim is:

1. In a vibratory roller machine having a roller body and a vibratory system for said roller body, said system comprising

two elongated eccentric masses rotatably mounted in said roller body, means for releasably locking said masses in radially angularly adjusted position one with respect to the other and driving means for rotating said two masses as a unit, said roller body having hollow stub axles, one of said eccentric masses consisting of a tubular member having eccentrically disposed tubular stub shafts rotatably mounted within the hollow stub axles of said roller body, the other of said masses consisting of a rod member disposed within said tubular member and having eccentric stub shafts rotatably mounted within the hollow stub shafts of said tubular member, all of said stub axles and stub shafts being coaxial with the axis of rotation of said roller body, said driving means including a driving rotary member secured to one of the stub shafts of only one of said tubular member and rod member and disposed outside said roller body stub axles, said releasable locking means operable on at least one pair of interengaged stub shafts of said tubular member and said rod member so arranged as to adjustably vary the amplitude of vibrations produced in the roller body by rotation of the two eccentric masses as a unit.

2. In a vibratory roller machine as claimed in claim 1, further including means to releasably lock said tubular member against rotation with respect to said roller body and operable only when said first locking means are released.

3. In a vibratory roller machine as claimed in claim 1, further including a frame, elongated support members in which the stub axles of said roller body are journaled and having upwardly converging end faces, brackets secured to said frame and providing upwardly converging faces parallel to the faces of said support members and spaced therefrom, and rubberlike blocks inserted between the bracket and support member faces and adhering thereto, to provide a suspension for said roller body which substantially prevents transmission of vibrations from said roller body to said frame.

4. In a vibratory roller machine as claimed in claim 3, further including means for driving said roller body, said means comprising a pinion journaled in said elongated support member on an axis spaced from the rotary axis of said roller body, said roller body having a crown gear secured thereto at one end thereof and having inwardly directed teeth loosely meshing with said pinion.

5. In a vibratory roller machine having a roller body and a vibratory system for said roller body, said roller body having hollow stub axles, said system comprising two elongated eccentric masses rotatably mounted within said roller body, means for releasably locking said masses in radially angularly adjusted position one with respect to the other and driving means for rotating said two masses as a unit, one of said eccentric masses consisting of a tubular member having eccentrically disposed tubular stub shafts rotatably mounted within the hollow stub axles of said roller body, the other of said masses consisting of a rod member disposed within said tubular member and having eccentric stub shafts rotatably mounted within the tubular stub shafts of said tubular member, all of said stub axles and stub shafts being coaxial with the axis of rotation of said roller body, said driving means including a driving rotary member secured to one of the stub shafts of only one of said tubular member and rod member, said locking means including a locking cap mounted for non-rotary but longitudinal movement on one end of a stub shaft of said tubular member, and spring biased into a limit position in which said cap is locked on said rod member to prevent rotation of the latter relative to said tubular member, axial displacement of said cap out of said limit position releasing said cap from engagement with said rod member to allow rotation of said rod member relative to said tubular member, and interengageable means on said locking cap and on the adjacent stub axle of said roller body, interengageable only when said locking cap is displaced out of said limit position, to releasably lock said locking cap and, consequently, said tubular member, against rotation relative to said roller body.