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VIBRATOR

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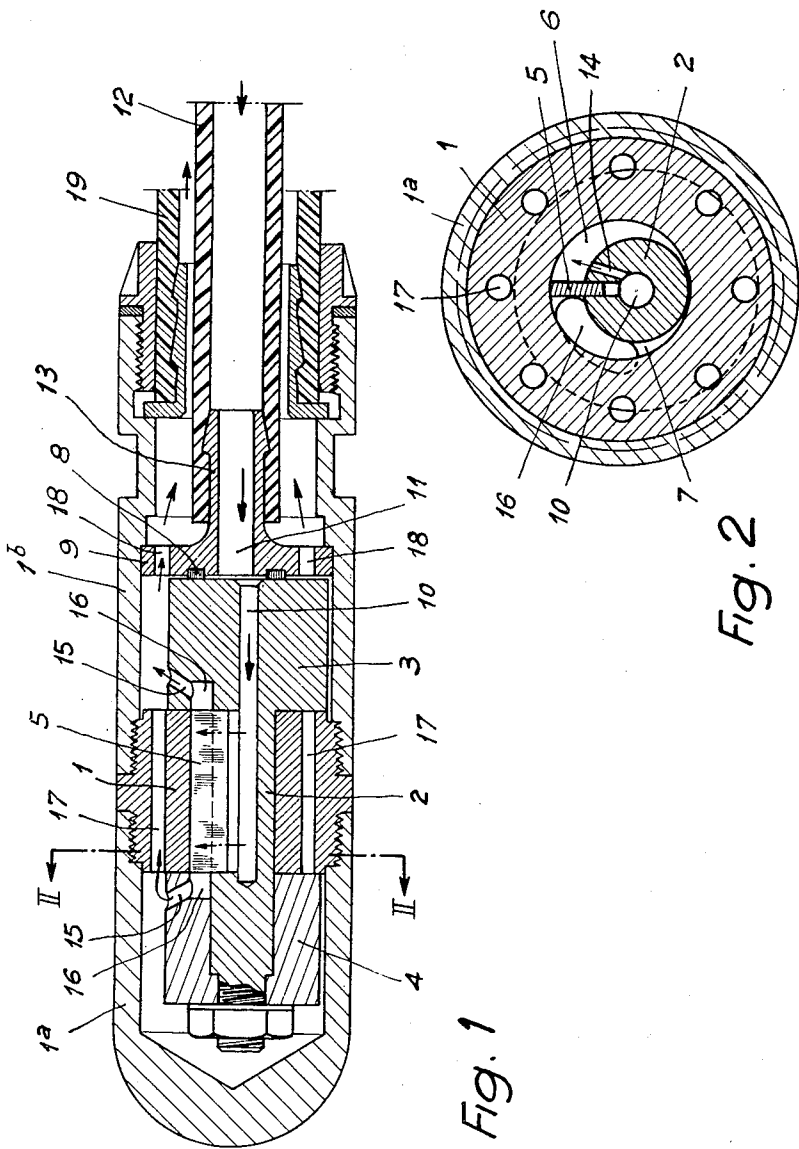


Fig. 1

Fig. 2

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2,967,048

VIBRATOR

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The present invention relates to an improved vibrator using the static pressure of a fluid under pressure.

The present invention is particularly concerned with the type constituted by a hollow cylinder, an inner cylinder having a smaller diameter arranged in said hollow cylinder, one of the cylinders being fixed and the other movable, said movable cylinder being adapted to roll freely in relation to the fixed cylinder without any mechanical connection with any outer member, each cylinder being provided at its ends with guiding side faces perpendicular to its axis, the guiding faces of the movable cylinder sliding at the contact of the guiding faces of the fixed cylinder, and a movable paddle dividing the room included between both cylinders into two chambers in communication one with an inlet port for the fluid under pressure and the other with an outlet port, said paddle being adapted for receding into a recess provided longitudinally in one of both cylinders.

Such a type of a vibrator is known in the art and is disclosed, for instance, in applicant's prior U.S. Patent No. 2,763,472, dated September 18, 1956.

In the vibrators of this type, the movable cylinder and the space included between both cylinders and divided into two chambers by the movable paddle or blade are extending along the same length. The same diameter of the outer cylinder and the same diameter of the inner cylinder throughout their lengths brings about a constant ratio between the total volume of the chambers and the weight of the rotated movable cylinder.

The consumption of fluid under pressure being proportional to the total volume of the chambers, it has been found that said consumption is excessive in relation to the weight of the rotated mass.

It is, therefore, one object of the present invention to provide a vibrator of this type consuming less of fluid under pressure with the same weight of the rotated mass.

It is another object of the present invention to provide a vibrator wherein the movable cylinder is extended laterally by a mass extending beyond the space included between both cylinders and divided into two chambers by the movable paddle.

Preferably, the movable cylinder is extended, on both sides of the space included between both cylinders and divided into two chambers by the movable paddle or blade, by two fairly symmetrical masses having a larger diameter than the inner diameter of the outer cylinder.

At least one of the guiding side faces of the movable cylinder may be constituted by a face of the mass prolonging said movable cylinder.

Said face of the mass may be adjoined to the end of the movable cylinder or adjoining to a face of a flange integral with the fixed cylinder.

It is also another object of the present invention to provide a vibrator wherein at least one of the masses prolonging the movable cylinder may be bored with one or more ducts for the passing through of the driving fluid.

It is yet another object of the present invention to

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provide a vibrator wherein said movable cylinder and at least one of the masses prolonging it may be bored with an axial duct for the passing through of the driving fluid.

It is still another object of the present invention to provide a vibrator wherein said axial duct may open opposite an axial duct going through a flange integral with the fixed cylinder, the mass extending the movable cylinder being in tight sliding contact with said flange.

With these and other objects in view, which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view of the vibrator; and

Fig. 2 is a cross-sectional view taken along the lines II—II of Fig. 1, at an enlarged scale.

Referring now to the drawing, the vibrator comprises a housing consisting of three tubular members, 1, 1a and 1b.

The central member 1 having the smallest inner diameter constitutes a fixed hollow cylinder of the driving member of the vibrator.

In the hollow cylinder is arranged an inner movable cylinder 2 of a smaller diameter laterally extended by two fairly symmetrical cheeks 3 and 4 of a larger diameter than the inner diameter of the fixed hollow cylinder 1.

A movable paddle or blade 5, extending along the entire length of the cylinders 1 and 2 and adapted to recede into a longitudinal slot of the inner cylinder 2, divides the space defined between both cylinders and the aforesaid side faces of cylindrical cheeks 3 and 4 into two chambers 6 and 7.

The other side face of the cylindrical cheek 3 is in tight sliding contact, under interposition of a sealing ring 8, with a flange 9 integral with or connected to the tubular member 1b and consequently with the fixed hollow cylinder 1.

The movable inner cylinder 2 and the cylindrical cheek 3 extending it are bored with an axial duct 10 which opens opposite an axial duct 11 going through the flange 9 through which enters the fluid under pressure conveyed by the pipe 12 fitted on a mouth piece 13 integral with the flange 9.

The diameter of the duct 11 is larger than the diameter of the duct 10 and the difference between the diameters is at least equal to the difference between the inner diameter of the fixed hollow cylinder 1 and the diameter of the movable inner cylinder 2, so that the opening of the duct 10 is constantly entirely in communication with the opening of the duct 11 when the movable inner cylinder 2 is rolling within the fixed hollow cylinder 1, which ensures a constant section for the admission of fluid under pressure into the driving member of the vibrator.

The duct 10 is in communication with the chamber 6 through the bores 14 drilled in the movable inner cylinder 2 on one side of the paddle or blade 5.

On the other side of the paddle or blade 5, the chamber 7 is in communication with the inside of the tubular member 1a and 1b through the bores 15 opening, on the one hand, on the periphery of the cylindrical cheeks 3 and 4 and, on the other hand, into recesses 16 provided in the side faces of the cylindrical cheeks 3 and 4 adjoining to the inner cylinder 2 and which are alternatively obturated and cleared by the side faces of the fixed hollow cylinder 1, when the inner cylinder 2 is rolling within the hollow cylinder 1.

The tubular members 1a and 1b are in communication with each other by means of a range of holes 17 going through laterally the wall of the fixed cylinder 1.

In a similar manner, the flange 9 is drilled through longitudinally with a range of bores 18 putting the tubular members 1a and 1b into communication with the

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inside of a tube 19 coaxial to the aforesaid tube 12 and fitted into the free end of the tubular member 1b.

The operation of the vibrator is similar to that of the vibrator described in applicant's prior U.S. Patent No. 2,763,472, dated September 18, 1956, with the only difference that the outer hollow cylinder, which is movable in said prior patent, is fixed in the present case, the relative motion of both cylinders remaining the same.

The admission of compressed air into chamber 6 is performed by a tube 12, the duct 11 going through the flange 9, the duct 10 going through the cylindrical cheek 3 and the movable inner cylinder 2, and the bores 14 disposed on one side of the paddle or blade 5, whereas the exhaust from the chamber 7 is performed by the recesses 16 and the bores 15 of the cylindrical cheeks 3 and 4, the bores 17 of the fixed cylinder 1, the bores 18 of the flange 9 and the pipe 19.

It will be noted that, in comparison with the old vibrators of the same type, the total volume of the chambers of the driving part is considerably reduced in relation to the weight of the rotated mass, which brings about the considerable reduction in the consumption of fluid under pressure with the same useful power.

While a particular embodiment of this invention has been illustrated and described herein, it is intended that this invention be not limited to such disclosure, and changes and modifications can be made and incorporated within the scope of the claims.

I claim:

1. A vibrator using the static pressure of a fluid under pressure, of the type constituted by a hollow cylinder, an inner cylinder having a smaller diameter arranged within said hollow cylinder, one of the cylinders being fixed and the other movable, the movable cylinder being adapted to roll freely in relation to the fixed cylinder without any mechanical connection with any outer member, each cylinder being provided at its ends with guiding side faces perpendicular to its axis, the guiding faces of the movable cylinder sliding at the contact of the guiding faces of the fixed cylinder, and a movable paddle divid-

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ing the room included between both cylinders into two chambers one in communication with a port for the admission of fluid under pressure and the other with an exhaust port, said paddle being adapted to recede into a recess provided longitudinally in one of the cylinders, the improvement residing in that the movable cylinder is prolonged axially by a mass extending beyond the room included between both cylinders and divided into two chambers by the movable paddle.

2. The vibrator, as set forth in claim 1, wherein the movable cylinder has cheek extensions of a larger outer diameter than the inner diameter of said fixed cylinder.

3. The vibrator, as set forth in claim 2, wherein at least one of the guiding side faces of one of said cylinders is formed by a face of said cheek extensions of said movable cylinder.

4. The vibrator, as set forth in claim 3, wherein said face of said cheek extensions adjoins the end of said fixed cylinder.

5. The vibrator, as set forth in claim 2, wherein one face of said cheek extensions adjoins a face of a flange integral with said fixed cylinder.

6. The vibrator, as set forth in claim 2, wherein at least one of said cheek extensions of said inner cylinder has at least one duct for the passing through of said driving fluid in communication with the fluid admission port.

7. The vibrator, as set forth in claim 2, wherein said movable cylinder and at least one of said cheek extensions have an axial duct for the passing through of said driving fluid in communication with the fluid admission port.

8. The vibrator, as set forth in claim 7, which includes a flange integral with said outer hollow cylinder, said axial duct opening opposite another axial duct going through said flange, and one face of one of said cheek extensions being in tight sliding contact with said flange.

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