

UNITED STATES PATENT OFFICE.

HENRY TONJES, OF MOUNT VERNON, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE AMERICAN VIBRATOR COMPANY, A CORPORATION OF OHIO.

PNEUMATIC VIBRATOR.

SPECIFICATION forming part of Letters Patent No. 760,088, dated May 17, 1904.

Application filed August 4, 1902. Serial No. 118,279. (No model.)

To all whom it may concern:

Be it known that I, HENRY TONJES, a citizen of the United States, and a resident of Mount Vernon, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Pneumatic Vibrators, of which the following is a specification.

This invention relates to pneumatic vibrators, having special reference to massage instruments.

The object of the invention is to provide an instrument by means of which perfect vibration under perfect control can be obtained in a simple piece of apparatus noiseless in operation.

The invention in general consists of a cylinder provided with means for connection with a source of compressed air and containing an automatically-reciprocating piston actuated by the air-pressure and which strikes a cushioned blow against the head of the cylinder at each end of its stroke to thereby jar or vibrate the structure. Such vibrations may be used direct by application of the instrument against the affected parts or communicated through a cushion, roller, or other appliance or tool best adapted for the special treatment desired.

The invention will be described more in detail with reference to the accompanying drawings, in which—

Figure 1 is a view of the complete outfit, including the operating instrument and the source of compressed air. Fig. 2 is a sectional elevation of the operating instrument. Figs. 3, 4, and 5 are sections of the head of the operating instrument, illustrating the operation of the device. Fig. 6 is an end view of the piston.

Referring to the drawings by letter, *a* indicates a cylinder mounted on the end of a tubular handle *A*, the latter having means, as *b*, for connection with a hose and provided or not with a regulating-valve, as indicated at *b'* in dotted lines. This handle is connected with the cylinder through the flexible coupling *c*, but may have a rigid connection there-

with by attaching the coupling parts 1 and 2 directly together. The flexible coupling when used prevents transmission of the vibrations to the hand of the operator.

The cylinder *a* is closed at each end by heads *a'* *a'*, which are screw-threaded to the cylinder, as shown. One of the heads contains a socket *a''* for the insertion of a tool or what I call a "vibratode" *d*. The other head is plain, but may also have a socket for the reception of a vibratode, if desired. On the outside of the cylinder is an elongated enlargement *e*, arranged parallel to the axis and having four ports 3, 4, 5, and 6 opening into the cylinder at the side and intercommunicating with each other through a passage 7. At an opposite point in the side of the cylinder are two ports 8 and 9, leading to the atmosphere for exhaust. Inside of the cylinder is a piston *f*, having three annular grooves *f'*, *f''*, and *f'''* equally spaced and ends or heads *f''* and *f'''*, formed by reducing the body to the depth of the grooves. The body portions between the heads and the next adjacent grooves are provided with passages 10 10 and 11 11, connecting the groove with the space beyond the head. The passage through the handle communicates with the cylinder at the middle of its length. The piston is free to move from end to end of the cylinder either by power, gravity, or inertia.

The operation is as follows: The air-pressure is turned on at the valve *v* on the tank or at the valve *b'*, or at both. Preferably these valves are turned on full, a suitable reducing-valve, as indicated at *g*, being used to regulate the pressure during operation. The instrument is then tilted to throw the piston to one end of the cylinder—say to the position shown in Fig. 2. Air then enters the groove *f''* from the handle, since in this position the port from the handle (shown at *p*) overlaps the groove. From groove *f''* the pressure extends by ports 5, 7, and 6 to groove *f'''*, and finally by ports 11 11 to the space between the head of the cylinder and the end of the piston. The pressure in the grooves equalizes on the piston; but at the end it has an

abutment against the cylinder-head, and the piston is forced to the opposite end of the cylinder, where the head f^5 strikes the cylinder-head. At the end of the stroke a portion of the spent pressure finds its escape to the atmosphere through ports 11, groove f^3 , and exhaust-port 8. At the same time the ports are given a new relation, such that pressure from the handle enters groove f^2 again and reaches the space at the opposite end of the cylinder by ports 4, 7, and 3, groove f' , and ports 10 10, whereupon the piston is sent in the opposite direction; but this time it fails to strike the cylinder-head, because the air entrapped in the space by the quick closing of the exhaust serves as a cushion and prevents actual contact of the piston against the cylinder. The impact, however, is sufficient to jar the entire structure and produce the desired tempered stroke. The partial exhaust again takes place through ports 10 10, groove f' , and exhaust-port 9, and at the next movement to the right the stroke is cushioned, as before described. These operations are now repeated as long as the pressure is admitted, and the force and rapidity of the jarring can be regulated perfectly by manipulating the valves.

In utilizing this instrument either the vibratorode or the main structure itself is applied to the part to be treated and either moved over said part or held stationary, as desired or required. The vibrations thus imparted to the affected parts have the usual well-known curative results, and with this instrument the results are markedly beneficial on account of the perfect regularity and rapidity of the tempered vibrations.

I wish it to be understood that my invention extends to pneumatic instruments or tools of any character in which mechanical vibrations can be employed.

Having described my invention, I claim—

1. In a pneumatic massage instrument, the combination with a cylinder and its piston, of a tubular handle comprising a rigid grip, a flexible connection carried by said grip and engaging means upon the cylinder and the grip for retaining the same together, said handle and connection adapted to receive means for actuating the piston, substantially as described.

2. In a pneumatic massage instrument, the combination with a cylinder and its piston provided with a series of annular grooves, of apertures formed upon the ends of the piston positively connecting the cylinder ends and an adjacent groove of the piston, a hollow flexible connection secured to the cylinder and a handle retained thereby, means passing through the handle and the connection for actuating the piston, substantially as described.

3. In a pneumatic massage instrument, the combination with a cylinder and its piston,

provided with a series of annular grooves, of means formed upon the piston ends for connecting the cylinder ends and an adjacent groove of the piston whereby said cylinder ends are alternatively connected with an exhaust-port, a tubular handle having a flexible connection and a rigid grip, a central bore throughout its length adapted to receive means for actuating the piston, substantially as described.

4. In a device of the character described, the combination with a cylinder and its piston, of a cylindrical handle comprising a grip and a flexible portion, said portion securing the grip to said cylinder and means for supplying pressure through said handle for actuating the piston, substantially as described.

5. In a device of the character described, the combination with a cylinder and its piston, of a hollow handle secured to said cylinder comprising a grip, a flexible connection interposed between said grip and the cylinder, said connection provided with reinforcing means, and means for connecting the said parts, substantially as described.

6. In a device of the character described, the combination with a cylinder and its piston, of a hollow cylindrical handle secured to said cylinder comprising a rigid grip, a flexible hollow portion having a spring retained therein, said portion interposed between the grip and cylinder, and suitable means for assembling the parts and retaining them attached to said cylinder, substantially as described.

7. In a device of the character described, the combination with a cylinder and a piston, of a tubular handle secured to said cylinder comprising a grip, a flexible connection having a spiral spring retained within, said connection interposed between the grip and the cylinder, couplers for said grip and flexible connection whereby the parts are assembled and connected to said cylinder, substantially as described.

8. In a device of the character described, the combination with a cylinder and its piston, of a handle secured to said cylinder comprising a rigid cylindrical grip, an external screw-threaded coupler secured thereto, said coupler retaining a flexible reinforced hollow connection assembled therewith, an internal-screw-threaded coupler secured to the cylinder retaining the opposite end of the flexible connection in a fixed position relative thereto and providing a central bore for the reception of means for actuating the piston, substantially as described.

9. As a new article of manufacture, a vibrating hammer also adapted to strike a swinging blow, comprising in combination, a comparatively long handle and a comparatively short head arranged transversely at one end of the same, whereby the device may be used as an ordinary hammer, said head being substantially cylindrical in form, having its ends

completely closed, and having in one end means
for holding a tool, a piston in said head, co-
acting passages in the head and in the piston
and means for supplying compressed air to
5 said passages to cause the piston to vibrate
against the opposite closed ends of the head,
substantially as and for the purposes set forth.

Signed at New York, in the county of New
York and State of New York, this 31st day of
July, A. D. 1902.

HENRY TONJES.

Witnesses:

FRANK S. OBER,
JOHN H. DALY.