

(No Model.)

G. RENNERFELT.
ELECTRICAL PUMPING APPARATUS.

No. 550,329.

Patented Nov. 26, 1895.

Fig. I.

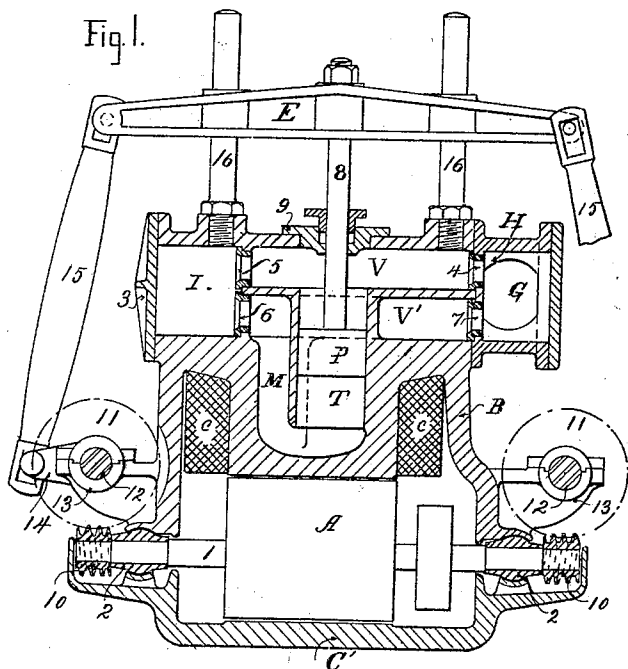


Fig. II.

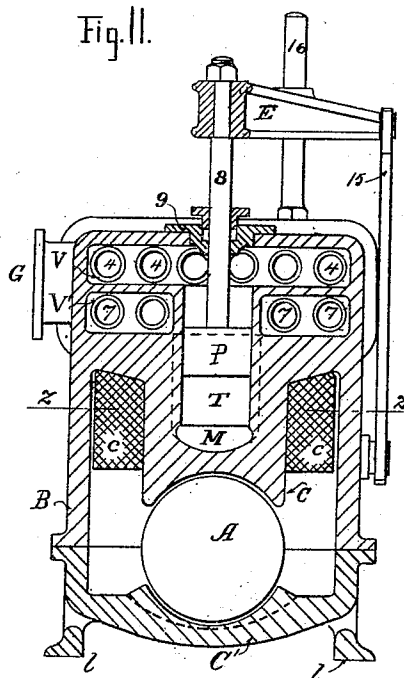


Fig. III.

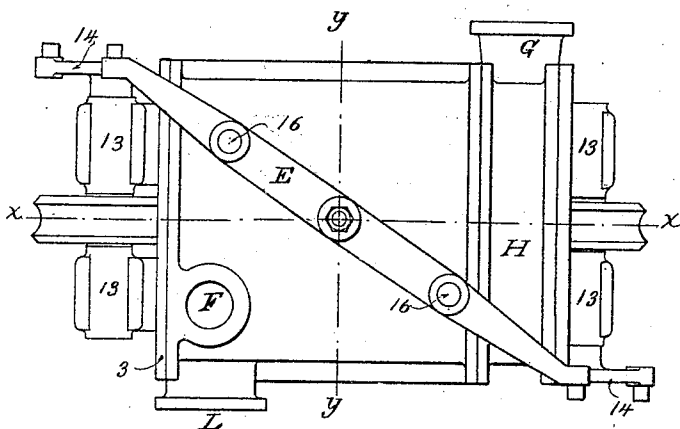
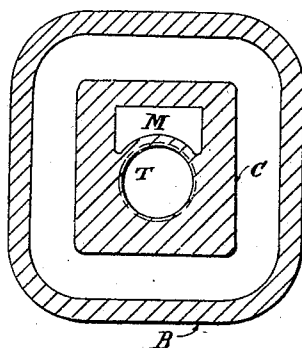


Fig. IV.



WITNESSES:

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UNITED STATES PATENT OFFICE.

GUSTAF RENNERFELT, OF ARVIKA, SWEDEN.

ELECTRICAL PUMPING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 550,329, dated November 26, 1895.

Application filed July 16, 1894. Serial No. 517,642. (No model.)

To all whom it may concern:

Be it known that I, GUSTAF RENNERFELT, a citizen of Sweden, and a resident of Arvika, in the Kingdom of Sweden, have invented a new and useful Improvement in Electrical Pumping Apparatus, of which the following is a specification.

My invention relates to the operation of liquid or fluid pumping or compressing apparatus by electric motors; and it consists of the combination of suitable pumping mechanism with an electric motor in a self-contained apparatus in which the pumping-cylinder and magnet-core are united in a single mechanical element.

My invention further consists of the devices and combination of devices hereinafter set forth and claimed.

The object of my invention is to produce an apparatus of the above class of compact form and minimum weight, the electric parts of which are protected as far as practical.

My invention as applied to a double-acting pump is illustrated by the accompanying drawings, in which—

Figure 1 is a vertical section on line X X, Fig. 3, showing cross-beam and immediately-associated parts in elevation. Fig. 2 is a vertical section on line Y Y, Fig. 3. Fig. 3 is a plan view. Fig. 4 is a horizontal section on line Z Z, Fig. 2.

Similar letters and figures of reference refer to similar parts throughout the several views.

Referring to the drawings, A represents the armature, which rotates between the pole-pieces C and C'. The armature-shaft 1 is provided with suitable bearings 2 2 in fixed portions of the apparatus.

C is the magnet-core, which is surrounded by a field-coil c. The magnet-core C is made hollow to form the pumping-cylinder T and other necessary passages more fully hereinafter described.

B is the magnetic yoke, which may be conveniently cast with the magnet-core C and bolted to the lower pole-piece C'. To protect the electrical parts from water, the magnetic yoke B is preferably so shaped that it surrounds the field-coil and armature completely, leaving no other openings than those through

which protrude the ends of the armature-shaft and the openings through which the brushes are inserted and adjusted, which latter openings may, if found necessary, be closed by suitable water-tight covers during the operation of the pump.

The suction-chamber is shown at H and the delivery-chamber at I, G and L representing, respectively, the suction and delivery pipes.

The suction-chamber H is preferably formed in a separate casting and bolted to the magnet yoke and core, and the delivery-chamber I is provided with a removable water-tight cover 3 for adjusting or repairing the valves.

The chambers H and I communicate through suitable ports 4 4 4, &c., and 5 5 5, &c., with a passage V, communicating with the pumping-cylinder T above the stroke of the piston and through suitable ports 6 6 6, &c., and 7 7 7, &c., with a passage V', communicating through a passage M with the cylinder T below the stroke of the piston. In the drawings, for the sake of clearness I have shown the valve-seats without the valves. Ordinary pump-valves may, however, be conveniently used, opening against a spring, or any form of valve suitable for the purpose.

In the cylinder T reciprocates a piston P, the arrangement being such that upon the downward stroke of the piston water is admitted from the suction-chamber through the ports 4 4 4, &c., and passage V into the cylinder T above the piston P, and the water below the piston P is forced through the passages M and V' and through the ports 6 6 6, &c., into the delivery-chamber I, the valves controlling ports 5 5 5, &c., and 7 7 7, &c., remaining closed during the downward stroke. Upon the upward stroke of the piston P the valves controlling ports 7 7 7, &c., and 5 5 5, &c., open, and water is admitted through ports 7 7 7, &c., from the suction-chamber H into the passage V', and thence through M into the cylinder T below the piston P, the water above the piston P being forced into the passage V and thence through the ports 5 5 5, &c., into the delivery-chamber I. The ports 6 6 6, &c., and 4 4 4, &c., remain closed during the upward stroke.

The piston P may be conveniently inserted in the cylinder T through a circular opening,

closed by a water-tight cover 9, through which the piston-rod 8 extends and in which suitable provision is made for packing therefor.

The piston P may be conveniently reciprocated by the following mechanism, to which I do not, however, consider my invention limited, as the same may be easily modified and other devices substituted therefor by a person skilled in the art without effecting the essential nature of my invention. Upon each end of the armature-shaft is a worm 10, which engages with a worm-gear 11, rigidly mounted upon a shaft 12, provided with suitable bearings 13 13 in the brackets on the yoke D or other suitable support. On the shaft 12 is a crank 14, connected by a pitman 15 with cross-beam E. By the above arrangement the rotation of the armature-shaft 1 produces a vertical reciprocation of the cross-beam E, which is suitably guided by the rods 16 16, and hence of the piston P, which is connected with cross-beam E by the piston-rod 8. The worm 10 10 may be cut right and left to take up end-thrust on armature-shaft.

F is an air-chamber connected with the delivery-chamber I to steady the delivery of the pump. The apparatus may conveniently rest upon suitable legs 17 17.

It will be noted that in the arrangement of the apparatus hereinbefore described the passages V, V', and M, through which the water enters and leaves the cylinder T, are placed adjacent to the field-magnet of the motor. By such arrangement I secure in the parts included in the magnetic field the cooling effect of the water passing through said passages.

The operation of my invention has already been sufficiently described in connection with description of the several parts and the functions thereof. I, however, wish to say that with such modification in form and arrangement of parts as would naturally occur to a person skilled in the art after reading the foregoing specification and without departure from the essential nature of my invention the herein-described apparatus may be

utilized as a vacuum-pump or air-compressor.

I claim as novel and desire to secure by Letters Patent—

1. In an electrical pumping apparatus, the combination of a pump and an electric motor in a self-contained apparatus in which the pumping cylinder and magnetic core are united in a single mechanical element, mechanism for actuating the pump, and a pitman connection between the same and armature, substantially as described.

2. In an electrical pumping apparatus the combination with the associated parts of a pump and electric motor of a pumping cylinder and magnet core united in a single mechanical element, and a magnet yoke made integral with the core and surrounding the field coil and armature and mechanism actuated by the motor for driving the pump substantially as described.

3. In an electrical pumping apparatus, the combination with a revolving armature, of a hollow pole piece, a piston therein, and connected mechanism actuated by the armature for actuating the piston comprising a plurality of rigid connecting bars, substantially as described.

4. In an electrical pumping apparatus, the combination with a revolving armature, of a hollow pole piece, a piston therein, connected mechanism actuated by the armature for actuating the piston, a field coil, and a yoke or keeper forming a water-tight shield for the coil, substantially as described.

5. In an electrical pumping apparatus, the combination with a revolving armature, of a hollow pole piece having a water way and cylinder therein, a piston working in the cylinder, and a driving connection between the armature and piston, substantially as described.

Dated at Arvika June 30, 1894.

GUSTAF RENNERTFELT.

Witnesses:

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