(No Model.)

2 Sheets—Sheet 1.

G. H. STODDARD.

REFRIGERATING AND DRYING MACHINE.

No. 267,806. Patented Nov. 21, 1882.

FIG. 1.

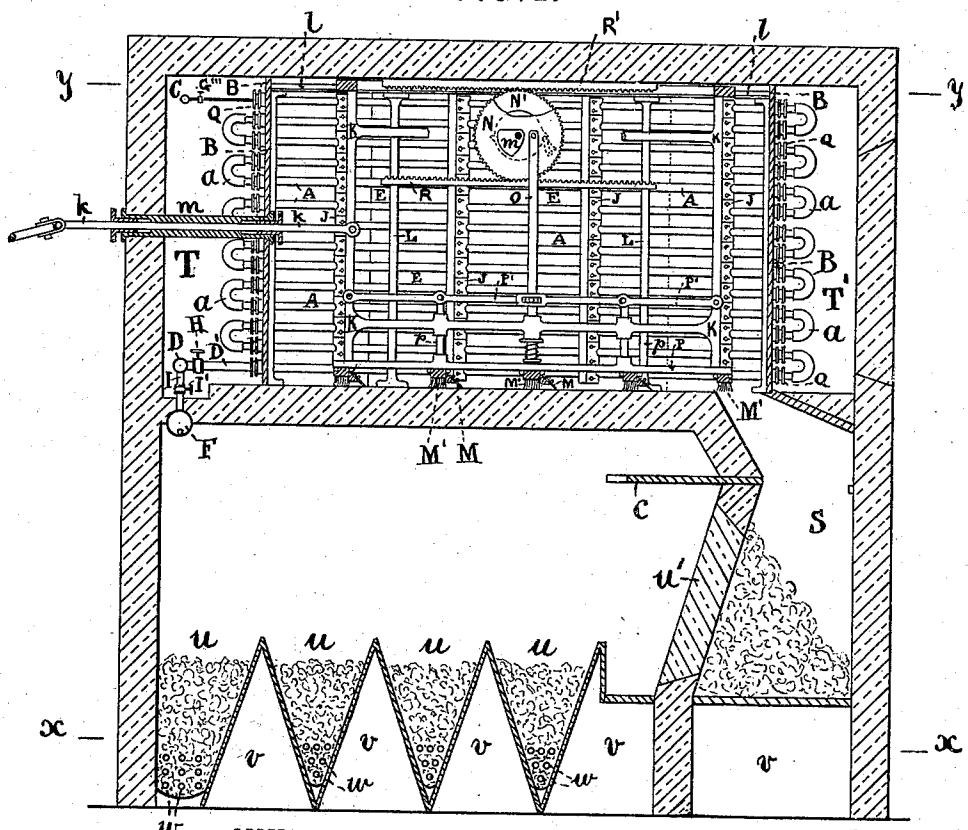
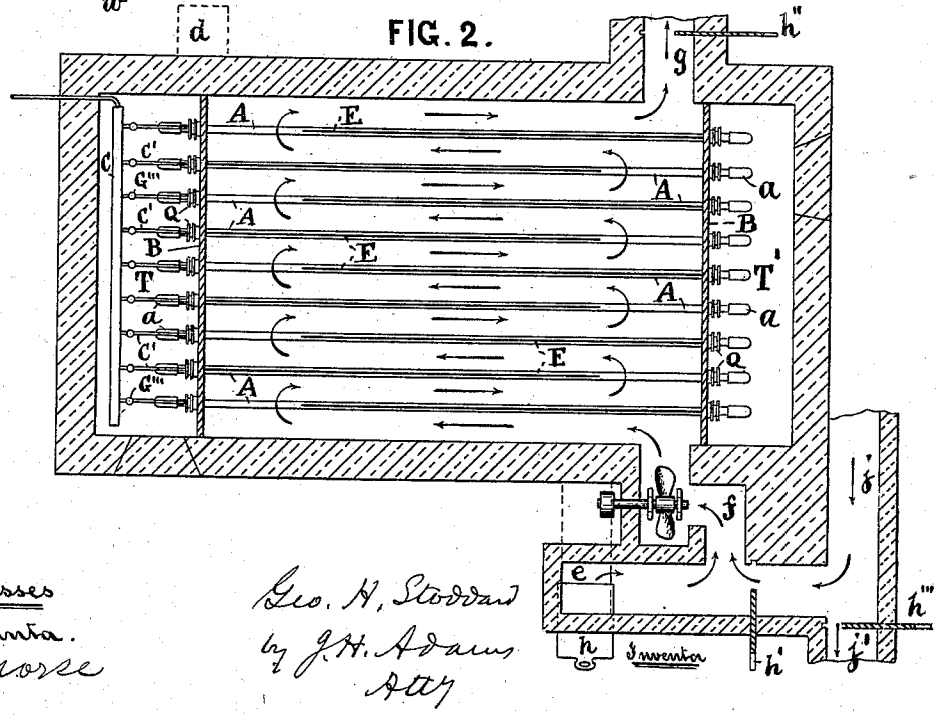


FIG. 2.



Witnesses
L. Blanta.
B. Morse

Geo. H. Stoddard
by J. H. Adams
Atty

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

(No Model.) 2 Sheets—Sheet 2.

G. H. STODDARD.

REFRIGERATING AND DRYING MACHINE.

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FIG. 3.

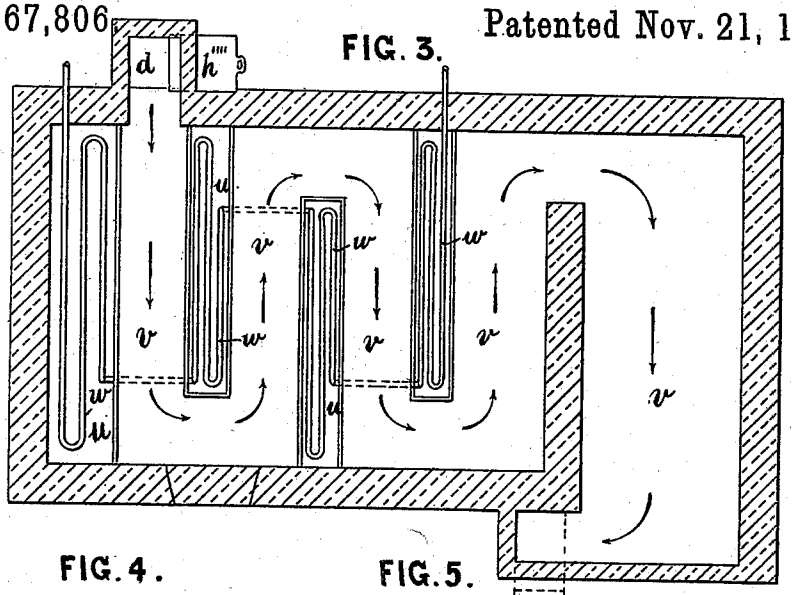


FIG. 4.

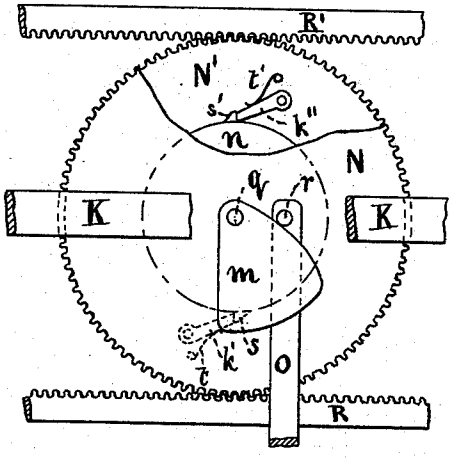
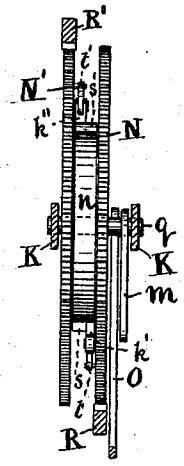


FIG. 5.



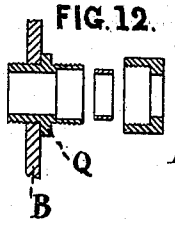


FIG. 12.

FIG. 7

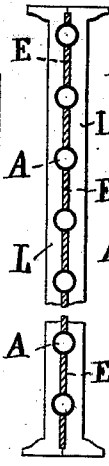


FIG. 6

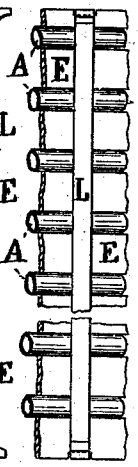


FIG. 8.

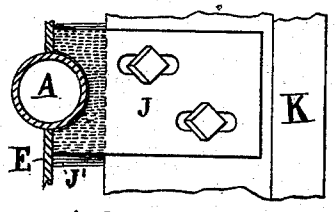


FIG. 9.

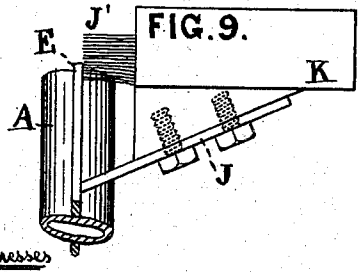


FIG. 10.

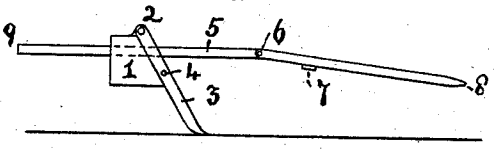
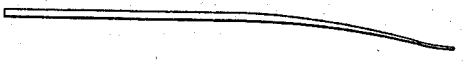


FIG. 11.



Witnesses
E. Blanta.
B. Morse

Inventor
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by J. H. Adams
Atty

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

UNITED STATES PATENT OFFICE.

GEORGE H. STODDARD, OF BOSTON, MASSACHUSETTS.

REFRIGERATING AND DRYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 267,806, dated November 21, 1882.

Application filed February 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. STODDARD, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Refrigerating and Drying Machines, of which the following is a specification.

My invention relates to an improvement in machines for refrigerating or freezing meats, fruits, &c.

In machines where refrigeration is accomplished by passing air over and in contact with pipes through which flows some refrigerating-fluid—such as ammonia, sulphurous-acid gas, &c.—certain difficulties occur which are necessary to be overcome before satisfactory refrigeration is effected. These difficulties are as follows: first, that of keeping the pipes free from frost or snow which accumulates on them, (if not removed,) caused by the condensation of the moisture in the air passing over them; second, that of making the joints and valves to the pipes so tight that they will not leak, or of so arranging the same that if they do leak the escaping fluid will not contaminate the air, and thus injure the articles subjected to refrigeration; third, the difficulty of admitting fresh air to the room or building under refrigeration without raising the temperature of the same. The pipes through which the refrigerating-fluid flows have been arranged in coils in the form of a wheel and rotated; but it is found in practice impossible to convey the refrigerating-fluid into these wheels through the hollow axles, which are required, without the escape of the fluid; and, again, the weight of the wheel is such as to rack the pipes to such an extent as to cause the joints to be constantly working loose, thus allowing the escape of the fluid, to the injury of the articles exposed to the same. Again, in the system of brushing the coiled pipes above referred to they are not kept free from snow, and consequently poor refrigeration is the result.

It is the object of my invention to overcome the difficulties above mentioned; and to this end it consists in so constructing the stacks of pipes as to obviate the liability of leaking, and in so constructing the cold room containing the pipes that if by any chance a leak should occur there is no possibility of the escaping fluid contaminating the air in the cold room. I further employ brushes and scrapers for keeping the pipes free from snow, so arranged and operating as to prevent any injury to the pipes.

The invention further consists in a means for automatically removing the snow from the floor beneath the stacks of pipes, so as to utilize the same in the process of refrigeration.

The invention further consists in a means of admitting fresh air to the room or building under refrigeration without raising the temperature of the same.

Referring to the accompanying drawings, Figure 1 is a longitudinal vertical section of an apparatus embodying my invention. Fig. 2 is a horizontal longitudinal section on the line *y y* of Fig. 1. Fig. 3 is a horizontal longitudinal section on line *x x* of Fig. 1. Figs. 4 to 12 are enlarged views in detail of parts of the apparatus.

The refrigerating apparatus is built in two stories, the upper or cold-air room containing a series of pipes, A A, extending lengthwise of the same, and connected together at their ends by means of curved coupling-pipes or elbows *a a*, so as to form a continuous passage through the said pipes for the refrigerating-fluid, which enters at the small pipe or manifold C and passes out at the large pipe or manifold D, from whence it is conducted back to the condensing-pump. At or near the ends of the straight portions of the pipes A A, on each end of cold room, are placed partitions B B, leaving spaces T T′, as shown. These partitions are made of metal or other suitable material, into which, on the outside, are secured stuffing-boxes Q, (see Fig. 12,) or the stuffing-boxes may be cast with the partitions. The ends of the pipes A A are connected to the curved pipes or elbows *a a* on the outside of the partitions B B, there being no joints or connections in the space between the said partitions, so that should there be any escape or leakage of the refrigerating-fluid at the joints or valves it cannot come in contact with the air between the partitions. The spaces between the pipes A A are closed alternately the greater part of their length by means of thin bars or plates of metal or other suitable material, E E, (see Figs. 2, 6, and 7,) arranged as

shown, so as to cause the air to take the direction indicated by the arrows, the air entering at *f*, Fig. 2, and passing to the box or passage *g*, and thence to the room under refrigeration. The pipes A A, with the bars or plates E E, are supported upon standards L L, which are cast in halves and bolted together, thus allowing the pipes and bars to expand and contract independently of each other.

The frost which collects on the pipes A A is cleared off by means of scrapers and brushes J J′, (shown enlarged in Figs. 8 and 9,) connected to a frame, K K, which slides upon guides *l*, and to which motion is imparted by a rod, *k*, passing through a long stuffing-box, *m*, and operated by any suitable power. The scrapers J are of the form shown in Fig. 8, having a sharpened curved edge fitting over the pipe A, but not in contact with them, and having dull straight edges that move in contact the bars or plates E. The scrapers J are adjustably attached to the frame K, and arranged at an angle with the pipes A, so as to prevent the snow from packing against the plates B. The brushes J′ are arranged at the rear of the scrapers and act in conjunction with them. The snow, as it falls upon the floor of the upper story, is carried by the scrapers and brushes N N′ into a box or receptacle, S, the said scrapers and brushes being so arranged and operated that they are in contact with the floor when moving toward the box S, but are raised up when moving in the opposite direction. The scrapers and brushes are connected to a bar, P, which is attached to the bar O, the latter being operated by a cam, *m*, as hereinafter described.

p are guides for the bar, and are connected to the same at one end and to the levers P′ at the other end. The levers P′ are pivoted to the frame K at one end, and are provided with a long slot in the other end, as shown, for a stud on the bar O to work in, so that when the said bar is raised it will elevate the scrapers and brushes, and when the bar O is down they will rest upon the floor. The manner of operating the rod O is shown in Figs. 4 and 5. The cog-wheels N N′ turn loosely on an axle, *q*, the wheel N gearing with the lower rack, R, and the wheel N′ gearing with the upper rack, R′. The racks R R′ are stationary, being attached to the ceiling of the room. Upon the axle *q* are tightly keyed a cam, *m*, and a wheel, *n*, upon the periphery of which latter are two teeth or stops, *s s*′. The axle *q* is supported in the frame K and moves with it. On the inner side of the wheel N is a pawl, *k*′, which is held against the periphery of the wheel *n* by a spring, *t*, and on the inner side of the wheel N′ is also a pawl, *k*″, and spring *t*′. The circumference of the cog-wheels N N′ is just twice as great as the distance through which the frame K moves in one direction When the frame K is farthest to the right and about to return the cogged wheels, cams, &c., are in the position shown in Figs. 4 and 5. When the frame K begins to move to the left the wheel N is rotated by the rack R, causing the pawl *k*″ to engage with the tooth *s*, and thus rotate the wheel *n* and with it the cam *m*, which raises the pin *p*, and, through the connecting rod or bar O and the lever P′, the scrapers and brushes M M′. The scrapers and brushes are kept raised until the frame is carried to the side of the cold room farthest to the left, when the position of the cam *m* is such as to permit the pin *p* to fall, and with it the brushes and scrapers. While the frame K is moving toward the left the rack R′ causes the wheel N′ to move in an opposite direction to the wheel N, and the pawl *k*′ slips over the wheel *n*; but when the frame K begins to move to the right the pawl *k*′ engages with the tooth *s*′ and rotates the wheel *n* and cam *m* until they come in position to raise the pin *p* and its connections, and so the operation is repeated at each stroke of the frame K. When the receptacles S are to be emptied of snow the slide *c* is closed and the snow is passed through the door or opening *u*′ and thrown into the boxes *u u*. There are as many boxes or receptacles S as there are spaces between the stacks of pipes A, the partitions of the same coinciding with the stacks of pipes. The boxes *u u* are so arranged that the melted snow can be readily drawn off. In the bottoms of the boxes *u u* are coils of pipes *w w*, through which flows the water used to cool the gases in the condenser, which is of ordinary construction, and not shown in the drawings. The refrigerating-fluid is distributed to the different stacks of pipes through the pipe or manifold C and the pipes *c*′, which latter are provided with valves G‴. After passing through the stacks of pipes, the fluid passes through pipes D′, which are provided with valves H, into the pipe or manifold D, whence it is conducted back to the condensing-pump.

Beneath the manifold-pipe D is arranged a receptacle, F, connected with said pipe at each end for catching any solid or liquid deposit from the refrigerating-fluid, which deposit can be removed, as desired. The several chambers or compartments are provided with suitable openings and doors for convenience of access.

In Fig. 2 is shown an arrangement of boxes and slides for regulating the admission of air to the cold-air chamber. *j* is a box by which the warm air returns to the cold room from the rooms under refrigeration. *j*′ is a box leading to the open air to carry off warm air, as desired. *d* is a box for admitting fresh air from the outside of the building. The slides *h*′ *h*″ *h*‴ are so arranged and adjusted that more or less of the warm air from the rooms can be let out of the building and replaced by fresh air. When fresh air from outside the building is to be used it enters through box *d* and passes through the boxes *v*, where it is cooled by the snow in the boxes *u*. It then passes by the box *v* up box *e*, and, mingling with the warm air from the rooms, is drawn

through box *f* by means of a fan and forced into the cold chamber, through which it circulates and passes off to the rooms under refrigeration by the box *g*.

Where a less expensive machine is desired the arrangement above described for operating the scrapers and brushes may be dispensed with and the device shown in Fig. 10 substituted, in which case the block 1 is fastened directly to the frame K; and to this block 1 is attached a scraper, 3, (or a brush, or both,) by a hinge, 2. 5 is a guide hinged at 6, (or a spring, as shown in Fig. 11,) the hinged portion being prevented from falling too low by a support, 7. The guide 5 is so placed that when the scraper 3 passes forward the pin 4 raises the hinged portion of the guide, passes beyond it, and allows it to fall. When the scraper moves backward the pin 4 strikes above the point 8 and slides upon the guide, lifting the scraper and holding it above the floor until the pin returns to the end, when it drops off the guide and permits the scraper to again touch the floor.

The pipes A are shown as being placed horizontally; but they may be arranged vertically and be made of a single length of pipe to form the stack.

What I claim as my invention is—

1. The combination, with the pipes A, provided with the bars or partitions E, of the scrapers and brushes, the scrapers being in contact with the partitions but not with the pipes, substantially as set forth.

2. The combination of the cogged wheels and racks, an intermediate wheel provided with teeth actuated by a pawl and a cam, with a sliding frame provided with scrapers and brushes, whereby the said frame is intermittently raised and lowered as it moves forward and back, substantially as set forth.

3. The chambers V, in combination with the boxes *u*, containing snow, as and for the purpose set forth.

4. The combination of the manifold D, pipe I, and receptacle F, as and for the purpose set forth.

5. The combination of the supports L, the pipes A, and bars or partitions E, as and for the purpose specified.

6. The combination, with the tubes A, of the adjustable scrapers L, constructed with the semicircular edge and two straight edges, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE H. STODDARD.

Witnesses:
JOS. H. ADAMS,
E. PLANTA.