

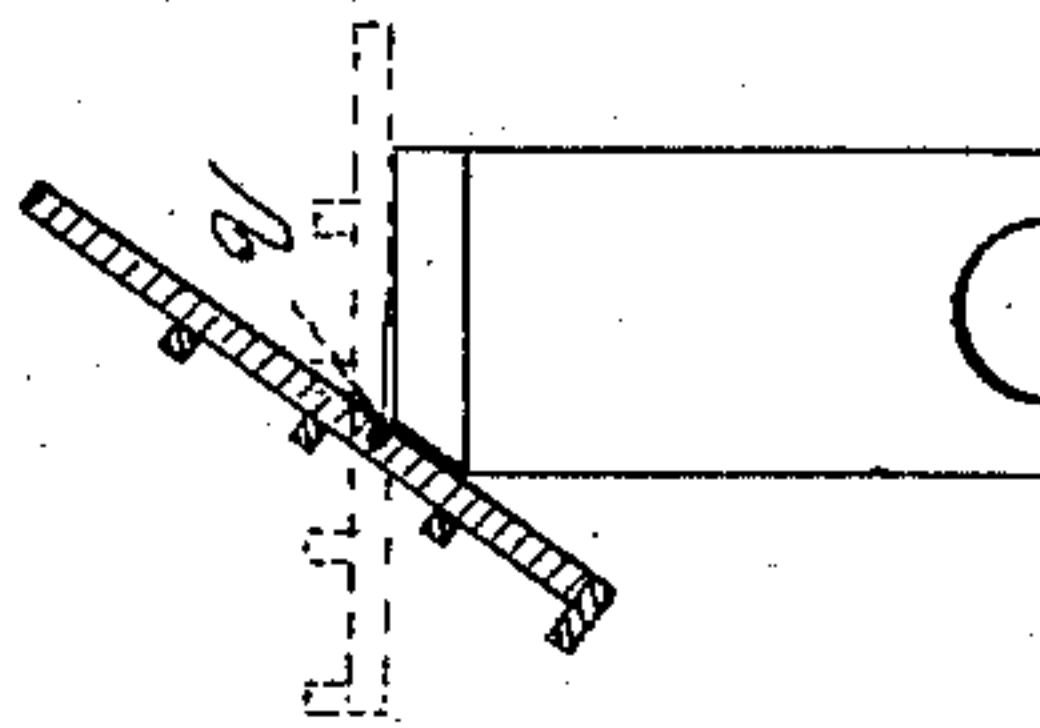
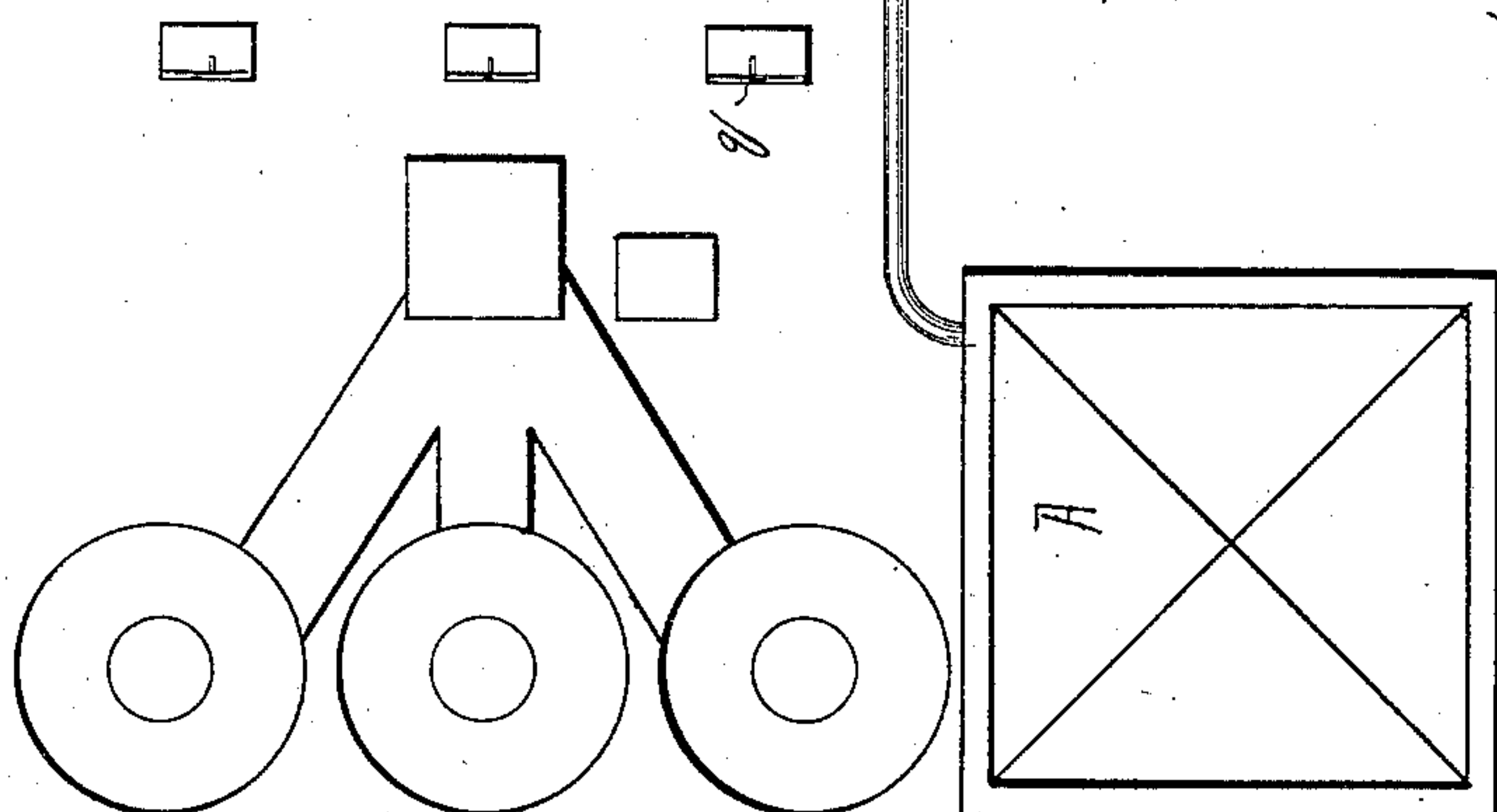
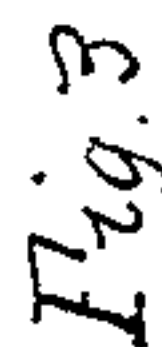
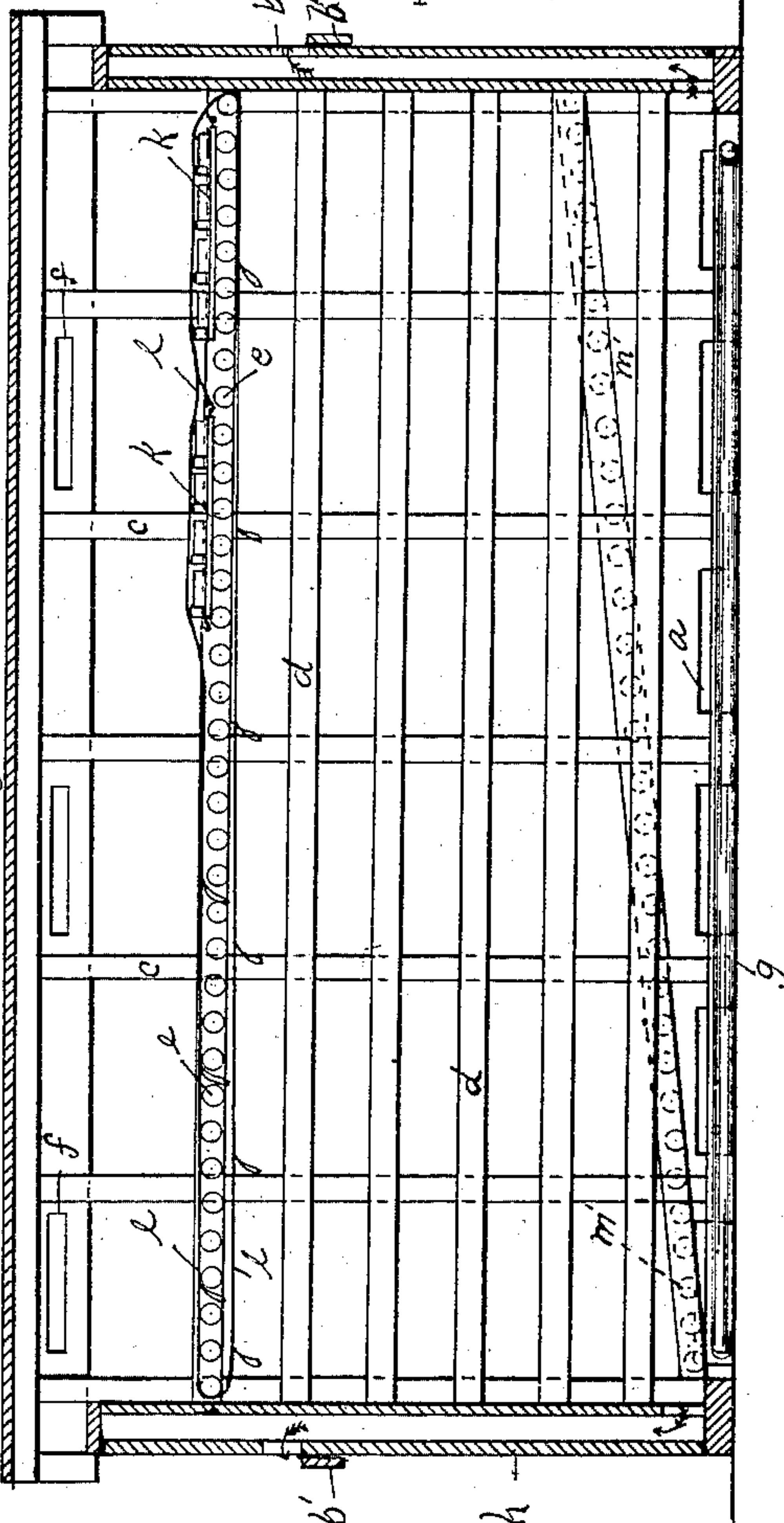
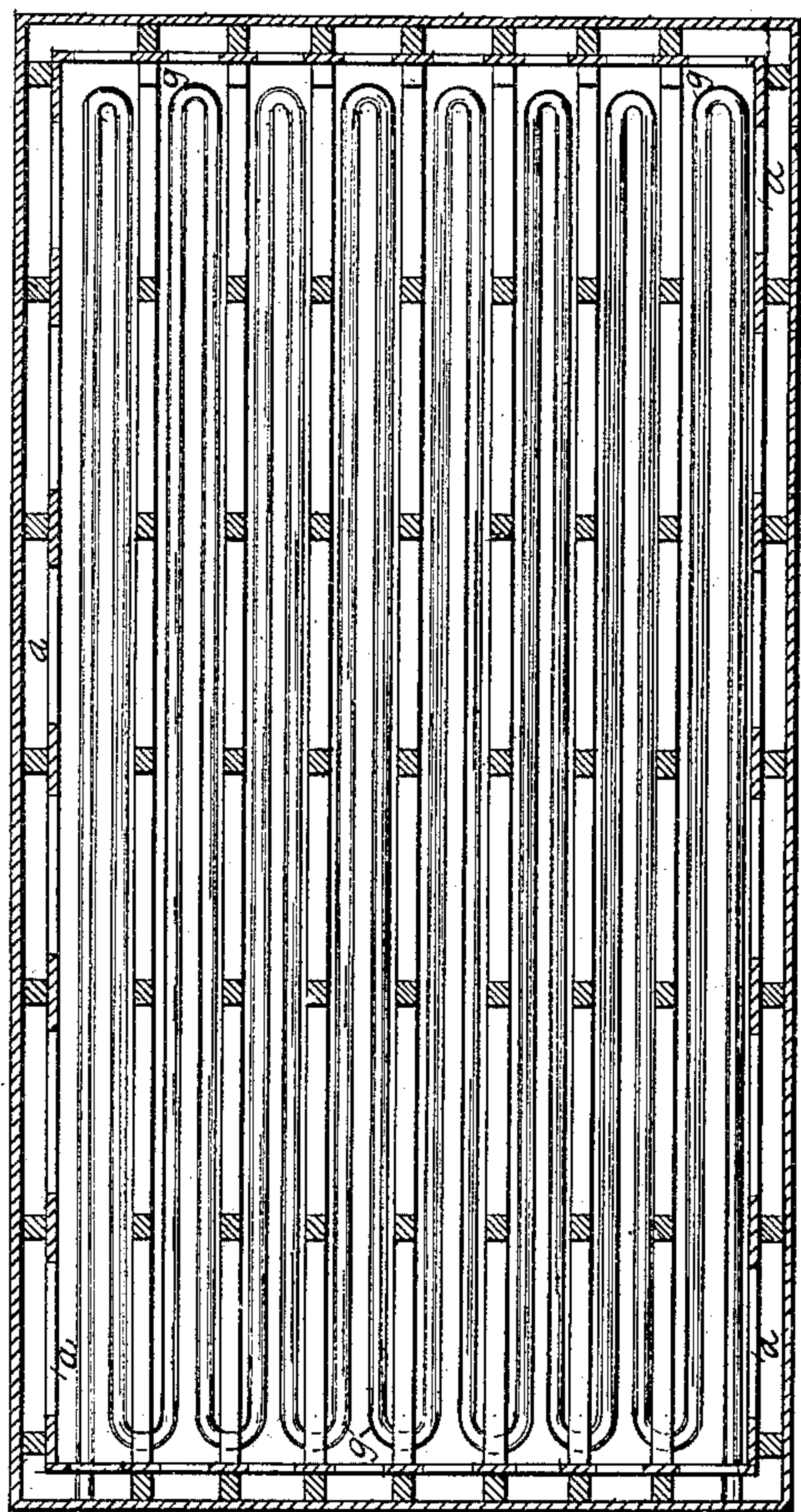
(No Model.)

4 Sheets—Sheet 1.

N. S. WILLET.
MANUFACTURE OF BRICK.

No. 315,200.

Patented Apr. 7, 1885.



Attest.
Chas. F. Herr
T. H. Campbell

Inventor:
Nathaniel S. Willet.
By Drake & Co. Attys.

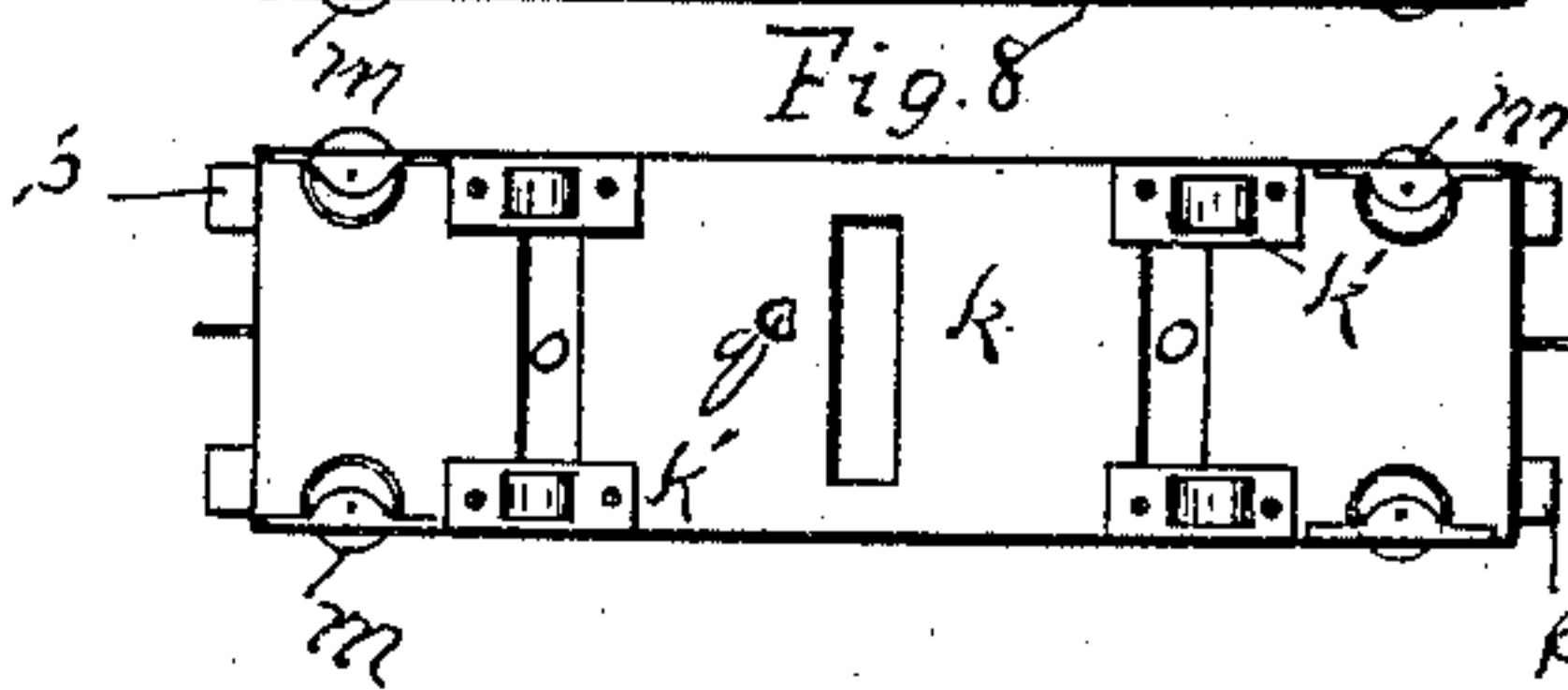
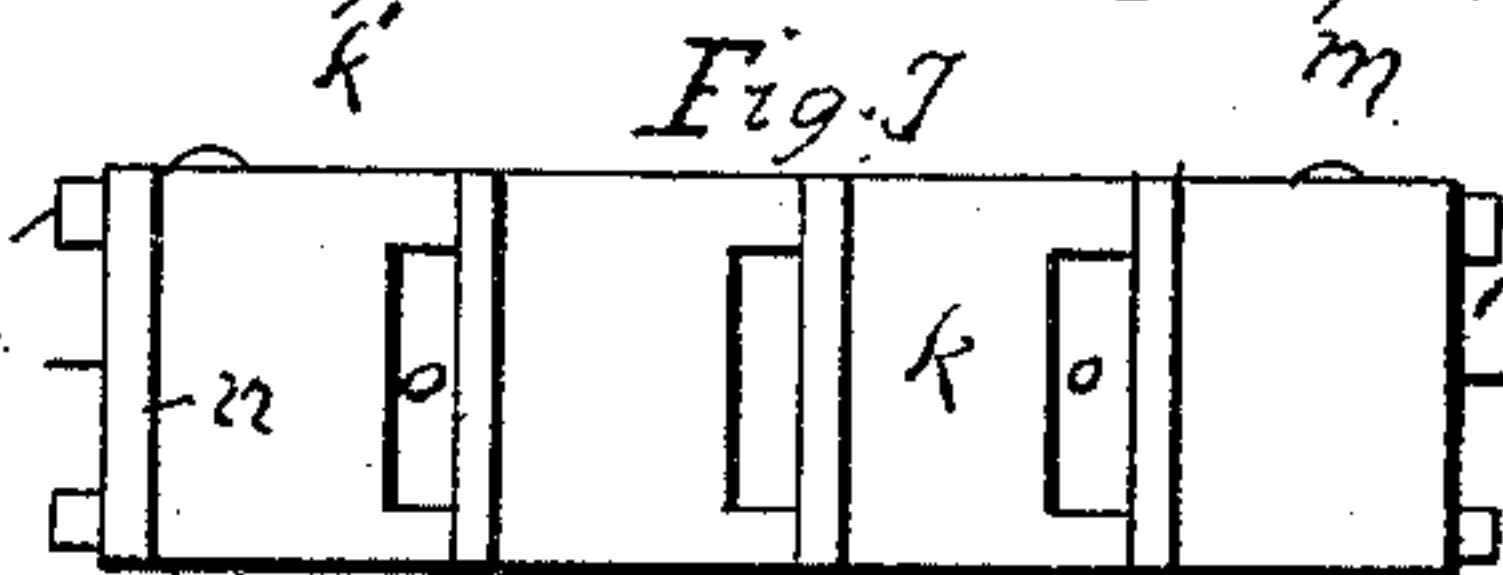
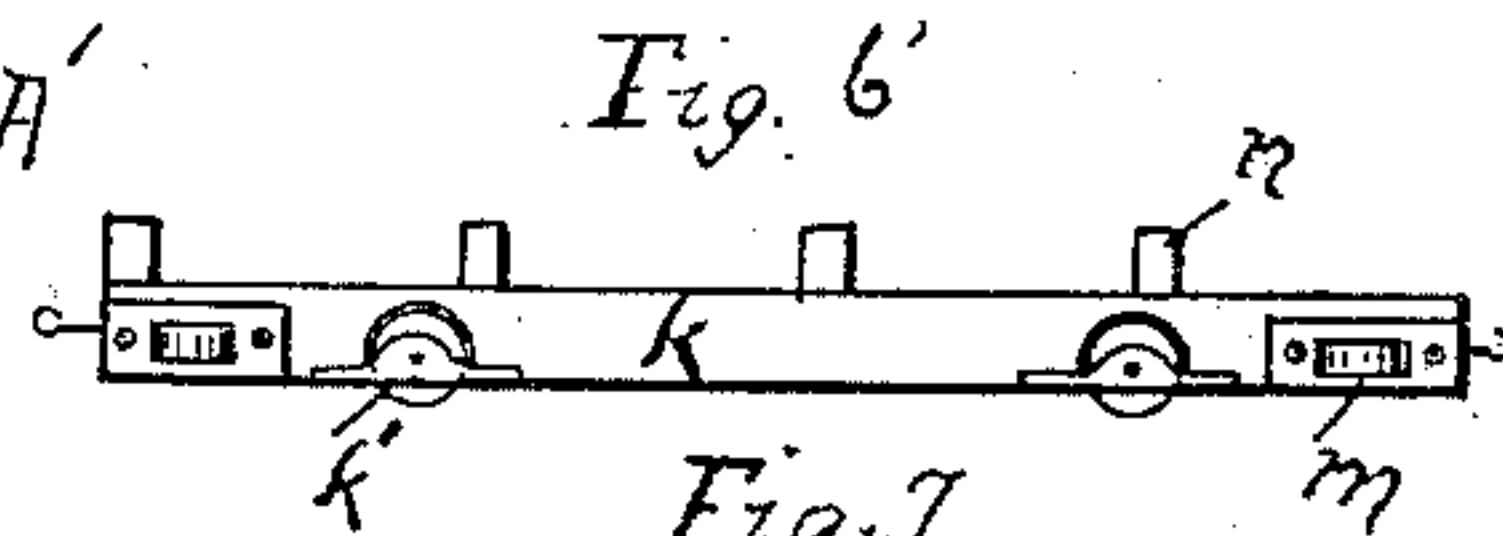
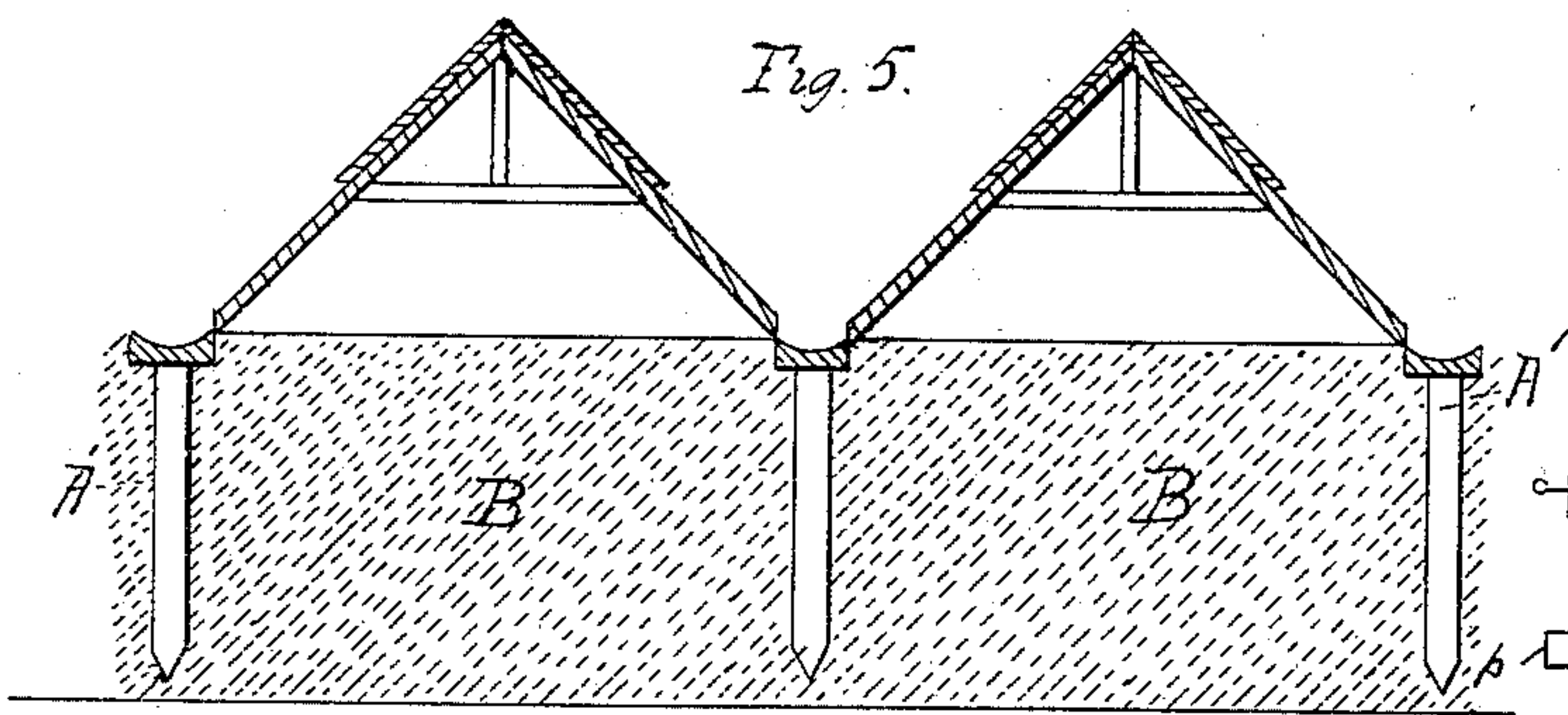
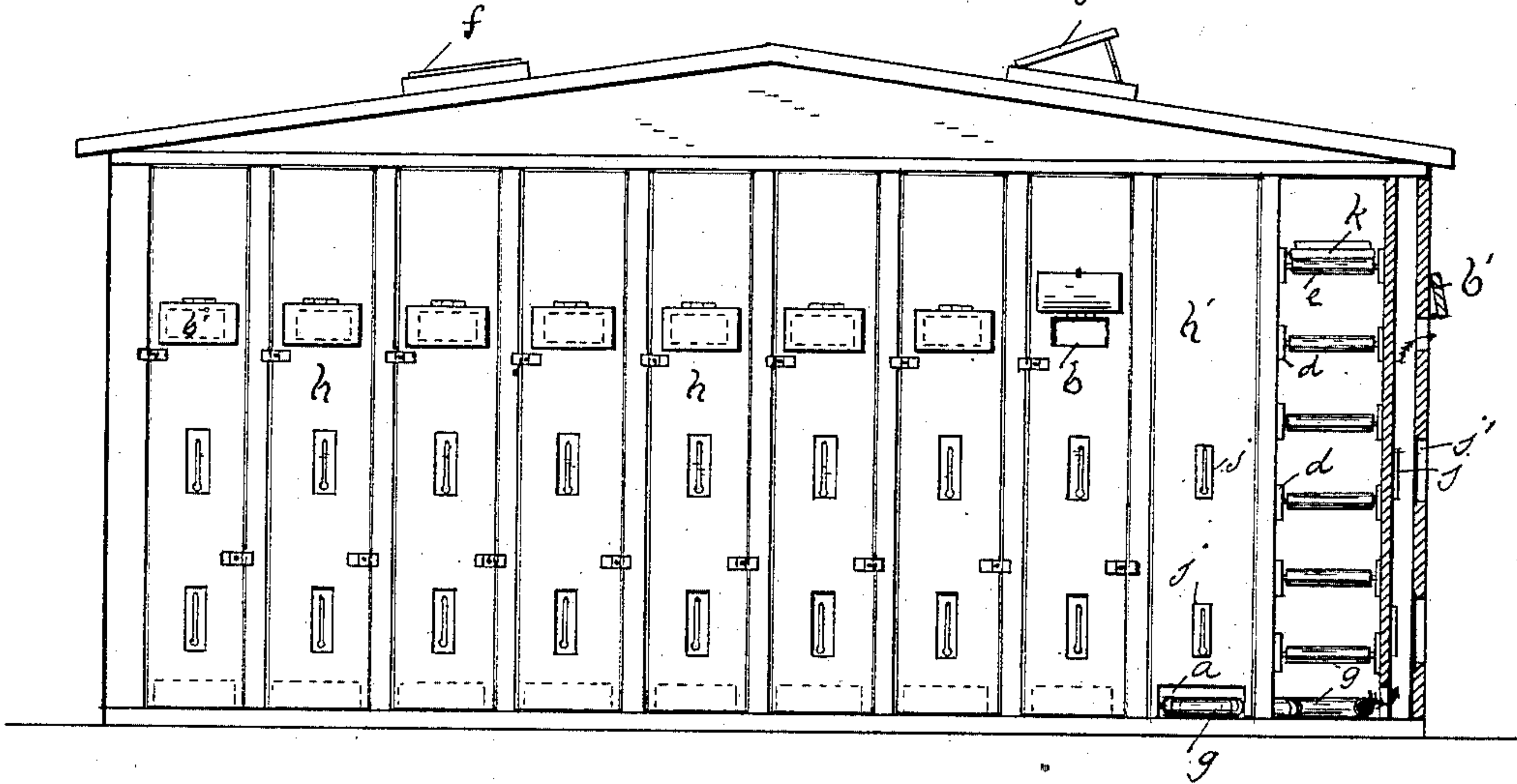
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Fig. 4 Patented Apr. 7, 1885.



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Fig. 9

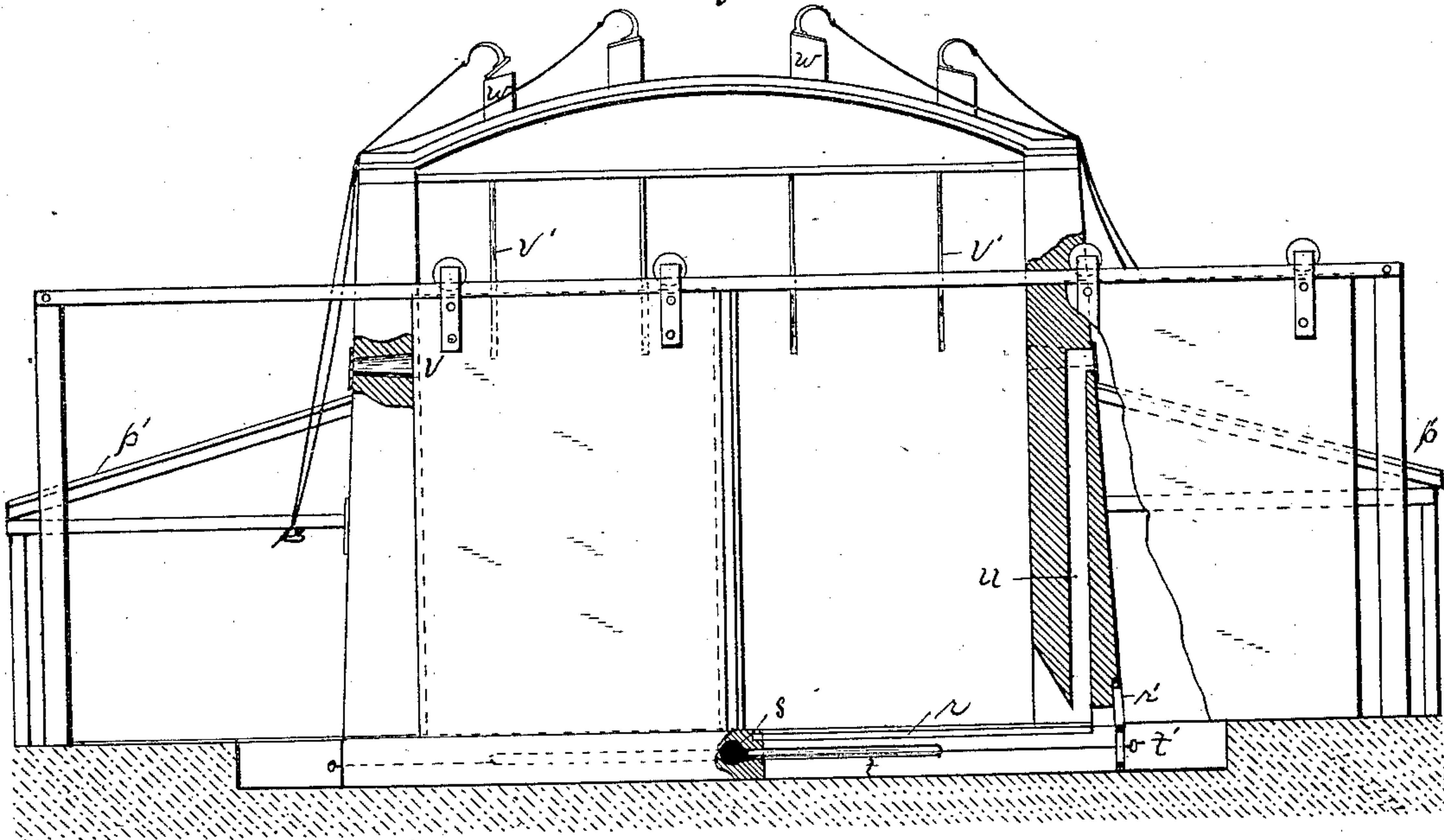


Fig. 10

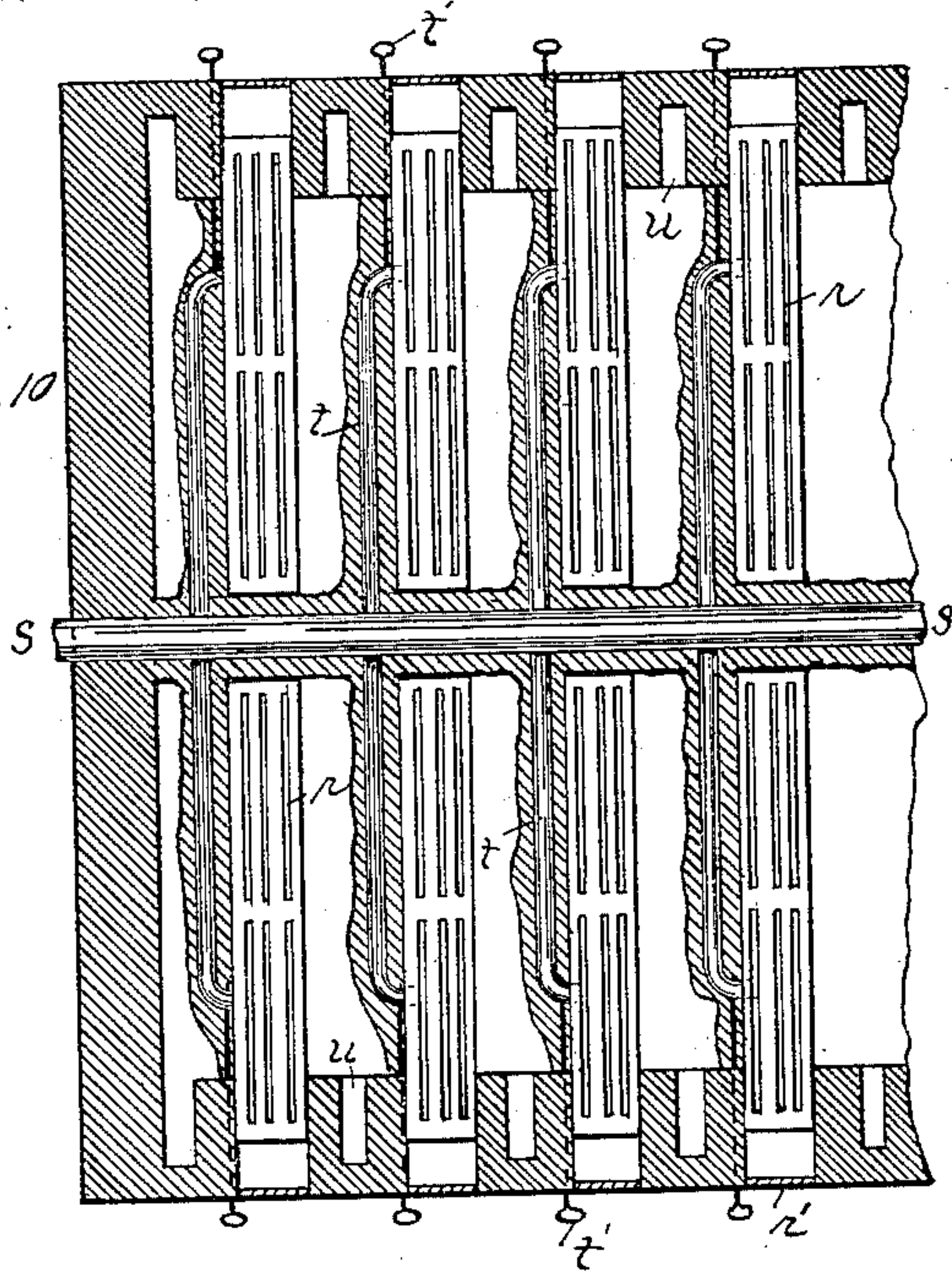
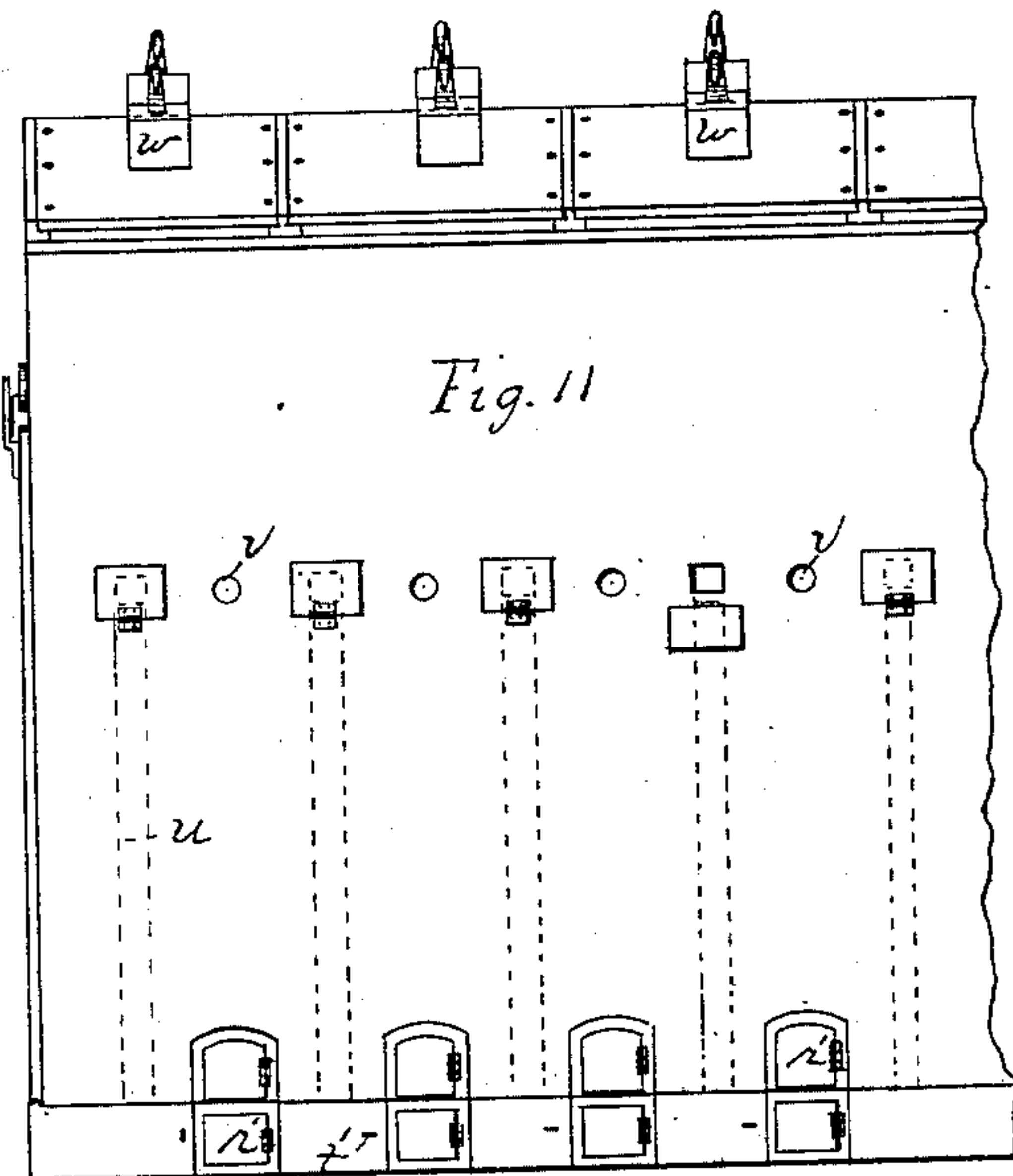


Fig. 11



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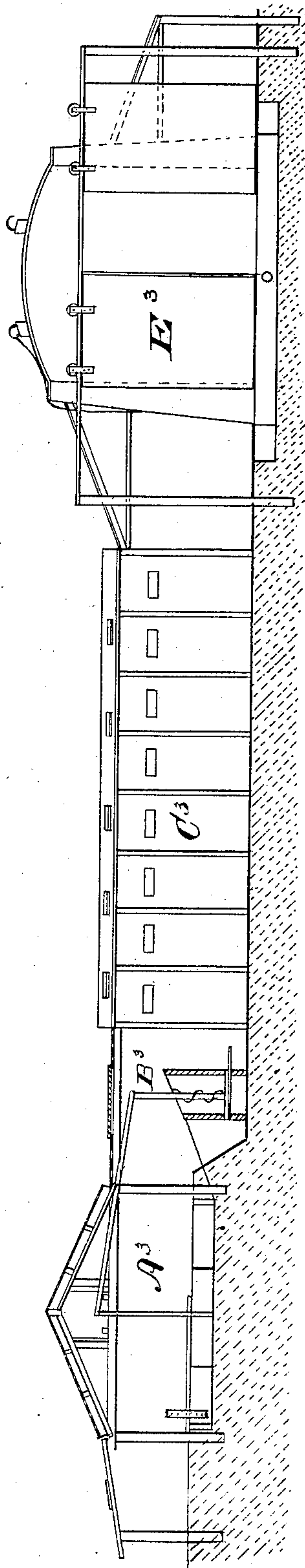


Fig. 12.

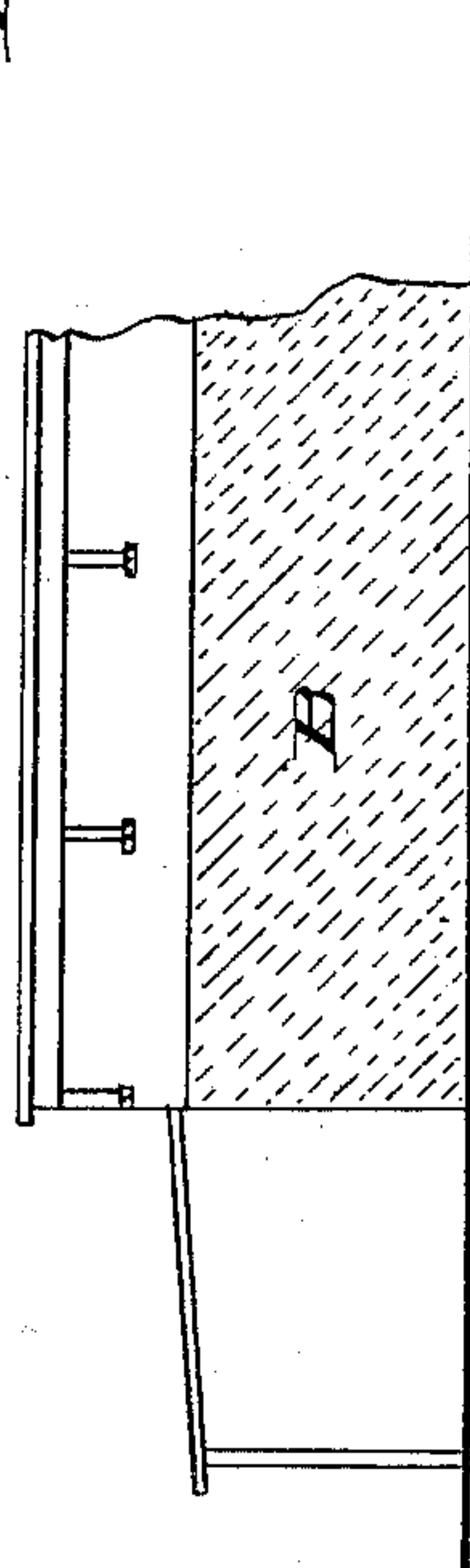


Fig. 13.

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UNITED STATES PATENT OFFICE.

NATHANIEL S. WILLET, OF NEWARK, NEW JERSEY.

MANUFACTURE OF BRICK.

SPECIFICATION forming part of Letters Patent No. 315,200, dated April 7, 1885.

Application filed August 28, 1883. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL S. WILLET, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in the Process of and Apparatus for the Manufacture of Brick; and I do hereby declare the following to be a full, clear, and exact description of the invention, such

as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to an improved process of and apparatus for the manufacture of brick, whereby certain new and important advantages are secured and other disadvantages in the manufacture of brick obviated. The primary object of this invention is to prevent access of rain and frost to the clay, both while it is in its original bank, bed, or pit, and subsequently while it is undergoing the process of mixing, molding, drying, and while in course of transportation from the mixing-pit to the molding-machine, and from the latter to the drying structure, whereby brick may be manufactured in large quantities throughout the year without regard to the state of the atmosphere, whether it be warm or frosty, wet or dry.

Heretofore clay-pits, mixing-pits, brick forming or molding machines, and the "brick-yard" have been detached from one another, and the clay-pits, and ordinarily the structures above enumerated, have been so exposed and open that the process of brick-manufacture has been greatly hindered or entirely stopped during a rain-storm, and during the winter in colder climates all operations have been interrupted.

By my invention the frost and rain are prevented from gaining access to the clay, and the processes of manufacture may thus be made continuous.

A secondary object of the invention is to improve the quality of the brick and to reduce the cost and facilitate the manufacture of the same.

The invention consists in the process of manufacturing brick, and in the arrangements and combinations of parts, substan-

tially as will be hereinafter set forth, and finally embodied in the several clauses of the claim.

In the accompanying drawings, comprised in four sheets, in which similar letters of reference indicate like parts in each of the several figures, Figure 1, Sheet 1, is a ground plan of the tempering-pits, brick-machine, brick-board benches, boiler and engine house, and the drying structure, showing the relative position of the parts. Fig. 2 is a central longitudinal section of the drying structure. Fig. 3 is a section of a brick-board attached or pivoted to a bench. Fig. 4, Sheet 2, is an end elevation of the drying structure. Fig. 5 is a longitudinal section of a part of a clay-bank and the roof inclosing it. Fig. 6 is a side elevation of a brick-board. Fig. 7 is a top view of the same, and Fig. 8 a bottom view. Fig. 9 is an end elevation of a brick-kiln, partly in section. Fig. 10 is a ground plan of a part of the kiln, and Fig. 11 is a side elevation of the same. Fig. 12, Sheet 4, is a side view, partly sectional, of the brick making and drying mechanism and structures, and Fig. 13 a side sectional view of the inclosed clay-bank.

In carrying out the invention I construct and arrange under one continuous roof and surrounded by one wall or series of walls the tempering-pits A^3 , in which the clay taken from the clay pit or bank B is worked to prepare it for the molding process, the brick-machine B^3 , in which the said clay is formed into "green" bricks, and drying-racks C^3 , on which said green bricks taken from the brick-machine are dried prior to the subsequent burning process. Between the mixing-pits and drying-racks are placed brick-board benches, as shown in Fig. 1, and on the opposite side of the said rack the kiln E^3 is erected. This structure is preferably connected at the roof and sides with the drying-racks, but not necessarily so, as it will be evident that there will be no danger after the bricks are dry of their being injured by frost. It will thus be observed that the clay, from the time it reaches the tempering-pits until it reaches in a dry state the kiln, is prevented from being frozen, and also that the manufacture and drying of the brick is not interfered with or even retarded by rain or dampness.

To enable clay free from frost to be obtained in sufficient quantities during the winter, I inclose the clay pit or bank B, Figs. 5 and 13, with a shed or inclosure, said shed extending back from the edge of the pit or bank, and thus covering enough surface to free enough clay from frost to last through the season. Said sheds or inclosures are supported by posts A', driven into the bank B, which posts are of sufficient length and are driven sufficiently deep to act as standards when the bank is removed. Stoves or other suitable heating apparatus may be used within the sheds, which latter are built out from the bank to secure working-room.

Because of the relation of the several structures, the various steps in making the brick are carried on most systematically and completely all unnecessary handling of the brick being thereby avoided. The clay is taken from the bank to the tempering-pits, which may be adjacent, then placed in the brick-machine, where the green brick are made, and then placed upon the brick-boards and within the drying-house; thence they are removed to the kiln, where the process is completed.

While the arrangement herein shown and described is preferred, I am aware that the relation of the parts may be changed, and hence I do not wish to limit myself to the exact arrangement specified. Only those steps in the process which are closely connected, one following the other, should be conducted in structures, and all the structures connected by one continuous roof or cover.

The tempering-pits employed in my system are similar to those already in use, except in being under cover and completely protected, three pits being used to one drying-house, instead of two, as are now employed, the increased number being necessary to supply the amount of clay required by my improved drying arrangements. The interiors of the sheds are heated by stoves or other suitable heating apparatus to maintain the right temperature.

The brick-machines are of the usual pattern, and are placed between the pits, and the drying-house being also under cover and protected.

The drying structure is constructed substantially as shown in Figs. 1, 2, and 4, having double walls of boards or other suitable material, with a space between, the inner wall being provided all around the house at the bottom with openings *a*, Figs. 1, 2, and 4, placed at suitable distances apart. Openings *b* are also provided in the outer wall toward the top, placed at intervals apart corresponding to the openings *a*, being provided with doors *b'*, suitably hung. By means of these openings communication is had between the inside and the outside of the drying-house, thus serving as flues through which the damp air from within can escape.

Within the drying-house *c*, Figs. 1 and 2, are uprights which support the rafters. *d* are cleats secured to said uprights, extending from

end to end of the structure, and arranged in parallel rows pitching toward the end of the house near the kiln.

e are rollers extending between the cleats *d*, Fig. 4, and working in bearings in or on the same, being placed near together and extending the whole length of the cleats in rows, one above the other, placed at suitable distances apart.

f are skylights in the roof to lighten the interior of the house and modify the temperature thereof. *g*, Figs. 1, 2, and 4, are steam-pipes, placed preferably on the floor, one end of which is connected with the boiler in the engine-house A. The other end may return to the boiler, or exhaust in the air, or conduct the steam to other parts of my yard where necessary. The ends of the drying-house are further provided with doors *h* and *h'* in the outer and inner walls, respectively, so that access may be had within the house. The flue-openings *a* and *b* are made in the doors, as shown in Fig. 4, so that when closed they act as flues, similar to the side walls. The doors are held in position preferably by buttons *i*, Fig. 4, so that they may be taken out and removed entirely when the drying-house is being filled with brick. Thermometers *j*, Fig. 4, may be placed on the inner doors, and openings *j'*, covered with glass, made in the outer doors, so that the temperature within can be observed and regulated.

k are brick-boards placed upon the rollers in the drying-house, as shown in Figs. 2 and 4. The rollers being pitched toward the rear, the boards by their own weight tend to move down on the rollers; but in order to facilitate their motion cords *l*, provided with loops at intervals, which catch upon hooks placed in the ends of the brick-boards, as in Figs. 2, 6, 7, and 8, may be used.

Other devices may be used to accomplish the same result; but I prefer the one described. The brick-boards are further provided with small rollers or window-sheaves, *m*, Figs. 6, 7, and 8, placed in the side edges, as shown, which still further assist the boards in moving on the rollers by bearing against the cleats and preventing the boards wedging between said cleats. The brick having been removed from the boards and piled within the kiln, the boards are placed upon the return-rollers *m'*, as shown in Fig. 2, said rollers forming an inclined table or support over which the empty brick-boards gravitate or slide from one side or end of the drying structure to the other, where they are received and are made ready to be again filled with brick and replaced within the drying structure.

The brick-boards, as shown in Figs. 6, 7, and 8, are provided with cleats *n* or *l*—pieces of iron screwed to the board on the upper side—against which the mold rests when the green brick are placed upon the board. Apertures *o* may be made through the boards, so as to secure free circulation of air around the brick, and on each end of the boards are

provided lugs *p*, which keep the boards apart and form openings between the boards when upon the rollers.

Hooks or projections *q*, Fig. 3, are secured to the brick-board benches, which fit or work within recesses *q'*, Fig. 8, in the under side of the brick-boards. These hooks serve as pivots upon which the brick-boards rotate, as described in a former patent, after being filled with brick from the machine.

Window-sheaves or small rollers *k'* may be placed on the bottom of the boards, as shown in Figs. 6 and 8. In this case the rollers *e* in the drying-house may be dispensed with, the boards moving on the cleats or prepared ways.

The brick-kiln is constructed substantially as shown in Figs. 9, 10, and 11, Sheet 3, having concrete walls and bottom of suitable thickness, and is placed with the roof of the sheds *p'* abutting against the roof or end of the drying structure. Grates *r*, Figs. 9 and 10, are built in the concrete bottoms, the ash-pits extending down into the same, and furnace-doors *r'* being provided in the walls at each grate.

In order to secure the proper draft, I provide a pipe, *s*, extending through the concrete, as shown in Figs. 9 and 10, with branch pipes *t* running under each grate, provided with dampers *t'*, extending out through the walls, as shown. A blower or other suitable device may be employed to supply the draft. Damp-air flues *u* are built in the walls, as shown in Fig. 9. Port-holes *v*, Fig. 9, covered with isinglass, are provided in the walls, through which the relation of the brick within the kiln to the guide-rods *v'* may be noted. The roof may be covered with boiler-iron supported by iron rafters resting upon iron plates upon the top of the concrete walls.

Draft-regulators *w*, Figs. 9 and 11, provided with suitable contrivances for opening

and closing said regulators, may be placed in the roof, as shown, so that the heat in any part of the kiln may be increased or diminished by modifying the draft in said part by means of said regulators and the dampers *t'*. The ends of the kiln are provided with sliding iron doors made perfectly tight, and constructed substantially as indicated in Fig. 9.

Having thus described my invention, what I claim is—

1. A brick-drying structure having double walls with openings *a b* therein, and having racks composed of uprights and cleats to receive the brick-boards, and having steam-pipes laid therein, all substantially as set forth.

2. In combination, a brick-drying structure arranged with hollow walls and having steam-pipes or other apparatus for producing artificial heat, and provided with racks formed of uprights and cleats, and provided with rollers to receive brick-boards, and said brick-boards adapted to receive the bricks, all substantially as herein set forth.

3. A brick-drying structure provided with hollow walls, uprights, and cleats, and an inclined table or support adapted to be varied to direct the brick-board from one side of the drying structure to the other, substantially as set forth.

4. A drying structure heated by steam, having double walls and damp-air flues, as *a* and *b*, removable doors, as *h h'*, uprights *c*, cleats, as *d*, rollers, as *e*, and means, as *m*, for returning the brick-boards, all substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 27th day of August, 1883.

NATHANIEL S. WILLET.

Witnesses:

F. F. CAMPBELL,
OLIVER DRAKE.