

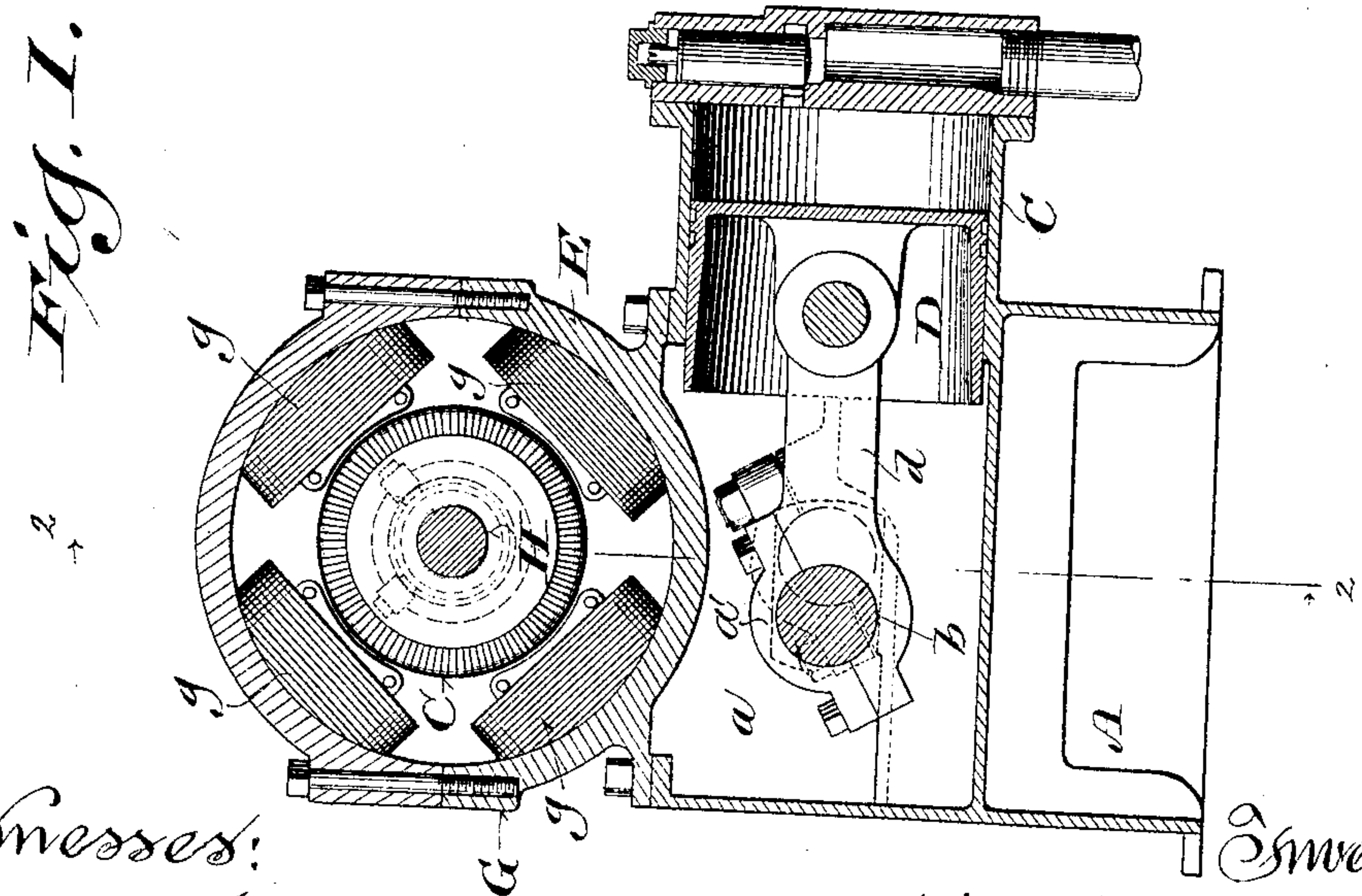
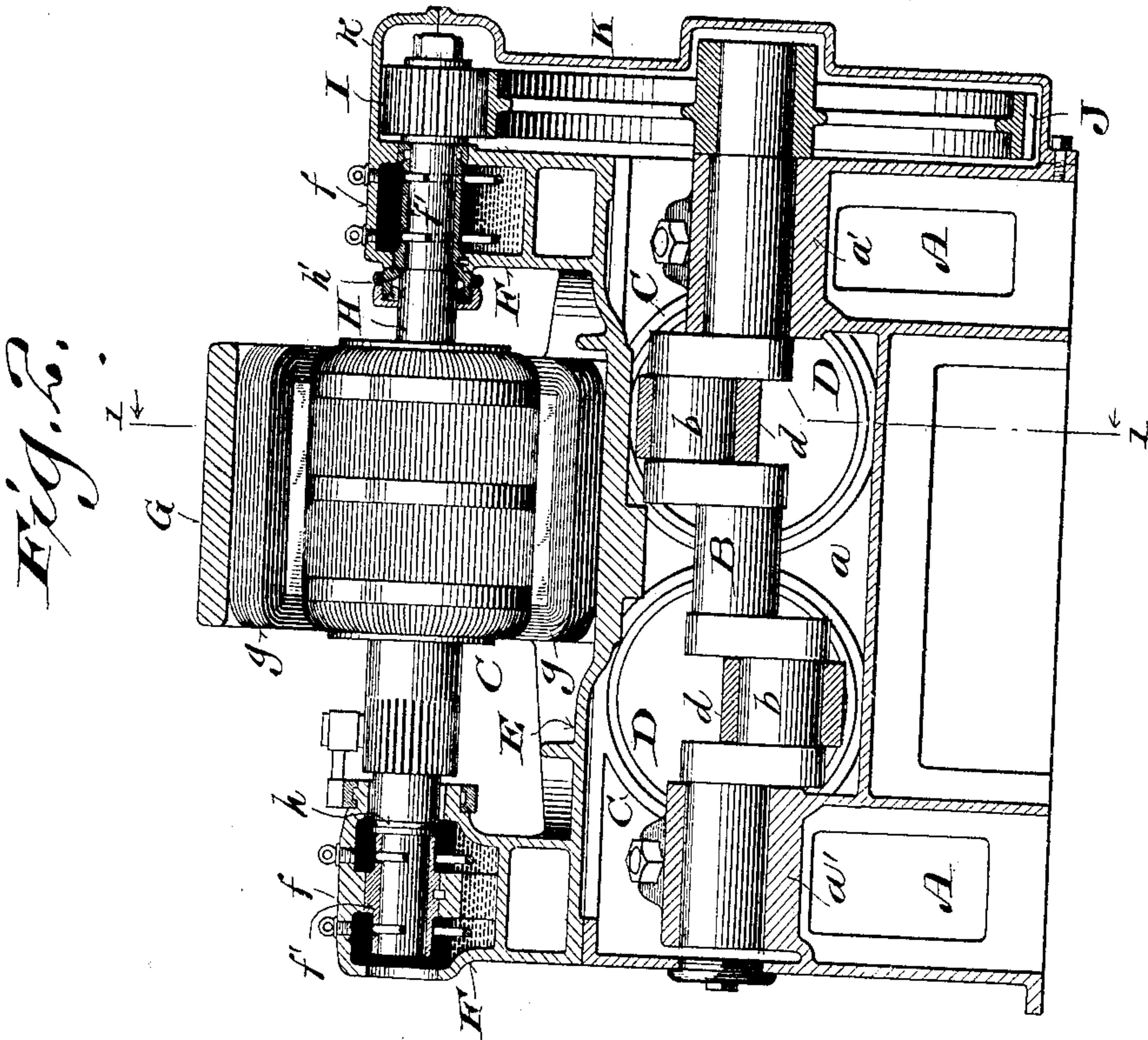
No. 635,280.

N. A. CHRISTENSEN.  
COMBINED PUMP AND MOTOR.

Patented Oct. 17, 1899.

(Application filed Dec. 30, 1896.)

(No Model.)



Witnesses:  
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# UNITED STATES PATENT OFFICE.

NIELS ANTON CHRISTENSEN, OF MILWAUKEE, WISCONSIN.

## COMBINED PUMP AND MOTOR.

SPECIFICATION forming part of Letters Patent No. 635,280, dated October 17, 1899.

Application filed December 30, 1896. Serial No. 617,464. (No model.)

*To all whom it may concern:*

Be it known that I, NIELS ANTON CHRISTENSEN, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in a Combined Pump and Motor; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The main object of my invention is to provide within small compass or in compact form a combined pump and motor of simple and durable construction that will not be affected by dust, mud, ice, or snow, that will be efficient and economical in operation, and that will require little attention.

It consists of certain novel features of construction and arrangement of parts, as hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in both figures.

Figure 1 is a vertical section cutting one of the compressor-cylinders longitudinally on the line 1 1, Fig. 2, of a combined pump and motor embodying my invention; and Fig. 2 is a vertical section cutting the machine lengthwise of the crank and motor shafts on the line 2 2, Fig. 1.

My improved pump and motor are designed particularly for use in connection with air-brakes for railway-cars on which the pump and motor are usually exposed to dust, mud, and snow, and the working parts if unprotected soon become worn and inoperative, besides requiring constant or frequent attention.

Referring to the drawings, A designates the main or pump frame, made of cast-iron and formed with a well or chamber *a* for inclosing and protecting the working parts of the pump and for containing oil for their thorough lubrication. The frame is formed or provided with boxes *a' a'*, which open at their ends into the chamber *a*. B is a shaft supported in said boxes and formed or pro-

vided between them with cranks or eccentrics *b b*.

C C are cylinders formed with or attached to the frame A and opening at one end into the chamber *a*. D D are pistons fitted in said cylinders and connected by pitmen *d d* with the cranks *b b*. The bottom of the oil chamber or well *a* is preferably arranged at or near the level of the lower sides of said cylinders, so that when said chamber is but partially filled the oil will flow therefrom into the cylinders and thoroughly lubricate the pistons.

Upon the frame A is mounted an electric motor comprising a base E, which is bolted to the top of said frame and serves as a cover or closure for the oil-chamber *a*. The working parts of the pump are thus completely inclosed and protected from dust and dirt. The motor-base E is formed or provided on its upper side in a line parallel with the crank-shaft B with oil-wells and box-housings F F, the upper halves or caps *f f* of which are detachable for the purpose of removing the armature. Between the box-housings F F the base E is formed or provided with an armature housing or casing G, to the inner side of which the field-magnets *g g* of the motor are attached. The upper part of this housing, with two pole-pieces or field-magnets attached thereto, is made detachable to facilitate access to and removal of the armature. This housing is preferably open at the ends to allow access of air to the armature, and thus afford ample ventilation and prevent heating of the armature. If necessary or desirable, the upper part of the housing may be extended at the ends, or covers may be attached thereto to protect the commutator and otherwise exposed ends of the armature, but under ordinary conditions these are not required.

H designates the armature-shaft, supported parallel with the crank-shaft B in the sleeves or boxes *f' f'*, provided therefor in the housings F F. Oil is prevented from following the armature-shaft to the commutator by an intercepting-groove *h*, formed around said shaft, and the escape of oil from the opposite well and box-housing and its access to the armature are prevented by a stuffing-box



$h'$  in the inner end of the adjacent journal-box  $f'$ . At one end of the machine the chamber  $a$  opens through the side of frame A and at the same end the armature and crank shafts are extended and provided, respectively, with a pinion I and a gear J, which mesh with each other.

K is a case, the larger part of which is bolted or otherwise suitably attached to the frame A over the gear J, thus inclosing said gear and forming a receptacle for holding oil in communication with the chamber  $a$ . The upper smaller portion  $k$  of the gear-case covering the pinion I is formed with or attached to the cap of the adjacent box-housing and is removable therewith for the purpose of obtaining access to or removing the armature-shaft. In practice the oil-wells in the box-housings F F, the chamber  $a$ , containing the pump-actuating connections, and the gear-case K are partially filled with oil, so that the pump-pistons, the cranks or eccentrics with which they are connected, and the gear J run in oil and the journals of the armature-shaft and the pinion I are constantly supplied with oil, thereby greatly reducing the care and attention that would otherwise be required to keep the machine properly lubricated and in proper working order.

It is obvious that a pump with a single cylinder may be made on the plan herein shown and described and that various other modifications in the details of construction and arrangement of parts may be made within the spirit and intended scope of my invention.

Under certain conditions the pumps incased and constructed as herein shown and described may be advantageously employed without the special motor mounted thereon, and I do not wish to be understood as limiting my invention to such a motor, except in those claims in which it is expressly specified.

The pump-cylinders being so set and arranged with respect to the oil-chamber  $a$  that a portion of them at least will be below the normal level of the oil in said chamber, the oil will serve by its constant agitation and contact with the metallic walls of chamber  $a$ , as well as with the cylinders and pistons, to distribute the heat produced by the operation of the pump, and thereby prevent overheating of the cylinders without using cooling-jackets.

Although the chamber  $a$  is shown as communicating with the gear-case K, the opening in the end of frame A between them may be closed, so that lubricants of different kinds may, if desired, be used, one for the gears and another for the cylinders, pistons, and cranks.

In either case the projecting end of the crank-shaft B, to which the gear J is attached, is covered by the gear-case or terminates therein, thus completely inclosing and protecting the driving connection of the pump and dispensing with the stuffing-box that is for obvious reasons objectionable, but is indispensable, in that class of machines where

the crank-shaft projects through the casing and has a driving connection outside.

I claim—

1. In a combined air-pump and electric motor the combination of the frame having a chamber adapted to contain oil, a shaft provided with a crank or eccentric inclosed in said chamber, a cylinder formed with or attached to said frame and opening at one end into said chamber, a piston fitted to work in said cylinder and connected with said crank or eccentric, a motor-base attached to said frame and forming a cover for said oil-chamber, an armature supported upon said base and connected by gears with said crank-shaft, and a gear-case attached to said frame and motor-base and forming therewith an inclosure for said gears and a receptacle for holding oil, said frame, gear-case and motor-base completely inclosing and protecting the driving connection of the pump and the crank-shaft terminating within said gear-case, whereby a stuffing-box therefor is dispensed with, substantially as and for the purposes set forth.

2. In a pump the combination with a frame or case formed or provided with a closed chamber adapted to exclude dirt and to contain oil, a shaft having bearings in said frame or case and provided with a crank or eccentric within said chamber, a cylinder formed with or attached to said frame or case, a piston fitted to work in said cylinder and connected with said crank or eccentric, a shaft mounted on said frame or case and connected by gearing with said crank-shaft, and a gear-case forming an oil-tight closure over said gearing and the end of the crank-shaft with which the driving connection of the pump is made, whereby a stuffing-box for said crank-shaft is dispensed with, substantially as and for the purposes set forth.

3. The combination of a frame provided with boxes and formed with an oil chamber or well between said boxes, a shaft supported in said boxes and provided between them with a crank or eccentric, a cylinder attached to said frame and opening at one end into the oil chamber or well therein, a piston fitted in said cylinder and connected with said crank or eccentric, a motor-base mounted upon said frame and forming a closure for said chamber, an armature-shaft supported in bearings upon said base parallel with said crank-shaft, and provided at one end with a pinion which meshes with a gear on the crank-shaft, and a case inclosing said pinion and gear forming a receptacle for holding oil, a part of said case over said pinion being detachable, substantially as and for the purposes set forth.

4. The combination of a frame formed with an oil well or chamber and provided with boxes in communication with said chamber, a shaft supported in said boxes and provided with a crank or eccentric, a cylinder attached to said frame and opening at one end into said oil-chamber, a piston fitted in said cylinder and



connected with said crank or eccentric, an electric motor mounted upon said frame and comprising a base which covers said oil-chamber and is provided on the upper side with  
5 oil-wells and box-housings having detachable caps and with an armature-housing and yoke having also a detachable cap, an armature and its shaft supported in said housings parallel with the crank-shaft and provided at  
10 one end with a pinion which meshes with a gear on said crank-shaft, and a gear-case forming an oil-receptacle and composed of

two parts, one attached to the frame and motor-base, and the other to and removable with the cap of the adjacent box-housing, substantially as and for the purposes set forth. 15

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

NIELS ANTON CHRISTENSEN.

Witnesses:

CHAS. L. GOSS,  
ERNEST SHULT.