

(No Model.)

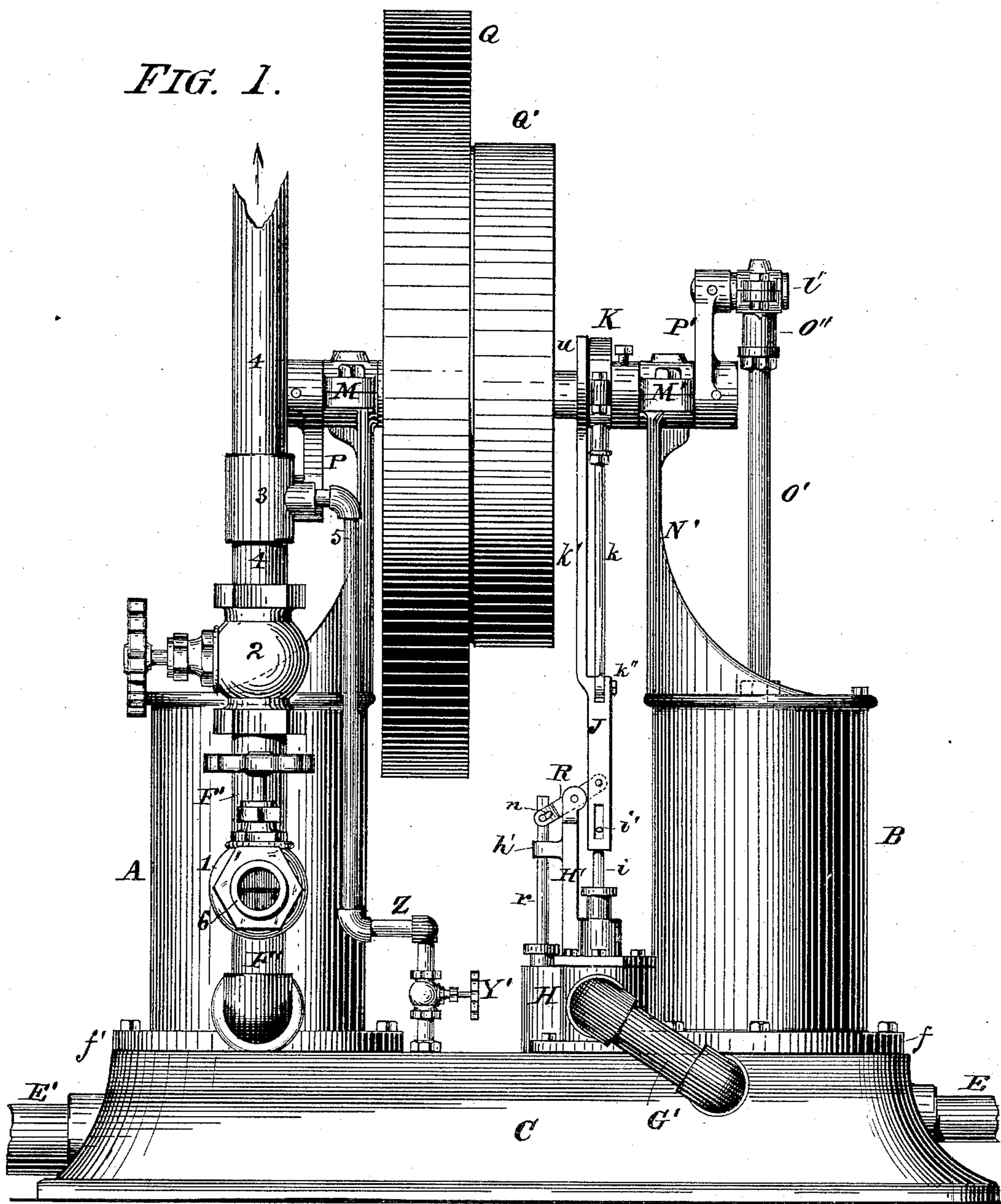
2 Sheets—Sheet 1.

F. C. OLIN.
STEAM PUMP AND MOTOR.

No. 426,511.

Patented Apr. 29, 1890.

FIG. 1.



Witnesses:

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Inventor:

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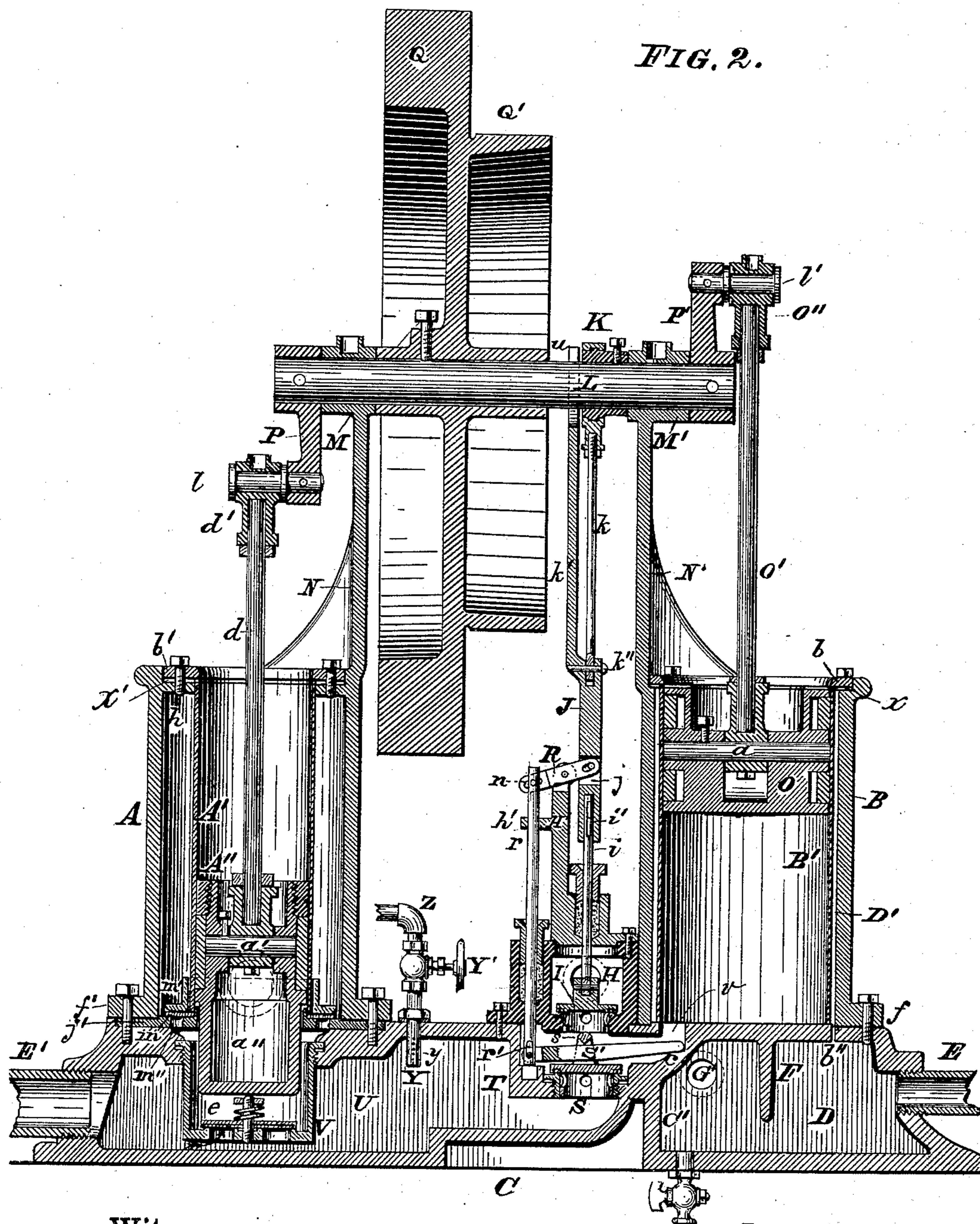
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2 Sheets—Sheet 2.

F. C. OLIN.
STEAM PUMP AND MOTOR.

No. 426,511.

Patented Apr. 29, 1890.



Witnesses:

John O. Stark
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Inventor:

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UNITED STATES PATENT OFFICE.

FRED C. OLIN, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE-HALF TO
DANFORTH & CLARK, OF SAME PLACE.

STEAM PUMP AND MOTOR.

SPECIFICATION forming part of Letters Patent No. 426,511, dated April 29, 1890.

Application filed November 9, 1889. Serial No. 329,764. (No model.)

To all whom it may concern:

Be it known that I, FRED C. OLIN, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful
5 Improvements in a Combined Steam Pump and Motor; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheets of drawings, forms a full, clear, and exact
10 specification, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has general reference to improvements in combined steam pumps and
15 motors; and it consists, essentially, in the novel and peculiar combinations of parts and details of construction, as hereinafter first fully set forth and described, and then pointed out in the claims.

20 In the drawings already mentioned, which serve to illustrate my said invention more fully, Figure 1 is a side elevation of my improved steam pump and motor. Fig. 2 is a longitudinal sectional elevation of the same.

25 Like parts are designated by corresponding letters of reference in all the figures.

The object of this invention is the production of a high and low pressure steam pump and motor combined that can instantly be
30 changed from a pump to a motor, or vice versa.

A is the pump and B the steam cylinder of my motor and pump combined, both being fastened upon a suitable base C by their
35 flanges $f f'$, respectively, and tap-bolts, as shown. This base C has a steam-chamber D, formed by a partition-wall C' , and a suitable bottom in said base, there being a steam-supply pipe E entering said base and chamber with a pendent wall or bridge-piece F in said
40 chamber to intercept any water of condensation that may enter said chamber, and which water may be carried off by the cock g or proper devices, such as a trap, &c.

From the side of the chamber D leads a
45 pipe G' to a steam-chest H, in which is located a puppet-valve I, actuated by an eccentric K from the main shaft L. This puppet-valve connects with a rod J by its valve-rod i , there being a slotted aperture i' in said
50 rod i , so that the pin connecting these rods has a certain play, as will hereinafter more fully

appear. The rod J connects with the eccentric by a jointed connecting-rod k , and it is guided vertically by an auxiliary rod k' , formed in one piece with the rod J, and having
55 on its upper end a fork u , passing over the shaft L in an obvious manner. In the rod J there is a slotted aperture j , wherein is pivoted one end of a beam R, the opposite end of which connects with a valve-rod r , the
60 fulcrum of said beam being in an upwardly-projecting support H' , formed in one piece with the cover for the steam-chest H, there being on said support a lateral projection h' , serving as a guide for the said valve-rod r .
65

Below the puppet-valve I there is located a further puppet-valve S, connecting with the valve-rod r by a lever S' , supported on one end at the point c in the base and engaging
70 said puppet-valve by a yoke s , having a knife-edge, as illustrated in Fig. 2. The rod r is connected in its lower end with said lever S' by a slotted aperture r' , so that a certain dwell occurs in the operation of the valve S, to be hereinafter more fully explained.
75

The cylinders A and B have upwardly-projecting supports $N N'$, provided on their upper extremity with bearings $M M'$ for the reception of the main shaft L, already mentioned, which shaft has on its ends cranks P
80 P' , set at opposite points and connected with the pistons of the pump and steam cylinders by means of connecting-rods $O' O''$ and $d d'$, respectively.

The pump and steam cylinders are lined
85 with composition linings $B' A'$, respectively held down upon the base C by the flanges $b b'$ and underlying elastic packing $x x'$ on the upper end of said cylinders, there being annular spaces $D' h$ in said cylinders, so as to
90 isolate said linings from the cylinders, and so that the annular space D' forms a steam-jacket for the steam-cylinder, and the annular space d in the pump-cylinder acts as an air-chamber to receive the concussion of the
95 water forced by said pump. In the base C there are apertures b'' , connecting the annular space D' with the steam-chamber D, so that the steam may enter said annular space and water of condensation pass from the said
100 space into said steam-chamber.

The steam-piston O is of usual construc-

tion, it having a pin a , serving as a wrist-pin for the connecting-rod O' .

Below the pump-cylinder is located a suction-valve chamber V , having a disk-valve e and suitable apertures to connect the interior of said chamber with a suction-chamber U , formed in the base, while a suitable recess in the face of the base and concentric with the pump-cylinder is placed a circular disk j' , having apertures m'' , covered by a flexible disk m , to act as a discharge-valve for the pump in conjunction with a metallic sleeve m' , fitting the exterior of the pump-lining and bearing with a flange upon said flexible disk m to cause the latter to properly seat upon its plate.

To the suction-chamber U leads a suction-pipe E' , while from the annular chamber h leads a discharge-pipe P' , Fig. 1, having a branch fitted with a stop-cock 1, and in its straight run 4 a stop-valve 2, there being above this stop-valve a T 3, having in its branch a pipe 5, which connects downwardly with an L Z and stop-valve Y' , and discharge-pipe Y , having perforations y , as shown in Fig. 2, the said perforated pipe entering the suction-chamber U between the pump-cylinder and the casing T of the puppet-valve S .

The pump-piston A'' has a wrist-pin a' to connect it with the connecting-rod d , and it has a downwardly-carried extension a'' to displace in the suction-valve chamber V as much space as practicable.

The operation of this steam pump and motor is substantially as follows: Assuming the parts to be in the position shown in Fig. 2—that is to say, all the valves closed and the steam-piston at its apex and at the moment of commencing its downstroke. The beam R has up to this point traveled a distance equal to the length of the slot-hole in the valve-rod r , so that as soon as the steam-piston starts on its downstroke the puppet-valve S (being the exhaust-valve) opens and allows the steam to escape into the suction-chamber U , which, it is assumed, is filled, or at least partly filled, with water either from priming it or from the action of the pump, where said steam will be immediately condensed, and thereby cause the downstroke of the steam-piston by atmospheric pressure, and at the same time assist in drawing water into the suction-chamber through the suction-pipe E' . This pump-piston acts both as a sucker for the water to be raised and as an air-pump for the condenser, it drawing from the suction-chamber U , and thereby drawing with the water also the air and other products resulting from the condensation of the steam. The suction-valve chamber V is carried down nearly to the bottom of the suction-chamber U , so as to draw therefrom as much as possible of the water and air contained therein. This is quite an essential feature to secure regularity in the action of the pump, which would not be so readily attained were the suction-chamber kept more or less full of the water of con-

densation. Owing to the partial vacuum in the suction-chamber during the downstroke of the pump-piston, when water is being forced, water will be drawn into the suction-chamber through the suction-pipe E' during that stroke, so that as soon as the steam-cylinder exhausts its steam will immediately come in contact with the fresh and cold water in said suction-chamber. When the steam-piston has nearly completed its downstroke, the puppet-valve S will seat, while the rod i , connected with the puppet-valve I , will have moved the length of the slot-hole i' , so that as soon as steam-piston O has completed its downstroke and just begins its upstroke said puppet-valve I will open and allow steam to enter the steam-cylinder by the passage v , which also forms the exhaust-passage for the steam after the completion of the upstroke. A repetition of the operations heretofore described causes the continuation of the operation of the machine, a fly-wheel Q , having a band-wheel Q' , assisting in carrying the cranks over their dead-centers.

It will now be observed that the water-pump by the pump-piston forms the medium to condense the steam used in the steam-cylinder. Should it be required to use high-pressure steam in the steam-cylinder to lift water from a certain height, I shall regulate the length of the slot i' in the valve-rod i , so that the puppet-valve I will close early in the upstroke of the steam-piston, and thereby allow of an expansion of the steam sufficiently, so that when the upstroke is completed the initial steam-pressure shall have been reduced to a comparatively low one, and so that this steam will be readily condensed by the water in the suction-chamber U without raising its temperature to any great extent, although steam at a high pressure will be condensed by said water if necessary.

To use the steam-pump as a motor or engine only, the suction-pipe E' must be closed by a valve, (not shown,) and the discharge-pipe closed by shutting the stop-valve 2 and by opening the stop-valve 1, the pipe 6 of which should be connected with a sewer, reservoir, or other suitable receiver for the water of condensation, resulting from the operation of the engine, and which is not intended to be forced into the receptacle into which the pump when in use will deliver its water, and then the stop-valve Y' opened to discharge into the suction-chamber U , with water which will now come from the said reservoir into which the pump delivers its water or which might be supplied from a street-main or other suitable source. If steam is now given to the steam-cylinder, the operation of the steam-piston and its accessories will be the same as heretofore described; but its exhaust-steam will now be condensed by the sprays of water issuing from the perforated pipe Y , and removed from the suction-chamber by the pump acting in this case as the air-pump only. It will thus be seen that the change

from a steam-pump to a steam-engine is one that can be made in a few moments of time, so that this machine is admirably adapted for farm and similar purposes, where it will only for a short time be used as a pump and may then be run as a motor.

One of the advantages of constructing the pump and motor as described is, that the condensed water always carrying with it a certain portion of air, the air in the air-chamber will constantly be replenished, it being a fact that in water-pumps having air-chambers the air is frequently forced out of said chambers, and then fails to properly perform its predesigned function. So does the suction-chamber act as an air-chamber for the suction-pipe, for the reason that it will never fill entirely with water when the engine is running even at a slow speed.

Having thus fully described my invention, I claim as new and desire to secure to me by Letters Patent of the United States—

1. In a steam pump and motor, the combination, with the base containing the water-suction chamber, of the steam-cylinder having the piston, as described, the steam-chest having the inlet-valve operated intermittently by the eccentric and rod having a dwell in its operation, the exhaust-valve located in said suction-chamber and operated by mechanism actuating the admission-valve, the pump-cylinder having its suction-valve within said suction-chamber, and a suction-pipe, as and for the purpose stated.

2. In combined steam pumps and motors, the combination, with the base having steam-chamber, of a steam-cylinder, a steam-chest connected with said steam-chamber and provided with puppet-valve actuated by an eccentric, a water-suction chamber communicating with said steam-chest, and a water-supply for said suction-chamber, as described.

3. A combined steam-pump and steam-motor consisting, essentially, of a base, a steam-cylinder having a piston connected with a crank-shaft, a steam-chest having an intermittently-operating admission-valve operated by the eccentric and rod having slotted connection, an exhaust-valve operated by said eccentric and intermediate levers, a pump-cylinder having its piston also connected with said crank-shaft, a suction-chamber having the suction-valve of the pump and the exhaust-valve of the steam-cylinder, a suction-pipe entering said suction-chamber, and a discharge-valve and discharge-pipe for said pump having pipe-connection with said suction-chamber, whereby said steam-pump is adapted for operation either as a steam-pump or as a steam-condensing motor, as set forth.

4. In steam pumps and motors, the combination, with the steam-cylinder and its piston, of a steam-chest having a supply and an exhaust valve actuated by a single eccentric connecting with said eccentric by the rods

having slotted apertures, whereby said valves are actuated intermittently, as and for the purpose stated.

5. A steam pump and motor combined, having a base provided with a suction-chamber, an upright steam-cylinder open at its upper end and provided with a piston, a steam-chest provided with an admission-valve, an exhaust-valve within the suction-chamber and operated as described, an upright pump-cylinder, also open at its upper end and provided with a piston, a suction-valve located in said suction-chamber, a suction-pipe connected with said base, a pump discharge-valve and discharge-pipe, a connecting-pipe between said discharge-pipe and the suction-chamber, and a spray-nozzle on the end of said connecting-pipe, as stated.

6. In a steam pump and motor, the combination, with the steam-motor, of a pump having a suction-chamber and suction and discharge pipes, as described, and a pipe-connection between said discharge-pipe and said suction-chamber and the exhaust-valve in said suction-chamber, whereby the exhaust-steam of said engine is first condensed by the water entering the said chamber through the pipe-connection to start the suction of the suction-chamber and then by the water entering by the suction-pipe, as stated.

7. The combination, in steam pumps and motors, with the eccentric having connecting-rod and slotted rod J, of the slotted beam R, valve-rod *r*, having slotted aperture *r'*, lever S', supported on one end and connecting with the other with said slotted rod *r*, and the puppet-valve S, having the yoke *s* engaging said lever S', as stated.

8. In a steam-motor, the combination, with the base C, having the steam-chamber D provided with the passages *b''*, of the steam-cylinder B, having the open collar or flange *b*, and the cylindrical lining B', of less diameter than said cylinder, said lining being held in position by the said flange, and an elastic gasket underneath said flange, as and for the object stated.

9. In a steam-motor, the combination, with the base having the steam-chamber D, provided with the partition F and steam-outlet G' and steam-inlet E, and the cylinder B, having the lining B', of less diameter than the said cylinder, the space D', between said cylinder and its lining, being connected with the chamber D by the passages *b''*, whereby said space is connected with said chamber and its condensed water returned thereto, as set forth.

In testimony that I claim the foregoing as my invention I have hereto set my hand in the presence of two subscribing witnesses.

FRED C. OLIN.

Attest:

MICHAEL J. STARK,
WILLIAM O. STARK.