3 Sheets—Sheet 1.

W. WEYHE.

Steam-Pump.

No. 197,578. **Patented Nov. 27, 1877.**

Fig. I.

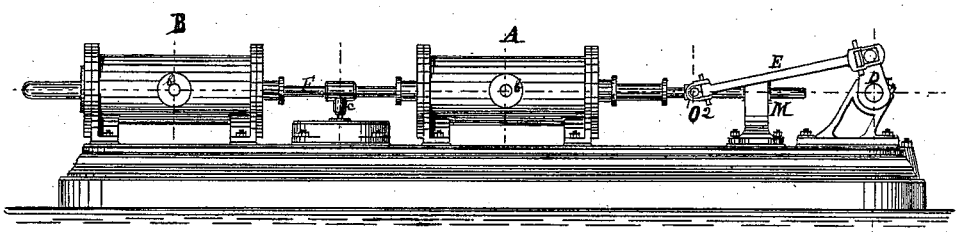


Fig. II.

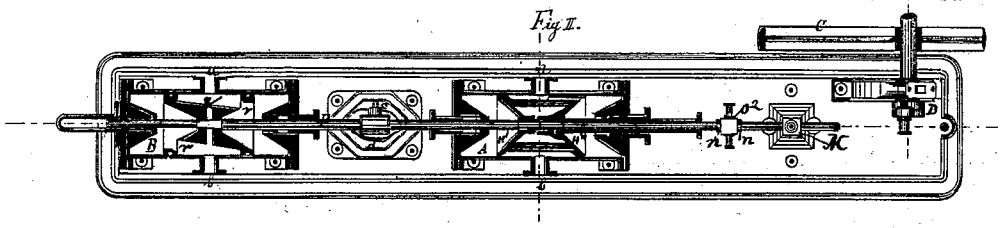


Fig. IX.

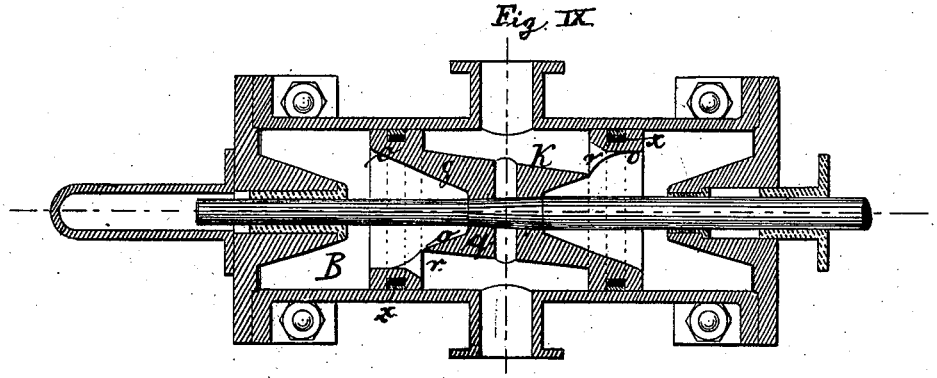
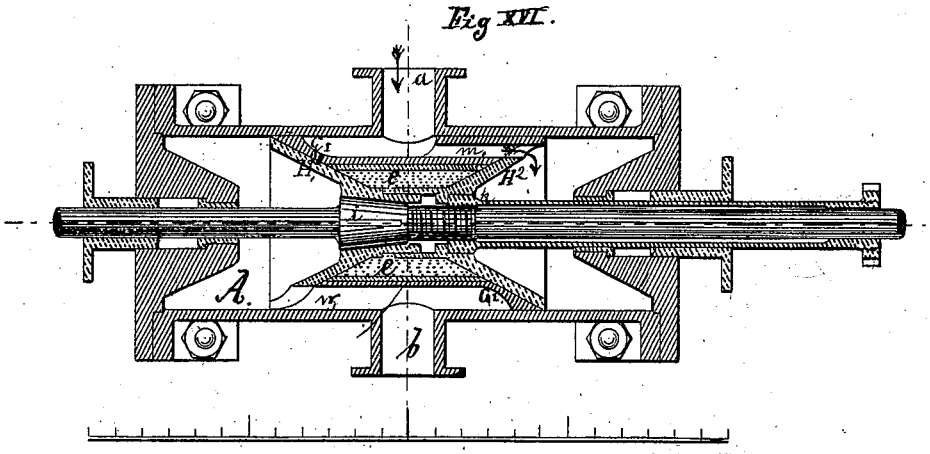


Fig XVI.



Witnesses
M. Gardner
A. Scott

Inventor—
Wilhelm Weyhe
per A. Schücking
Attorney

W. WEYHE.

Steam-Pump.

No. 197,578. Patented Nov. 27, 1877.

Fig. III

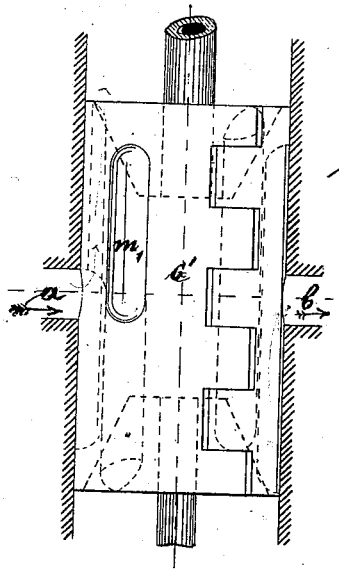


Fig. IV

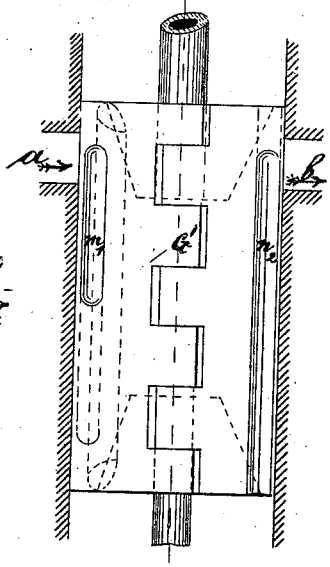


Fig. V

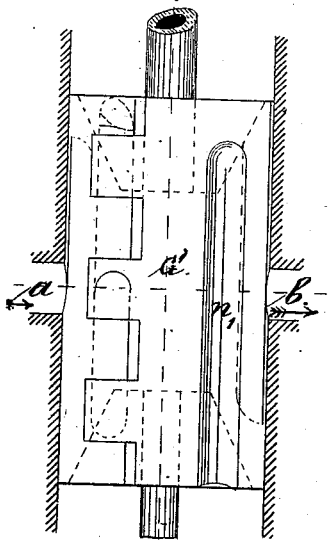


Fig. VI

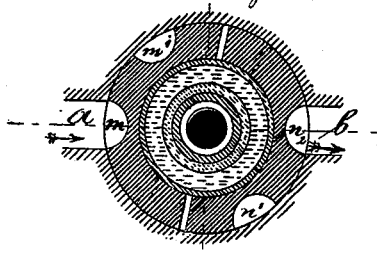


Fig. VII

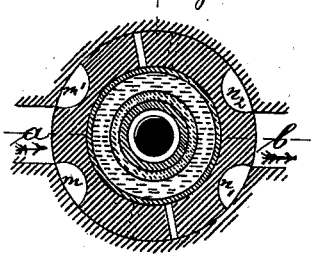


Fig. VIII

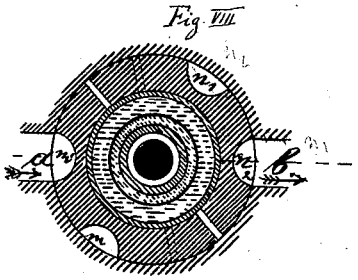


Fig. XVII

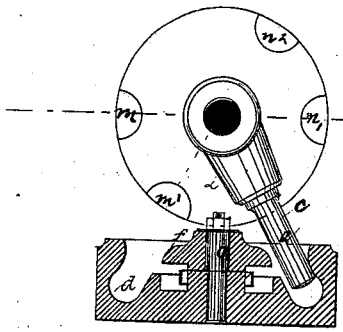
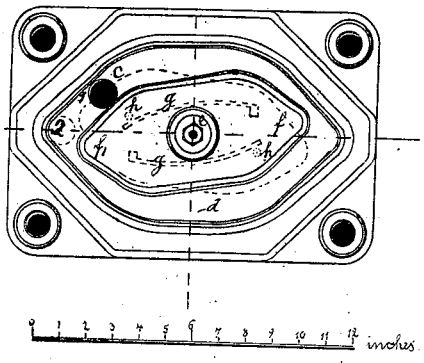


Fig. XVIII.



Witnesses.
M. Gardner
A. Scott

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Wilhelm Weyhe
per A. Schaeffer
Attorney

3 Sheets—Sheet 3.

W. WEYHE.

Steam-Pump.

No. 197,578. Patented Nov. 27, 1877.

Fig. X

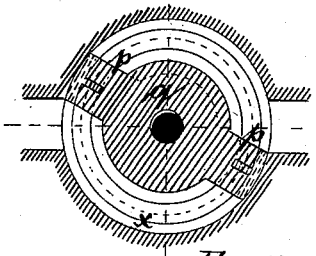


Fig. XI

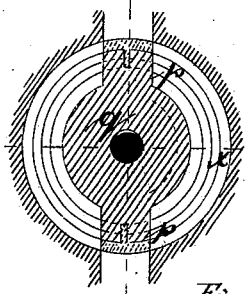


Fig. XII

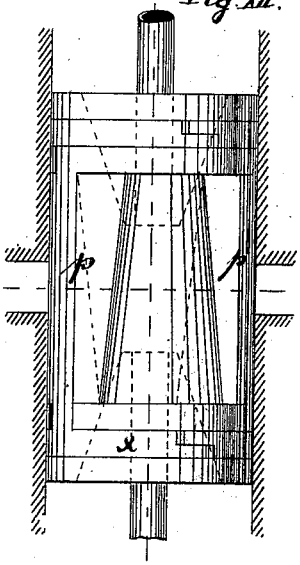


Fig. XIII

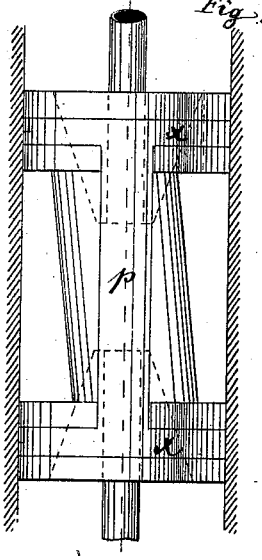


Fig. XIV

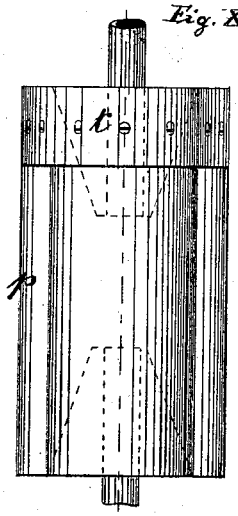
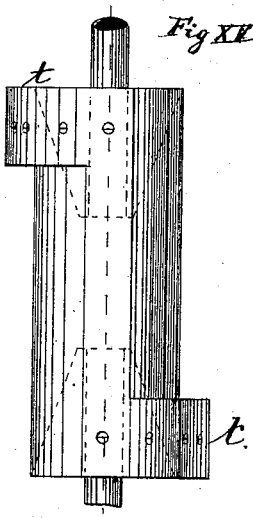
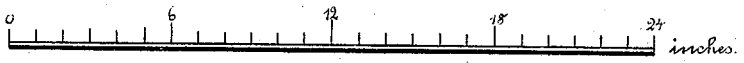


Fig. XV





Witnesses
Alexander Scott

Inventor
Wilhelm Weyhe
per A. Schneider Atty

UNITED STATES PATENT OFFICE.

WILHELM WEYHE, OF BREMEN, GERMANY.

IMPROVEMENT IN STEAM-PUMPS.

Specification forming part of Letters Patent No. **197,578**, dated November 27, 1877; application filed September 13, 1877.

To all whom it may concern:

Be it known that I, WILHELM WEYHE, of Bremen, Germany, have invented a certain new and improved combined steam-engine without the motion of a sliding valve, and pump without valves, of which the following is a specification:

The invention relates to certain improvements in steam-pumps, whereby the use of valves is obviated, and the induction and eduction of the steam are effected by a piston of a peculiar construction.

The invention consists in the construction and arrangement of parts, which will be hereinafter fully explained, and subsequently set forth in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a longitudinal side elevation of a steam-pump constructed according to my invention. Fig. 2 is a horizontal section of the same. Figs. 3 to 18, inclusive, are detail views representing the construction of the pump and steam pistons, the various positions which they assume, and the means for oscillating or rocking the pistons.

The steam-cylinder A and the pump-cylinder B are both of the same construction, and have legs for attaching the same to a bed-frame, and inlet and outlet openings *a b*. The pistons of the cylinders differ, however, in construction, and both are attached to a piston-rod, F, which receives a reciprocating movement through the medium of a fly-wheel, C, crank D, and connecting-rod E. The piston-rod receives, in addition to its reciprocating movement, an oscillating or axial movement, through the agency of a spur or stud, *c*, on the piston-rod entering a guide-plate, *d*, or what may be termed a plate with a cam-groove. (Shown more fully in Figs. 17 and 18.) The oscillating or rocking movement of the piston-rod, or the stud thereof, is aided by the pivoted plate or shuttle *f*, turning on an axis-pin, *e*, which plate is forced to turn in one direction, to the right, by means of two springs, *g*, bearing against two pins, *h*, of the pivoted plate or shuttle. When the spur *c* leaves the position indicated in black in Fig. 18, and takes the position shown in dotted lines, which is at the end of the stroke of the piston, then the pivoted plate or shuttle flies into the position indicated by the dotted lines, for permitting the spur *c* to pass around the point *f'* of the plate into that portion of the cam-groove leading to the right. In consequence of these motions the piston-rod will be rocked or oscillated during the backward and forward strokes of the pistons, for effecting the inflow and outflow of steam from the steam-cylinder, and dispensing with the ordinary valves of the pump, by causing the inflow and outflow of the water by the action of the pump-piston itself. The steam-piston is provided, for the aforesaid purpose, with peripheral channels or ducts, which are so shaped and disposed that they will effect the induction of the live steam and eduction of the exhaust-steam. In order to enable this operation to take place the piston is fitted steam-tight to the interior surface of the cylinder. The steam-piston consists of the cylindrical shell G', which is split or divided longitudinally in a zigzag manner, and combined with means for expanding and contracting the same, so as not to have any unnecessary friction or waste of steam. The means for adjusting the piston-shell and securing the same consists of the cone-shaped heads H^1 H^2, of which the former is secured to the piston-rod by means of a conical collar, *i*, while the latter is made adjustable on the rod by a screw-threaded sleeve, *k*, for expanding or adjusting the shell of the piston. The sleeve is firmly connected with the cone-shaped head H^2, and has an internal screw-thread at its inner end, which fits on a corresponding external thread cut on the piston-rod. The outer end of said sleeve has a toothed or milled nut, adapted to receive a wrench for turning or adjusting the sleeve. The cone-shaped head H^2 has a cylindrical inner extension, which fits on and is guided by a similar extension of the opposite head, H^1.

An elastic packing, *e*, fills the space between the heads and expansible shell of the piston, as is shown more clearly in Fig. 16 of drawings.

The steam, entering the inlet-opening *a* of the cylinder, is conveyed to the front or rear of the same by means of the channels *m* and m^2, and the exhaust-steam is led off by the channels *n* and n^2. The different positions of the pis-

tons are indicated by Figs. 3 to 8, inclusive. Figs. 3 and 5 represent the piston in its middle position, when it is moving from right to left. The course of the steam is indicated by the arrows, and does not require further explanation. As shown in Fig. 4, the piston has reached the end of its stroke, and the several channels or steam-ducts are closed, as is more clearly illustrated in Fig. 7. Figs. 6, 8, and 17 finally show the piston again in its middle position, when it is moving from left to right.

The pump-piston can be constructed in several ways without departing from the principle of my invention, which is a piston shaped so as to receive and discharge the water, and the entire absence of valves. Figs. 9 to 13, inclusive, and the main Fig. 2, illustrate a piston consisting of two end heads, *o*, placed at a suitable distance apart from each other—about the length of the stroke of the piston—and connected by means of two longitudinal bars, *p*, and a cone-shaped or tapering core-piece, *q*. The end heads are provided with circumferential packing-rings *x*, and the connecting-bars are provided with similar packing-strips, connecting the packing-rings of the heads, so as to produce a tight joint between the wall of the cylinder and the piston. The heads *o* are broken through at opposite sides, so as to form apertures or ports *r*, of which one leads to the front and the other to the rear of the piston. As shown in Fig. 2, the space to the right of the piston is the suction-space, and that to the left the pressure-space. The channels of the piston are closed at the end of the stroke, as shown in Fig. 12, and when, by the oscillation of the piston, the channels change their positions, the suction-space of Fig. 2 will become the pressure-space, and vice versa.

In the modification shown in Figs. 15 and 16, the piston is provided with semi-cylindrical end heads *t*, projecting from opposite sides thereof. In this form of construction the channels of the piston are dispensed with.

It will be apparent that the cross-head o^2 must be constructed so that the piston-rod can rock in the same, and for this object the rod is held in said cross-head by two rings, *n*, and is also guided by a tubular block, M.

I desire to use my reciprocating and oscillating pistons in other machines besides steam-pumps, and reserve for myself the right to make changes in the details of construction and form.

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

1. In a steam-pump, the combination, with channeled pistons operating in pairs in axially-opposite cylinders, and having a rod provided with a spur, of a fixed slotted guide-plate and a pivoted spring-pressed plate or shuttle, operating on the piston-rod connecting the pair of pistons to effect the rotation of the latter, thereby reversing the action of the fluid in the cylinders, substantially as and for the purpose herein set forth.

2. The combination, in a steam-pump having the steam and pump pistons attached to a reciprocating and oscillating piston-rod, of a steam-piston consisting, essentially, of an expansible shell having channels upon its surface, for conducting live and exhaust steam to and from the ends of the cylinder, the fixed and adjustable end heads, and suitable adjusting and retaining devices, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILHELM WEYHE.

Witnesses:

GERARD WENSESLAUS V. NAWROCKI,
EDWARD P. MACLEAN.