(No Model.) 2 Sheets—Sheet 1.

F. O. MATTHIESSEN & W. E. QUIMBY.

VENTILATED STORAGE SHED.

No. 537,986. Patented Apr. 23, 1895.

Fig. 1

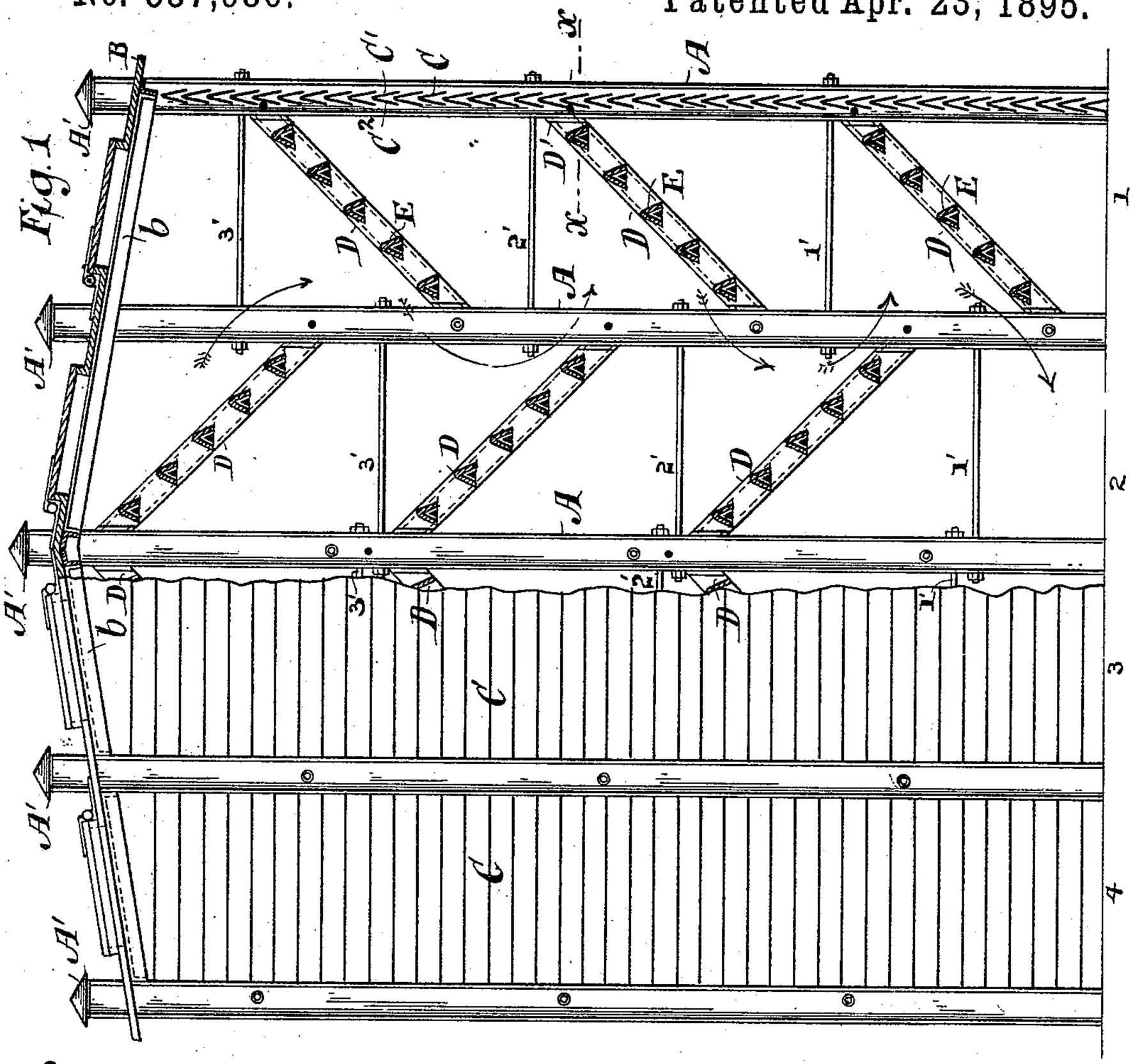

Fig. 3

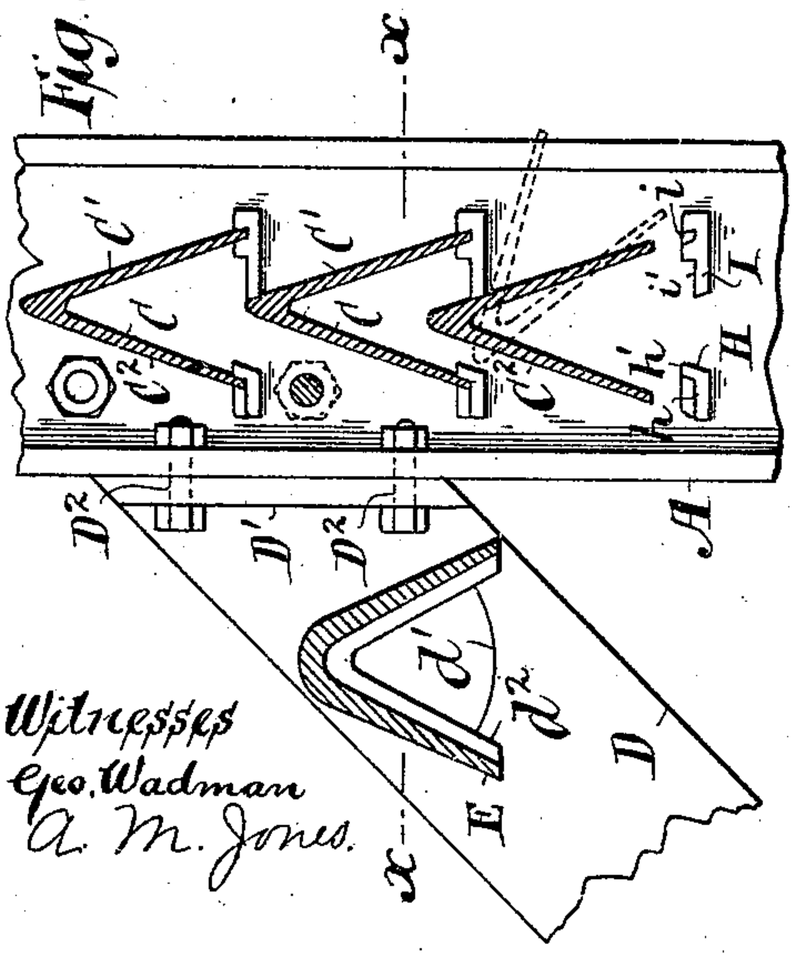

Fig. 2

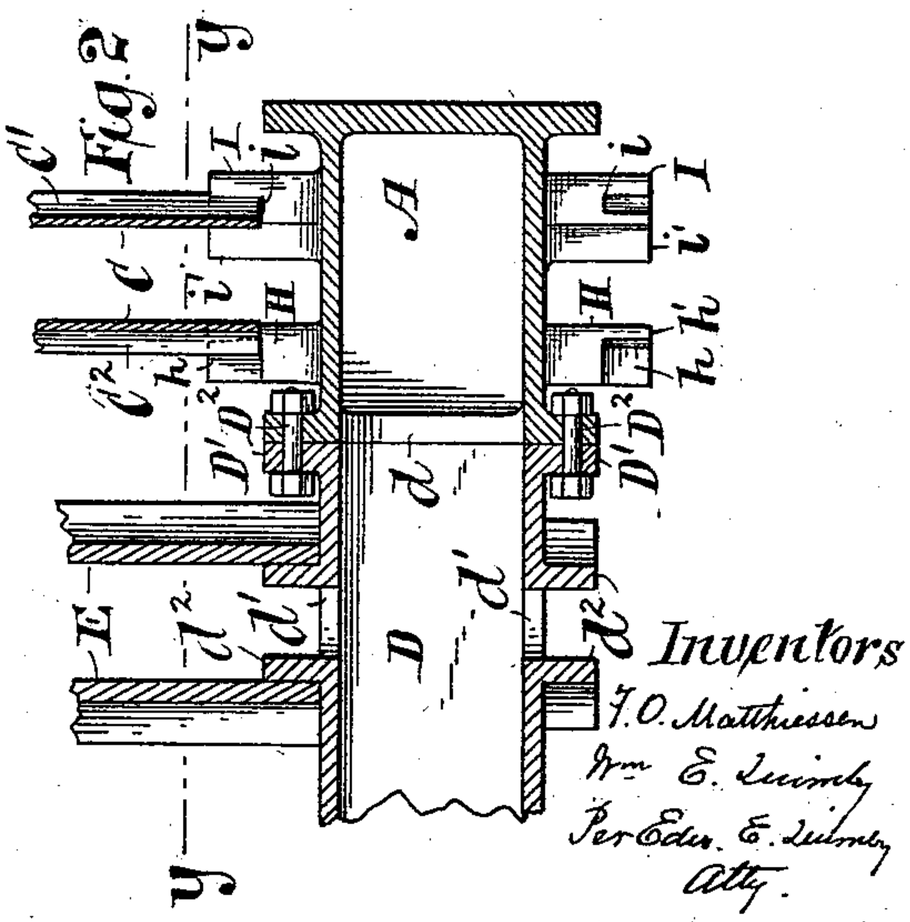

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Fig. 4.

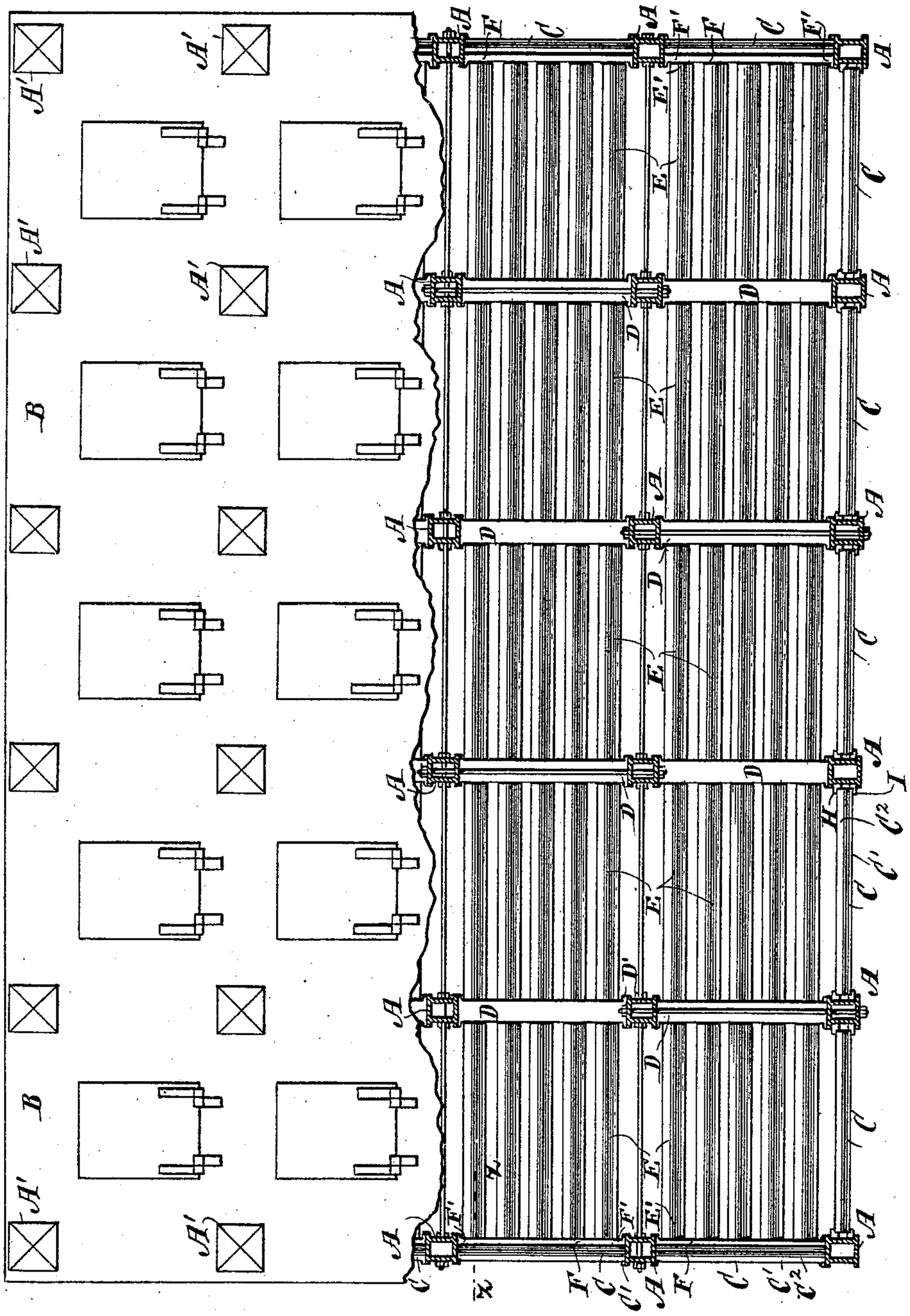

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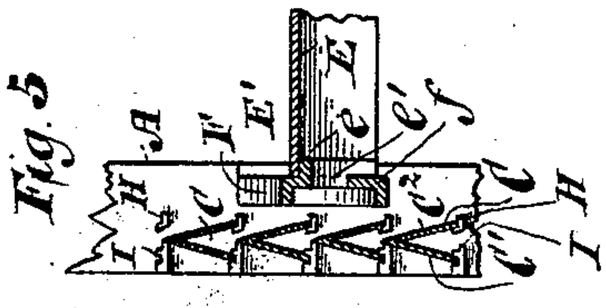
Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANZ O. MATTHIESSEN, OF IRVINGTON, NEW YORK, AND WILLIAM E. QUIMBY, OF ORANGE, NEW JERSEY.

VENTILATED STORAGE-SHED.

SPECIFICATION forming part of Letters Patent No. 537,986, dated April 23, 1895.

Application filed May 21, 1894. Serial No. 511,947. (No model.)

To all whom it may concern:

Be it known that we, FRANZ O. MATTHIESSEN, of Irvington, New York, and WILLIAM E. QUIMBY, of Orange, New Jersey, have invented certain Improvements in Ventilated Storage-Sheds, of which the following is a specification.

The object of these improvements is to effect the thorough ventilation and cooling of substances which are liable to be injuriously affected when stored in large masses.

Certain features of the structure shown in the drawings constitute modifications of the device shown in the pending application of F. O. Matthiessen, serially numbered 511,525.

The improvements are herein described as illustratively embodied in a shed for storing bituminous coal which is especially liable to spontaneous ignition, if stored in piles of considerable height. This liability is effectively guarded against by means of ventilating devices which tend to keep the mass of coal cool, and which incidentally relieve the lower strata of the mass from excessive pressure.

The apparatus employed embraces air channels in the form of inverted troughs extending transversely across the coal pile; also vertical columns or flues consisting of hollow columns and together therewith inclined hollow girders which support the said inverted troughs, and the interiors of which are in communication with the transverse air channels which the said troughs afford; and incidentally the arrangement in inclined planes at suitable distances from each other of superposed systems of transverse inverted troughs which partly support the weight of the superincumbent bodies of coal.

The accompanying drawings illustrating a coal storage shed employing the various features of the invention are as follows:

Figure 1 is an end elevation partly in vertical section. Fig. 2, illustrating details of construction of the side of the shed, is a horizontal section taken through the plane indicated by the dotted line *x*—*x* on both Figs. 1 and 3. Fig. 3 is a vertical section taken through the plane indicated by the dotted line *y*—*y* on Fig. 2. Fig. 4 is a top view partly in horizontal section. Fig. 5 is a vertical section taken through the plane indicated by the dotted line *z*—*z* on Fig. 4, and shows the mode of supporting the inverted V-shaped trough at the ends of the shed.

The structure represented in the drawings embraces several rows of equidistantly arranged vertical chimneys or flues, each of which consists of a hollow column A usually square in cross section, extending above the roof B and surmounted by a hood A′ and supported upon a suitable foundation. The columns are bound to each other at different elevations by any desired number of horizontal systems of stay-rods. Three such systems 1′, 2′, 3′ are represented in the drawings.

The roof B is supported on the inclined rafters, *b*, bolted to the columns A near their upper ends.

Along the sides and ends of the structure are systems of superposed inverted V-shaped troughs C which extend horizontally across the spaces between the exterior rows of columns and are supported at their ends either by being bolted to the columns, or by being dropped down upon suitable lugs cast upon or affixed to the adjacent faces of said columns. By this device air is admitted through the spaces between the inverted troughs C. The exterior inclined faces C′ of the troughs serve to shed the rain. The interior inclined faces C^2 serve to prevent the coal from falling outward through the spaces between the troughs.

At suitable intervals within the structure are arranged the cross flues D which are preferably square in cross section and which at their ends are fastened to the vertical columns, between which they extend, in any convenient way as, for example, by the construction illustrated in Figs. 2 and 3 which show the end of the flue D as being provided with a flange D′ which is fastened by the transverse bolts D^2 to the adjacent flanges of the column A.

The interiors of the cross flues D communicate with the vertical flues A through appropriately located perforations, *d*, in the shells of the vertical flues. The side walls of the

cross flues are provided with equidistant perforations, d', around the edges of which are cast outwardly projecting lugs, d^2, which afford the supports for the ends of the transverse inverted V-shaped troughs E. Series of these transverse troughs E, the members of which are usually arranged in alignment with each other, extend entirely across the structure from end to end. The outer ends E′ of the exterior series of the said troughs are supported on lugs, e, which are cast around the edges of perforations, e', in the web, f, of each of the girders F, the opposite ends F′ of which are bolted to the vertical columns between which they extend. By this construction the transverse air channels afforded by the interiors of the inverted troughs E are in communication with the outer atmosphere through the spaces between the superposed inverted V-shaped troughs C extending transversely across the spaces between the vertical columns at the ends of the structure.

Considered as a whole the structure may be regarded as a massive coal shed. Access may be had to its interior for the purpose of filling it with coal either through trap-doors in the roof, if the structure is roofed, or by the temporary removal of any one or more of the inverted V-shaped troughs C at any desired elevation either on the sides or on the ends of the structure. Similarly, access may be had to the interior for the purpose of taking the coal out of the structure by removing any desired number of the troughs C at or near the ground.

The construction for supporting the troughs C is preferably of such a character that the said troughs can be removed singly when desired. This construction is illustrated in detail in Figs. 2 and 3, the same being a portion of an elevation and a cross section of one of the exterior vertical columns A, showing the equidistant pairs of projecting lugs H I for supporting the troughs C. The lug H presents a horizontal bearing, h, for the bottom edge of the inner wall of the adjacent end of the inverted trough C, and a short inclined bearing, h', for the lower portion of the inner side of the inner wall of the trough C. The lug I presents an inclined recess, i, for receiving the lower portion of the outer wall of the trough C, and also presents at its inner end an inclined bearing, i', which serves as a stop for the upper portion or apex of the next lower trough. By contact with its stop, i', each of the troughs C is supported so that its upper portion will not be rocked outward by the lateral thrust against it of the coal inside the bin.

When occasion arises for removing one of the troughs C it is lifted bodily, as illustrated in the lower part of Fig. 3, and is then rocked upon its longitudinal axis into the position in which its cross section is represented in dotted lines in Fig. 3, from which it can be removed bodily outward, as will be perceived, because the vertical spaces between the pairs of lugs are each greater than the extreme width of the mouth of the trough.

Although not indispensable, it is desirable to arrange the cross flues D in inclined positions. When the cross flues are thus arranged those of the superposed series of transverse inverted troughs E which are between the same two rows of vertical flues occupy parallel inclined planes.

Referring now to Fig. 1 and designating the spaces between the rows of vertical columns as sections 1, 2, 3 and 4, it will be seen that the cross flues D and the transverse inverted troughs E, which are arranged in the exterior sections 1 and 4, incline inwardly and downwardly from their points of connection with the exterior rows of vertical flues, and that the points of connection with the vertical flues of the lower ends of the cross flues in one section are in each case nearly or about midway between the points of connection with the same vertical flues of the lower ends of the cross flues in the next adjoining section, and it will also be seen that the cross flues in adjoining sections incline in relatively opposite directions. These relatively opposite inclinations and staggered positions of the inclined planes occupied by the systems of inverted troughs E in the different sections serve to facilitate the distribution and movement of the coal from one section to another, either in the act of filling the shed from the top or in the act of removing its contents from the bottom, because the coal in falling from the upper to the lower part of the shed is, to some extent, guided in the zigzag paths indicated by the bent arrows shown in the drawings.

Several features of the structure are useful in themselves, and are also useful in combination with each other. Thus the superposed groups of inverted troughs E, in connection with the cross flues, constitute continuous air channels which extend transverely through the mass of coal and communicate at their outer ends with the external atmosphere, thus affording paths for the escape of heated air from the mass of coal, and also paths for the flow through the mass of coal of currents of air from the exterior of the shed.

The combination of the transverse inverted troughs E and the cross flues with the vertical flues further promotes the escape of any heated air from the mass of coal and the introduction of external air to take the place of such heated air.

The employment of the superposed inverted V-shaped troughs in the exterior walls of the shed constitutes a further expedient for admitting external air into the sides of the mass of coal contained within the shed. Incidentally, it is desirable to make the vertical superposed V-shaped troughs in the exterior walls of the structure separately removable. It is not necessary to make them all separately removable, because obviously it will be sufficient to only make them thus removable

at the places where it is desired to have access to the interior of the shed.

It will be understood that horizontal girders may in any case be substituted for the stay-rods.

What is claimed as the invention is—

1. In a coal shed, systems of inverted horizontal troughs arranged in inclined planes of prescribed different elevations and affording continuous transverse air channels communicating at their ends with the atmosphere outside the shed.

2. The combination, as herein set forth, of superposed systems of inverted horizontal troughs, corresponding inclined cross flues in communication with the interiors of said inverted troughs respectively and vertical flues in communication with said inclined cross flues.

3. In a coal shed provided with rows of vertical hollow columns, superposed systems of inverted horizontal troughs and inclined cross flues arranged at prescribed different elevations within the spaces between the said rows of vertical columns in laterally staggered inclined planes.

4. In an exterior wall for a coal shed, a system of vertically superposed inverted V-shaped horizontal troughs arranged at prescribed distances from one another as and for the purposes set forth.

5. A coal shed, the exterior walls of which are in part composed of systems of vertically superposed inverted V-shaped horizontal troughs suitably distant from one another any desired number of which said troughs are so supported as to be separately removable for the purpose of obtaining access to or from the interior of said coal shed.

6. The combination in a coal shed as herein set forth of parallel rows of vertical flues, systems of inclined cross flues communicating with said vertical flues, superposed systems of inverted troughs respectively supported upon and communicating with the interiors of said inclined cross flues and affording continuous air channels which extend transversely across the shed and communicate at their outer ends with the atmosphere outside the shed, and systems of vertically superposed inverted V-shaped horizontal troughs arranged in the exterior walls of the shed at prescribed distances from one another.

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