(No Model.) 2 Sheets—Sheet 1.

J. E. McLAUGHLIN.

REFRIGERATING MACHINE.

No. 519,730. Patented May 15, 1894.

Fig. 1.

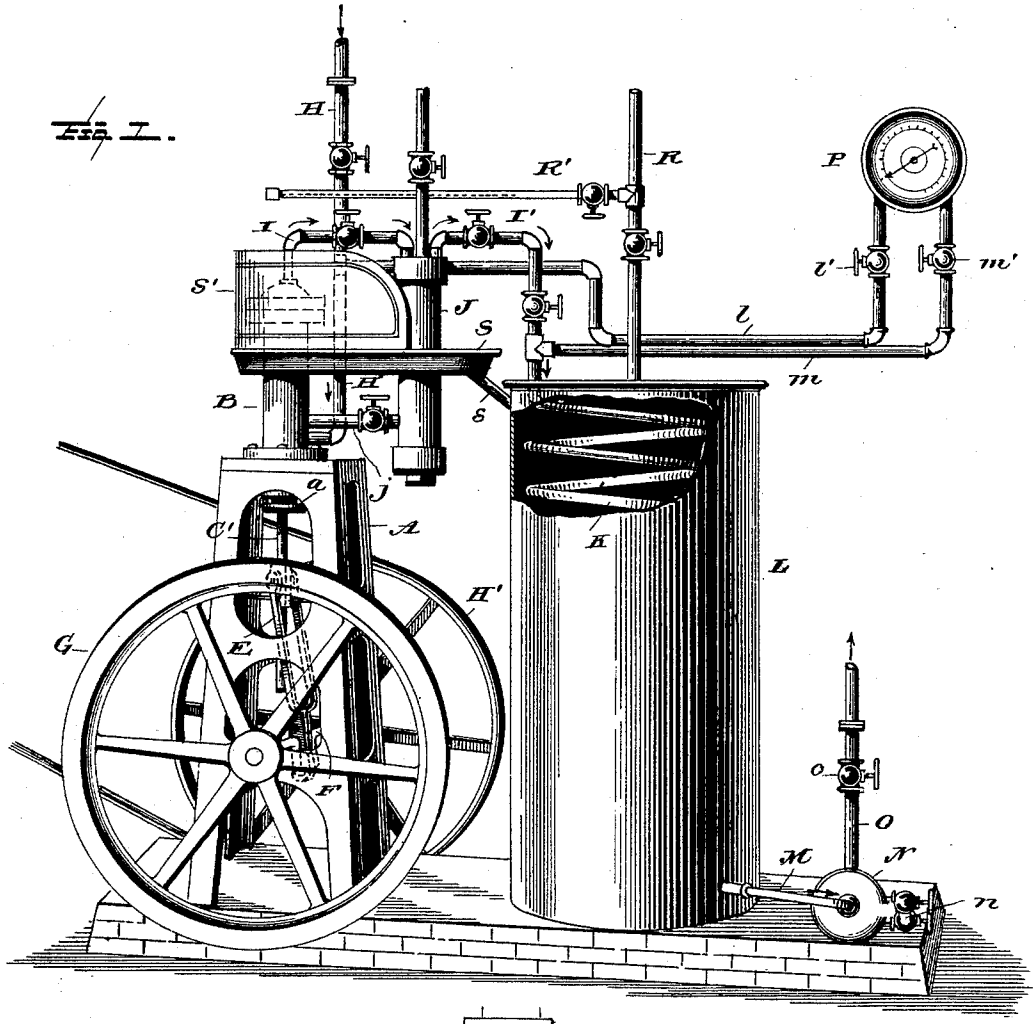
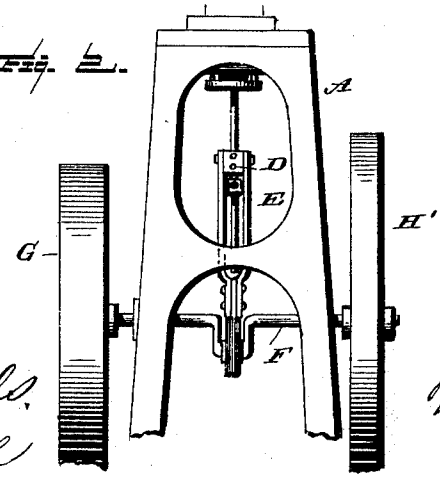


Fig. 2.



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Inventor:
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THE NATIONAL LITHOGRAPHING COMPANY.
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. E. McLAUGHLIN.

REFRIGERATING MACHINE.

No. 519,730. Patented May 15, 1894.

Fig. 4.

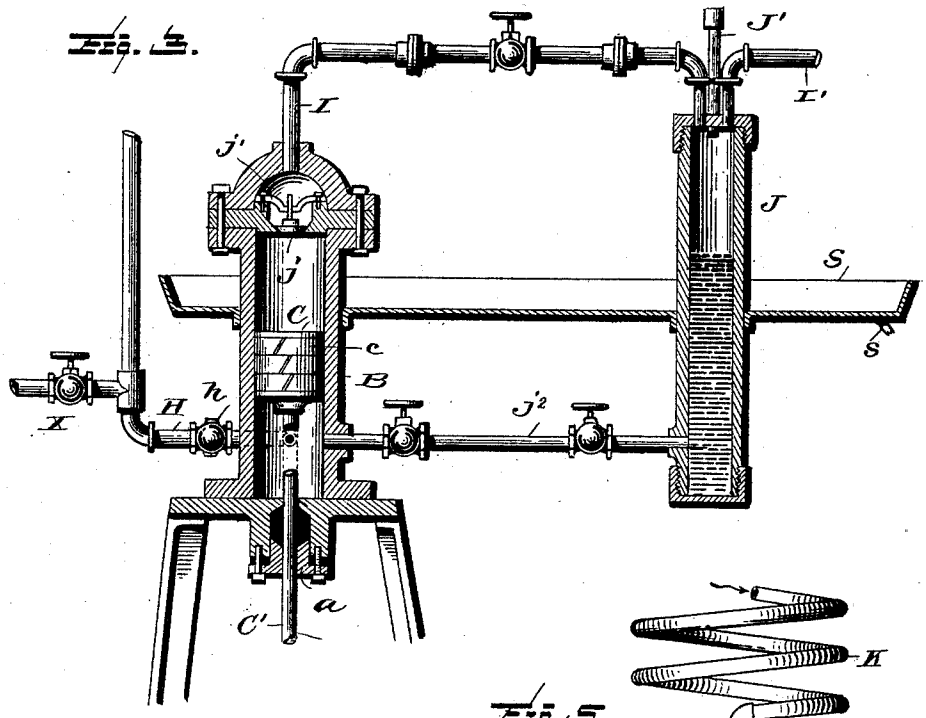


Fig. 5.

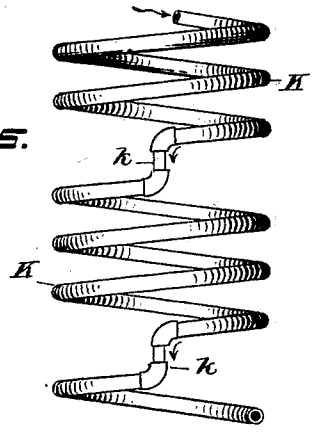


Fig. 7.

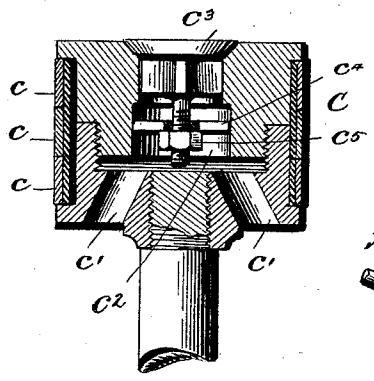
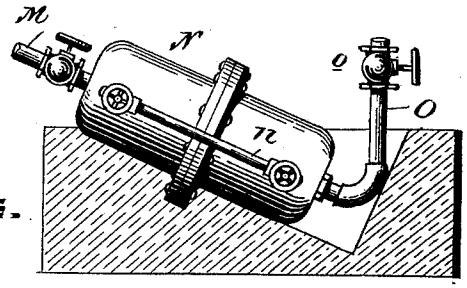


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES E. McLAUGHLIN, OF SAN FRANCISCO, CALIFORNIA.

REFRIGERATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 519,730, dated May 15, 1894.

Application filed August 5, 1893. Serial No. 482,441. (No model.)

To all whom it may concern:

Be it known that I, JAMES EDMUND MCLAUGHLIN, of San Francisco, in the State of California, have invented certain new and useful Improvements in Refrigerating-Machines, of which the following is a specification.

The refrigerating machine to which my invention is directed while adapted to be used not only for refrigerating but also for ice making, is intended more particularly for cold storage purposes, and my object is to produce a machine for this purpose which while, simple in construction, inexpensive to make, compact and easily worked and managed, shall be entirely efficient in its action.

To this end my invention resides in the construction, arrangement and organization of the refrigerating apparatus shown in the accompanying drawings, in which—

Figure 1 is a perspective view of the complete machine. Fig. 2 is a front elevation of the pump driving mechanism. Fig. 3 is an enlarged vertical section through the pump cylinder and oil chamber. Fig. 4 is an axial section on still larger scale of the pump piston or plunger. Fig. 5 is a view of a part of the condensing coil. Fig. 6 is a side elevation of the receiver.

The pump and oil chamber are carried by a stand A, upon which is secured in vertical position the pump cylinder B, the lower head of which is formed by the top of the stand A—which latter is provided with a stuffing box *a* for the passage of the pump piston rod C′. This piston rod is held at its lower end in a cross head D, journaled in the forked upper end of the connecting rod E which at its lower end is mounted on the crank of the driving shaft F, supported in bearings in the stand A, and having on it the fly wheel G, and driving pulley H′ which is to be belted to any suitable prime mover.

Into the lower or suction end of the pump cylinder, at a point some little distance above the bottom, opens the inlet pipe H which leads from the pipes or coils used for refrigerating purposes—which latter are not shown. From the top of the pump cylinder leads the outlet pipe I to the top of the oil cylinder or chamber J; and thence another pipe I′ leads to the condensing coil K contained in the tank L. From the other end of the condensing coil leads a pipe M, to the receiver N, which as shown in Fig. 5, is set in a slanting position and has a gage glass *n* on its side to indicate the height of the liquid therein; and from the receiver leads the pipe O back to the cold storage or refrigerating coils. The circuit thus traced is that through which the refrigerant passes when the apparatus is in action. The inlet pipe H at or near the point where it enters the pump has a check valve *h* to prevent back flow from the pump. In the top or dome of the pump cylinder is an outwardly opening check valve *j*, having its stem passing through and guided by a bridge piece *j′*. On the pipe O, which leads the condensed refrigerant from the receiver N, is an expansion valve *o*.

A pressure gage P is connected by a pipe *l* (having valve *l′*) to the inlet pipe H, and by another pipe *m* (having valve *m′*) to the pipe I′ which leads into the condenser coil. By this means I can ascertain readily the pressure at either the suction or condenser end of the apparatus.

The pump piston is shown at C. Its body is made in two parts, which screw together, and are peripherally recessed to receive the sectional packing rings *c*. The piston is hollow, having in its base inlets *c′* which open into the central passage c^2, which latter is closed by the puppet or check valve c^3. The head or top of the check valve when closed does not project above the head of the piston, so that the latter in its upward movement may come close up to the correspondingly flat head of the pump cylinder. The check valve c^3 has the usual guide wings below its head which fit the upper and narrower part of the central passage c^2. Below these wings, and mounted on the stem of the valve, is a cross bar c^4, which is located in the lower and wider part of the central passage c^2, and serves as a stop to limit the opening movement of the valve—this being held at any desired height on the valve stem by a nut c^5, whereby the valve can be set to open to a greater or less extent as desired.

From the lower part of the pump cylinder B leads a valve or cock controlled pipe j^2 into the lower part of the oil cylinder or receptacle J. This pipe opens into the pump at

about the level of the inlet pipe H. Oil from the oil receptacle enters and gathers in the lower part of the pump cylinder; and the piston, dipping into this oil on its down stroke, thus takes with it on each up stroke a liberal supply of oil which lubricates all the parts and passages of the pump. Oil in appreciable quantity will, under this arrangement be forced out from the pump cylinder along with the refrigerant; but by its passage through the upper part of the oil cylinder the refrigerant will be rid of this oil, the latter dropping into the body of oil in the receptacle, while the gaseous refrigerant passes out through the pipe I′ on top to the condenser.

The oil cylinder is provided with a suitable filling pipe or nozzle J′ which of course is closed except when the supply of oil must be renewed.

To carry off the heat generated by the action of the pump—which exhibits itself more particularly in the pipes I, I′,—I provide a perforated water pipe R′ from which water is sprayed upon these pipes, the water thus thrown being caught by a pan S and thence carried off by a pipe *s* to some suitable point, as for example into the condenser tank. The sprayer pipe R′ is a branch from the main water pipe R which supplies the condenser tank. The pan S is partly surrounded by a shield or screen S′ to prevent the spray from splashing and sprinkling the other parts of the apparatus. The oil cylinder is firmly held in place by the dripping pan, which is fastened on the one hand to the oil cylinder, and on the other hand to the pump cylinder, and also by its pipe connection to the pump cylinder and condenser.

The receiver N is a strong iron or other metal vessel, which can be of any suitable shape and size.

The condenser consists of a coil K contained in a tank L of galvanized iron or other suitable material, which is kept constantly supplied with water while the apparatus is in operation. The coil itself is made up of several pipe lengths each joined to the other by a tubular connection *k*, the bore of which stands at about right angles to the bores of the pipe sections which it connects, there being a drop of about three inches between the lower end of one section and the upper end of the section next below. In practice I have about five such drops in a coil whose total length is say ninety-six feet. This construction is material and enhances the efficiency of the condenser. The column of refrigerant fluid, which is in gaseous state when it enters the condenser, instead of traveling in a smooth uniform and unbroken spiral path, meets at the several points *k* an obstruction by which it is broken and is required to rearrange itself, thus insuring the bringing of all of it into contact with the condensing surface of the coils.

The refrigerant is supplied to the apparatus through a pipe X which enters the inlet pipe H above its check valve. This pipe is simply used to charge the apparatus in the first instance, and to supply the loss in refrigerant which may occur in process of time. There is however little if any loss. The point most liable to leakage is that at which the piston rod works through the bottom of the pump cylinder; but this point is very effectually protected by the oil bath in the bottom of the cylinder, so that the leakage is trifling at the most.

The whole apparatus is exceedingly compact and occupies but little room. It is not expensive to make, and for ordinary uses requires only from one to two horse power to run it. It is simple in construction and requires no skilled labor to operate it, and is most efficient for ice making and refrigerating purposes.

What I claim herein as new, and desire to secure by Letters Patent, is—

1. The refrigerating apparatus comprising the pump, the pump supporting stand and pump actuating mechanism; the oil chamber; the condenser provided with a coil having interposed in its length drop sections *k* at right angles to the spiral portions of the coil; the receiver; and the valve controlled connections between the said pump, oil chamber, condenser and receiver—these parts being constructed and arranged together for joint operation as herein shown and illustrated in the accompanying drawings.

2. The condenser comprising the tank L, and the tubular coil composed of spiral sections, and short connecting pipes *k*, standing at about right angles to the spirals, and joining the lower end of one section to the upper end of the section next below, as and for the purpose shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

J. E. McLAUGHLIN.

Witnesses:
M. BAILEY,
ROBT. W. COX.