Nov. 26, 1963 A. K. ANDERSON 3,112,098

PNEUMATIC VIBRATOR

Filed Nov. 3, 1961 2 Sheets-Sheet 1

Fig-1

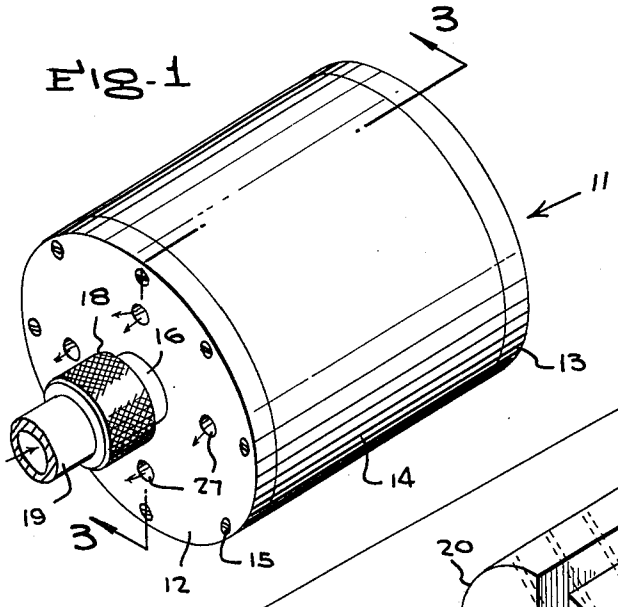
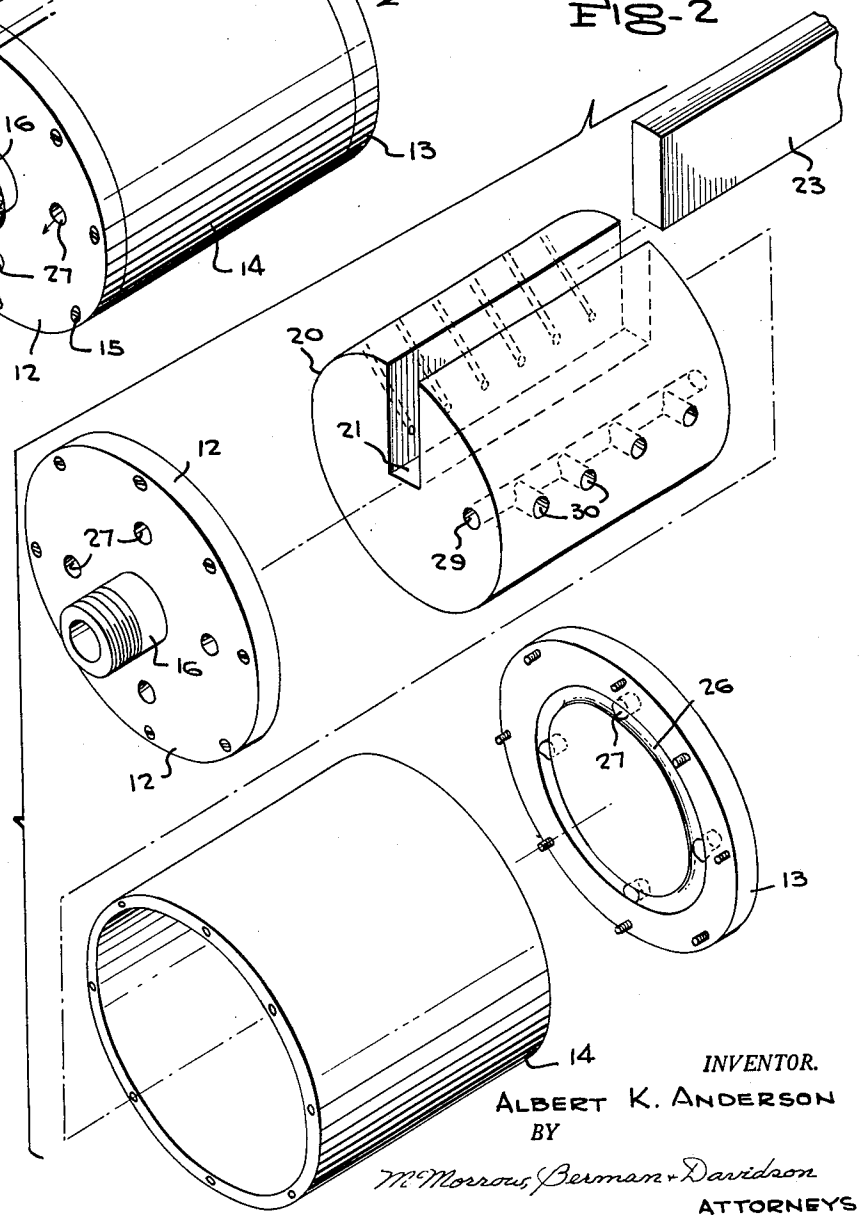


Fig-2



INVENTOR.
ALBERT K. ANDERSON
BY
McMorrow, Berman & Davidson
ATTORNEYS

Nov. 26, 1963 A. K. ANDERSON 3,112,098

PNEUMATIC VIBRATOR

Filed Nov. 3, 1961 2 Sheets-Sheet 2

FIG-3

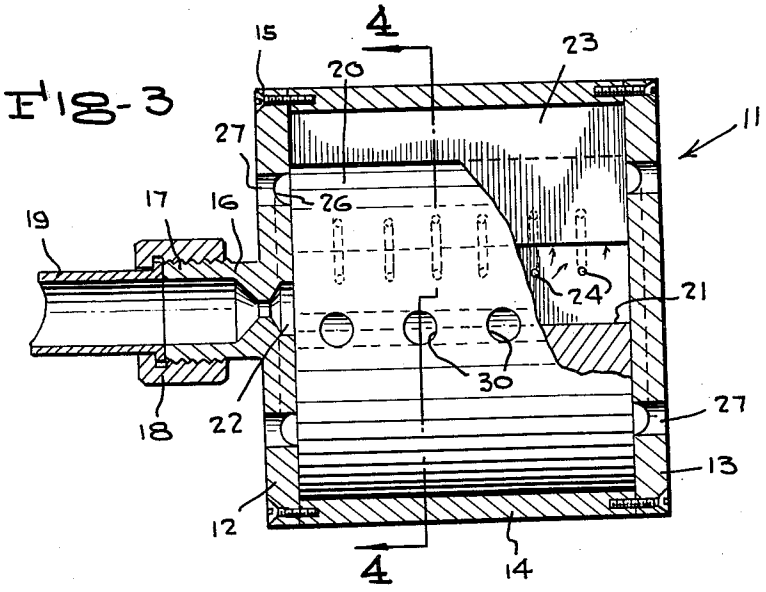


FIG-4

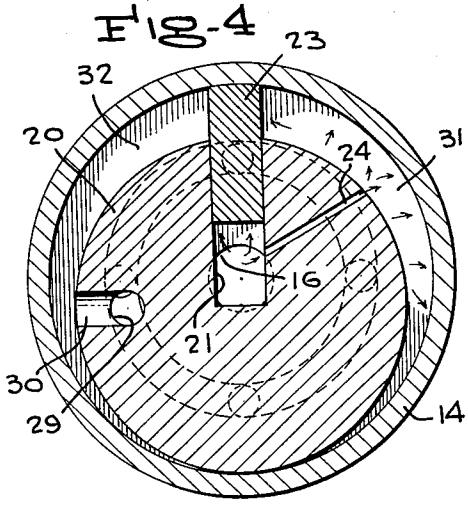
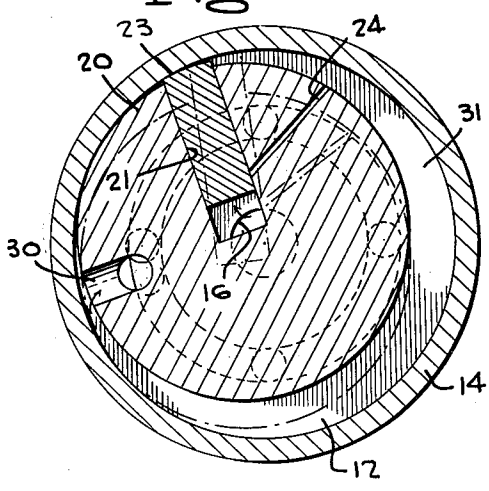


FIG-5



INVENTOR.

ALBERT K. ANDERSON

BY

McMorrow, Berman & Davidson

ATTORNEYS

United States Patent Office 3,112,098 Patented Nov. 26, 1963

3,112,098

PNEUMATIC VIBRATOR

Albert K. Anderson, Park Ridge, N.J., assignor to Vibco, Inc., Sparta, N.J., a corporation of New Jersey

Filed Nov. 3, 1961, Ser. No. 149,905
3 Claims. (Cl. 259—1)

This invention relates to mechanical vibrators, and more particularly to a mechanical vibrator of the pneumatically driven type.

A main object of the invention is to provide a novel and improved vibrator adapted to be operated by fluid under pressure, such as compressed air, or the like, the vibrator being simple in construction, requiring no special valves, and involving a minimum number of moving parts.

A further object of the invention is to provide an improved pneumatically driven vibrator which is inexpensive to fabricate, which is durable in construction, and which is very efficient in operation, the vibrator involving parts which are of simple shape which can be manufactured by known apparatus without requiring the construction of special tools or dies.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a perspective view of an improved pneumatically operated vibrator constructed in accordance with the present invention.

FIGURE 2 is a perspective view of the components of the vibrator illustrated in FIGURE 1, shown in separated positions.

FIGURE 3 is a longitudinal vertical cross sectional view taken substantially on the line 3—3 of FIGURE 1, a portion of the cylindrical rotor member being broken away.

FIGURE 4 is a transverse vertical cross sectional view taken on the line 4—4 of FIGURE 3.

FIGURE 5 is a transverse vertical cross sectional view, similar to FIGURE 4, but showing the rotor moved to a position wherein the piston bar has been forced inwardly toward sealing position.

Referring to the drawings, **11** generally designates an improved fluid pressure operated vibrator constructed in accordance with the present invention. The vibrator **11** comprises a generally cylindrical chamber having the circular end walls **12** and **13** and the cylindrical main wall **14**, the end walls being secured to the edges of the main wall **14** by suitable fastening screws **15**. Centrally connected to the circular end wall **12** is a fluid inlet conduit **16**, the conduit **16** being integrally formed with the central portion of the end wall **12**, as shown in FIGURE 3, and being provided with an externally threaded connection portion **17** which may be engaged by a union coupling **18** to connect the conduit member **16** to a compressed air supply pipe **19**.

Disposed in the chamber and slidably and sealingly positioned between the end walls **12** and **13** is a cylindrical solid vibratory rotor **20** which is smaller in diameter than the inside diameter of the cylindrical chamber wall **14** and which is formed with a radial slot **21** which extends for its entire length and which extends from the central axial portion of the body **20**, so that it is registrable with the bore **22** of the air inlet conduit **16**. Slidably mounted in the radial slot **21** is a piston bar **23** whose outer edge is slidably engageable with the inside surface of the cylindrical main wall member **14**. The rotor **20** is formed with a fluid passage **24** which extends from the inner portion of the slot **21** to the periphery of the rotor body **20** and which is located on one side of the slot **21**, as shown in FIGURE 4. As will be readily apparent from FIGURE 5, when the body **20** is rotated in a counterclockwise direction from the position shown

in FIGURE 4, the piston bar **23** will be forced inwardly towards a position wherein it seals off the inner end of the bore **24**.

The end walls **12** and **13** are formed with circular grooves **26** at their inner sides, said grooves being concentric with the axis of the main cylindrical wall **14**, and communicating with exhaust passages **27** formed in the end walls **12** and **13** and spaced around the circular grooves **26**, as shown in FIGURE 2.

The vibratory rotor body **20** is formed with a longitudinally extending passage **29** which extends for the full length of the body **20** and which is registrable with the grooves **26** to establish communication with the exhaust passages **27**. The body **20** is formed with a plurality of outwardly extending passages **30** which connect the longitudinally extending passage **29** with the periphery of the body **20**, as is clearly shown in FIGURE 4.

As shown in FIGURE 3, a plurality of passages **24** are preferably provided, said passages **24** being spaced uniformly along the rotor body **20**.

In operation, fluid under pressure, such as compressed air, is admitted centrally into the chamber through the inlet conduit **16**, the fluid passing into the inner portion of the radial slot **21** and acting on the piston bar **23** to urge same outwardly, for example, to the position shown in FIGURE 4. The compressed fluid passes outwardly through the passages **24** into the space **31** at one side of the piston bar **23**, exerting a force on the face of the piston bar **23** exposed thereto which tends to rotate the body **20** in a counterclockwise direction, as viewed in FIGURE 4, the air in the space **32** at the left side of the piston bar **23** being vented to atmosphere through the passages **30** and **29**, the grooves **26** and the passages **27**. The body **20** is thus rotated counterclockwise to the position shown in FIGURE 5, wherein the piston bar **23** is forced inwardly, sealing off the inside ends of the passages **24**, the body **20** eventually rotating sufficiently to expose the space **31** to the passages **30**, allowing space **31** to exhaust to atmosphere. As this occurs, the fluid pressure acting in the inner portion of the radial slot **21** returns the rotor body **20** to a position wherein the passages **24** again communicate with the slot **21** and the passages **30** are no longer in communication with the space **31**. Thus, the device returns to the position thereof illustrated in FIGURE 4, allowing the cycle to be repeated. The resultant action causes the rotor **20** to periodically strike the inside surface of the cylindrical wall **14** and also turn a few degrees. The motion of the rotor body **20** is thus a combination of impacts and turns, producing a vibratory effect. The device may develop several thousand impacts per minute and a much smaller amount of revolutions per minute of the rotor body **20**. The rate of rotation of body **20** is sufficiently small that its angular momentum does not substantially affect its vibratory movement.

As above mentioned, the opposite ends of the rotor body **20** are in sliding and sealing contact with the inside surfaces of the end walls **12** and **13**, except that the grooves **26** are in communication with the longitudinally extending bore **29** in the roller body **20**.

As will be further apparent from FIGURE 5, when the body **20** is in the position thereof causing the piston bar **23** to be pushed inwardly, the inner portion of the radial slot **21** remains in communication with the air supply conduit **16**.

While a specific embodiment of an improved fluid-operated vibrator has been disclosed in the foregoing description, it will be understood that various modifications within the scope of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A fluid-operated vibrator comprising a chamber having parallel end walls and a uniform internal cross sectional shape, a fluid inlet conduit at the central portion of one of said end walls, at least one of said end walls being formed with an outlet port spaced from its central portion, a cylindrical vibratory body disposed in said chamber with its ends in sliding and sealing contact with said end walls, said body being formed with a radial slot extending its entire length and communicating with said inlet conduit, and a piston bar slidably disposed in said slot, the body being formed on one side of the slot with a fluid passage connecting the inner portion of the slot with the periphery of the body, said piston bar being engageable with the bore of the chamber and being movable inwardly to thereby seal off said passage responsive to rolling movement of the body in the chamber, said body being formed with an exhaust passage connecting its periphery with an end thereof and being registrable with said outlet port to at times allow the chamber to be exhausted through said outlet port.

2. A fluid-operated vibrator comprising a chamber having parallel end walls and a circular cross sectional shape, a fluid inlet conduit at the central portion of one of said end walls, at least one of said end walls being formed with an outlet port spaced from its central portion, a cylindrical vibratory body disposed in said chamber with its ends in sliding and sealing contact with said end walls, said body being formed with a radial slot extending its entire length and communicating with said inlet conduit, and a piston bar slidably disposed in said slot, the body being formed on one side of the slot with a fluid passage connecting the inner portion of the slot with the periphery of the body, said piston bar being engageable with the bore of the chamber and being movable inwardly

thereby to seal off said passage responsive to rolling movement of the body in the chamber, said body being formed with a longitudinally extending exhaust passage and with passages connecting its periphery to said longitudinally extending passage, said longitudinally extending passage being registrable with said outlet port to at times allow the chamber to be exhausted through said outlet port.

3. A fluid-operated vibrator comprising a chamber having parallel end walls and a circular cross sectional shape, a fluid inlet conduit at the central portion of one of said end walls, said end walls being formed with internal circular grooves and with outlet ports communicating with said grooves, a cylindrical vibratory body disposed in said chamber with its ends in sliding and sealing contact with said end walls, said body being formed with a radial slot extending its entire length and communicating with said inlet conduit, and a piston bar slidably disposed in said slot, the body being formed on one side of the slot with a fluid passage connecting the inner portion of the slot with the periphery of the body, said piston bar being engageable with the bore of the chamber and being movable inwardly to thereby seal off said passage responsive to rolling movement of the body in the chamber, said body being formed with a longitudinally extending exhaust passage and with passages connecting its periphery to said longitudinally extending passage, said longitudinally extending passage being registrable with said circular grooves to at times allow the chamber to be exhausted through said ports.

References Cited in the file of this patent

UNITED STATES PATENTS

2,187,088	Malan	Jan. 16, 1940
2,743,090	Malan	Apr. 24, 1956