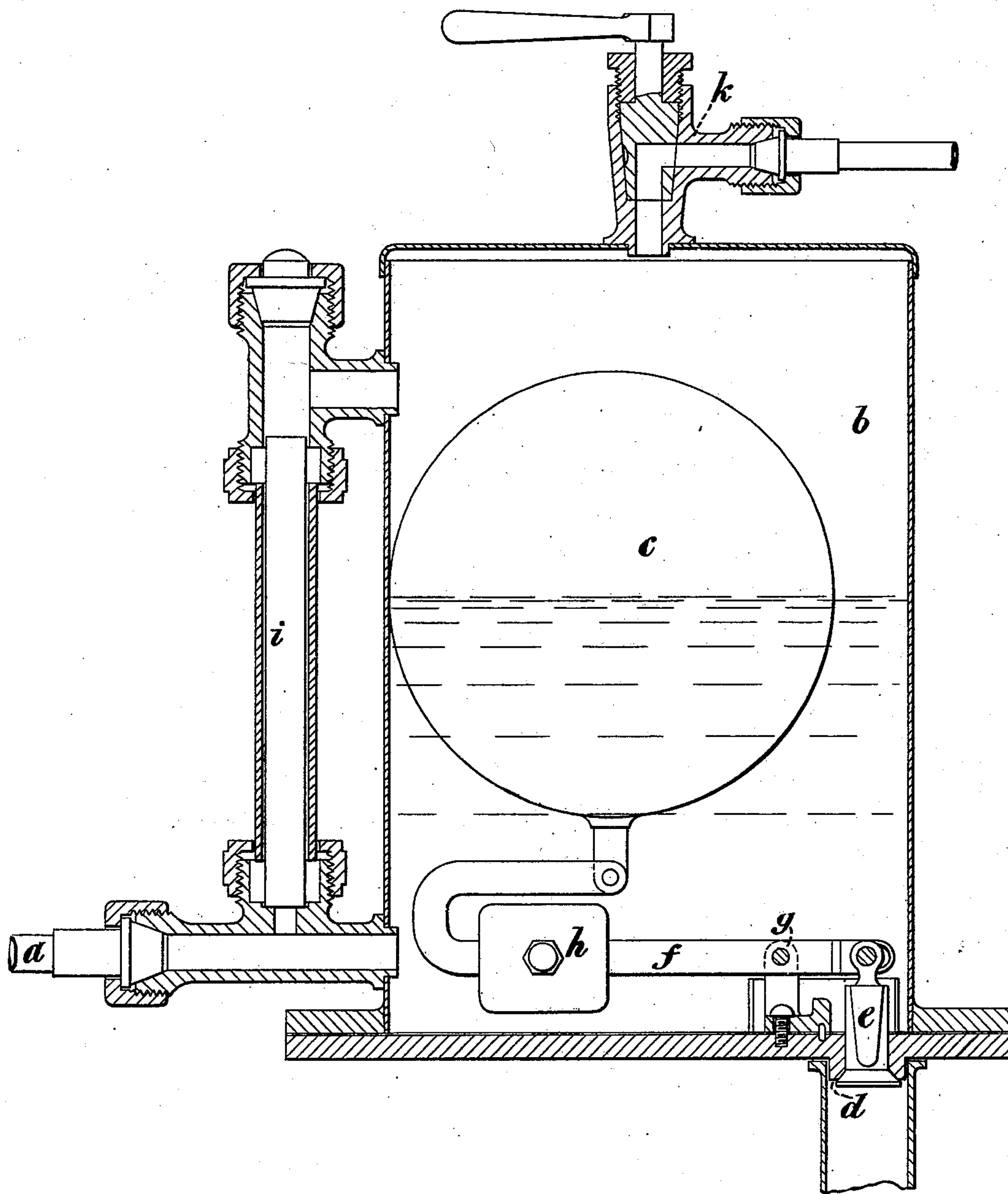


J. SIDDELEY & F. N. MACKAY.  
Ether Meter for Refrigerating Machines.

No. 208,045.

Patented Sept. 17, 1878.



Witnesses

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# UNITED STATES PATENT OFFICE.

JOHN SIDDELEY AND FREDERICK N. MACKAY, OF LIVERPOOL, ENGLAND.

## IMPROVEMENT IN ETHER-METERS FOR REFRIGERATING-MACHINES.

Specification forming part of Letters Patent No. **208,045**, dated September 17, 1878; application filed May 20, 1878; patented in England, January 20, 1869.

*To all whom it may concern:*

Be it known that we, JOHN SIDDELEY and FREDERICK NOEL MACKAY, both of Liverpool, in the county of Lancaster, England, have invented a new and useful Improvement in Ether Meters or Regulators for Refrigerating Machines, for which English Patent No. 178 of 1869 was granted to us, and of which the following is a specification:

The object of this invention is to provide apparatus or appliances which shall act automatically to regulate or control the supply of liquid ether passing from the condenser to the evaporating or vacuum chamber or chambers of refrigerating-machines, so as to allow the said liquid ether, as fast as it is condensed, to flow into the said evaporating or vacuum chamber or chambers, and yet prevent a partial vacuum from being formed in the condenser.

For the above purpose we employ, in combination, a valve or valves, opening with the pressure and toward the said evaporating or vacuum chamber or chambers, and a float or floats connected together by a lever or levers. The said float or floats is or are placed in a chamber or chambers into which the liquid ether flows from the condenser or condensers. The said liquid ether, as it flows into the said chamber or chambers, acts on the float or floats so as to open the valve or valves and allow part of the said liquid ether to flow into the evaporating or vacuum chamber or chambers.

The accompanying drawing is a sectional elevation, showing one way of constructing our improved apparatus or appliances.

*a* is a pipe leading from the condenser to the vessel *b*, which contains the float *c*, here formed of a hollow metal ball. *d* is a passage, closed by the valve *e*, leading to the evaporating or vacuum chamber. The float *c* and valve *e* are connected together by the lever *f*, working on the fulcrum *g*. The lever *f* is shown provided with a sliding weight, *h*, whereby the height of the liquid ether in *b* necessary to raise the float *c* and operate the valve *e* may be adjusted.

It will be obvious that the passage from

the condenser to the evaporating or vacuum chamber will always be closed by the presence of the liquid ether in the vessel *b*, and that all the liquid ether beyond the quantity necessary to seal the passage will flow past the valve *e* into the evaporating or vacuum chamber.

It is also obvious that, as the valve *e* opens into or toward the vacuum or evaporating chamber on one side and sustains the weight of the liquid ether in the vessel *b* on the other, the function of the weight *h* is to keep the valve closed against this pressure; and that it must be so adjusted that when the liquid ether in the vessel *b* has reached the desired height the buoyancy of the float, aiding the pressure on the valve, will overbalance the weight and permit the valve to open; and as the accretion of the liquid ether in the chamber *b* is gradual, the supply to the vacuum-chamber is in like manner gradual and continuous, it flowing in a steady stream, and not in a spasmodic or intermittent way. This is demonstrated daily in the machines we now have in use, the valve never closing during the operation of the machine, but accommodating the size of the opening exactly to the size of the stream of liquid ether flowing through it, and thereby completely sealing the passage and preventing the formation of a partial vacuum in the condenser. It also prevents the hammering and jarring of the valve-seat and valve, and the consequent wear and imperfect operation of the machine.

It is also obvious that the explosions produced by excessive or undue pressure in the condenser, which are matters of known and not infrequent occurrence, cannot take place in our machine, because any such pressure in the condenser is immediately relieved by the opening of the valve thereunder.

In other known constructions of ice-machines this danger is always present, because such pressure closes the valve or cock, as the case may be, and prevents the relief of the condenser.

*i* is a gage-glass, showing the height of the liquid ether in the vessel *b*. *k* is a cock and pipe leading to the evaporating or vacuum



chamber, which is opened when it is desired to remove by evaporation all the ether from the vessel b.

What we claim is—

In a meter for automatically regulating the flow of the refrigerant in refrigerating-machines, the combination of a valve opening with the pressure and seated in the vacuum-

chamber or pipe, a weighted lever and a float attached thereto, substantially as and for the purposes hereinbefore set forth.

JOHN SIDDELEY.

FREDK. N. MACKAY.

Witnesses:

J. KING,

J. JOHNSON.

1,000 words