

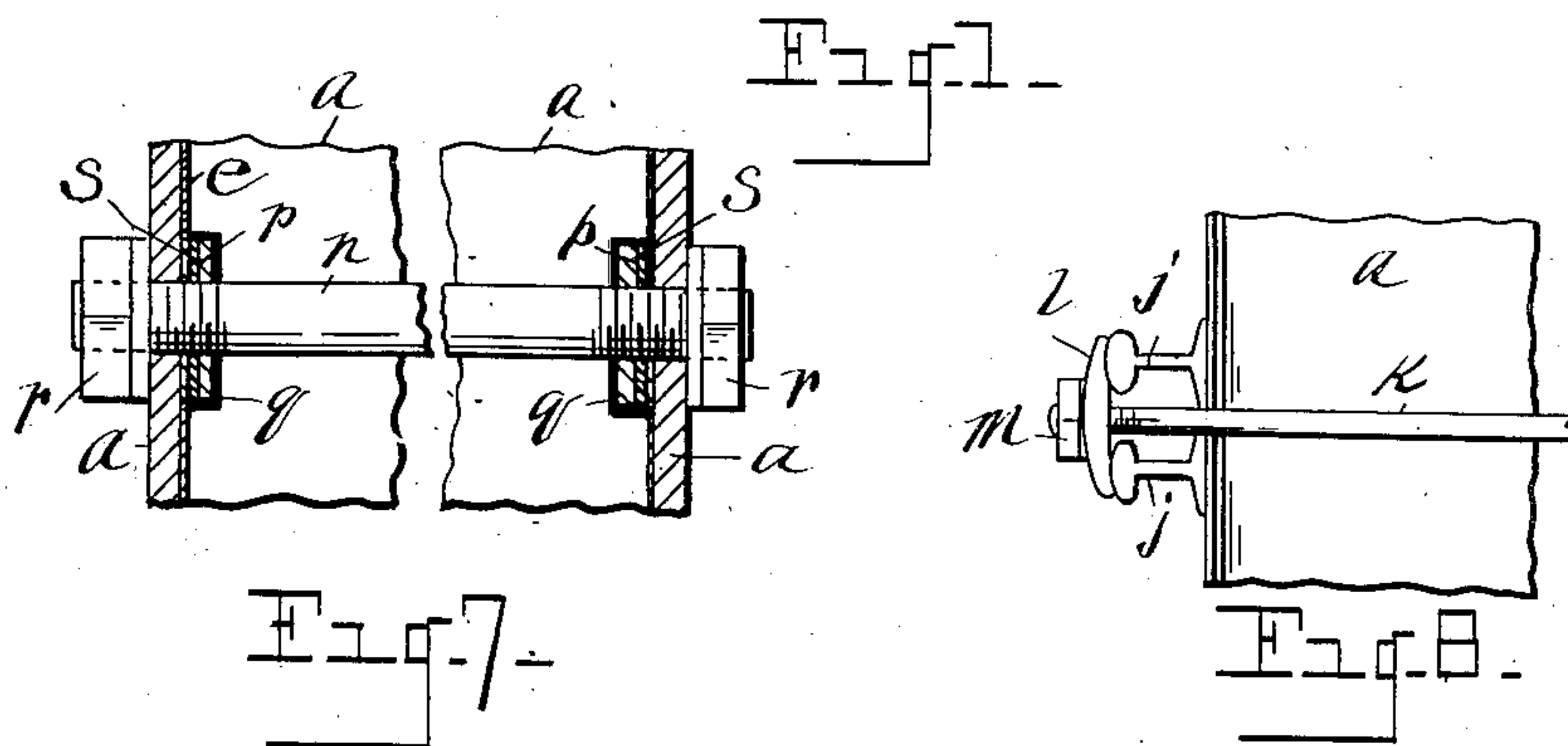
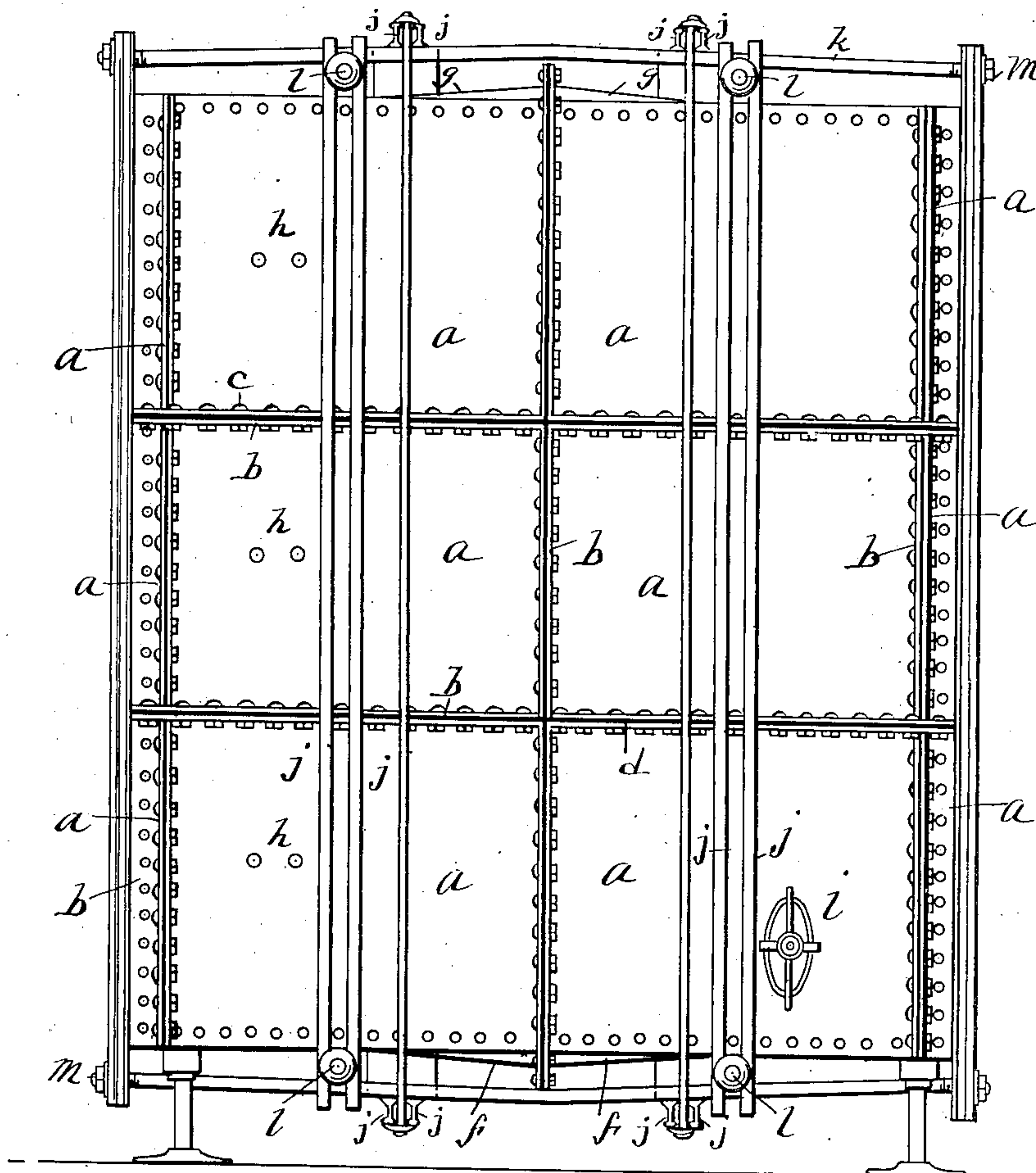
No. 814,160.

PATENTED MAR. 6, 1906.

D. O. PAIGE.
TANK.

APPLICATION FILED OCT. 30, 1903.

4 SHEETS—SHEET 1.



WITNESSES:
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David O. Paige INVENTOR.
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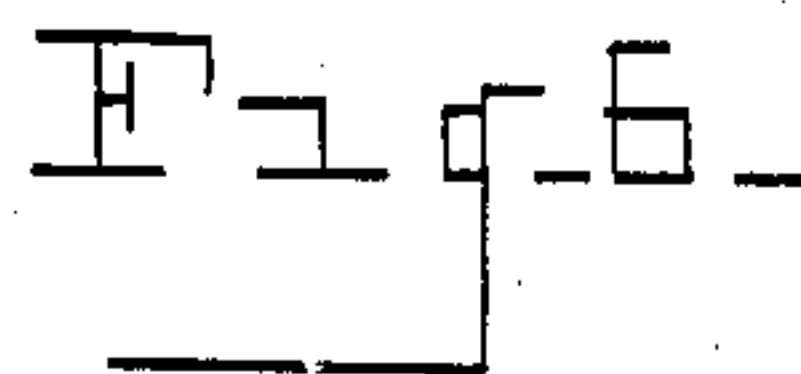
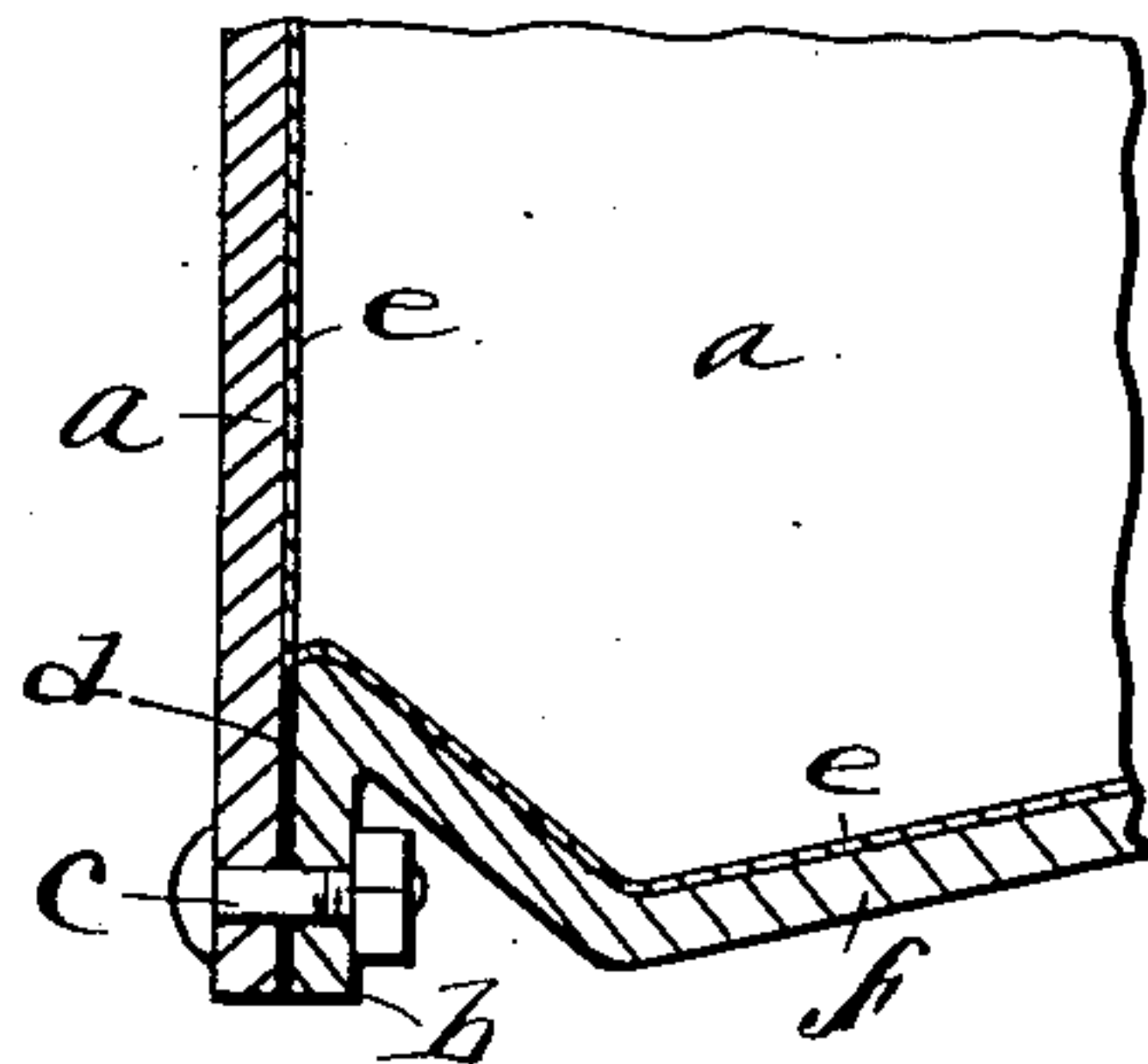
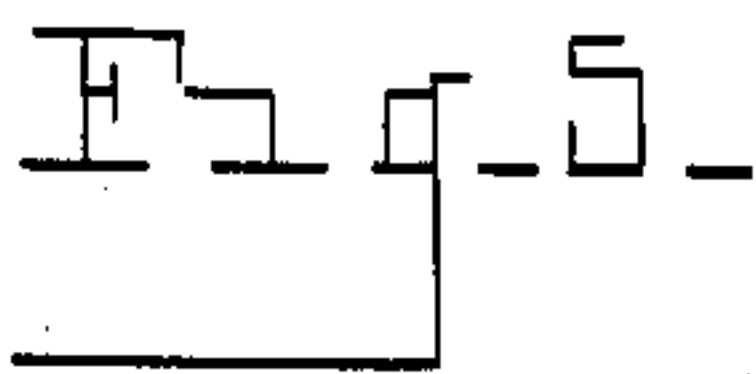
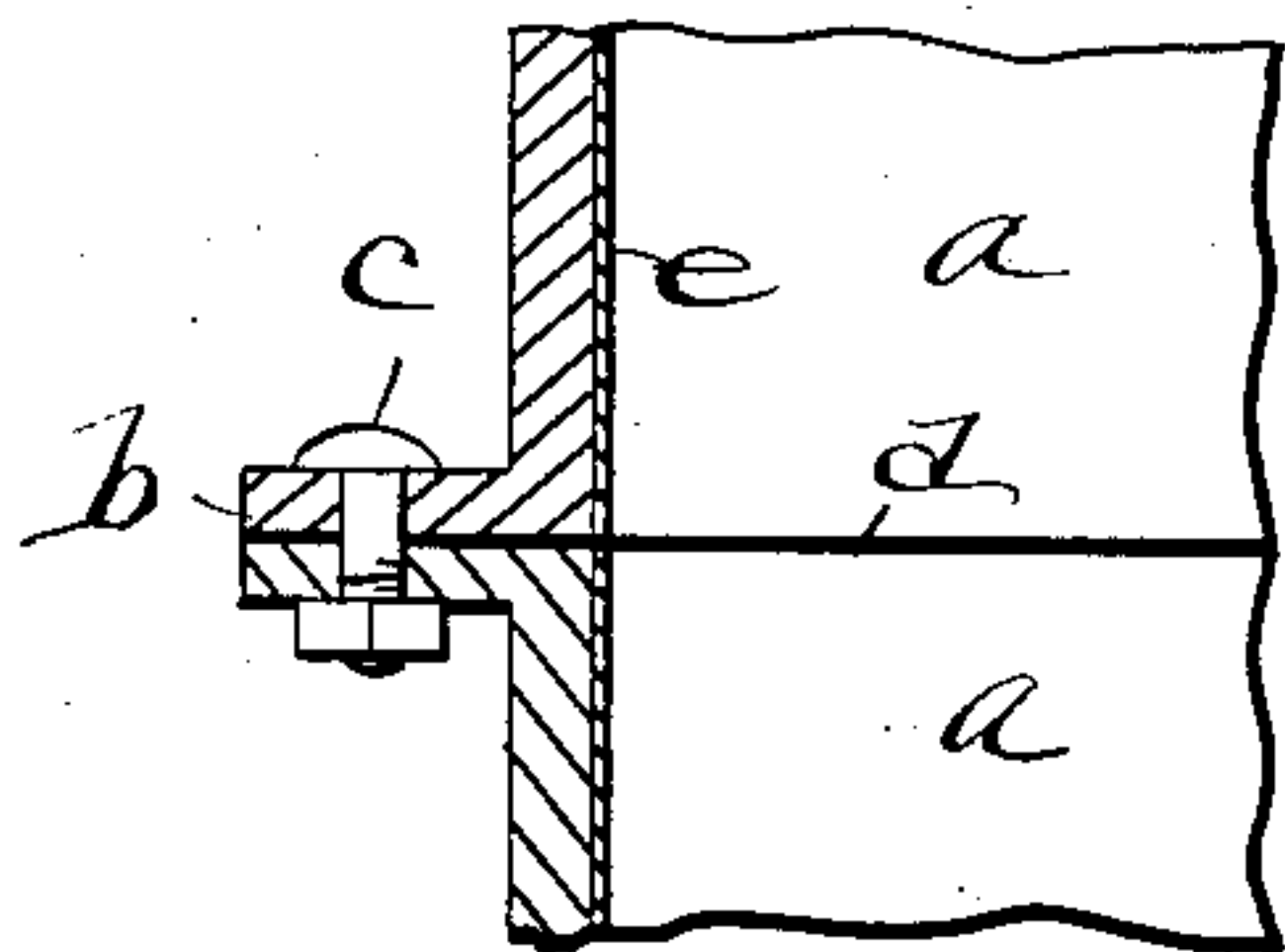
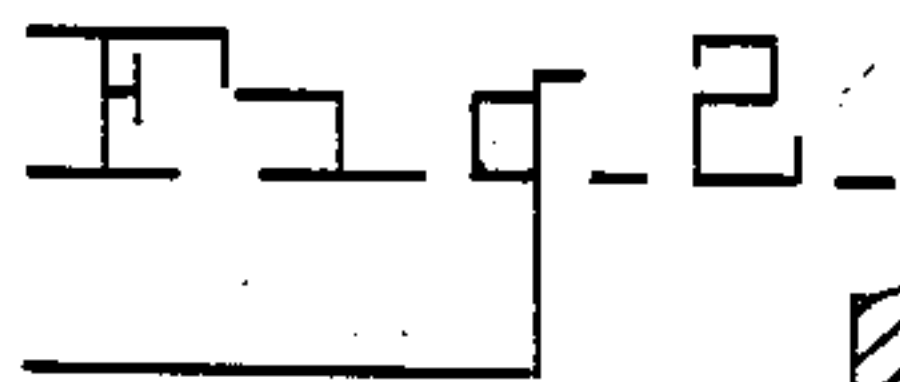
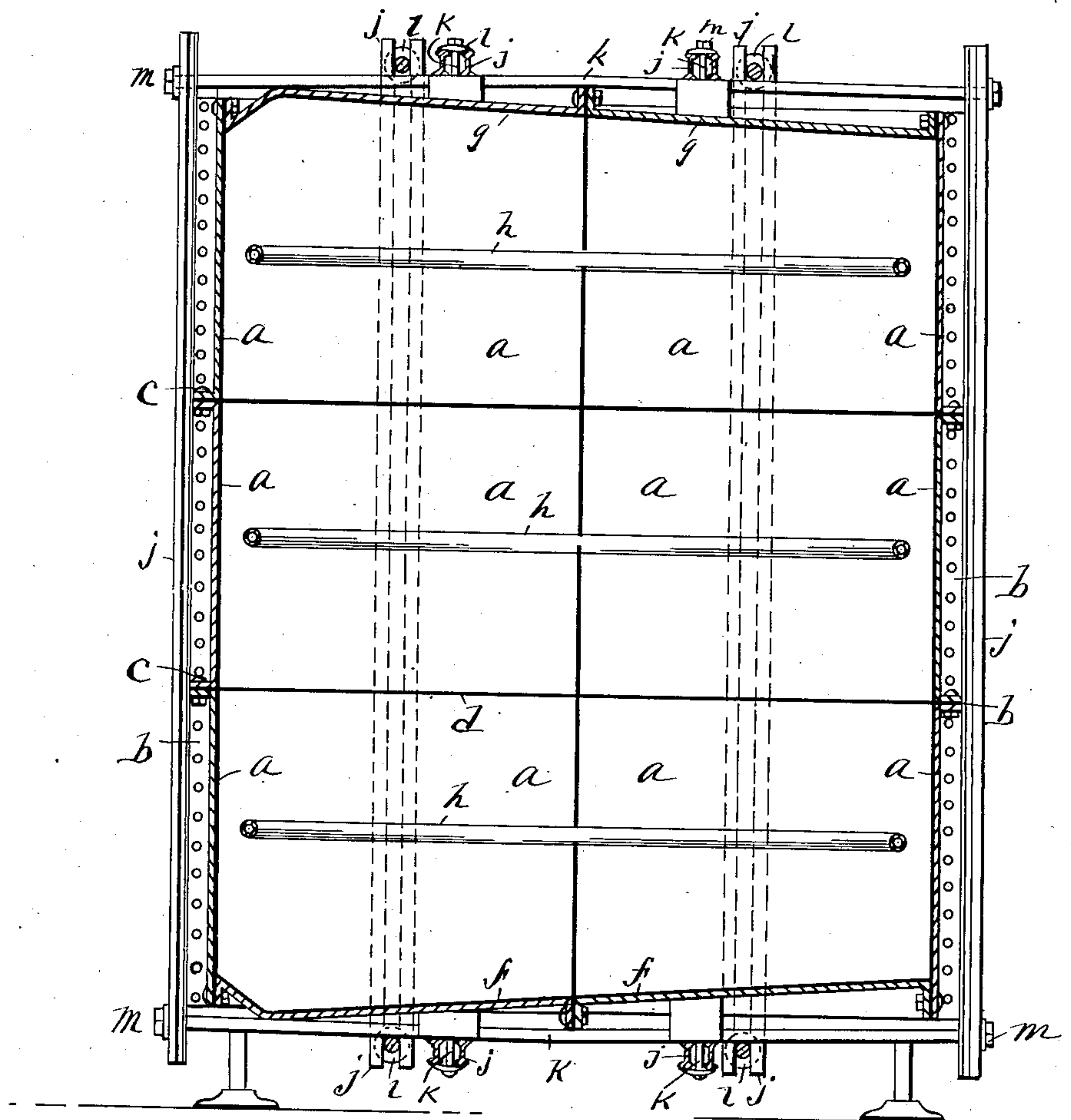
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4 SHEETS—SHEET 2.



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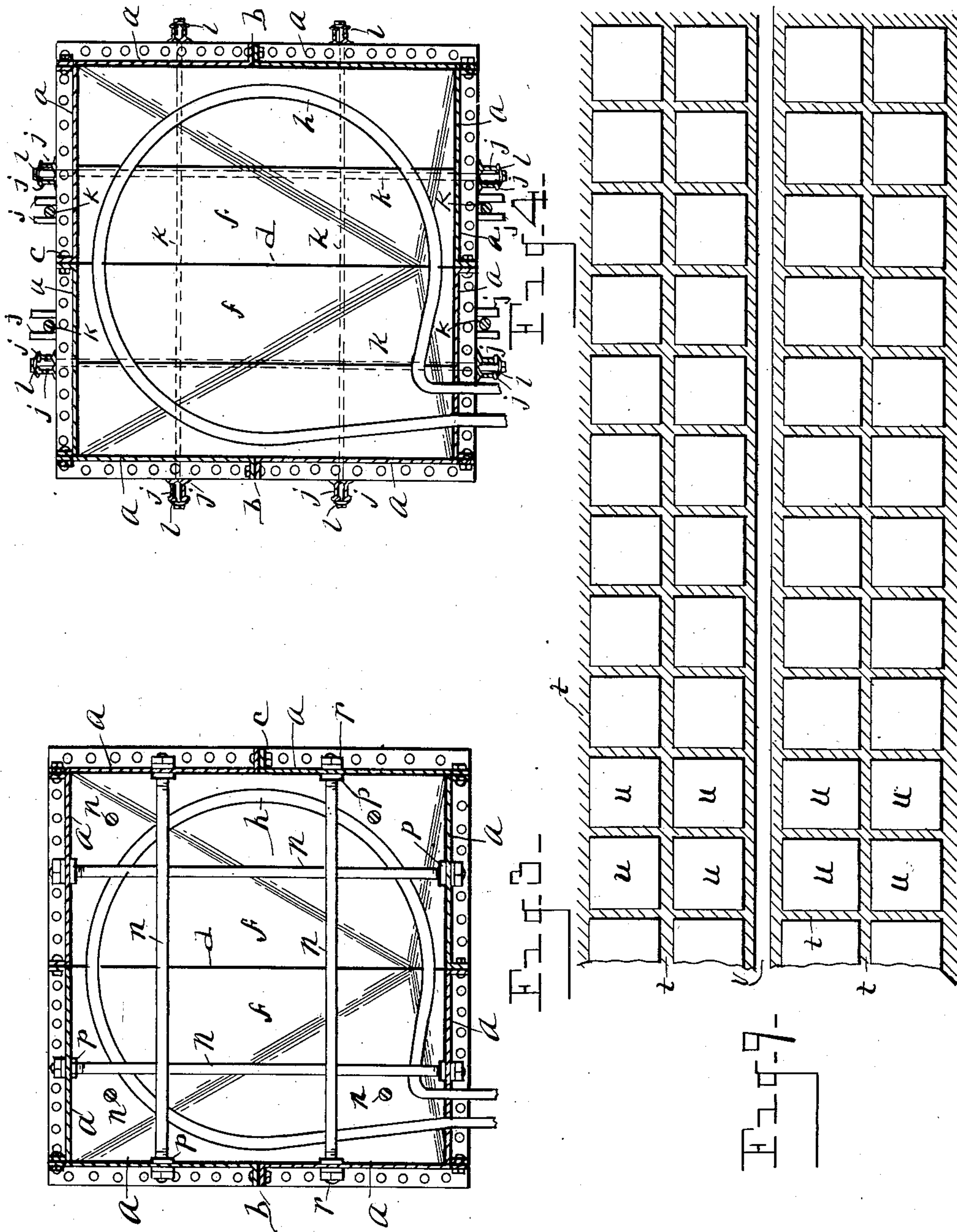
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4 SHEETS—SHEET 3.



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No. 814,160.

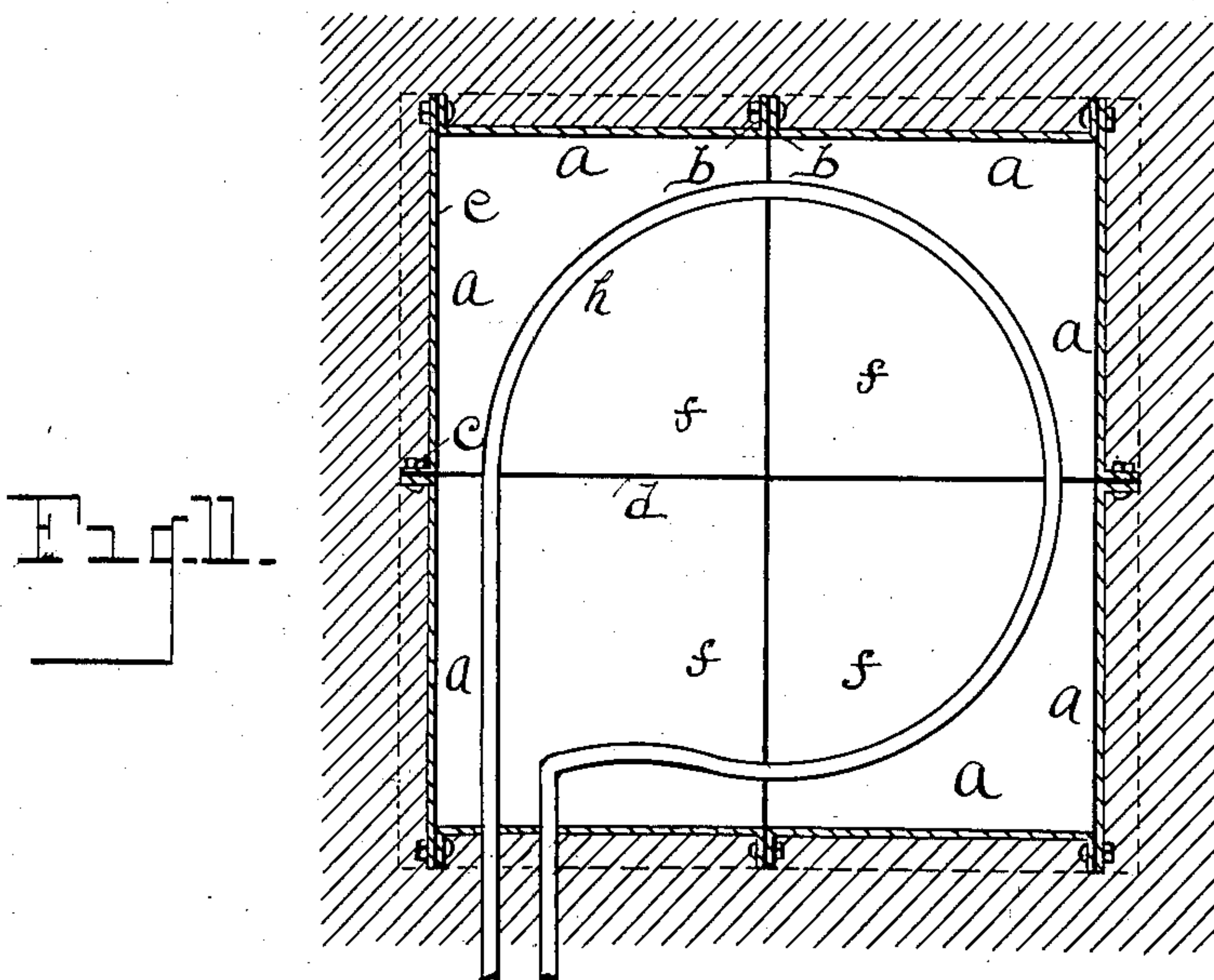
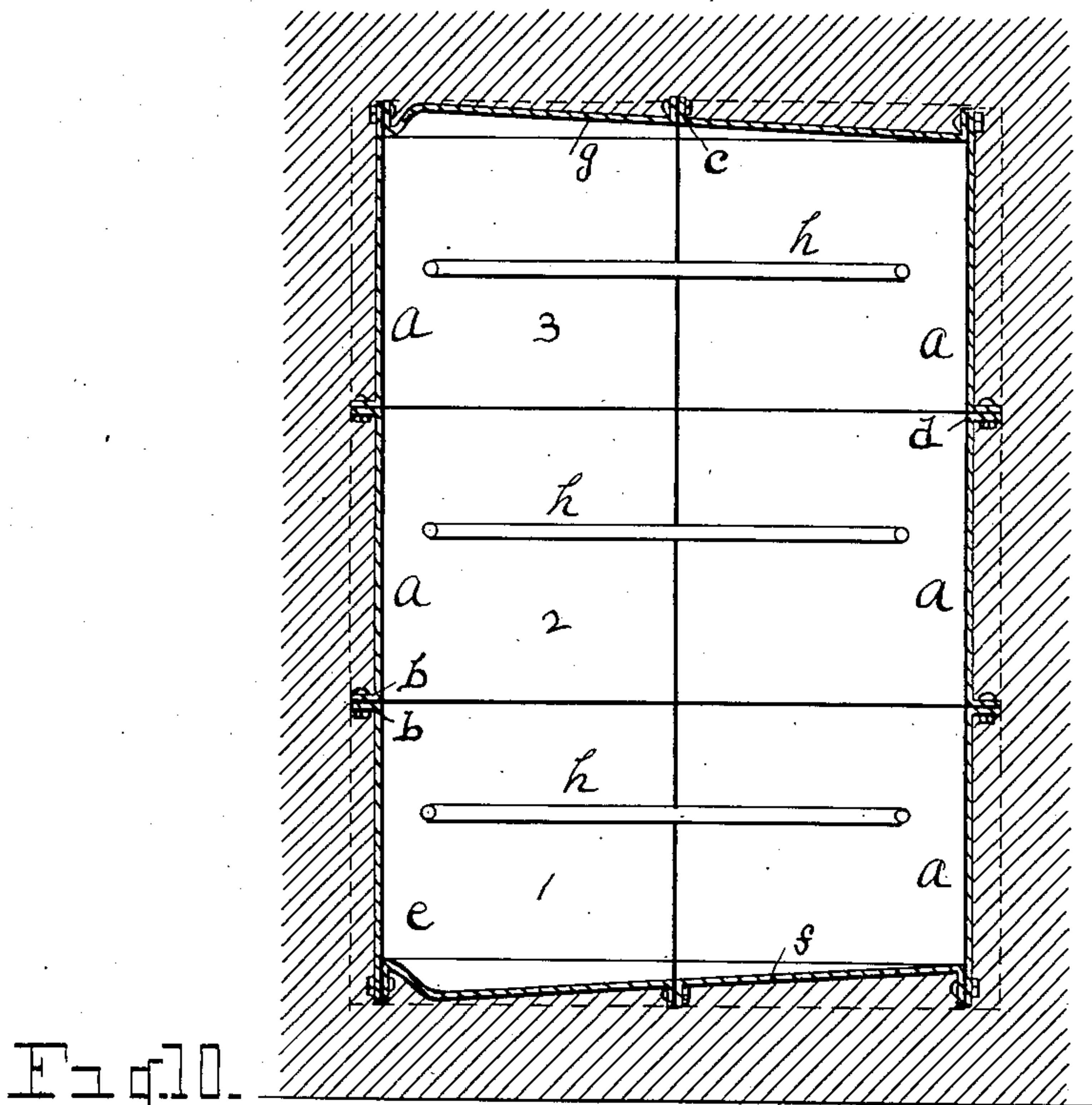
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

DAVID O. PAIGE, OF DETROIT, MICHIGAN, ASSIGNOR TO THE PFAUDLER CO., OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

TANK.

No. 814,160.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed October 30, 1903. Serial No. 179,150.

To all whom it may concern:

Be it known that I, DAVID O. PAIGE, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Tanks, of which the following is a specification, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object a glass-lined tank or cask of superior efficiency and utility; and it consists of the construction and combination of devices hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation, illustrating my invention. Fig. 2 is a view in vertical section. Fig. 3 is a view in horizontal section, illustrating a modification. Fig. 4 is a view in horizontal section through the devices shown in Fig. 1. Fig. 5 is a detail view, in vertical section, illustrating the manner of joining two of the intermediate plates or sections together; and Fig. 6 is a similar view showing the method of uniting an upright plate with an adjacent top or bottom plate. Fig. 7 is a view in detail, illustrating, on a larger scale, features shown in Fig. 3. Fig. 8 is a view in detail, showing, on a large scale, the method of engaging a tie-rod with the buckstays. Fig. 9 is a diagrammatic view illustrating an arrangement of a series of tanks embodying my invention. Fig. 10 shows in vertical section a tank inclosed by an insulating-wall. Fig. 11 is a view illustrating the same in horizontal section.

More particularly, my invention has for its object the construction of a tank or cask of angular form in cross-section, the tank being preferably square in cross-section, the same being constructed of a series of flanged plates, the plates being either formed of cast or of wrought metal, as may be preferred, the tank being made up in sections composed of such metallic plates flanged and properly bolted together, the flanges being dressed off and a packing located between the joints.

In the drawings, *a* represents one of the plates, and *b* flanges thereupon. These plates may be of any desired or convenient size, the sections of the tank being built up of a plurality of plates of any desired number arranged in angular form in cross-section. The flanges are shown bolted together, as in-

dicated at *c*, and *d* represents an intermediate packing. These plates, preferably before they are put together, are glass-enameled, as indicated at *e*. The bottom plates are shown at *f* and so formed and arranged as to converge, preferably, toward one side of the tank to facilitate drawing off the contents of the tank. So, also, I prefer that the top plates *g* should rise or converge toward one side of the tank, as shown. The top and bottom plates may be thus interchanged by simply reversing them for the one location or the other, this construction simplifying the formation of the tanks.

My invention also contemplates providing the tanks with interior refrigerating-coils, one or more, (indicated at *h*.) The tank may be provided also with a manhole *i* and with any suitable inlet and draw-off devices (not shown) as may be required.

To give additional firmness to the construction, my invention contemplates the provision of means to strengthen the walls of the tank when the various plates or sections have been united. This result may be accomplished in a variety of ways within the scope of my invention, and I have shown in the drawings three ways to accomplish this end. As shown, for example, in Figs. 1, 2, 4, and 8, buckstays are located on the exterior of the tank on various sides thereof, the stays on opposite sides of the tank being connected by suitable tie-rods. I do not limit myself to any particular construction of the buckstays, but find that stays made of railway-rails or similar rails effectually serve my purpose. These stays I prefer to arrange in pairs, two pairs being shown on each side and also extending across the top and bottom, said stays being indicated at *j j*, the corresponding connecting tie-rods being indicated at *k*. The ends of the tie-rod may be provided with a head or saddle (indicated at *l*) extending over the adjacent surface of the companion rails forming the stays. A nut *m* on one end of the tie-rods provides for tightening up the tie-rods as required. It is obvious that these stays will effectually withstand any outward pressure liable to be exerted by the contents of the tank. These tanks are designed to be made of large dimensions for many purposes—as, for example, ten feet square—and to contain, for example, three hundred barrels each, more or less.

A modification of the means for strengthening the structure is shown in Figs. 3 and 7, in which stay-rods n are provided running through the tank, the stay-rods being shown threaded at their extremities and provided with collars p on the interior of the tank, which may be screwed into place and rigidly held in position in any suitable manner. For example, the rods n and collars p may be tinned over or enameled, as indicated at q , which would securely hold the collars in place.

The threaded ends of the rods n extend through the corresponding plates a' on opposite sides of the tank and are provided with nuts r , whereby the rods n may be tightened in place, and preferably with inner gaskets s . By this construction it will be evident that the walls of the tank will effectually be held in position against either inner or exterior pressure. Such stay-rods n may be employed to connect the sides and also the top and bottom of the tank.

I do not limit myself to any particular way of staying the sides of the tank. Instead of the means hereinbefore described the same end might be accomplished by walling in the tanks, as by a brick or cement or concrete or analogous wall, (indicated at t , Figs. 9, 10, and 11,) the space between a series of tanks being shown in Fig. 9 as being filled in with concrete or other material, the wall surrounding the entire tank and a series of tanks. It will be evident that a brick or cement or concrete wall around each of the tanks would materially aid in refrigeration, inasmuch as such a wall will materially insulate the tanks and prevent radiation of heat or the absorption of heat.

By employing cement or concrete in the construction of the wall it is evident that the flanges of the plates, with their bolts and nuts, will be embedded therein, which will effectually anchor and sustain the tanks in the walls, and when the tanks are arranged close together in a manner indicated in Fig. 9 the flanges, bolts, and nuts of two adjacent tanks are anchored and the tanks sustained in one intermediate wall. The walling in of the tanks will enable me to construct the plates of thinner and lighter metal, economizing thereby in the cost of construction. The wall will also keep the metallic plates from corrosion.

It will be seen that the plates are provided with vertical and horizontal flanges and that the tank, as shown more particularly on Figs. 1, 2, and 10, is built up of a series of horizontal sections, the sections being indicated by the numerals 1, 2, and 3, the sections extending about the tank and each section being composed of a series of the metallic enameled plates.

One purpose of my invention is to provide tanks of angular form in cross-section, pref-

erably square, to economize space, also to economize the cost of construction, and also to economize in the cost of refrigeration.

I have shown in the diagrammatic view in Fig. 9 how a series of square tanks may be located one adjacent to the other in a row, the completed tanks being shown in outline at u , a couple of rows of tanks being located also back to back, requiring only a passage-way v between them and room for the buckstays. It will be evident that by constructing tanks of this form they can be put much nearer together than tanks of circular form, for example, saving very largely in space, the space outside the tanks, wasted, where tanks of cylindrical form are employed, for example, being saved, so that there will not be nearly the same amount of space outside the tanks to be refrigerated where outward refrigeration is employed, as is the case where tanks are employed as hitherto constructed.

I have described the plates as glass-enameled on their inner surfaces, and I would have it understood that I do not limit myself solely to enameling said plates with glass, inasmuch as within the scope of my invention they may be enameled or coated or glazed in any desired manner or with any suitable or desired material calculated to protect the plates from the actions of acids or other contents of the material stored within the tanks.

The walls may be made of any suitable material other than brick or cement, if desired. While I do not limit myself to any particular use to which these tanks may be applied, they are more particularly designed for brewing purposes.

I have stated that the tanks might be located adjacent one to another. This obviously might be accomplished either by placing the tanks close together on a horizontal plane or a series of tanks might be arranged one above another on the same principle. For example, it has been customary to arrange a series of tanks for brewing purposes with a fermenting-tank at the top of a vertical series, so as to discharge by gravity into a curing-tank located therebeneath, the curing-tank discharging by gravity into a storage or finishing tank at the bottom of the vertical series. My invention contemplates such an arrangement as coming within its scope, the series of tanks being walled in or insulated from heat in a manner analogous to that above described. It will be obvious that where a series of tanks are thus insulated by a surrounding wall the contents of the tank may be refrigerated by coils extending therewithin and that in such a case the room in which the tanks are located would not need to be refrigerated. Where the room itself is refrigerated in the customary manner, the attendants must work in a refrigerated atmosphere, in consequence of which they are liable to contract colds, rheumatism, &c.

This liability, however, may be entirely prevented by use of my invention, a very considerable saving being also effected by not having to refrigerate the room. It will be seen that the sections of the tank are formed of flat flanged plates united at adjacent ends to form the corners in any suitable manner.

It is believed that a tank enameled on its interior surface provided with means for interior refrigeration and with an insulating exterior wall to protect the tank from heat is novel.

It will be evident from Figs. 2, 3, and 4 of the drawings particularly that the top and bottom plates, which are reversible and interchangeable, slope from opposite sides of the tank and toward the center to form the gas-chamber at the top at one side thereof and the liquid-pocket at the bottom at one side thereof. The plates forming the top and bottom of the tank at one side of the tank are preferably bent or shaped at an obtuse angle from the sloping body of the plate to the adjacent attaching-flange, as shown more particularly in Figs. 2 and 6, to afford room for engaging the nuts on the corresponding bolts.

What I claim as my invention is—

1. A tank formed of a plurality of metallic plates forming the sides and the top and bottom of the tank, said plates provided with attaching-flanges, the plates forming the top and bottom of the tank arranged to slope downward in opposite directions.

2. A tank formed of a plurality of metallic plates forming the sides and top and bottom of the tank, said plates provided with attaching-flanges, and the plates forming the top and bottom of the tank arranged to slope downward to form at the top of the tank a gas-chamber, wherefrom the gas may be emitted from the top of the tank, and to form a liquid-pocket at the bottom of the tank to facilitate the drainage of the tank.

3. A tank of angular form in cross-section constructed of a series of metallic plates provided with attaching-flanges, stays at the top and bottom of the tank, and means to unite the extremities of the corresponding top and

bottom stays to stay the tank against interior pressure.

4. A tank constructed of a series of coated or enameled metallic plates, vertical exterior stays on opposite sides of the tank, horizontal tie-rods at the top and bottom of the tank to unite the stays on opposite sides of the tank, horizontal stays at the top and bottom of the tank, and vertical tie-rods to unite the horizontal stays.

5. A tank of exterior angular form in cross-section constructed of metallic plates having marginal attaching-flanges and means to unite adjacent flanges, the top and bottom plates of the tank being reversible and interchangeable to form either the top or bottom of the tank as may be desired, the top plates sloping upward and from the sides thereof toward the center, the bottom plates sloping downward and from the sides thereof toward the center.

6. A tank of angular form in cross-section having the top and bottom thereof respectively sloping from one side toward the other and from the other sides thereof toward the center to form at the top of the tank a gas-chamber to afford exit for the gas at the top of the tank and to form a liquid-pocket at the bottom of the tank to facilitate the drainage of the tank.

7. A tank of exterior angular form in cross-section constructed of metallic plates having attaching-flanges, the plates forming the top and bottom of the tank sloping from one side toward the other to form at the top of the tank a gas-chamber and at the bottom of the tank to form a liquid-pocket, the top and bottom plates toward one side of the tank shaped at an obtuse angle from the sloping body of the plate to the adjacent attaching-flange.

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

DAVID O. PAIGE.

Witnesses:

N. S. WRIGHT,
M. L. SIMMONS.