July 21, 1953 W. BERNARDONI 2,645,904

APPARATUS FOR PRODUCING COMPRESSED AIR FOR OBTAINING VIBRATORY AIR MOVEMENTS THEREFROM

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Fig. 1

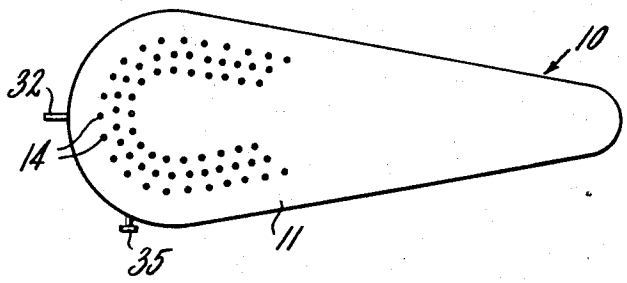


Fig. 2

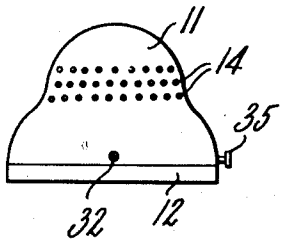


Fig. 3

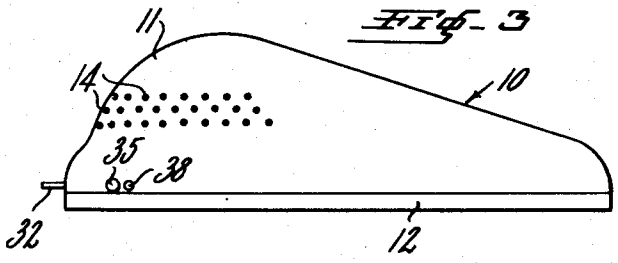
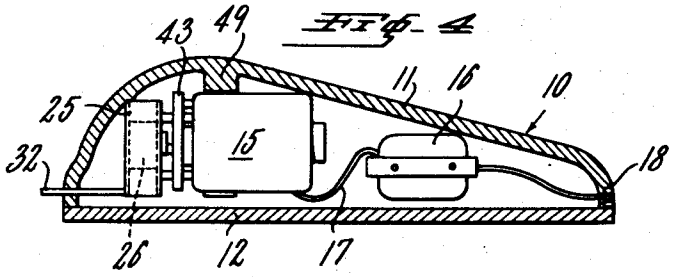


Fig. 4



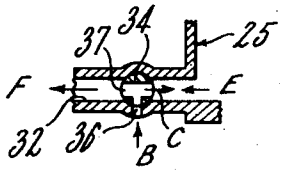


Fig. 6

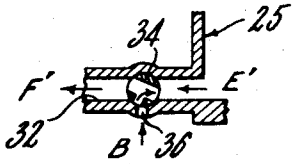


Fig. 7

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Fig. 8

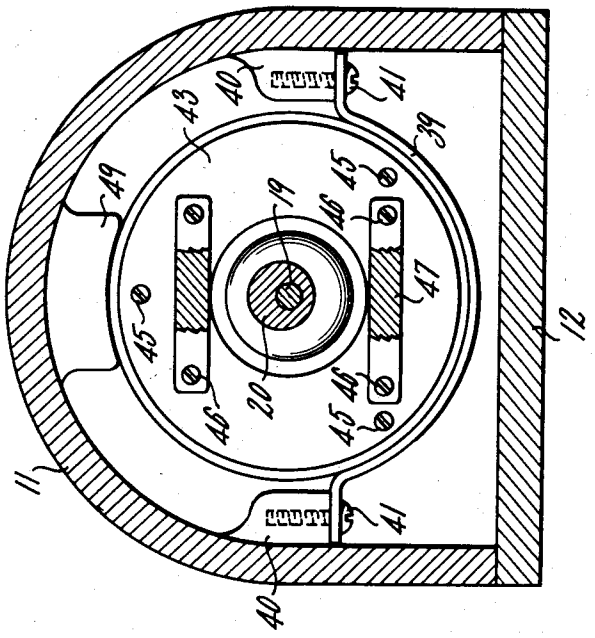
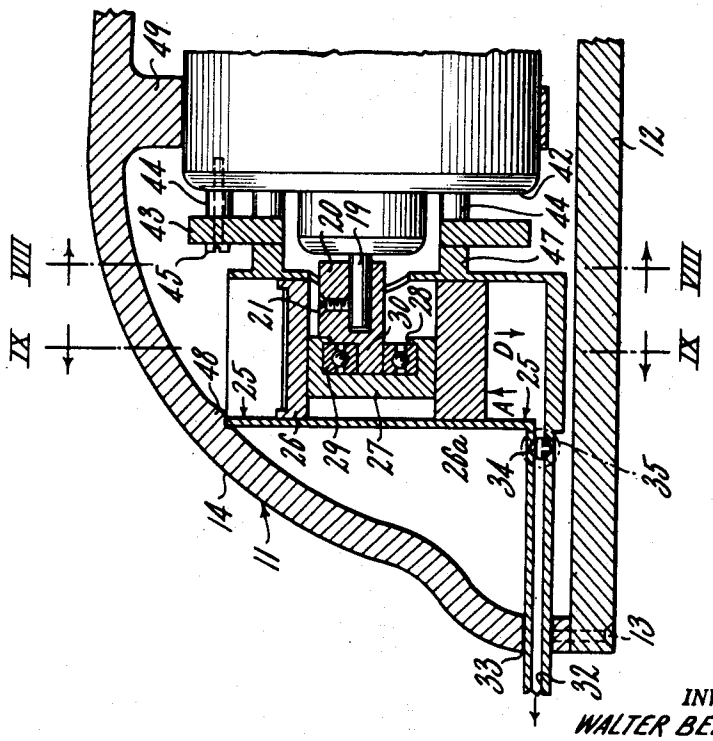


Fig. 5



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Fig. 10

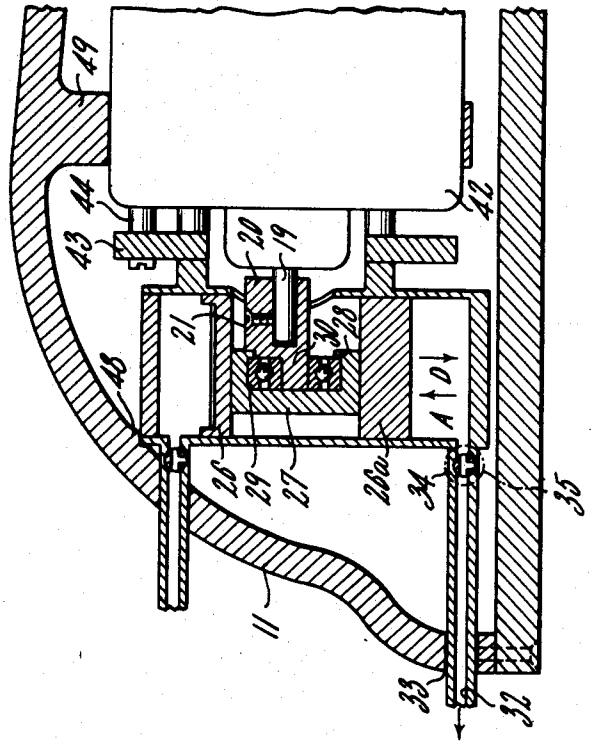
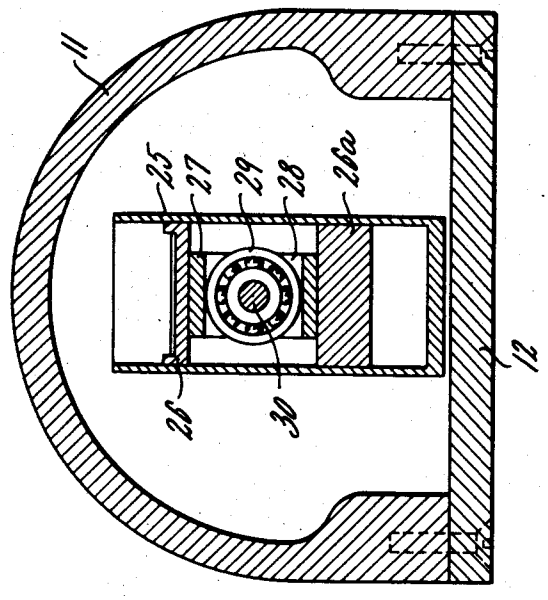


Fig. 9



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UNITED STATES PATENT OFFICE

2,645,904

APPARATUS FOR PRODUCING COMPRESSED AIR FOR OBTAINING VIBRATORY AIR MOVEMENTS THEREFROM

Walter Bernardoni, Rome, Italy

Application February 21, 1948, Serial No. 10,124
In Italy August 8, 1947

5 Claims. (Cl. 60—62.6)

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The present invention refers to an improved apparatus for producing compressed air for the operation of automatic repair needles of mending machines. In devices known heretofore, for the production of compressed-air for the actuation of automatic needles for mending stockings the motion of the piston in the cylinder serving for the compression of air, is transmitted from the shaft of the electric motor by means of a connecting rod.

Such devices have proved to be little convenient, because the continuous hammering becomes the cause of quick wear of the bronze bush or of the ball-bearing upon which the shaft is suspended.

It is, therefore, an object of the invention to devise a system for the transmission of the motion to the piston of the compressing cylinder, which does away with the drawbacks above mentioned, for it ensures a great elasticity in the connections particularly adapted to transmit the very high speeds implied thereby. It is also an object of this invention to provide an apparatus of the aforesaid nature which is of simplified and sturdy construction, has relatively few parts and ensures prolonged use without getting easily out of order.

It is another object of the invention to provide an apparatus of the aforesaid type for operating automatic needles for mending hosiery and similar goods, which apparatus is very compact and houses the vital elements thereof, namely, the generator for producing compressed air, a small electric motor therefor and, if necessary, an electric current transformer.

It is another feature of the invention to provide a streamlined cover or closure for the apparatus which encloses the moving parts of the apparatus, made of a suitable material light in weight, has a pleasant outer appearance and protects all elements which perform movements so as to eliminate possible injury to the operator.

It is still another feature of the invention to provide an apparatus of the aforesaid type which includes an electric motor for actuating the generator for compressed air which consists of a cylinder in which a reciprocating piston works and a follower with ball bearing moves, the same being displaced by a cam keyed to the axis of the electric motor.

It is another feature of the invention to provide means for varying the amount of compressed air produced in the cylinder and the change of speed of the operating needle without interrupting the operation of the apparatus.

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Still a further object of the invention is to provide a member of simple and safe operation, which might serve contemporaneously, for the adjustment of the inlet of compressed air into the duct which conveys it to the operating needles and for the suction into the compressing cylinder of the air to be compressed.

Another object of the invention is to provide the possibility of deriving from the compressing cylinder two pipes at two opposite ends of said cylinder in order to control by compressed air two operating needles independent from each other.

These and other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawing which discloses, by way of example, the principle of the invention and preferred modes which have been contemplated for applying said principle.

In the drawing:

Fig. 1 is a top plan view,

Fig. 2 is an end view, and

Fig. 3 is a side-elevational view of the apparatus made in accordance with this invention;

Fig. 4 is a cross-sectional view through the apparatus;

Fig. 5 is an enlarged, fragmentary, sectional view, similar to that of Fig. 4, but showing only one end portion thereof;

Figs. 6 and 7 are sectional detail views of the valve shown in two different positions as employed according to this invention;

Fig. 8 is a cross-section taken substantially on the line VIII—VIII of Fig. 5;

Fig. 9 is a cross-section taken substantially on the line IX—IX of Fig. 5;

Fig. 10 shows a second form of embodiment of the invention.

Referring now more particularly to the drawing, there is shown in Fig. 4 an apparatus 10 having a cover 11 and a base 12, the latter being affixed to cover 11 by means of screw bolts 13, as indicated in Fig. 5. As can be seen from Figs. 1 to 3 inclusive, cover 11 has a somewhat streamlined form and is provided with a plurality of openings 14 to permit circulation of air within apparatus 10. Inside the cover 11 is mounted a motor 15 which is supported by traverse 39 fixed to two projections 40 of the cover 11 by means of screws 41. In its upper portion, the motor bears against rib 49 of cover 11. If necessary, there may be applied to motor 15 a transformer 16 which is fixed to the lateral sides of cover 11. To transformer aggregate 16 electric current

may be supplied by means of a cable 17. A suitable socket 18 is indicated at one end of apparatus 10 for connection with a power line for supplying electric current to the transformer 16 and/or motor 15.

As can be further seen from Fig. 5, motor 15 has a shaft 19 which carries on a portion thereof a cam 20 which extends in the direction of and is fixed to said shaft 19 by means of a set screw 21. As can be seen from Figs. 5 and 8 to the anterior surface 42 of motor 15 is fitted supporting ring 43, spaced from motor surface 42 by means of spacers 44 and fixed to the said face by means of screws 45. To supporting ring 43 are fixed by means of screws 46 two members 47 made of one piece with the cylinder 25. Hence, the latter is held in its right position in the interior of cover 11, against which it bears at the level of its upper border 48. Within cylinder 25 a piston 26 having opposite end faces moves to and fro, which includes a cam follower 27. In a suitable recess 28 of follower 27, which recess is located intermediate said end faces of said piston, there is mounted a ball bearing 29 which engages projection 30 of cam or eccentric 20. Such ball-bearing can accomplish within the recess 28 a reciprocating motion, within a plane perpendicular to the cross-section shown in Fig. 5. It will thus be apparent, that upon rotation of motor shaft 19 cam 20 will be actuated and set in rotation and will cause by means of its eccentric or projection 30 a reciprocal movement of piston 26 through follower 27. Ball-bearing 29 will accomplish a reciprocating motion, within a recess of follower 27 and in a plane perpendicular to the cross-section of Fig. 5.

Connected to cylinder 25 and below piston head 26*a*, there is provided a tube 32 extending with its connecting end through an opening 33 of cover 11. Tube 32 is equipped with a tap or valve 34 having a manually operable, knurled knob 35 for a purpose hereinafter to be more fully described.

As seen in Figs. 6 and 7, tap or valve 34 on the one hand connects with the interior of cylinder 25 and tube 32 and, on the other hand, is in connection with the atmosphere through a suitable passageway or opening 36 which is somewhat smaller than opening 37, providing a passageway between the interior of cylinder 25 and tube 32. It will thus become apparent that upon movement of the piston head 26*a* in the direction of arrow A, fresh air will be supplied to the interior of cylinder 25 in accordance with arrows B and C. On its return stroke in the direction of arrow D, piston head 26*a* compresses the air previously sucked into the cylinder 25 and pushes said compressed air through tube 32 in the direction of arrows E and F, while only a small and negligible amount of compressed air will escape through opening 36. If it is desired to vary the amount of air to be compressed or to be supplied to the cylinder 25 and tube 32, respectively, the turning of knurled knob 35 will change the cross-section of passageway 36 so that the pressure and quantity of air pushed by piston head 26*a* through tube 32 will be readily modified. This changed supply of compressed air is indicated in Fig. 7 by arrows E' and F'.

As is well known in the art, a rubber tube (not shown) may be connected to the undulated end of tube 32 which connects with an oscillating needle (not shown).

The apparatus according to this invention has the particular advantage that the shifting speed of the mending needle during operation of the apparatus may be readily changed without stopping the apparatus, as is required in heretofore known mending machines. Thus, the air impulses imparted to the needle for obtaining its reciprocal movements or strokes may be effectively regulated during operation of the machine by the operator without subjecting the needle and its sensitive parts to undesirable disturbances and breakage.

It is well understood that the apparatus as hereinabove pointed out may be readily modified to make the cylinder and piston 25—26 double-acting, whereby for examples, two needles may be operated during to-and-fro movements of the piston 26. Such apparatus has been illustrated in Fig. 10, in which otherwise the parts are designated by the same reference numerals as employed in connection with Figs. 5 to 8.

Fresh air may be supplied to passageway 36 through perforations or openings 14 and/or opening 38 provided in the hood or cover 11 of the apparatus (Fig. 3).

As many possible embodiments of the above invention may be made, and as many changes might be made in the embodiment above set forth, it is to be understood that all matters hereinbefore disclosed or shown in the accompanying drawing are to be interpreted as illustrative and not in a limiting sense.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In an apparatus for the production of compressed air serving to control automatic needles to mend stockings and like knitted fabrics; the combination of a housing, a motor having a shaft and supported within said housing, an air compression cylinder closed at one end and disposed within said housing, a reciprocable piston within said cylinder, said piston being provided with a recess, coupling means extending from said motor shaft to said piston whereby reciprocable movement may be imparted to said piston from said motor, a ball bearing within said recess and movable relatively to said piston, said coupling means including a cam fixed to said shaft and extending into said ball bearing in said recess, tube means connected to said cylinder and communicating with a space defined by said piston and said one end of said cylinder, and adjusting means inserted in said tube means to regulate contemporaneously compressed air from said cylinder and supply of air to said cylinder.

2. An apparatus for the production of compressed air serving to control automatic needles to mend stockings and like knitted fabrics, comprising a base, a cover for said base and forming a housing with the latter, a motor having a shaft and supported within said housing, an air compression cylinder disposed within said housing, a piston within said cylinder, said piston being provided with a recess, cam means extending from said motor shaft into said piston recess whereby reciprocable movement may be imparted through said cam means from said motor shaft to said piston, ball bearing means seated within said recess and movable relatively to said piston, said cam means being supported by said ball bearing means in said recess, tube means connected to said cylinder at at least one of the ends of the latter, and adjustable means inserted in said tube means to regulate contempora-

neously compressed air from said cylinder and supply of air to said cylinder.

3. An apparatus according to claim 2, wherein said cylinder extends in substantially perpendicular direction to said motor shaft.

4. An apparatus according to claim 2, wherein said adjustable means includes two angularly directed passageways movable within said tube means, the diameter of one of said passageways being larger than the diameter of the other passageway.

5. An apparatus according to claim 2, wherein said cylinder and said piston extend substantially perpendicular to said motor shaft, said recess being located intermediate opposite end faces of said piston, said tube means being connected to said cylinder at opposite ends thereof and communicating with respective spaces defined by the end faces of said piston and the contiguous ends, respectively, of said cylinder.

WALTER BERNARDONI.

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