(No Model.)

F. X. KUHN.

PUMP FOR ICE MACHINES.

No. 465,276. Patented Dec. 15, 1891.

Fig.1.

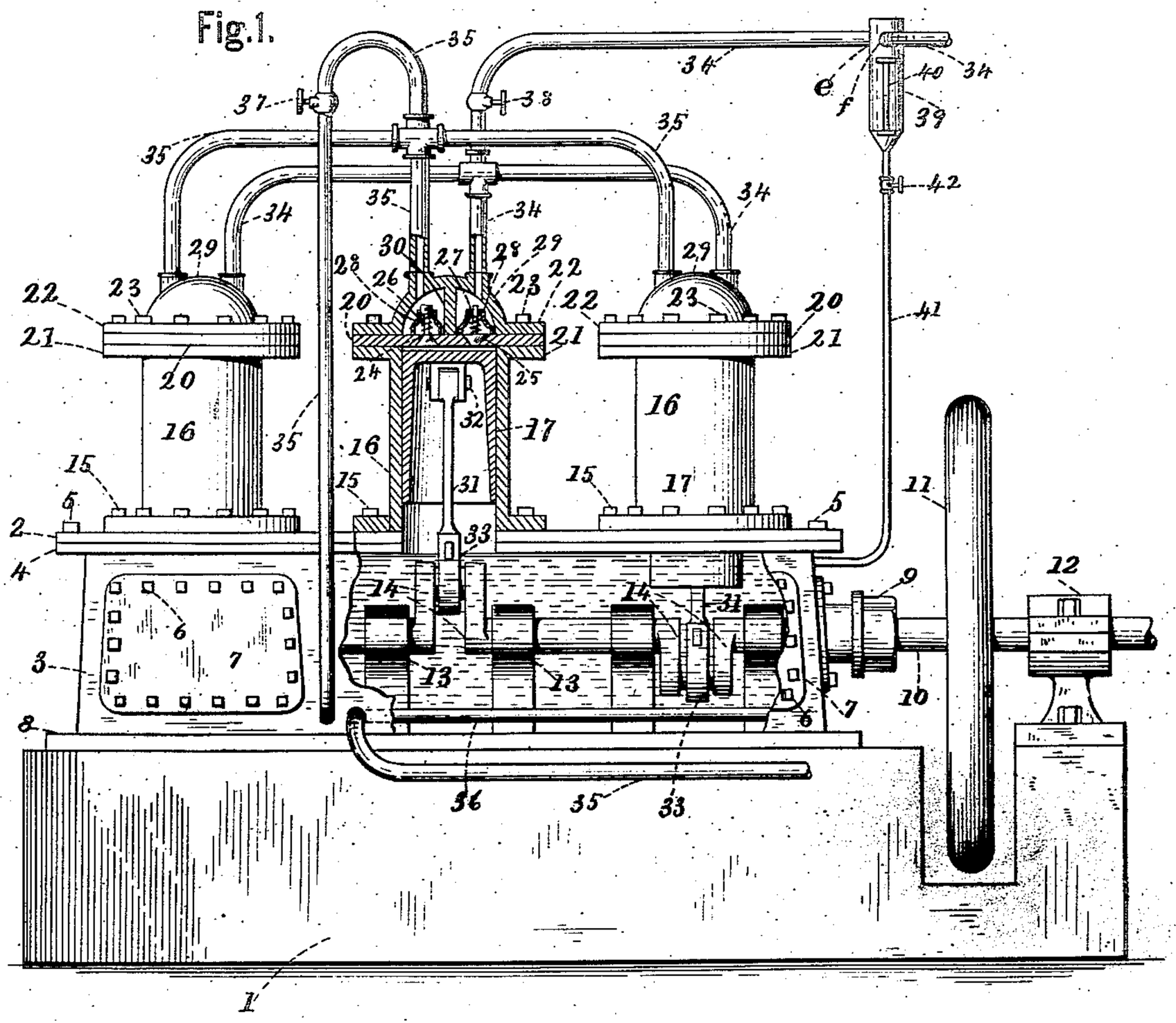


Fig.2.

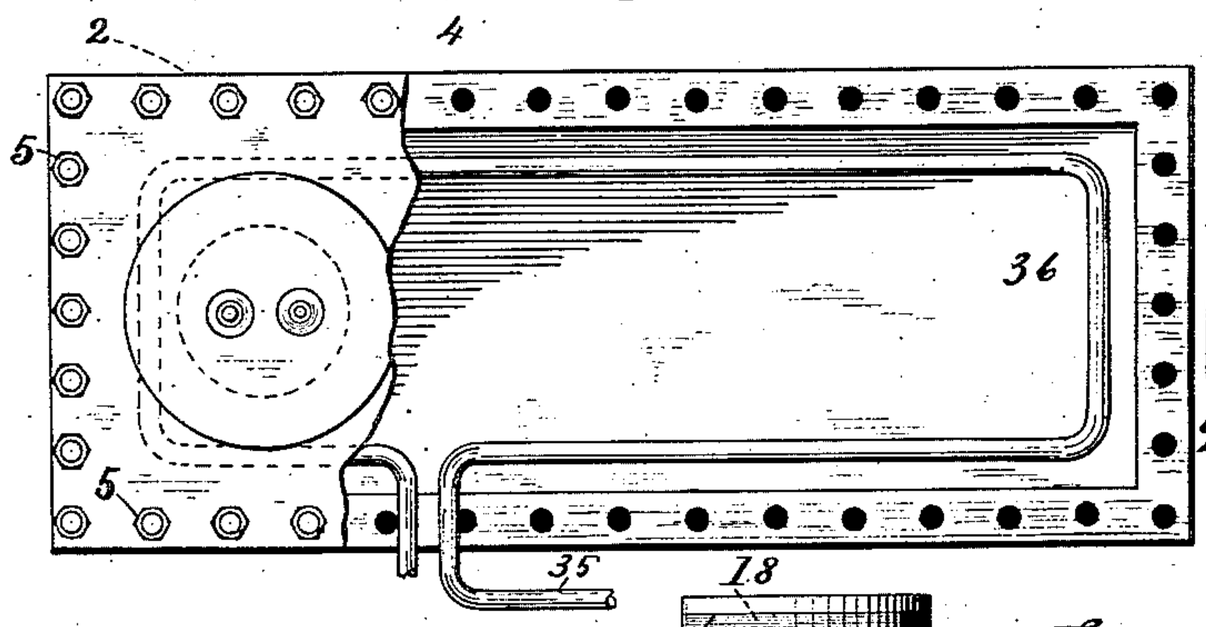


Fig.3.

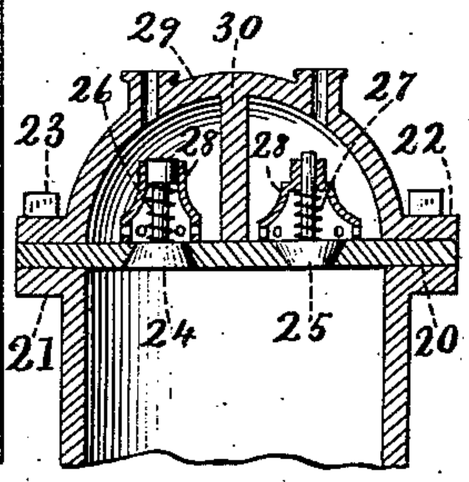
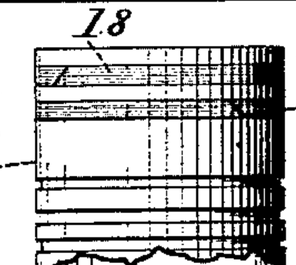


Fig.4.



Witnesses.

Arthur J. Sangster,

Harriet Johnson

Frederick X. Kuhn. Inventor.

By James Sangster,

Attorney.

UNITED STATES PATENT OFFICE.

FREDERICK X. KUIIN, OF BUFFALO, NEW YORK.

PUMP FOR ICE-MACHINES.

SPECIFICATION forming part of Letters Patent No. 465,276, dated December 15, 1891.

Application filed June 5, 1889. Serial No. 313,133. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK X. KUHN, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Pumps for Ice-Machines, of which the following is a specification.

My invention consists in certain improvements in pumps for ice-machines, whereby the leakage of ammonia therefrom is almost entirely prevented and whereby the machine is rendered more efficient and more simple in its construction, all of which will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation, partly in section. Fig. 2 is a top plan view of the lower part of the machine, a portion being broken away to show the interior construction. Fig. 3 is a sectional elevation of the upper portion of one of the cylinders. Fig. 4 represents a detached sectional elevation of one of the pistons.

In said drawings, 1 represents the foundation upon which the machine stands, which is made in any well-known way either of cement or stone or other suitable material. The lower portion or base or oil-receptacle of the machine is preferably made of cast-iron, and is a hollow box made air-tight, the top plate 2 being bolted securely to the sides 3 by means of the flange 4 and the usual bolts 5, and is made removable by means of said bolts. At the front is two or more removable plates 7, rigidly secured in place by bolts 6, their object being to provide the means for getting at the interior whenever it becomes necessary for repairs or for other purposes. The bottom 8 may be formed in one piece with the sides 3, as shown, or it may be bolted to the sides 3 in the same manner that the top is secured in place.

At one end of the oil-receptacle is a stuffing-box 9, through which the driving-shaft 10 passes and extends out far enough to receive the fly-wheel 11 and rest in the journal-box 12. The opposite portion of the shaft 10 is mounted in journal-boxes 13, within the oil-receptacle, and is provided with a series of double cranks 14.

To the top of the oil-receptacle are rigidly secured by bolts 15 three cylinders 16. I have shown three, but there may be more than that number, if desired, although three answers the purpose perfectly.

Within each cylinder 16 is a hollow piston 17, fitted and provided with suitable packing-rings 18, (see Fig. 4,) so as to fit air-tight, or substantially so, within the cylinders, and each piston is provided with a series of grooves 19, also shown in Fig. 4, adapted to receive and hold a portion of oil as they move up and down within the cylinders, and at each downward movement dip into the oil-receptacle and carry up a portion of oil into the cylinders at each upward movement to lubricate them.

At the top of each cylinder is a circular valve-plate 20. It is secured between the flanges 21 and 22 by bolts 23, and, if required, a packing of any well-known material suitable for the purpose may be interposed between them to make the joints perfectly tight.

In the valve-plate 20 are two valves. (There may be more than that number, if desired.) The suction-valve 24 and the force-valve 25 are kept to their seats by springs 26 and 27, the spring 26 holding the suction-valve up to its seat and the spring 27 holding the force-valve down to its seat. Surrounding each valve is a perforated case 28, which keeps the valves in line and permits the inlet and outlet of the ammonia. Above the valves is a dome-shaped case or top 29, forming a portion of the flange 22 and provided with a central partition 30 for insulating the valve-chambers from each other. Each cylinder 16 is provided with a connecting-rod 31, pivoted to a holding-piece within the piston by a pin 32 (see the sectional portion of Fig. 1) and to the crank-shaft or crank-pins by the usual gib and key-joint 33. The cranks on the shaft 10 are set at an angle of about one hundred and twenty degrees with each other, so that the pumps work in succession one after the other, and thereby keep up a very steady pressure and a continuous and uniform circulation of the ammonia through the machine.

The figures 34 represent the pipes through which the ammonia is compressed and forced through any suitable condenser and then through cooling-pipes or a brine or freezing-vat of any well-known construction.

The figures 35 represent the suction or return pipes which draw the ammonia back again from the condenser after it has parted with a portion of its heat, to be again compressed and condensed, thereby keeping up a constant circulation. It will be noticed that the suction or return pipe passes in a coil 36 around the oil-receptacle. The object of this construction is to keep the oil cool and thick, so as to more effectually prevent any escape of ammonia should any leak down into the oil-receptacle, and the object in filling the oil-receptacle in the base of the machine is to prevent any gas or ammonia from getting into it. The crank-shaft 10 and the cranks and bearings are all immersed in the oil, so that the lubrication of all the parts is perfect.

37 represents a stop-valve on the return or suction pipe, and 38 the valve on the forcing-pipe for shutting off or preventing the escape of ammonia when required. Connected with the force-pipe is a receptacle 39, adapted to catch any oil that may escape or be drawn up and carried over with the ammonia. It will be noticed that the forcing-pipe is connected to it at the point *e*, and another portion of the forcing-pipe is connected to another side *f* of the vessel 39 at or about a right angle to the point *e*, or thereabout, the object being to allow the oil to drip down into the receptacle 39 and not pass in a direct line through the forcing-pipe.

To one side of the receptacle 39 is a glass tube 40, communicating with the interior, so that the level of the oil may be seen at any time required. This vessel 39 communicates with the machine-oil receptacle by a pipe 41, which is provided with a valve 42, so that when the vessel 39 is full of oil it may be conducted back to the oil-receptacle in the base of the machine. In doing this it is necessary to be careful and not let the oil leave the vessel 39. The stop-valve 42 is therefore closed before the oil is all out, so as to prevent any of the ammonia getting into the lower oil-receptacle.

The operation of the machine is as follows: The machine being charged with ammonia and set in motion, every upward motion of the cylinder-pistons operates only the valve 25 and forces and compresses the ammonia into any suitable or well-known condenser, from which it passes after parting with a portion of its heat and then expands and passes into the cooling and freezing pipes. Every downward movement of the pistons operates only on the suction-valve 24 and draws the ammonia from the return-pipes and fills the cylinders or pumps, which is then forced out by the return or upward movement of the pistons. In this way a continuous circulation of the ammonia is kept up. The end of the shaft outside of the box or bearing 12 is adapted to be connected with the crank-disk of a steam-engine or other source of power.

I claim as my invention—

In an ice-machine, the combination of the oil-receptacle, the cranked shaft mounted therein, the cylinders communicating with the receptacle, the pistons in said cylinders operated by the shaft, the dome-shaped divided valve-cases on said cylinders, the force and suction valves in said cases, the suction-pipes having the coil extending into the oil-receptacle, and the force-pipes having the branch, and the oil-receptacle communicating with said branch pipe, all substantially as shown, and for the purpose described.

FREDERICK X. KUHN.

Witnesses:
JAMES SANGSTER,
CHARLES W. KALTENBACH.