Oct. 18, 1960 L. PER-TROLLE B. BONDESON 2,956,788

COMPRESSED AIR-DRIVEN VIBRATORS

Filed Sept. 16, 1954

Fig. 1.

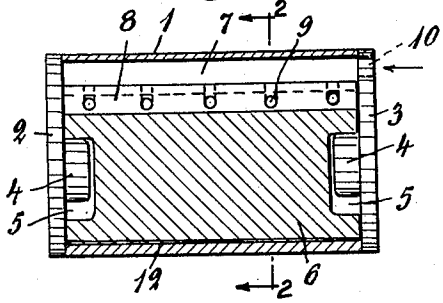


Fig. 2.

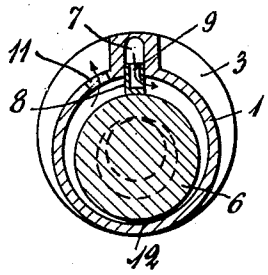


Fig. 3.

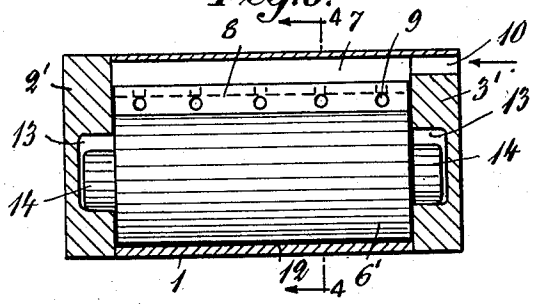


Fig. 4.

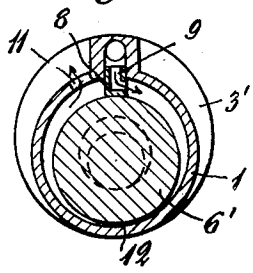


Fig. 5.

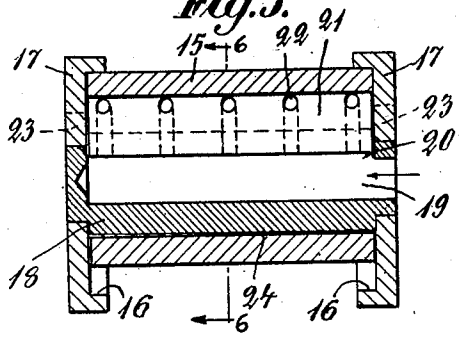
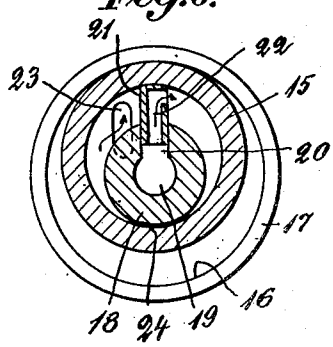


Fig. 6.



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COMPRESSED AIR-DRIVEN VIBRATORS

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6 Claims. (Cl. 259—1)

This invention relates to a compressed air-driven vibrator of the type comprising a roller body which, under the action of a current of air flowing through the vibrator, is adapted to be set in a substantially planetary rolling movement along an annular roller track or race.

The arrangement according to the invention is mainly characterized by a valve device placed in the path of the air current which is adapted to be influenced by the roller body during the rolling movement of the same, in such a way, that the valve device is alternately caused to increase and decrease the quantity of air passing through the vibrator, so that the roller body when in operation is influenced by a pulsating air current. By this means a very high efficiency can be obtained in compressed air-driven vibrators of the type in question, which in itself offers numerous advantages, including amongst others the fact that no sensitive bearings, exposed to the high and uneven loads set up when the vibrator is working, are required.

The invention will by way of example be more particularly described with reference to three preferred embodiments of the vibrator, as shown in the accompanying drawing in which Fig. 1 is an axial section through one form of construction of the vibrator, Fig. 2 is a cross-section through the vibrator according to Fig. 1, Fig. 3 shows an axial section through another form of construction of the vibrator, Fig. 4 is a cross-section through the vibrator according to Fig. 3, Fig. 5 is an axial section through the third form of construction of the vibrator and Fig. 6 is a cross-section through the vibrator according to Fig. 5.

The vibrator according to Figs. 1 and 2 consists of a casing **1** the inner surface of which forms a cylindrical surface. The casing **1** is substantially closed by end members **2** and **3**, which are fitted on their inner sides with track-forming dowel pins or shaft-ends **4**, and on which a roller body **6** provided with cylindrical end recesses **5** is supported. The casing **1** and end members **2** and **3** form a substantially enclosed cylindrical chamber. In the casing **1** a guiding slot **7** is arranged for a valve **8** provided with through holes **9** which open out on one side of the valve and which communicate with the space in the guiding slot **7** in front of the valve, the said space being connected through an air admission aperture **10** in one vibrator end member **3** with a source for supplying compressed air. The valve **8** extends axially along the part of the roller body **6** actuated by the compressed air and is guided in the guiding slot **7** in such a way that it can move substantially radially in relation to the shaft-ends **4**.

The valve **8** is held by the current of compressed air pressed in a yielding manner against the rolling body **6** so that its inner edge makes tight contact with the periphery of the roller body. This effect may be intensified, if necessary, by suitable springs. An air outlet opening is arranged in the casing **1** close to and on the side of the valve **8** which is turned away from the

hole openings **9** in the same. To prevent the valve or the parts of the openings at the guiding slot **7** from being damaged when the vibrator is working, the shaft-ends **4** and recesses **5** are so dimensioned that the roller body **6** is permanently separated from the inside of the casing **1** by a narrow gap **12**.

In operation, the compressed air admitted through the air admission aperture **10** will flow into the vibrator casing **1** as soon as the roller body assumes such a position that the inflow holes **9** in the valve **8** are not closed by the valve being pressed completely into the guiding slot **7**. Apart from the leakage which takes place through the gap **12**, the compressed air cannot flow out again through the outlet opening **11**, however, before it has displaced the roller body **6** and when the outlet opening is uncovered for the previously admitted compressed air, the compressed air supply being cut off as the roller body presses the valve into the guiding slot in this position. Thus, the air is utilized effectively and in portions at a time, whereby each portion of air forces the roller body one revolution round the roller track.

The form of construction according to Figs. 3 and 4 only differs from that described above therein that the vibrator end members **2'** and **3'** are provided, in place of the roller track-forming end-shafts, with circular recesses **13** which form the roller tracks and the roller body **6'** is provided with end-shafts **14** projecting into these recesses. The remaining parts are constructed in the same manner as in Figs. 1 and 2 and corresponding references have therefore been employed. The method of operation is also similar. A more detailed description of the parts and method of functioning is therefore unnecessary.

The vibrator shown in Figs. 5 and 6 is equipped with a sleeve-shaped roller body **15**, the end parts of which cooperate with internal roller tracks **16** arranged in two bowl-shaped end members **17**, incorporating air outlets **23**, which are open towards one another and form with the interior of the sleeve-shaped roller body **15** a substantially enclosed cylindrical chamber. The end members **17** are fastened to and held together by a central shaft-like body **18** of substantially cylindrical form which runs through the roller body **15**. In the body **18** a bore **19** and a guide slot **20** for a valve **21**, passing out radially from the bore are arranged which, in the same manner as described previously, are provided with through holes **22** which open on one side of the valve and connect the bore **19** serving for the air admission with the crescent-shaped space between the body **18** and the roller body **15**. The valve **21** extends axially along the whole length of the roller body **15** and the outer edge of the valve is held yieldingly in tight contact with the inside of the roller body **15** by means of the compressed air or suitable springs.

In operation, the air flows out through the air outlets **23** arranged in the end members **17** close to the rear side of the valve **21**, so that each portion of air is forced to act on the roller body **15** before it reaches the outlet apertures **23** in the same manner discussed in connection with Figs. 1 and 2. The roller tracks **16** are so dimensioned in relation to the roller body **15** that the latter is permanently separated by a narrow gap **24** from the central stationary body **18** and therefore cannot damage the valve **21** when it is pressed into the guide slot **20**.

The invention is, of course, not limited to the forms of construction illustrated and described above. Thus, the valve may take the form of a kind of slide valve adapted to open and close a passage through which the compressed air flows forward to the admission apertures

formed in the casing, and the direction of the air current may be the opposite of that which has been assumed in the example described, and so on.

I claim:

1. A pneumatically operated vibrator comprising a substantially enclosed casing having its interior defined by a cylindrical surface and end walls, an annular track in the casing concentric with the cylindrical surface, a cylindrical roller body in the casing extending between the end walls, the roller body engaging a section of the track and adapted to travel with a substantially planetary rolling movement along the annular track, inlet means and outlet means in the casing for passing a current of air through the casing to actuate the roller body along the annular track, a radially extending slot formed in the casing and extending into the cylindrical surface, the cylindrical surface being spaced by a narrow gap from the roller body, valve means slidably mounted in the slot and extending from the slot into substantially airtight engagement with the roller body along a strip extending between the end walls in the chamber, displacement of the valve means into the slot reducing the flow of air through the vibrator, the inlet and outlet means being positioned in communication with the chamber circumferentially adjacent to and on opposite sides of the slidable valve means, the valve means being cyclically displaced in accordance with the travel of the roller body to inhibit and intensify alternately the flow of air so that the roller body is acted upon by a pulsating air current.

2. Apparatus as defined in claim 1, wherein the valve means is provided with at least one air passage, one end of the passage communicating with an air duct leading to the slot, the other end of the passage opening into the chamber on one side of the valve means and being at least partially obstructed when the valve means is displaced into the slot by the roller body to inhibit the air current.

3. Apparatus as defined in claim 1, wherein the annular track comprises trunnions on the end walls, and recesses formed in each end of the roller body cooperating with the trunnions.

4. Apparatus as defined in claim 1 wherein the annular track comprises recesses in the end walls, and trunnions on the ends of the roller body cooperating with the recesses.

5. A pneumatically operated vibrator comprising an annular track, a tubular roller having inner and outer cylindrical surfaces, the outer cylindrical surface engaging the annular track, end portions of the vibrator rigidly connected to the annular track and forming with the inner cylindrical surface of the roller a substantially enclosed chamber, a cylindrical member concentric with the track and spaced by a narrow gap from the inner cylindrical surface of the roller, the cylindrical member extending through the roller and being rigidly connected to the end portions of the vibrator, inlet means and outlet means in the vibrator for passing a current of air through the chamber to actuate the roller with a substantially planetary rolling movement along the annular track, a radially extending slot extending into the cylindrical member from the chamber, valve means slidably mounted in the slot extending from the cylindrical member into substantially airtight engagement with the roller body along a strip of the inner cylindrical surface extending between the end portions of the vibrator, displacement of the valve means into the slot by the roller reducing the flow of air through the vibrator, the inlet and outlet means being positioned in communication with the chamber circumferentially adjacent to and on opposite sides of the valve means, the valve means being cyclically displaced in accordance with the travel of the roller to inhibit and intensify alternately the flow of air so that the roller is acted upon by a pulsating air current.

6. Apparatus as defined in claim 5, wherein the valve means is provided with at least one air passage, one end of the passage communicating with an air duct leading to the slot, the other end of the passage opening into the chamber on one side of the valve means and being at least partially obstructed when the valve means is displaced into the slot by the roller body to inhibit the air current.

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