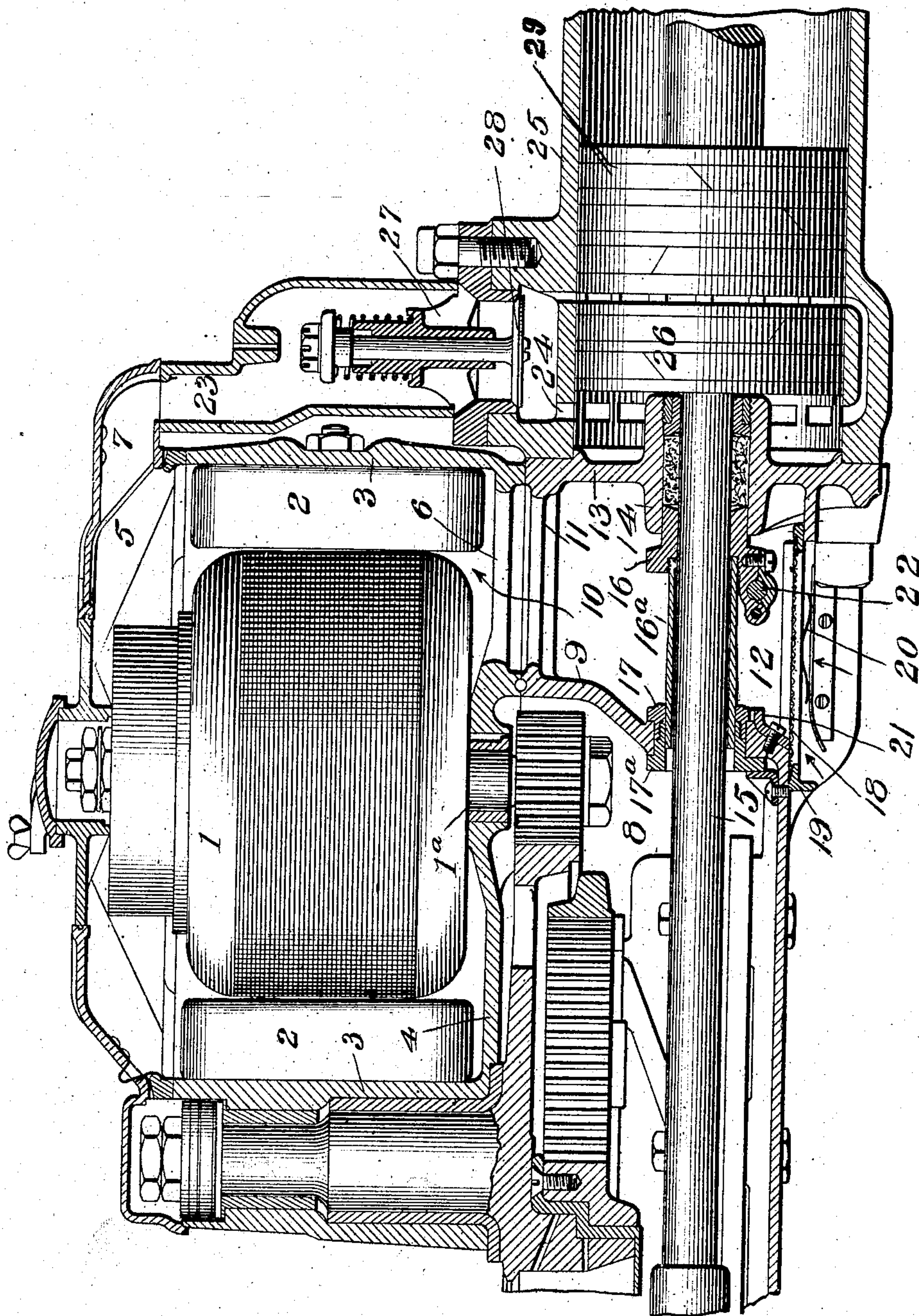


W. Z. WARD.
ELECTROPNEUMATIC TOOL.
APPLICATION FILED MAY 29, 1908.

923,913.

Patented June 8, 1909.



Witnesses

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UNITED STATES PATENT OFFICE.

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ELECTROPNEUMATIC TOOL.

No. 923,913.

Specification of Letters Patent.

Patented June 8, 1909.

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To all whom it may concern:

Be it known that I, WILLIAM Z. WARD, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York; have invented certain new and useful Improvements in Electro-pneumatic Tools, of which the following is a specification.

My invention relates to tools or apparatus wherein air is compressed by an electrically driven piston and utilized for the performance of work, and the object of my invention is to establish such relation between the driven and driving parts that each charge of air drawn in by the compressing piston will be caused to circulate through the actuated motor in such a manner as to keep the latter cool.

My invention consists in certain novel features of construction in an apparatus of this kind wherein the stated object may be carried out without undue complication of parts or increase in weight or dimensions, as will hereinafter be fully described and particularly pointed out in the claims.

As my invention has been designed with particular reference to electro-pneumatic percussion tools, I have illustrated the same as embodied in a machine of this character and have shown the same in the accompanying drawing in vertical longitudinal section taken in the plane of the axes of the motor and the compressing piston.

1 represents the motor armature which is mounted upon the vertical shaft 1^a and 2 represents the field magnets carried by the magnetic frame 3. The motor is housed in a casing made up of the magnetic frame 3, a bottom wall 4 and a top or cover 5. The bottom wall is provided with an air inlet 6 while the top is constructed to provide an air outlet 7 which inlet and outlet adapt the motor housing for the circulation of a cooling current of air around the poles and through the armature and its commutator, the armature being open wound and the commutator being perforated to permit of such circulation. Beneath the motor housing is a gear casing 8 in which is located the gear which connects the shaft to the armature with the air compressing means, and the inner transverse wall 9 of this casing 8 separates the latter from an air collecting chamber 10 which has an outlet 11 corresponding in position to the air inlet 6 of the

motor housing and an air intake 12 at the bottom of the machine. The forward wall 13 of the chamber 10 constitutes the rear wall of the compression space of the air pumping means and carries cylindrical bosses 14 which receive piston rod 15 of the air compressing means, which is suitably packed by the gland 16. Inasmuch as the rod 15 receives its lubrication from the gear case 8, and distribution of oil in the chamber 10 is undesirable, the gland 16 carries an extension 16^a surrounding the rod 15 and terminating in the wall 9, where it is packed by the packing 17—17^a. Extension 16 is sufficiently loose upon the rod 15 to permit the lubricant to be carried into the packed bearing 14.

In order to protect the intake 12 from dust which, in a mine where the illustrative machine is intended to be used, said intake is provided with a screen 18 of fine mesh wire cloth mounted upon a frame 19 which is slid into position across the intake and held there by a spring 20.

21 and 22 represent nut locks for the packing ring 17 and gland 16, respectively.

Extending from the outlet 7 of the motor housing, to the inlet port 24 of the air compressing means, is a downtake 23 supported upon the cylinder 25 containing the piston 26, and containing the mounting 27 for a check valve 28; said downtake being thus made to serve the purpose of a valve housing in addition to establishing communication between the motor housing and the compression cylinder.

29 represents a piston which, in the type of machine selected for illustrating my invention, is driven forward to deliver a working stroke by each charge of air compressed by the piston 26, the forward stroke of said piston 29 being followed by the forward movement of the piston 26 which sucks in a new charge of air previous to a new compression and a repetition of the cycle of movements described. Each charge of air drawn in by the piston 26, after being separated from harmful dust by the screen 18, passes through the collection chamber 10, and openings 11 and 6, into the motor casing, where it circulates freely among the parts of the motor and then passes to outlet 7 and downtake 23 to the cylinder 25.

By the construction described above, the motor is kept cool without material addi-

tion of complication or weight to the parts; moreover, by providing the motor with a cooling device of the efficiency of that described, the parts may be made much more compact and the proportions correspondingly reduced, which is a very important consideration in portable machines controlled by hand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a machine of the character described, the combination of the vertically disposed motor having a housing provided with an air inlet at bottom and an air outlet at top, an air compressing cylinder containing a piston drawing in a charge of air previous to compressing the same, located adjacent to the motor housing, and an air passage connecting the air outlet of the motor housing with the inlet port of the air compressing cylinder.

2. In a machine of the character described, the combination of the motor, the motor housing provided with a lower air inlet and upper air outlet, the air collecting chamber located beneath the motor housing, communicating at top with the motor housing and having an air intake at bottom, the compression cylinder having an air compressing piston located below the motor housing and the downtake leading from the outlet of the motor housing to the inlet port of the compression cylinder.

3. In a machine of the character described the combination of a vertically disposed motor, the motor housing surrounding the same provided with an air inlet at bottom and an air outlet at top, the gear casing provided with a driving gear located beneath the motor housing, the air collection chamber located beneath and connected at its top with the motor housing, located in line with the gear casing, and having an air intake at bottom, the air compression cylinder in line with the gear casing and air collecting chamber, the piston in said cylinder having a piston rod extending through the air collecting chamber into the gear casing, and the downtake leading from the outlet of the motor casing to the inlet of the compression cylinder.

4. In a machine of the character described, the combination with the motor housing containing the motor and having suitable inlet and outlet for air to be circulated through the motor, the gear casing and air collecting chamber located beneath the motor

housing, the compression cylinder containing a piston having its piston rod working through the walls of the collecting chamber and extending into the gear casing, and a backing for the piston rod in one of said walls, having an extension surrounding the piston rod and terminating in the other of said walls.

5. In an electrically actuated pneumatic machine, the combination of the compressing cylinder having an intake, the vertically disposed motor, the motor housing therefor, having an air inlet at bottom and an air outlet at top, a duct communicating between the air outlet of the motor housing and the intake of the compressing cylinder, the air collecting chamber located beneath and communicating at its top with the motor housing and having an air intake at bottom, and the screen extending across the said air intake.

6. In an electrically actuated pneumatic machine, the combination of the compressing cylinder having an intake for air, the vertically disposed motor, the motor housing therefor, having an air inlet at bottom and an air outlet at top, a duct communicating between the air outlet of the housing and the intake of the cylinder, the air collecting chamber located beneath and communicating at its top with the inlet of the motor housing and having an air intake at bottom, and the screen extending across the air intake, of the collecting chamber, comprising a suitable straining cloth, a frame upon which the cloth is mounted, and a spring interposed between the frame and a fixed part for holding the frame in position.

7. In a machine of the character described the combination of the vertically disposed motor, the housing surrounding the same and provided with a bottom inlet and a top outlet, the gear casing located beneath the motor housing, the compression cylinder located in line with the gear casing and having a piston with piston rod extending into the gear casing, and a combined downtake and valve housing located beneath the air outlet of the motor housing and the air inlet of the compression cylinder, and containing a check valve closing under back pressure in said downtake.

The foregoing specification signed at Heilwood, Pa., this 24th day of March, 1908.

WILLIAM Z. WARD.

In presence of two witnesses:

R. L. STEWART,
HARRY WALLACE.