(No Model.)

L. BLOCK.

SEPARATING TANK FOR REFRIGERATING MACHINES.

No. 389,494. Patented Sept. 11, 1888.

Fig 1

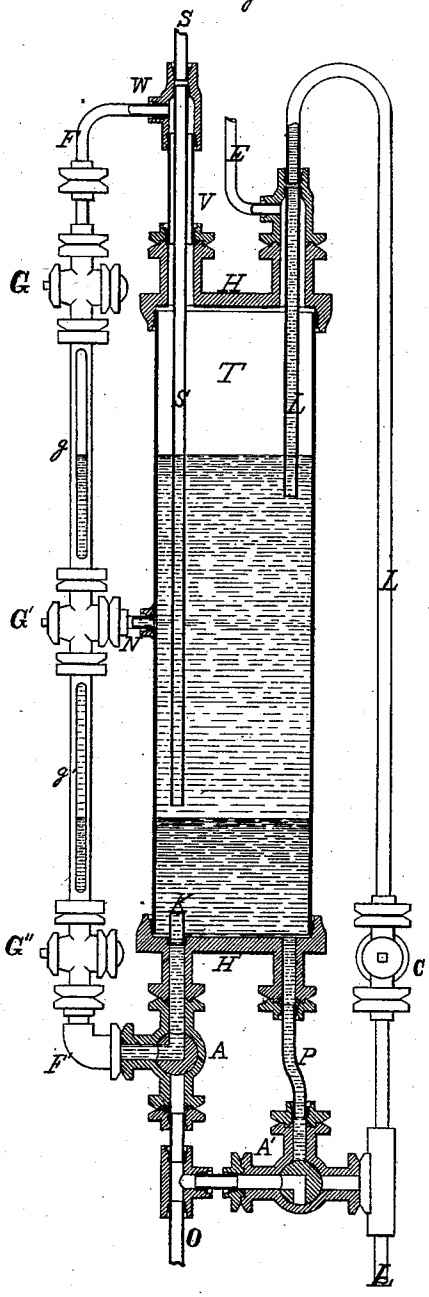
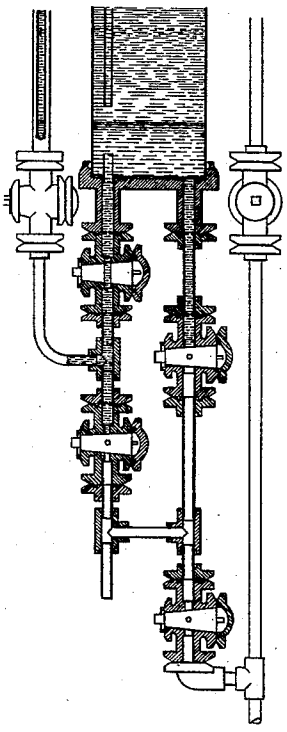


Fig 2



WITNESSES:

J. P. Lamb.

L. M. Gifford

INVENTOR

Louis Block.

BY Hubert A. Banning

ATTORNEY

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

LOUIS BLOCK, OF NEW YORK, N. Y., ASSIGNOR TO THE DE LA VERGNE REFRIGERATING MACHINE COMPANY, OF SAME PLACE.

SEPARATING-TANK FOR REFRIGERATING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 389,494, dated September 11, 1888.

Application filed March 3, 1887. Serial No. 229,515. (No model.)

To all whom it may concern:

Be it known that I, LOUIS BLOCK, a citizen of the United States, and a resident of the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Separating-Tanks for Refrigerating-Machines, &c., of which the following is such a full, clear, concise, and exact description as will enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates more particularly to that class of machines used to make ice or to produce refrigeration, in which the compression and liquefaction of gases take place, and wherein a sealing and lubricating agent is used to seal the valves and moving parts. In such machines the lubricating agent is circulated to a greater or less extent when in contact or combined with the gas or refrigerating agent, and it is essential to effect a separation of the sealing or lubricating agent from the gas or liquefied gas or refrigerant before such agent is admitted to that portion of the system where it is desirable to have it circulate when free from the lubricating agent.

Heretofore in apparatus for making ice or to produce refrigeration a separating-tank was interposed between that part of the machine in which the heat of compression was taken up from the gas, and which is called the "condenser," and the heat-absorbing coil in which the gas was permitted to evaporate and expand and perform its refrigerating work. In the tank so interposed between the condenser and heat-absorbing coil the separation of the lubricating agent from the liquefied gas took place, owing to the difference of the specific gravity of the two fluids, and a connection was made with such tank to allow the oil to be returned to some other tank or receptacle of the system in which the same pressure obtained and which was in a lower part of the system, or else, as in some instances, the lubricating-liquid was allowed to flow into a tank or receptacle in which the pressure was lower than that of the separating-tank. A single pipe leading from the bottom of the separating-tank before referred to was usually connected to both of the receptacles above mentioned. A T-piece was inserted into the pipe leading from the separating-tank close under such tank, and a small pipe connected this T-piece with the lower end of the gage-glass of the tank, while the upper end of the gage-glass was connected with the top of the tank. A stop-cock close to the separating-tank was interposed between such tank and the receptacle in which the same pressure as in the tank obtained, and another stop-cock was placed in that portion of the pipe which connected the separating-tank with the receptacle in which a lower pressure obtained. Whenever it was apparent that some of the lubricating-liquid had collected in the separating-tank, the stop-cock nearest thereto was opened for the purpose of letting the oil drop or run out of the bottom of the tank. After the cock had been open for a few seconds, the oil or lubricating-liquid which prior to the opening of such cock was visible in the gage-glass disappeared. The cock was then closed, as it was supposed that all the lubricating-liquid had run out of the tank; but shortly after the closing of the cock the oil was seen to rise again in the gage-glass, and the height of the column plainly indicated that but very little oil had, in fact, run out. The operation being repeated, it was found that the gage-glass never truly indicated the oil column in the tank during the operation of dropping out the oil, owing to the small quantity of oil within the glass being forced out of it by ejection, which was effected by the rapid descent of the lubricating-liquid in the main pipe and through the T-piece by which the gage-glass was connected with the main pipe. The consequence of this was that it was necessary to estimate the length of time during which the cock, which was situated close under the tank, should remain open. Very frequently it was allowed to remain open too long, and liquefied gas would then flow into the other receptacle, which was intended to contain lubricating liquid and gas only, and from which receptacle the lubricating-liquid was passed through a cooling-coil into another receptacle under a lower pressure, from which or from the receptacle under a higher press-

ure it was pumped or injected into a gas-compressor. The liquefied gas having run from the separating-tank into the oil-receptacle, as before explained, would then follow the course of the oil and be injected into a chamber of the gas-compressor in which at the time a lower pressure was obtaining than the pressure of the oil and liquefied gas, and consequently such liquefied gas would evaporate and absorb heat, thus congealing the oil which was mixed with it. This naturally occasioned much trouble and annoyance, besides depreciating the efficiency of the apparatus.

The object of my invention is to overcome the objectionable features above described and to provide means whereby the oil may be run out of the separating-tank without emptying the gage-glass, and to control the flow of the oil should I want to feed it to the gas-compressors directly from the separating-tank, as well as to have such regulating attachments as will enable me to empty the separating-tank entirely by first allowing the oil to run out into another receptacle for receiving the same, and then allowing the liquefied gas in the separating-tank to run into a pipe communicating with some other part of the system; and to this end my invention consists of a vertical separating-tank in which a lubricating-liquid may be separated from a liquefied gas having a peculiar arrangement of pipe-connections and cocks in combination therewith and with each other, as hereinafter more fully described and claimed.

In the drawings, Figure 1 is a longitudinal sectional view of a separating-tank provided with the necessary connections and attachments for carrying my invention into effect. Fig. 2 is a similar sectional view, on a smaller scale, of the lower part of such separating-tank, showing a modification of the cocks and connections at the lower end thereof.

In the drawings, T represents a metal tube, to the ends of which heads H H′ are secured by means of screw-threads on the exterior of the tube ends and screw-threads in the heads. These heads, as is evident, may be secured to the tube in various ways. They may be of wrought-iron and welded on, or the tube may be flanged at its ends and the heads may be bolted to these flanges. I prefer to secure them as shown. The tube with its heads I shall hereinafter call "tank." These heads H H′ are provided with flanged nozzles or flanged outlets, to which the pipe-connections are made. The side of the tank with the gage-glass I will call the "front" of the tank, because in practice that side is usually, if not always, in front. The pipe S, which runs nearly to the bottom of the tank, enters it through the front top nozzle and conveys to it liquefied gas and oil from a condenser. (Not shown.) Through pipe L, which enters the tank by passing through the rear top nozzle, and which in practice runs to within six inches of the center of the tank, the pure liquefied gas is drawn and led to another part of the system of the refrigerating-plant, of which I assume this tank to be a part. Cock C in pipe L is for the purpose of shutting off the flow of liquefied gas. The pressure in the tank is kept in equalization with the condensing-pressure by means of the annular space around pipe L and the equalizing-pipe E.

Gage-glasses *g g′* are held between flanged stop-cocks G G′ G″ and communicate with the center of the tank through the plug or cock G′ and nozzle N, with the top through cock G, pipe F, T-piece W, and annular space around pipe S, formed by pipe V, and with the bottom of the tank through cock G″, fitting F′, and angle-cock A. Pipe P is the oil-outlet pipe, and is by means of a flange secured to rear nozzle of bottom head of the tank. The lower end of pipe P is secured to angle-cock A′. By means of this cock A′ communication is afforded between the rear bottom nozzle of tank and liquefied-gas pipe L and oil-pipe O. Oil-pipe O may also communicate with the gage-glass through angle-cock A and fitting F′.

The gas-compressing machine which forms part of the same system of which this separating-tank forms a part is put into operation, oil is injected into the compressor, and gas is sucked in from some other part of the system. The oil and gas are discharged from it and either circulate in the presence of each other until they reach the separating-tank, or the oil is separated from the gas while the latter is in its gaseous state, and the gas, with such particles of oil which have not been completely separated, is forced into the condenser, where the gas liquefies and the oil is precipitated. Both fluids pass hence through the pipe S into the separating-tank. Here the oil, by reason of its greater specific gravity, falls to the bottom of the tank, while the liquefied gas rises to the top and flows through pipe L to some other part of the system where a lower pressure is obtaining.

The gage-glasses *g g′* at all times show the height of the oil within the tank, and whenever the tank is not entirely filled show also the height of the liquefied gas within the tank. The oil can now be withdrawn from the tank periodically or in a continual flow, should this be desirable, by turning the plug of the angle-cock A′ in such a position that the pipe P communicates with pipe O, the oil column visible in the gage-glass always indicating correctly the height of the oil column within the tank. Thus with ordinary care the liquefied gas can be prevented from entering the pipe O unless the operator is willing that it should flow into it. Should it for some reason be required to empty the separating-tank both of the lubricating-liquid and the liquefied gas, it will only be necessary to close the stop-cock on pipe S, (not shown in the drawings,) and, after having withdrawn all the oil through pipe P and pipe O, to turn the plug of angle-cock A′ in such a way that pipe P communicates with pipe L and lets the liquefied gas pass through pipe P, through angle-cock A′, into pipe L.

K is a pipe-nipple screwed into the inner opening of the front nozzle or bottom head of the tank, and is for the purpose of preventing dirt or scale entering the pipe communicating with the gage-glass. Should the gage-glass or the passage leading to it still become closed up with dirt or other foreign matter, the plug in angle-cock A will be turned so that the fitting F communicates through the plug with pipe O. The liquid in the glass will then rush down and clear the passage. Should the pressure of the liquid column alone not be sufficient, then pipe O can be put into direct connection with a tank or receptacle under a lower pressure than that obtaining within the separating-tank and the gage-glass and its passage-way can be cleaned by blowing out.

Fig. 2 is the lower part of the tank in section on a smaller scale, and shows how the same result can be accomplished as by the mode of construction shown in Fig. 1. Four straight-way cocks are here used instead of two angle-cocks. I prefer to use the mode of construction shown in Fig. 1.

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

1. A tank or receptacle for the separation of a lubricating-liquid from a liquefied gas having two openings at its bottom, in combination with a gage-glass, a cock adapted to make communication between one of such openings and said gage-glass, a pipe leading from below said cock, another pipe leading from the other opening in said tank, and connections between said two pipes, substantially as and for the purpose set forth.

2. In a system for producing refrigeration, a separating-tank having two openings at its bottom, in combination with a pipe adapted to introduce a lubricating-liquid and gas liquefied in a condenser into said tank, a pipe by which the pressure in said tank is equalized with the pressure in the gas-condenser, a pipe by which the liquefied gas is withdrawn from said tank, a gage-glass and connections communicating with one of the openings at the bottom of said tank, a pipe leading below the point where said gage-glass communicates with said opening, and another pipe-connection with the other opening in the bottom of said tank and having communication with the pipe leading below said gage-glass connections, substantially as and for the purpose set forth.

3. In a system for producing refrigeration, a tank or receptacle for separating a lubricating-liquid from a liquefied gas, said tank being provided with an opening at its bottom, in combination with a gage-glass having communication with said opening and with said tank above said opening, a pipe leading below the point of communication between said gage-glass and said opening, and a cock or cocks adapted to shut off such communication and to make communication between said gage-glass and said pipe, whereby said glass may be cleaned by blowing out, substantially as described.

LOUIS BLOCK.

Witnesses:
J. P. LAMB,
MARTIN RILKE.