

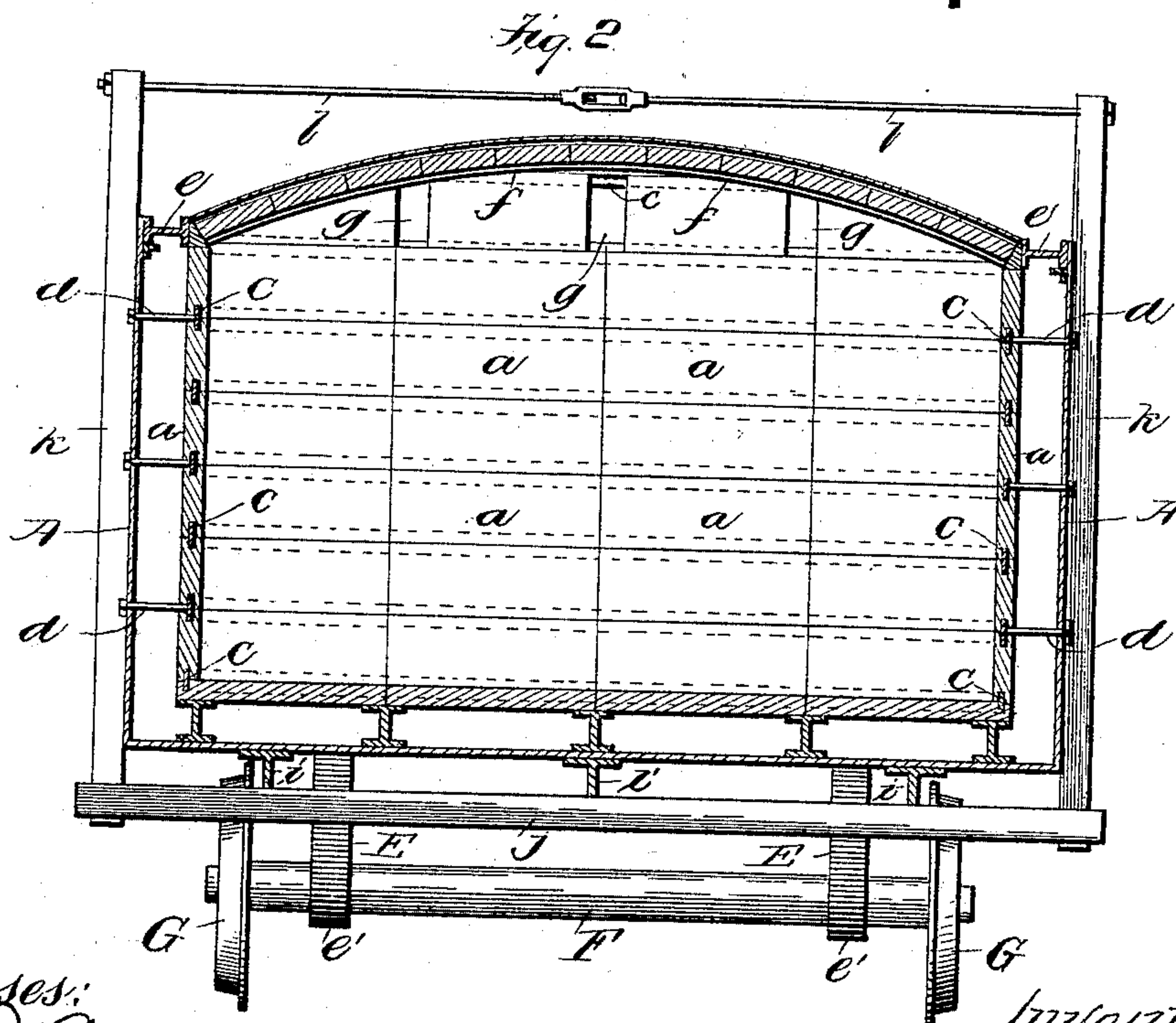
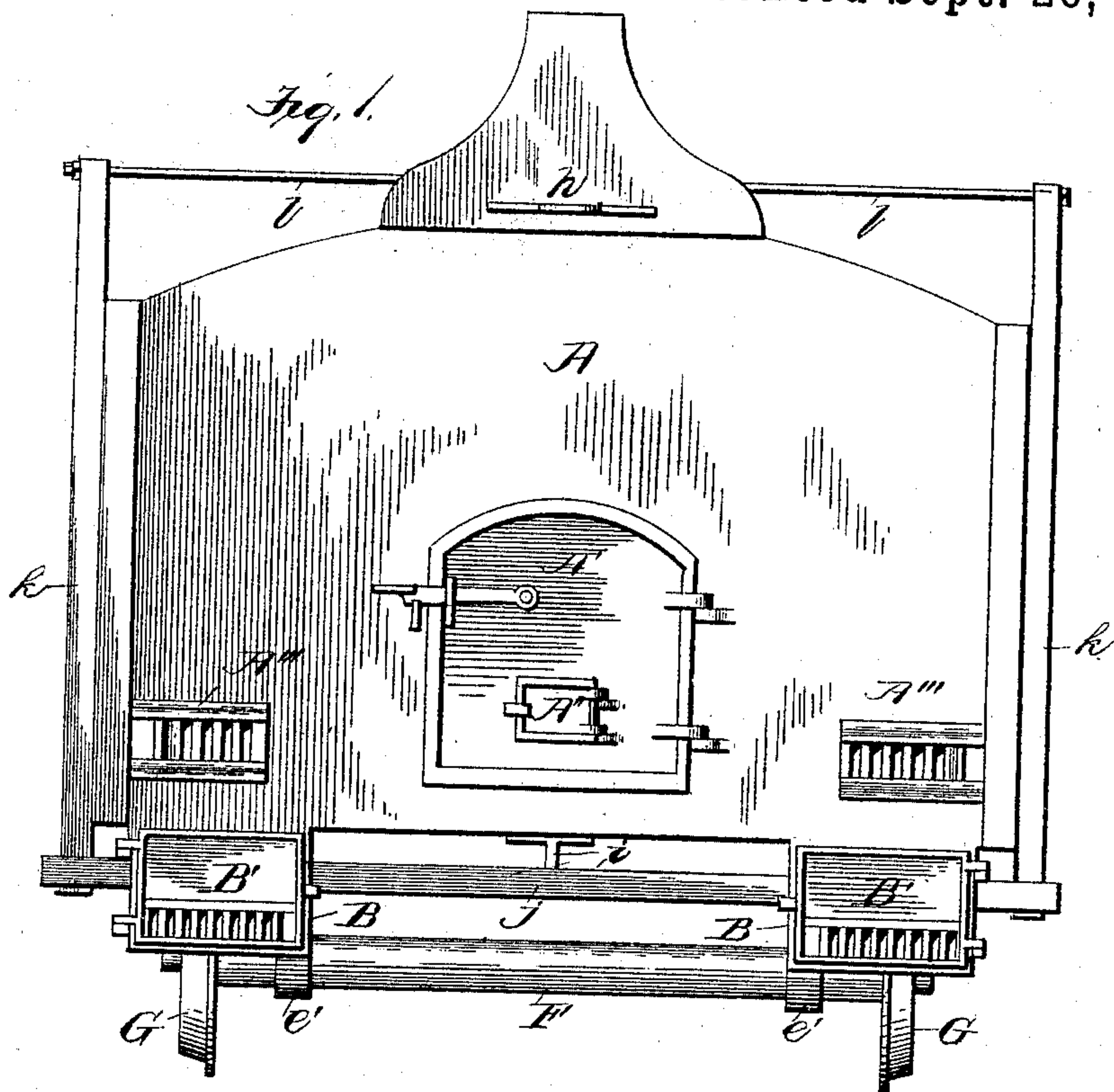
(No Model.)

3 Sheets—Sheet 1.

W. F. MODES.
GLASS ANNEALING KILN.

No. 505,716.

Patented Sept. 26, 1893.



Witnesses:
F. R. Cornwall
H. K. Wagner.

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Atty.

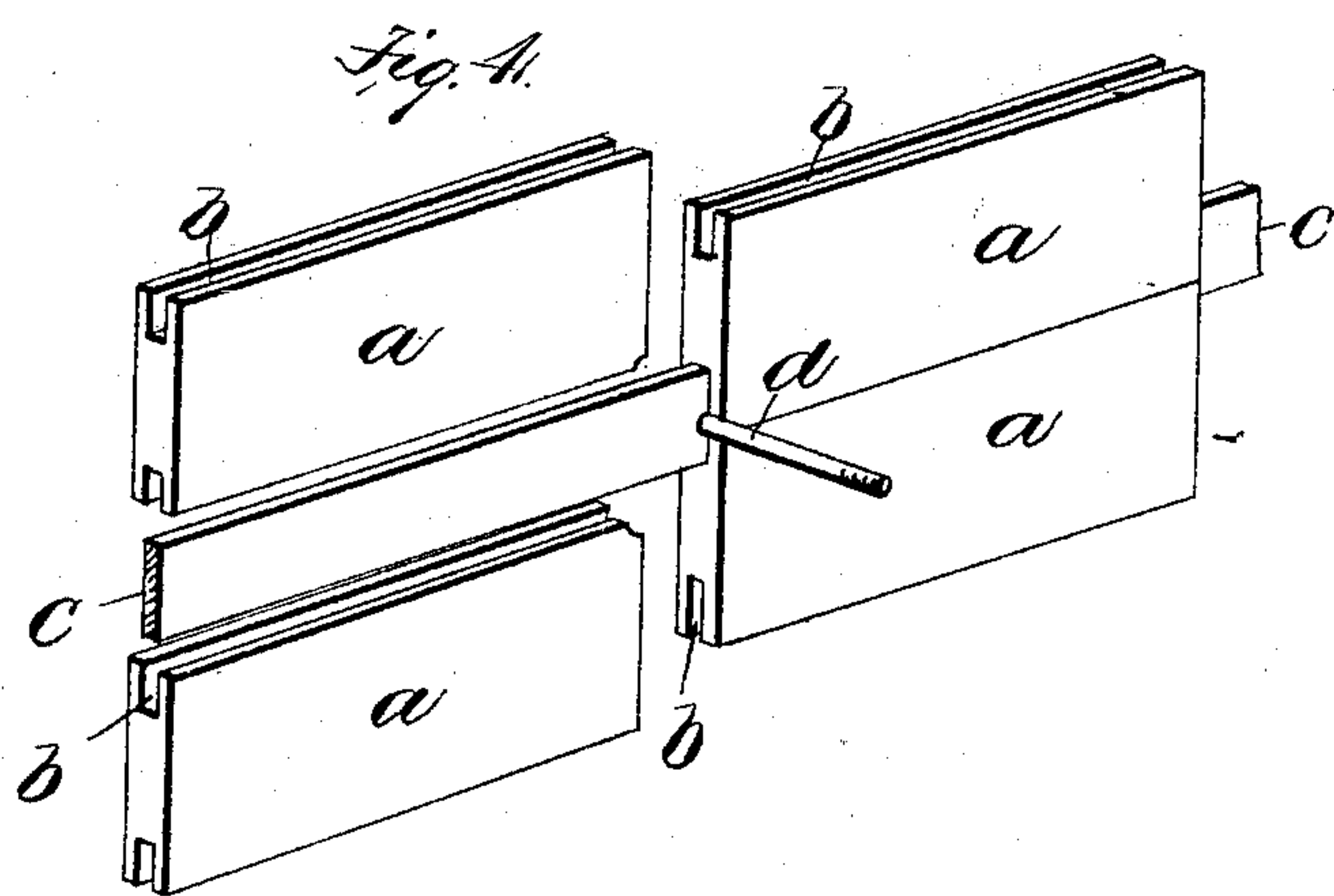
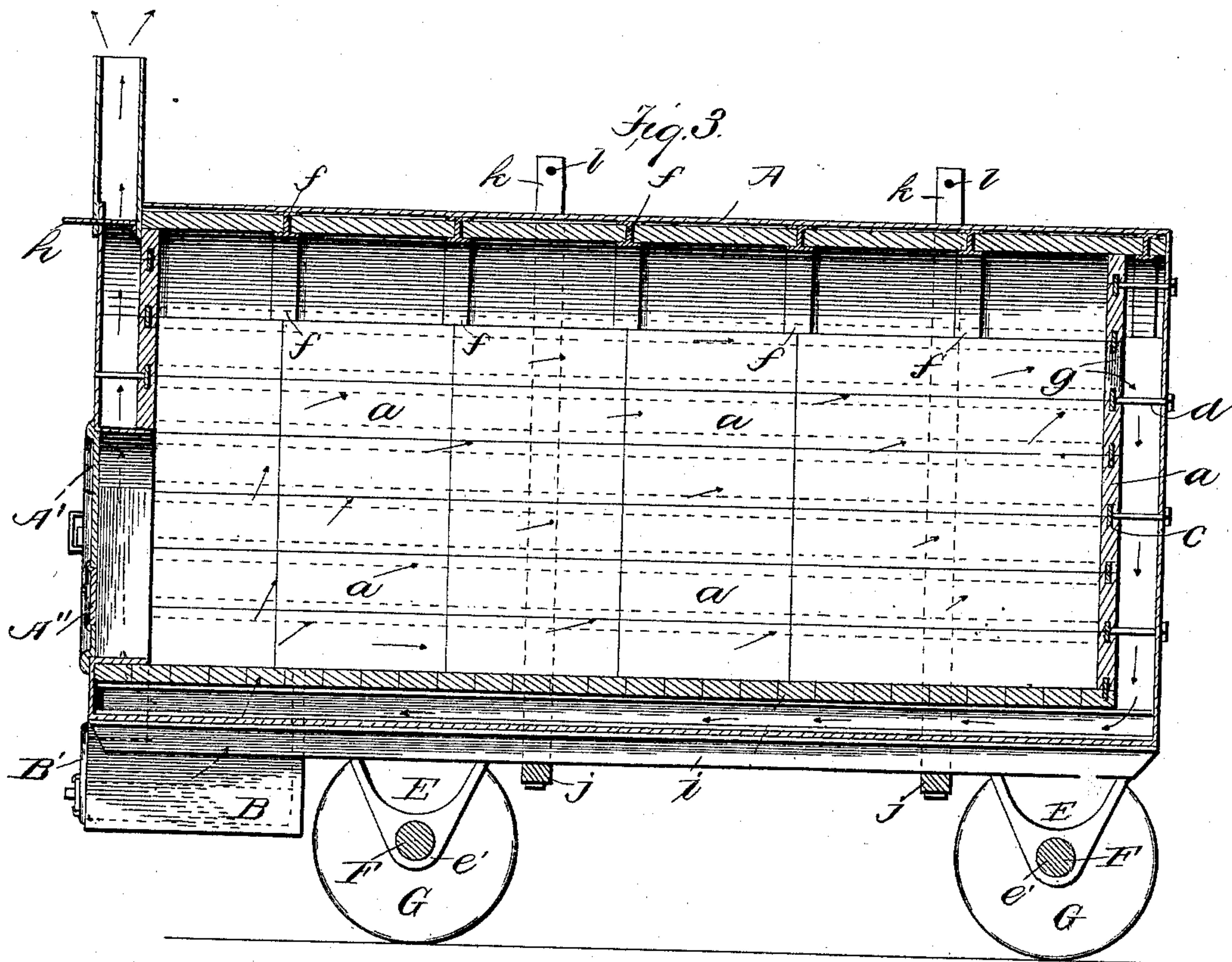
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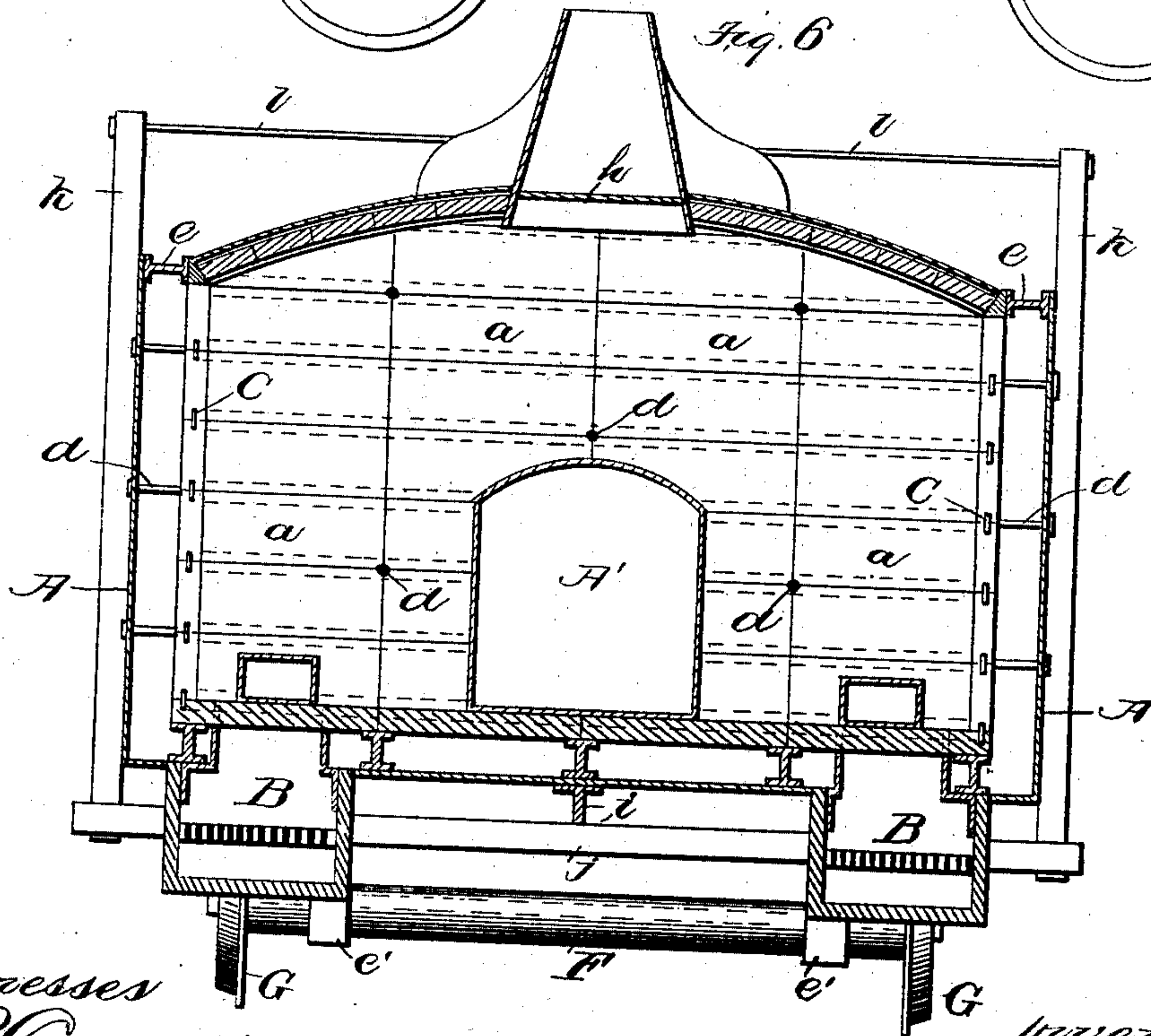
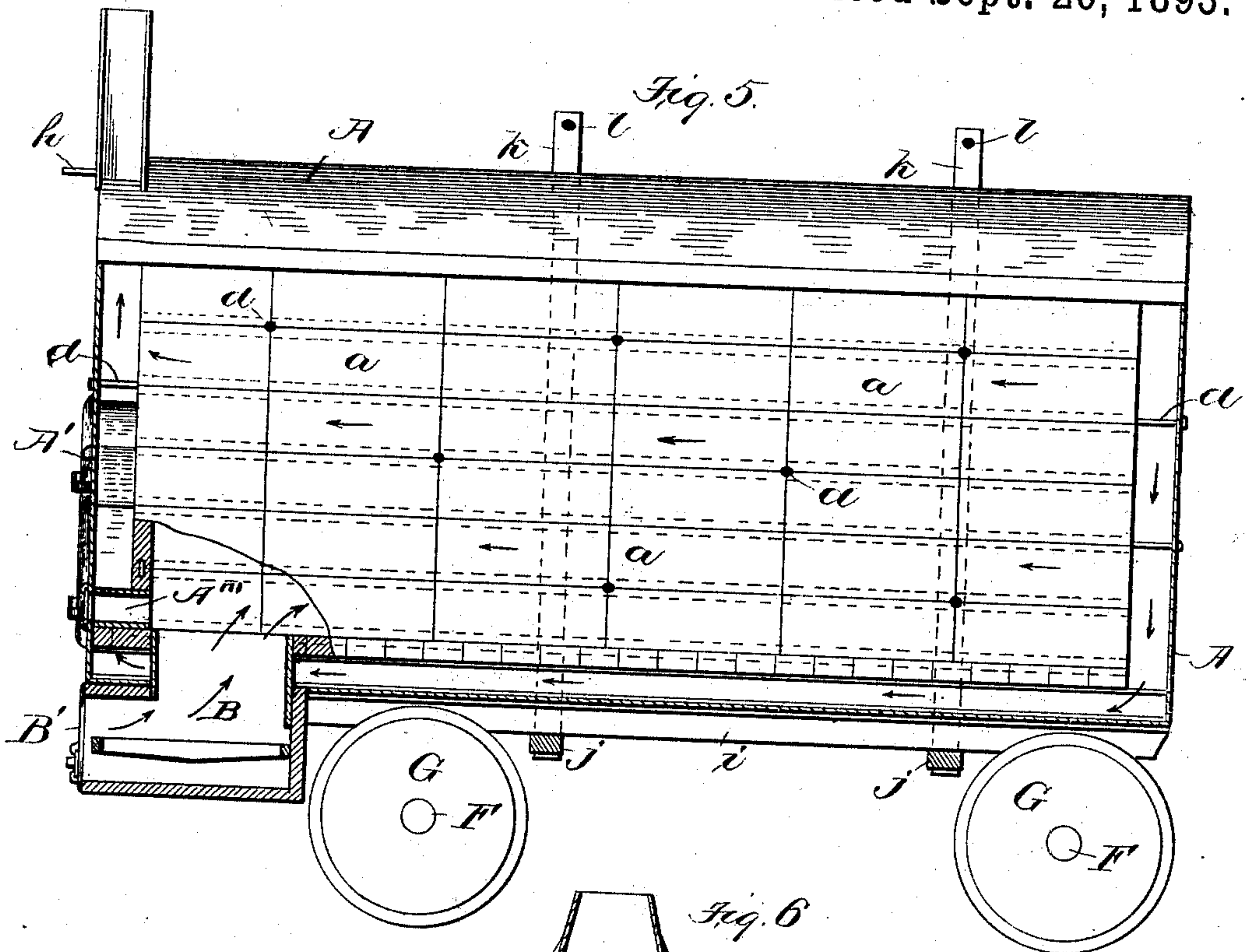
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W. F. MODES.
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UNITED STATES PATENT OFFICE.

WILLIAM F. MODES, OF STREATOR, ILLINOIS.

GLASS-ANNEALING KILN.

SPECIFICATION forming part of Letters Patent No. 505,716, dated September 26, 1893.

Application filed September 26, 1892. Serial No. 446,905. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. MODES, a citizen of the United States, residing at Streator, in the county of La Salle, State of Illinois, have invented a new and useful Improvement in Glass-Annealing Kilns, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

Heretofore, the general practice has been in the processes of annealing glass, to build the kiln or kilns, in the immediate vicinity of the working out end of the furnace, in order that the heat contained in the glass would be retained therein, and when placed in the kiln, maintain by radiation, an annealing temperature, without materially decreasing the temperature of the glass itself. The location of the kilns in the immediate vicinity of the furnace proper, is a necessity, from the fact, that should it be necessary to convey the glass to a distant kiln, it would become cold or nearly so before it was introduced into the kiln, and consequently useless as a commercial article. By this arrangement of the kilns, their capacity is not only limited by their restricted construction, but the output of the furnace is affected depreciatingly. Another objection to such a construction, resides in the inactivity of the charged kiln for such a space of time as to enable the glass to cool slowly and properly, and should all the kilns be charged at the same time, the workmen at that particular furnace will have to cease on account of the inability to properly dispose of the products of their labor.

The object of my present invention, is to obviate as far as possible, the difficulties and objections above set forth, and it consists in the construction of a portable kiln which, for the sake of convenience in handling, I mount on a track running from the furnace to any suitable point, which construction permits a charge to be introduced, and the kiln removed to some convenient point where it may gradually cool, thereby permitting the replacement of another and empty kiln, to be charged in like manner; thus affording ample facilities for conveniently handling the continuous output of the furnace.

The first feature of my invention, resides

in mounting a kiln upon a suitable carriage or truck, which is supported by a track leading from the furnace to any desired place.

A second feature resides in combining with the kiln proper a fire box or boxes, which tend to maintain an annealing temperature when the glass is being introduced into the kiln, and in forming draft flues therearound, which not only carry off the products of combustion, but evenly diffuse the heat generated throughout the entire kiln.

A third feature resides in the means for sealing the kiln proper from the influence of outside cold air, which would be detrimental to the inclosed glass, which permits the maintenance of an annealing temperature by retaining the heat in and around the kiln, which is eventually cooled slowly by the radiation of the heat from the inclosing shell.

A fourth feature resides in the peculiar construction and arrangement of the refractory material forming the kiln proper, and its connection with the inclosing shell, whereby is not only structural rigidity obtained, but the separated walls of the kiln proper and its inclosing shell form draft flues around the kiln which permits the same to be heated throughout at a uniform degree of temperature; and finally, in the construction, arrangement and combination of the several parts, all as will hereinafter be described and afterward pointed out in the claims.

In the accompanying drawings forming a part of this specification, wherein like symbols of reference refer to like parts wherever they occur:—Figure 1 is a view in front elevation of my improved annealing kiln. Fig. 2 is a vertical transverse section therethrough. Fig. 3 is a vertical longitudinal section, and Fig. 4 is a detail perspective view of the fire brick and method of building the same. Fig. 5 is a longitudinal, vertical section through one of the side draft flues. Fig. 6 is a vertical transverse section through the front end of the kiln just back of the inclosing shell and charging doors, showing the extension of the fire boxes into the kiln chamber.

A indicates the inclosing shell or outer casing formed of boiler iron or other suitable material, said shell being provided in its forward end with a door A', in which latter, for the purpose of maintaining an even degree

of temperature in the kiln while receiving its load, I provide a smaller door way A'' through which the kiln is charged by forks or other suitable instrument.

5 A''' indicates draft openings formed in the lower edge of the front end of the inclosing shell, directly over the fire boxes, the size of said openings being regulated by a suitable sliding plate, as is common.

10 B represents fire boxes of any convenient size and number, located beneath the forward end of the kiln proper and opening thereinto, said boxes being reached by suitable doors B', and provided with a grate bar of any de-
15 sired construction.

If desired, gas or fuel other than solid may be used as a heating medium, in which instance the draft openings A''' will be opened to permit the passage of air to support com-
20 bustion, which will take place in the kiln chamber.

The kiln proper is composed of fire brick or other refractory material and is preferably built up in the shell A so as to leave a space
25 or flue at the ends, sides and bottom, for the passage and return of the products of combustion to the front end of the kiln.

To elevate the bottom of the kiln above the shell and form a space or flue beneath the
30 same, I support the ends of the floor brick upon I-beams as shown, and extend said bottom to within a short distance of the ends and side walls of the shell, where it supports the side and end walls of the kiln, they in like
35 manner being built up so as to leave a space between them and the walls of the inclosing shell.

The bricks a which are used in the construction of the side and end walls of the kiln, are
40 preferably grooved as at b in their side edges to afford reception for continuous joggles c which run the full length of the wall.

Projecting outwardly from the joggles c preferably at the meeting line of four bricks,
45 are spacing bolts d, which are secured thereto in any suitable manner, the outer ends of said bolts being threaded and passed through the shell A where they are secured by nuts. The side spaces between the kiln and shell are
50 closed at top by I-beams e, which also form a support for the arched I-beams f of the roof, in the reduced portion of which, are received the fire brick, as shown in Fig. 3.

In the upper edge of the rear wall of the
55 kiln, I form flue openings g through which the products of combustion pass after circulation throughout the kiln chamber, in which place it is diffused by passing through the interstices formed by the articles to be an-
60 nealed, thereby raising the temperature of each to a uniform degree.

To more thoroughly accomplish the distribution of heat uniformly throughout and around the kiln chamber, I form, as before
65 stated, flues around the end and side walls, and beneath the bottom, into which the heated

air is drawn through the draft holes g by reason of a suction created by the draft passing out at the forward end of the furnace. This exit draft flue is provided with a damper
70 h of any suitable construction, which may be utilized in the course of raising the temperature of the kiln to a uniform degree, as a draft regulator, and after the temperature has been raised sufficiently, it may be closed
75 to retain the heat in and around the kiln, which heat is reduced slowly by radiation. When leaving the kiln to cool, the draft openings A''' and the doors of the fire boxes are also closed, thus preventing further circula-
80 tion of the contained heated air and rendering the admission of outside cold air, practically impossible. It will of course be understood that the door opening for the door A', and the draft openings A''', being situated
85 in the shell A, it is essential to form a suitable connecting channel or port leading directly to the interior of the kiln chamber, thus directing the air admitted by the draft open-
90 ings immediately over the fire boxes, where, in the instance of using solid fuel, the air will become heated upon its entrance, and should gaseous fuel be used, it will support combustion. The side walls of the fire boxes are also extended upwardly as far as the
95 interior of the kiln for the obvious reason of directing the heat thereinto, otherwise it would ascend upward in the forward wall flue and out the exit flue, assuming the short-
100 est course as it is influenced by the draft. The kiln, as a whole, is mounted on a carriage or truck, which, in this instance, is illustrated as supporting blocks E having upwardly ex-
105 tending arms upon which rests the shell A. In the lower extremity of these blocks are journal bearings e' in which are mounted the axles F carrying the supporting wheels G as shown.

Although I have shown two trucks, independent of each other, still, it is obvious that
110 a suitable single truck or carriage could be utilized advantageously, the kiln in this latter instance, being supported by the floor of the carriage, and secured thereto in any suitable manner.

To add rigidity to the structure as a whole,
115 I preferably brace the bottom of the shell A by longitudinally disposed reinforcing T-beams i, which not only tends to distribute the weight of the kiln evenly on the shell, but
120 prevents its sagging in the middle.

To retain the proper relation of the side walls with their conjunctive parts, I provide two or more cross beams j, to the ends of which are secured vertically disposed side bars k
125 which bear against the outside of the shell. The upper ends of these side bars are connected by tie rods l in which are placed turn-buckles, or other suitable devices, for drawing the upper ends of the side bars toward
130 each other.

Having thus described my invention, what

I claim, and desire to secure by Letters Patent, is—

1. In a glass annealing kiln, the combination with the kiln, of a truck or trucks for supporting the same, cross beams beneath the kiln, side bars secured to said cross beams and tie rods connecting the upper ends of the side bars; substantially as and for the purposes described.

2. In a glass annealing kiln, the combination with the kiln and its inclosing shell forming draft flues at the bottom, sides and ends of the same, of a fire box or boxes at one end of the kiln chamber and opening thereinto, a flue at the opposite end of the kiln chamber opening into the draft flues, and an exit flue leading from the draft flues, substantially as described.

3. In a glass annealing kiln, the combination with the kiln and its inclosing shell forming draft flues at the bottom, sides and ends of the same, of a fire box or boxes opening into the kiln chamber at the forward or charging end thereof, a flue at the opposite or rear end of the kiln chamber leading into the draft flues, an exit flue at the forward or charging end of the kiln leading from the draft flues, and means at the forward end of the kiln within reach of the operator, for regulating the draft in the several flues, substantially as described.

4. In a glass annealing kiln, the combination with the kiln and its inclosing shell forming draft flues at the bottom, sides and ends of the same, of heat generators leading into the kiln chamber at one end, draft openings leading into the chamber above said generators, an opening connecting the opposite end of the chamber with the flues formed by the inclosing shell, an exit flue leading from said latter flues and a damper in said exit flue; substantially as and for the purposes described.

5. In a glass annealing kiln, the combination with the kiln and its inclosing shell forming draft flues at the bottom, sides and ends of the same, of a fire box beneath the shell the side walls of which are extended up to

the bottom of the kiln, draft openings immediately over said fire box openings, means for regulating the draft, a flue-opening in the rear of the chamber, connecting the same with the flues formed by the inclosing shell, and an exit flue leading from these latter flues and provided with means for regulating the exit of the heated air; substantially as and for the purposes described.

6. In a glass annealing kiln, the combination with the inclosing shell, of the kiln-bottom provided with a groove around its upper outer edge, side and end walls provided with registering grooves, and joggles in said grooves; substantially as and for the purposes described.

7. In a glass annealing kiln, the combination with the inclosing shell, of a kiln, the bottom of which is elevated from the bottom of the shell by I-beams, and its side and end walls connected by spacing bolts to the side and end walls of the shell; substantially as and for the purposes described.

8. In a glass annealing kiln, the combination with an inclosing shell, of grooved fire brick, joggles in the grooves of said brick, and spacing bolts attached to said joggles at the meeting point of four of said bricks, their other ends being secured in the inclosing shell; substantially as and for the purposes described.

9. In a glass annealing kiln, the combination with the inclosing shell and its contained fire brick composing the kiln proper, of I beams on the bottom of the shell for supporting the tiles composing the floor of the kiln, above the shell, and transversely disposed arched I beams extending across the tops of the side walls, into the channels or recesses of which the brick composing the roof are received, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 23d day of September, 1892.

WILLIAM F. MODES.

Witnesses:

F. R. CORNWALL,
W. M. BYRNE.