

F. M. McMILLAN.
Process for Freezing and Pressing Paraffine Oil.
No. 215,471. Patented May 20, 1879.

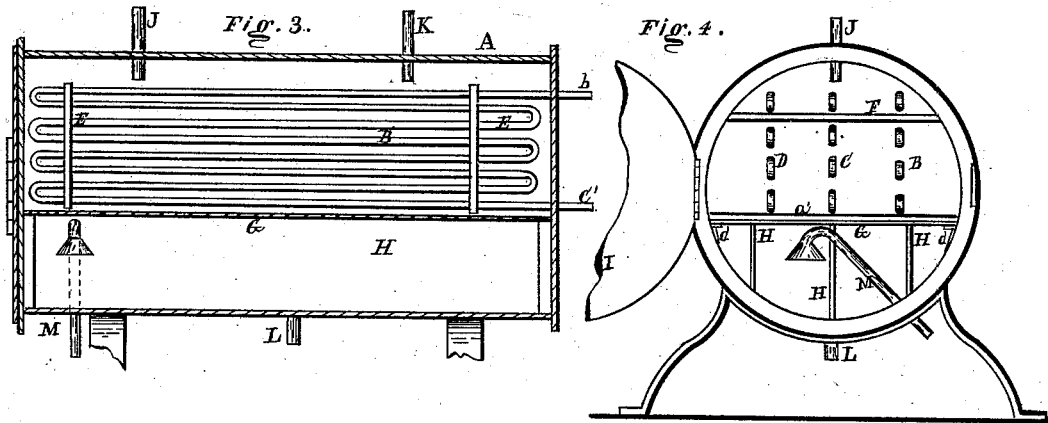
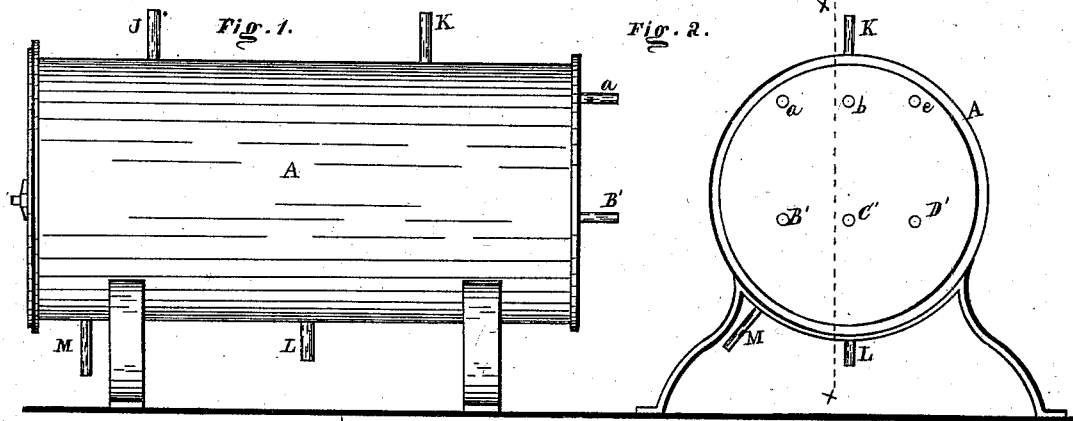
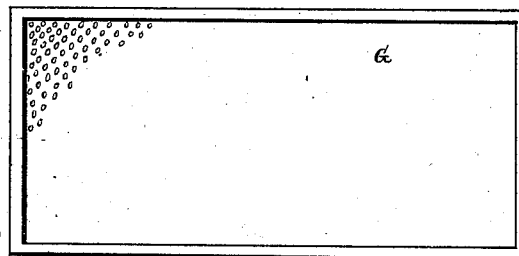


Fig. 5.



Witnesses.
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Fig. 6.

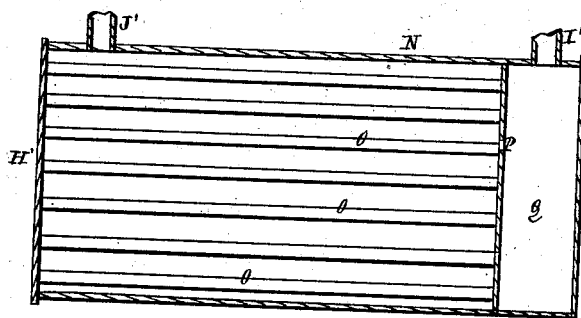
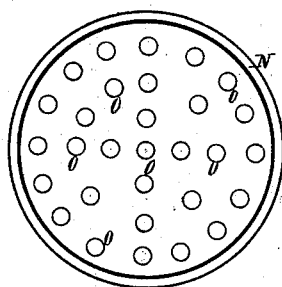


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PROCESSES FOR FREEZING AND PRESSING PARAFFINE-OIL.

Specification forming part of Letters Patent No. **215,471**, dated May 20, 1879; application filed October 12, 1876.

To all whom it may concern:

Be it known that I, FRANCIS M. McMILLAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Processes for Freezing and Pressing Paraffine-Oil, whereof the following is a description, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side view of the apparatus. Fig. 2 is an end view. Fig. 3 is a longitudinal vertical section in direction of the line *xx* in Fig. 2. Fig. 4 is an end view of the inside. Fig. 5 is a detached section.

Like letters of reference refer to like parts in the several views.

This invention relates to a process for freezing and pressing oil by compressed air admitted into the chamber containing the material, in order to extract therefrom paraffine, and to obtain cold-pressed oil that shall be free, or nearly so, from paraffine, for lubricating purposes, &c.

The apparatus which I use for the foregoing process is constructed and operated in the manner as follows:

In a chamber or case, A, the length and diameter of which may be more or less, as its holding capacity may be required, are arranged three systems of serpentine pipes, B C D, or their equivalent. The ends of each system of pipes project through the end of the cylinder or chamber to the outside, as will be seen in Figs. 2 and 3, in which B' C' D' are the lower ends of the pipes, and *a b c* the upper ends.

The lengths or returns of the pipes are bound to each other and retained in position by bands E, and are supported in their vertical position in the case by their projecting ends inserted in the head thereof, and by a cross-bar, F, Fig. 4, at the front end. The position of the pipes and their relation to each other when in the chamber will be understood on examination of Figs. 3 and 4.

Immediately below the pipes, and longitudinally therewith, is arranged a perforated diaphragm or supplementary bottom, G, Fig. 4. A detached view of the diaphragm is shown in Fig. 5. Said diaphragm is supported in place by plates H, set edgewise and longitudi-

nally therewith, as will be seen in Figs. 3 and 4. The edges of the diaphragm are supported in the case by brackets *d*, attached to the side thereof.

I is a door, whereby access is had to the inside of the case, and which, when closed, is made air-tight by any suitable means. J is an induction-pipe, the purpose of which will hereinafter be shown. L is an eduction-pipe, and M an exhaust-pipe.

As above said, this invention is for freezing oil and extracting therefrom paraffine. To this end the diaphragm G is covered with woolen cloth, duck, or other suitable material or materials for a strainer or filter, and which is so adjusted upon the diaphragm that it may cover its edges along the sides of the case to make tight the joint, and also the ends of the diaphragm in contact with the door and end of the case.

In this apparatus the product of the crude paraffine distillate of petroleum, which has been previously treated for the purpose with sulphuric acid, in the ordinary way, is now put into the case or chamber A through the induction-pipe J, thereby filling, or nearly so, the entire space above the diaphragm covering the pipes. Sometimes this material is again distilled over before being treated with the sulphuric acid. This product just described is now to be frozen by ammoniacal gas, which, by an appropriate apparatus, has been prepared for the purpose.

The receiver in which the gas is held is put in connection with the projecting ends B' C' D' of the freezing-pipes B.

As the gas passes through each system of pipes, it expands and extracts the heat from the oil surrounding them, thereby developing extreme cold by extracting the heat from the oil and other material placed therein for being frozen.

The gas in a free state passes from the pipes through the ends *a b c*, from which it is conducted to the compressor, and again compressed and forced through a cooler, thence into a receiver, from which it passes again into and through the freezing-pipes. Thus a continuous circulation of compressed gas is established through the pipes, continuously

reducing the temperature of the oil until it freezes, and then down to a zero temperature, or about that degree, and below, if necessary, in which condition the oil is fit for being pressed for extracting therefrom the paraffine.

The pressure for this purpose is applied by a pneumatic pump similar to those of the same class in ordinary use, it being simply modified for adaptation to this apparatus; hence no particular description thereof will be necessary; also, the gas compressor and receiver referred to will not be here described, as they form no part of the invention, and which consist of a modification of such as are in use for similar purposes.

By means of the pump alluded to air is forced into the chamber or case through the air-pipe K above and upon the frozen oil. The pressure thus applied expresses the oil through the filtering-cloths and diaphragm into the space below, from which it flows through the eduction-pipe L. The degree of pressure to this end will be determined by the flow of oil, and which pressure may be augmented by the use of an exhaust-pump applied to the pipe M, thereby producing a vacuum in the case below the diaphragm.

After the bulk of the oil is forced out by the pressure, as above described, then a solution or solvent, naphtha, or benzine may be introduced into the chamber, which, with the forced air, will dissolve out and clear off all traces of the oil from the wax. The residuum resulting from this treatment of the oil is paraffine, which may be removed from the case through the door I.

The paraffine thus obtained is found to be very white, solid, and almost entirely free from oil, while the oil is clear and limpid after the separation of the wax or paraffine therefrom.

In place of the pipes D, narrow chambers may be substituted, which will admit the passage of ammoniacal gas through, while surrounded by the prepared material.

The ordinary process of extracting paraffine from oil is by freezing the oil in canisters, by placing around them a freezing-mixture of ice and salt, thereby reducing the oil to about ten or fifteen degrees above zero. The oil thus frozen is taken from the canisters and put into sacks and submitted to the action of a press for extracting the paraffine; which to be successfully done, the oil must be at a much lower temperature than can be obtained by the freezing-mixture. In the act of taking the oil from the canisters and preparing it for the press, its temperature is raised by exposure to the warm air, and especially is this the case during the summer months. This increase of the temperature of the oil prevents the paraffine from being wholly extracted. Much of it still remains in the oil; hence the oil becomes milky at a freezing temperature, in consequence of the paraffine it contains, and the extracted

paraffine will be yellow in consequence of the presence of oil. These difficulties are avoided by the use of the apparatus herein described, as the frozen oil is not removed from the freezer for pressing; therefore it is in no way exposed to the warm air of the work-room, the freezing and pressing being one continuous operation.

In filling the chamber or case, should the oil be in such a fluid condition as to permit it to run through the filter, as might be the case in certain seasons of the year, the pipe J may be provided with a chilling-jacket, which will chill the first of the oil passed into the case and so thicken it that it cannot run through but spread over the filter, and prevent the mass of oil from passing through until subjected to the action of the pump referred to.

The oil by this apparatus can be reduced to a much lower temperature than by a freezing-mixture. It can be easily reduced to forty or fifty degrees below zero, and lower, if necessary.

A modification of the above-described apparatus consists of a case or cylinder, N, Fig. 6, having therein a number of pipes, O, instead of the serpentine pipes B. One end of said pipes O terminates in a diaphragm, P, and opens into a chamber, Q. The opposite ends of the pipes pass through the head H' of the case to a strainer similar to the supplementary bottom G, which may be secured to the case in any desirable way.

In this case the oil is poured into the chamber Q through the pipe I'. From this chamber it flows into the pipes. The gas for freezing the oil therein is inducted into the case through the pipe J'. The gas thus admitted circulates about the pipes and freezes the oil therein. The frozen oil is removed from the pipes by forcing it therefrom by a pneumatic press attached to the chamber Q. The pressure thus applied to the contents of the chamber is exerted on the oil in the pipes, which are forced therefrom upon a strainer, referred to, through which the expressed oil will flow, leaving the paraffine. The diaphragm P should be airtight in its connection with the case.

The apparatus herein described is not new, as it has been used for the manufacture of other materials, as soap and lard, where heat or steam has been employed to melt them, so that they could pass through a perforated diaphragm; but I am not aware that it has ever been employed to effect a separation of oil from paraffine by freezing the paraffine and forcing from it the oil, which cannot be frozen, by means of the atmospheric air so compressed as to produce that result.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The process of separating lubricating-oil and refined paraffine contained in the product of crude paraffine distillate of petroleum in one continued process, by subjecting said product to a freezing temperature, and while in this

