

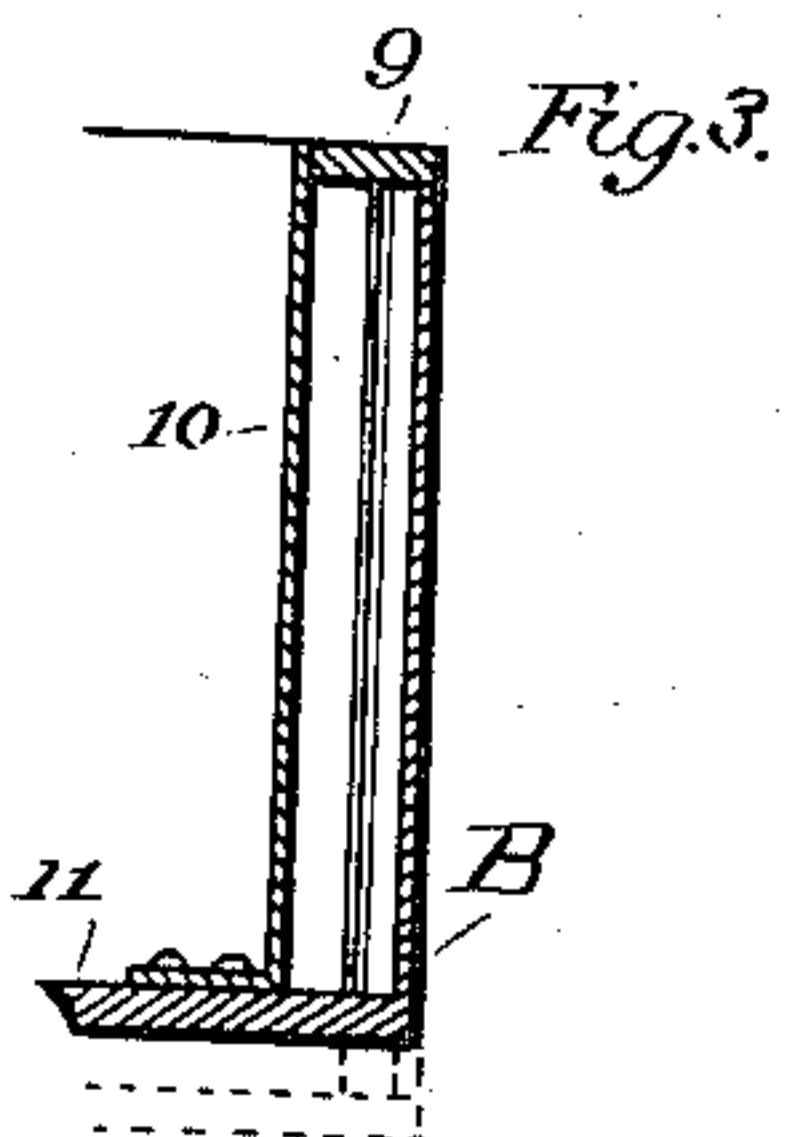
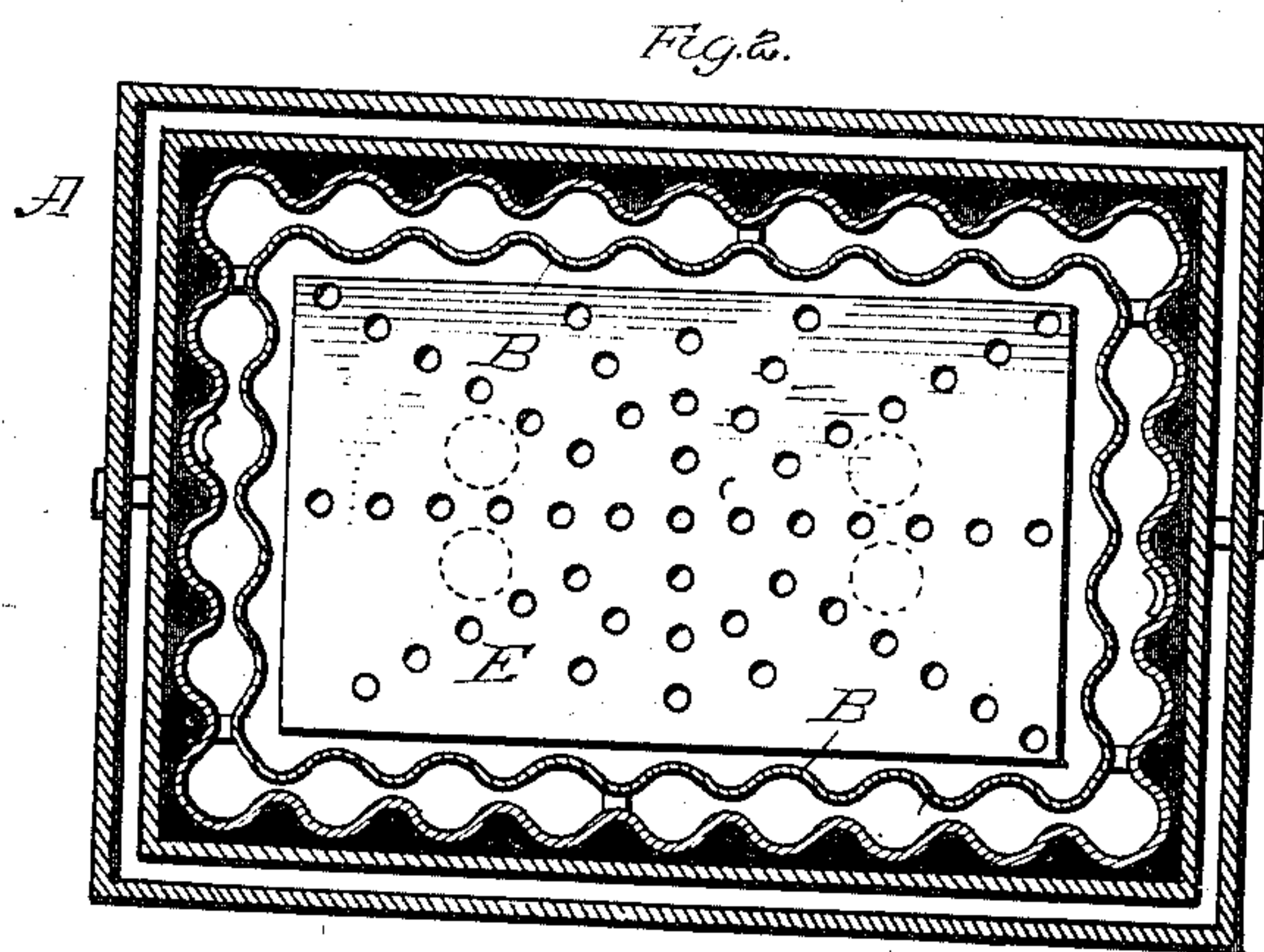
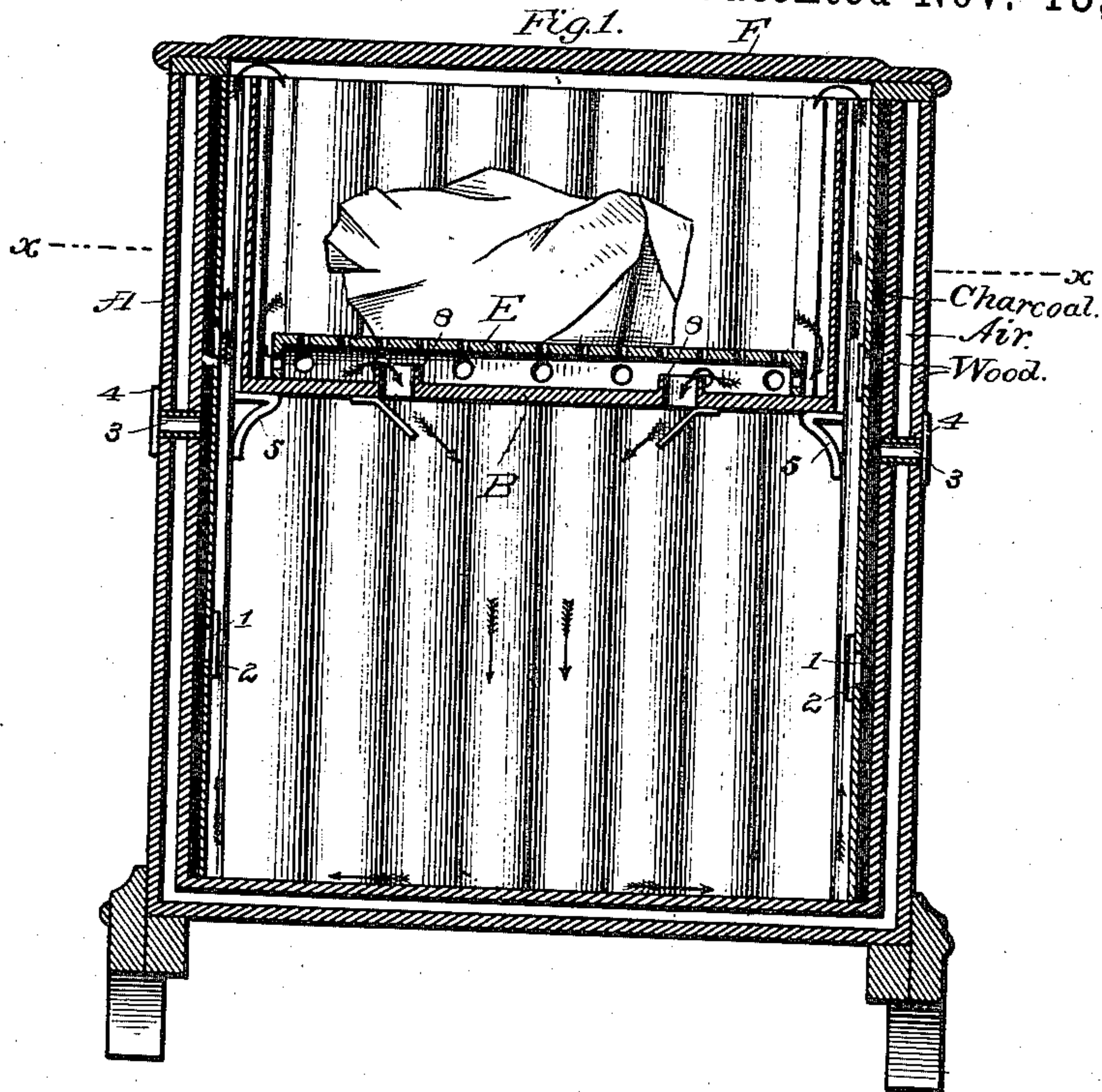
(No Model.)

H. H. & H. T. LOVELL.

REFRIGERATOR.

No. 288,583.

Patented Nov. 13, 1883.



Attest:

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UNITED STATES PATENT OFFICE.

HENRY H. LOVELL AND HOMER T. LOVELL, OF IONIA, MICHIGAN.

REFRIGERATOR.

SPECIFICATION forming part of Letters Patent No. 288,583, dated November 13, 1883.

Application filed February 13, 1883. (No model.)

To all whom it may concern:

Be it known that we, HENRY H. LOVELL and HOMER T. LOVELL, of Ionia, in the county of Ionia and State of Michigan, have invented a new and useful Improvement in Refrigerators; and we do hereby declare that the following is a full, clear, and exact description of the same.

Our invention relates to improvements in refrigerators of that class in which the ice-box is located above the provision-chamber, and communicates with the latter by means of passages up which the warm air rises to be cooled and is afterward discharged into the provision-chamber again.

In this class of refrigerators, which are calculated to maintain a circulation of air from the ice to the provision-chamber, it is desirable for the best operation that the currents should be unobstructed either by contact of currents flowing in opposite directions or by tortuous or partially-obstructed passages. Further, it is desirable that the air should have free and direct passage upward from all points when there is greatest tendency to maintain a higher temperature within the provision-chamber; and it is also desirable, for the certain maintenance of a circulating current, that the ascending warmer currents should not impinge too closely or in too thin sheets against the cold sides of the ice-box, since the currents would thereby be chilled and fall directly back in greater or less degree.

Heretofore refrigerators have been devised with tubes and passages leading up at one end over the ice-box to conduct the air partially warmed in the provision-chamber, and from the ice-box air-passages at the other end conducted the cool air back to the provision-chamber. In other cases the ascending air-passages have been provided at both ends, and a central opening in the ice-box for the descending and cooled air.

We aim to give a more direct, uniform, and unobstructed ascending current, and corresponding free and uniform descending current; and to this end our invention consists, partly, in combining with an exterior case or box an ice-box having an open top, and air-passages on all sides of such ice-box, and discharge-

openings in the bottom of the ice-box, situated at points between the center of such bottom and the edges; further, in the peculiar corrugated linings to the provision-chamber and ice-box; further, in the construction of the ice-box and tray for holding the ice; further, in the novel ventilating devices; and, finally, in various details of construction, combinations of parts, and special improvements, all fully hereinafter described and claimed.

In the drawings, Figure 1 is a vertical section. Fig. 2 is a horizontal section on line *x* of Fig. 1; Fig. 3, a sectional detail view.

A represents a box, case, or cabinet of ordinary form, having short supporting-legs, a hinged door or doors in front, and a hinged cover or covers at top. The box has double front, side, rear, and bottom walls, forming a continuous dead-air space except at the point where an opening is made for the door.

Within the inner wall of the refrigerator is a vertically-corrugated lining, which extends entirely around the same and from top to bottom, with the exception of course of the opening for the door. The space between the inner wooden wall and the corrugated lining is filled with some good non-conducting and absorbent material. Openings 1 1, covered by adjustable slides 2 2, form passages from the interior of the refrigerator into the space fitted with non-conducting and absorbent material, and openings 3 3, closed by slides 4 4, form passages from the filling into the dead-air space and through the outer wall to the atmosphere. We prefer, however, to connect the filling with the external air by short tubes passing through the dead-air space. The purpose of the openings 2 2 is to absorb the gases generated in the provision-chamber, while the openings 3 3 serve to ventilate the filling and permit the absorbed gases to escape.

The lower and central part of the interior of the case forms the provision-chamber, within which may be placed any suitable arrangement of shelves and racks.

The ice-box B rests upon cleats or brackets in the provision-chamber, and we prefer to construct such box of corrugated metal, as shown. The ice-box extends up nearly to the top of the refrigerator, and is of slightly less

length and breadth than the walls of the case which surround it, so that a continuous air-passage is formed between the adjacent walls of the ice-box; but if reasonably deep corrugations be used, the ice-box may extend to the apexes of the corrugations, leaving the grooves for the air-passages. In these the air flows up in comparatively deep streams, with only small part in contact with the outer surface of the ice-box. The whole top of the ice-box is open, so that the air rising upon all sides flows over the edge directly into contact with the ice. The ice is placed upon a shallow inverted tray, E, having vertical sides perforated with a row of holes, and has preferably a perforated top. We may, however, construct the ice-box with double walls and bottom, as shown in Fig. 3. In this construction a strip of wood, 9, is fitted to the inner side of the box at the top, and to this is attached a plate or wall, 10, of thin sheet metal, provided with a flange at the bottom thereof, which may be attached to the false bottom 11 of the ice-box. By this means a dead-air space is formed, and tends to retain the cold imparted by contact with the ice.

The passages for the ascending currents having been provided for to the best advantage, it is sufficient to arrange passages for the descending currents at any point where they will not interfere with the ascending currents. Openings for that purpose have heretofore been made at the center of the ice-box; but in order to give free downward passage of the cold air and to distribute it uniformly over the articles in the provision-chamber, we make two or more discharge-holes in the bottom. If only two holes are made, they should be about equidistant between the center and ends of the box. If several holes are made, they should be distributed about the bottom, not approaching too near the walls. The openings are provided with upturned flanges 8, to prevent the melted ice from dripping down into the provision-chamber, and we may provide such openings with deflectors to direct the air, as it is discharged, toward the center of the provision-chamber.

The cover F is of any suitable construction, and, as well as the door of the provision-chamber, should be of double thickness, suitably lined with a non-conductor.

By this construction the comparatively warm air in the provision-chamber is carried directly to the ice-box. As the air nearest the sides is heated first, its tendency is to rise upon all sides in thin streams, and if sufficient inlet is provided it will pass into the ice-box in direct lines without having been carried through all parts of the provision-chamber in search of a single inlet at a particular point. In our refrigerator this is accomplished by the air-space, which entirely surrounds the ice-box, to which the warm air rises directly close to the side walls, the corrugated shape

of such walls forming deep channels for the currents, and prevents them from coming in such close and direct contact with the ice-box, which would tend to chill the air and cause it to fall back without flowing over the edge into the box. The openings in the bottom of the ice-box, which discharge the cooled air again into the provision-chamber, must be so placed with relation to the side passages that the descending shall not interfere with the ascending currents; and in order to provide for the proper uniform discharge of air entering the ice-box upon all sides, it is necessary to provide several openings at proper points in the bottom. Such openings may be placed, as shown in the drawings, about equidistant from the center and edges of the bottom; or they may be distributed about in the bottom a little distance from the sides, so as not to interfere with the ascending currents at the sides. In our device, therefore, we not only obtain the advantages resulting from a direct entrance in vertical lines of the warm air nearest all four walls of the provision-chamber, but we secure, also, the continuous and uniform discharge of such air, thoroughly cooled, into the provision-chamber at points within the ascending currents, so that the circulation is rendered uniform throughout the whole extent of the refrigerator.

The melted ice may be led off by a drip-pipe, 10, connected to the ice-box, and running down inside the provision-chamber.

We are aware that an ice-box located above the refrigerator, with central openings in its bottom and side passages for the ascent of the air, is not new. The distinction in this case is this: When passages are provided on one or two sides only, the central downward current of cold air, spreading out on the bottom, meets on one or two sides only flues for direct ascent. On the other sides it meets the wall and is turned aside. This causes something more than mere lack of uptake. It causes eddies in the lower part of the provision-chamber, and impedes thereby the circulation, at best inclined to be sluggish.

Having thus described our invention, what we claim is—

1. The combination, in a refrigerator, of the open-top ice-box located above the provision-chamber, an unobstructed space on all sides of the ice-box, forming air-passages from the provision-chamber to the ice-box, and air-passages in the bottom of the ice-box, between the center and edges, leading directly to the provision-chamber.

2. The combination of the case A, having the corrugated lining, the ice-box having open top and corrugated sides, the continuous air-flue between the ice-box and the corrugated lining, and discharge-openings in the bottom of the ice-box.

3. The combination of the case A, the corrugated lining, the non-conducting filling, the

openings from the interior into such filling, and the removable covers to such openings.

4. The combination of the box or case, the inner metallic lining, the non-conducting filling, and openings connecting such filling with the external air, such openings being provided with removable covers.

In testimony whereof we have signed our

names to this specification in presence of two subscribing witnesses.

HENRY H. LOVELL.
HOMER T. LOVELL.

Witnesses:

CHARLEY D. PARKS,
LEWIS V. DEAN.