

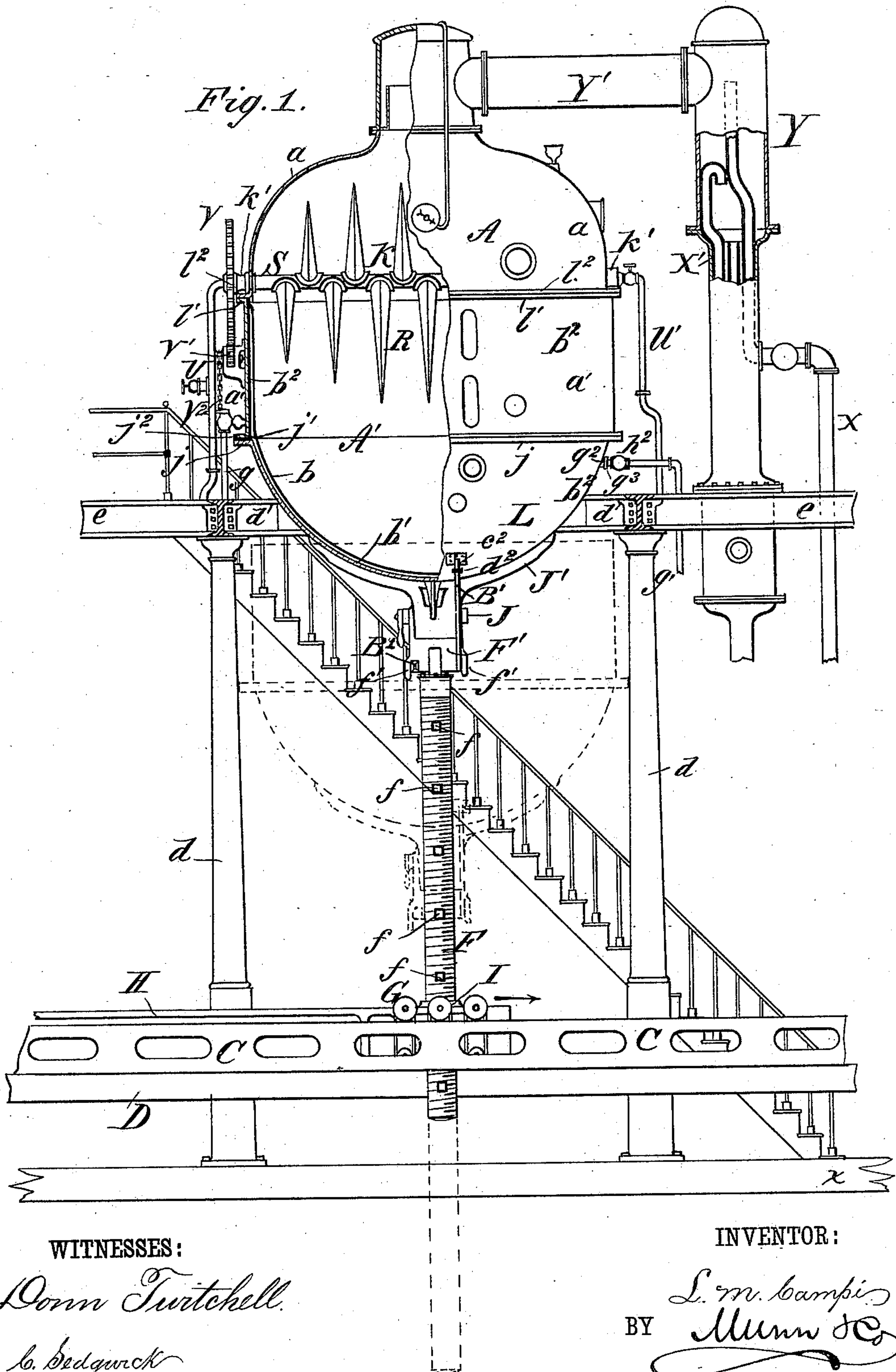
(No Model.)

3 Sheets—Sheet 1.

L. M. CAMPI.
VACUUM PAN.

No. 299,112.

Patented May 27, 1884.



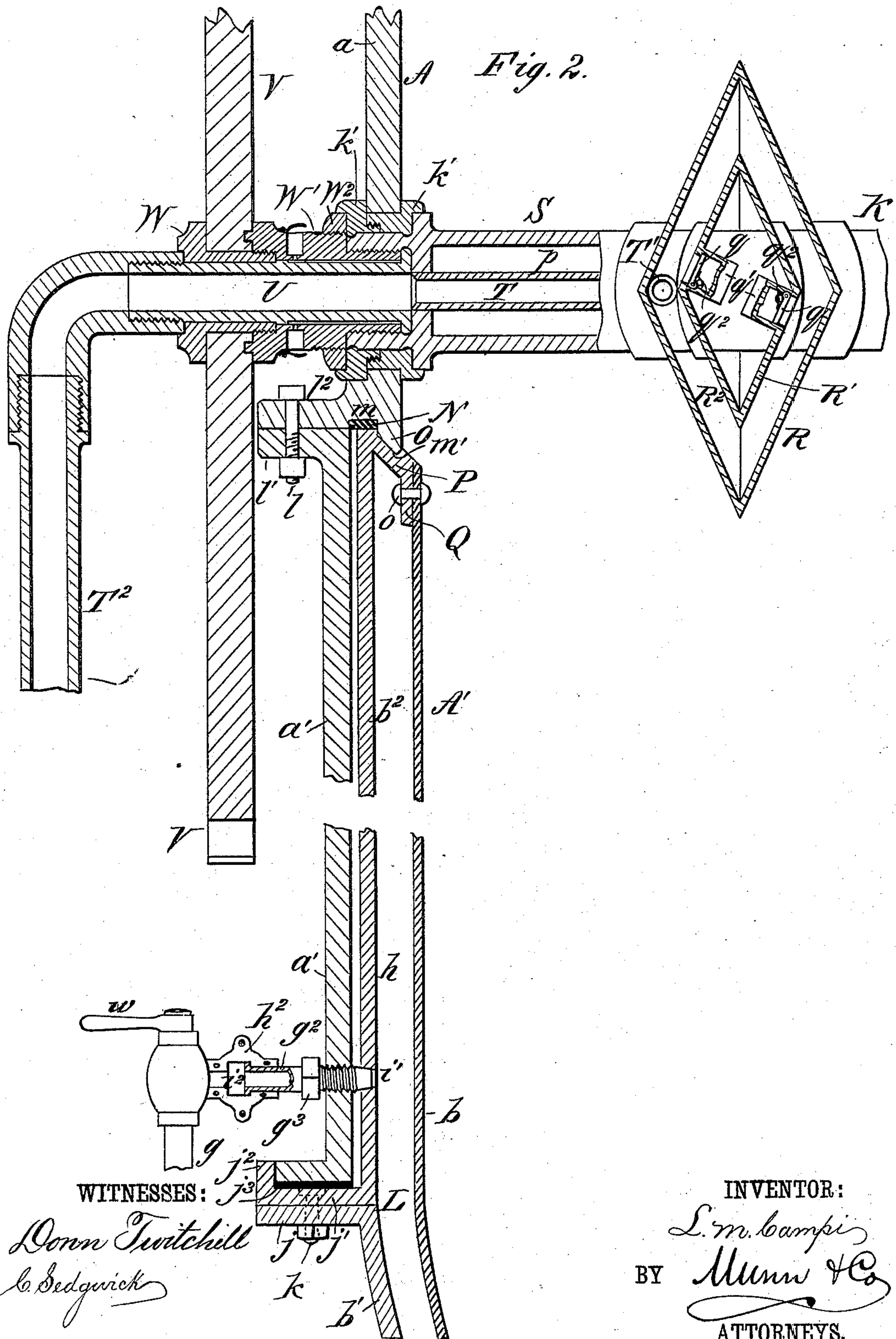
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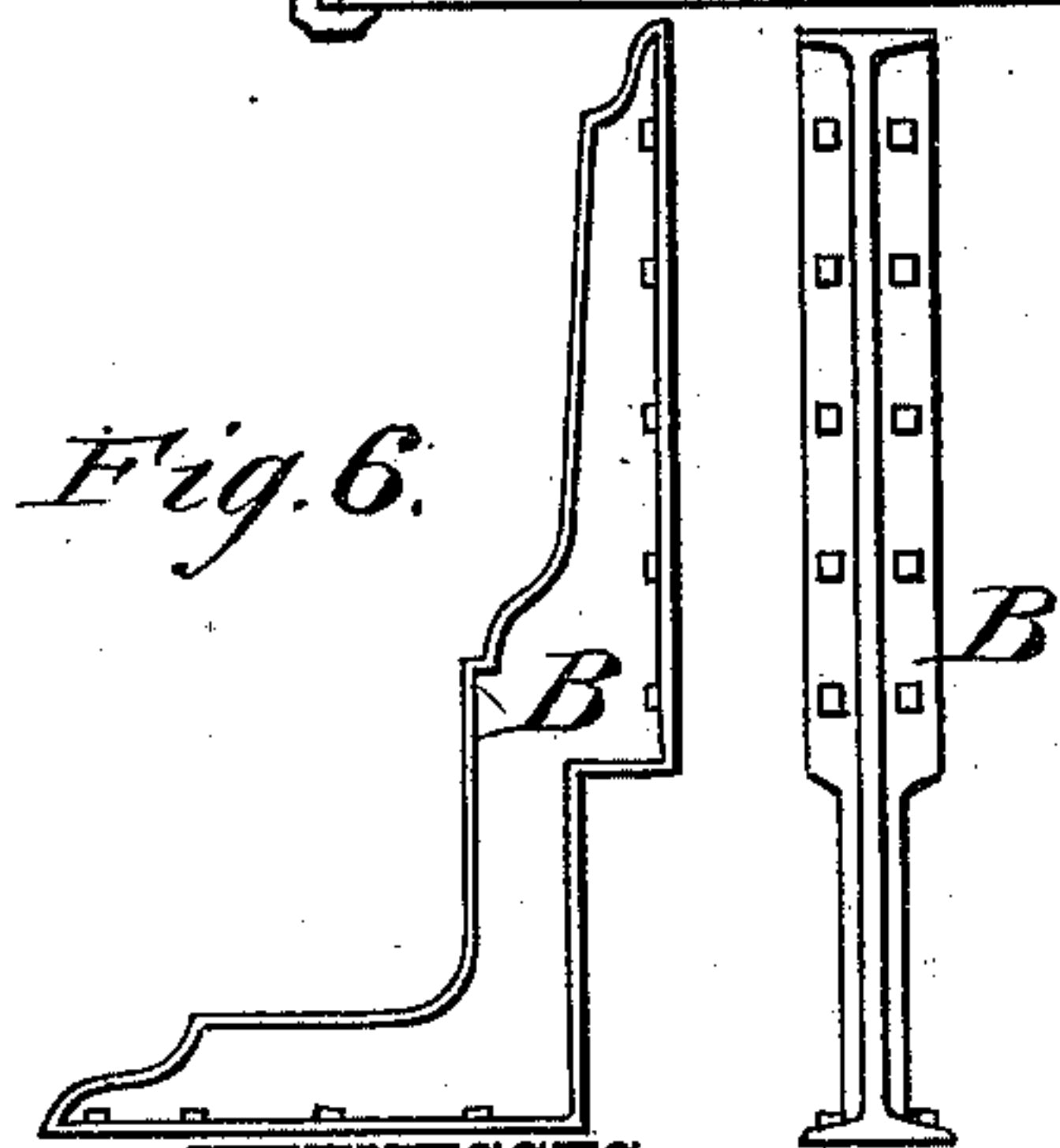
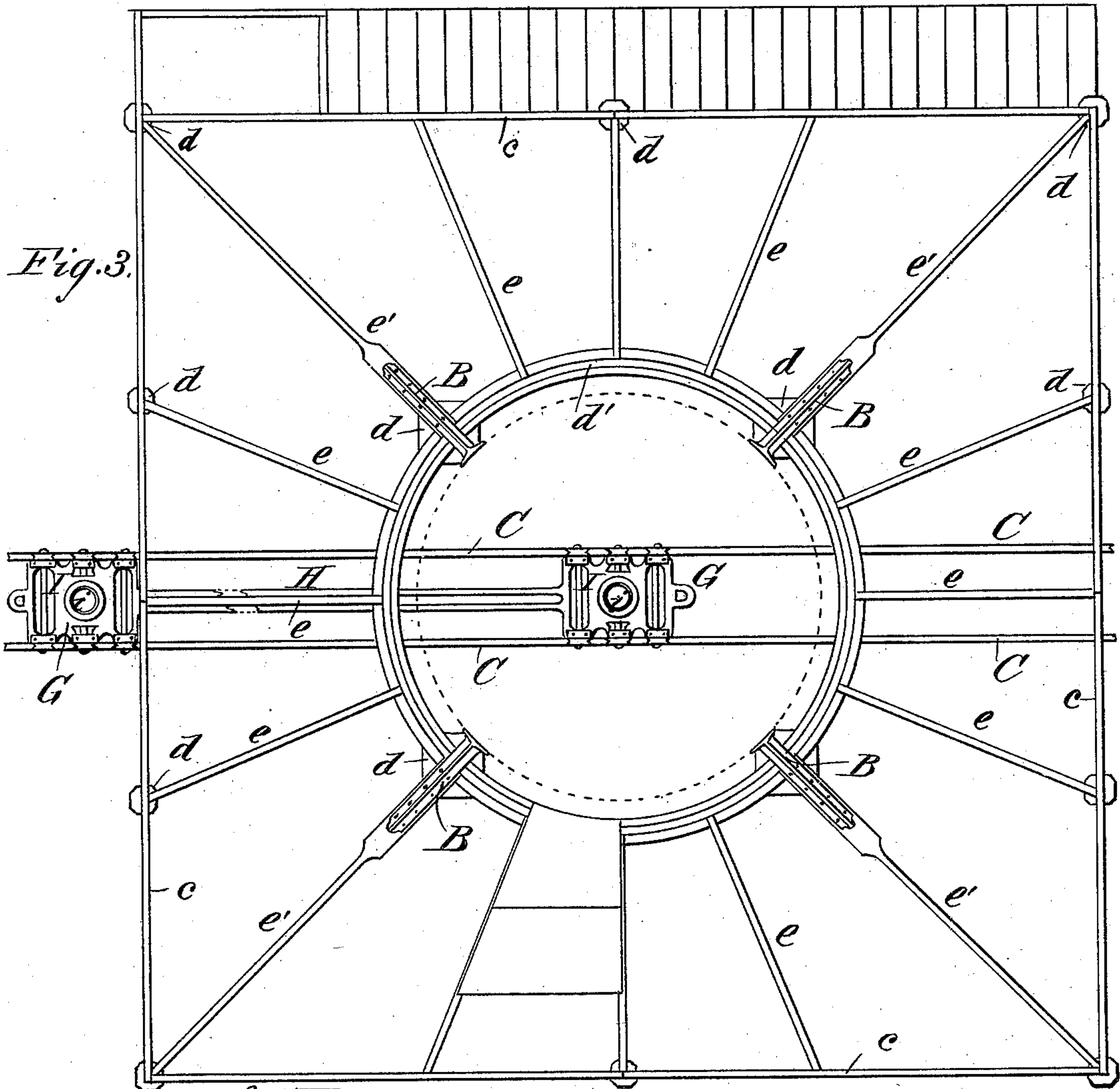
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3 Sheets—Sheet 3.

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VACUUM PAN.

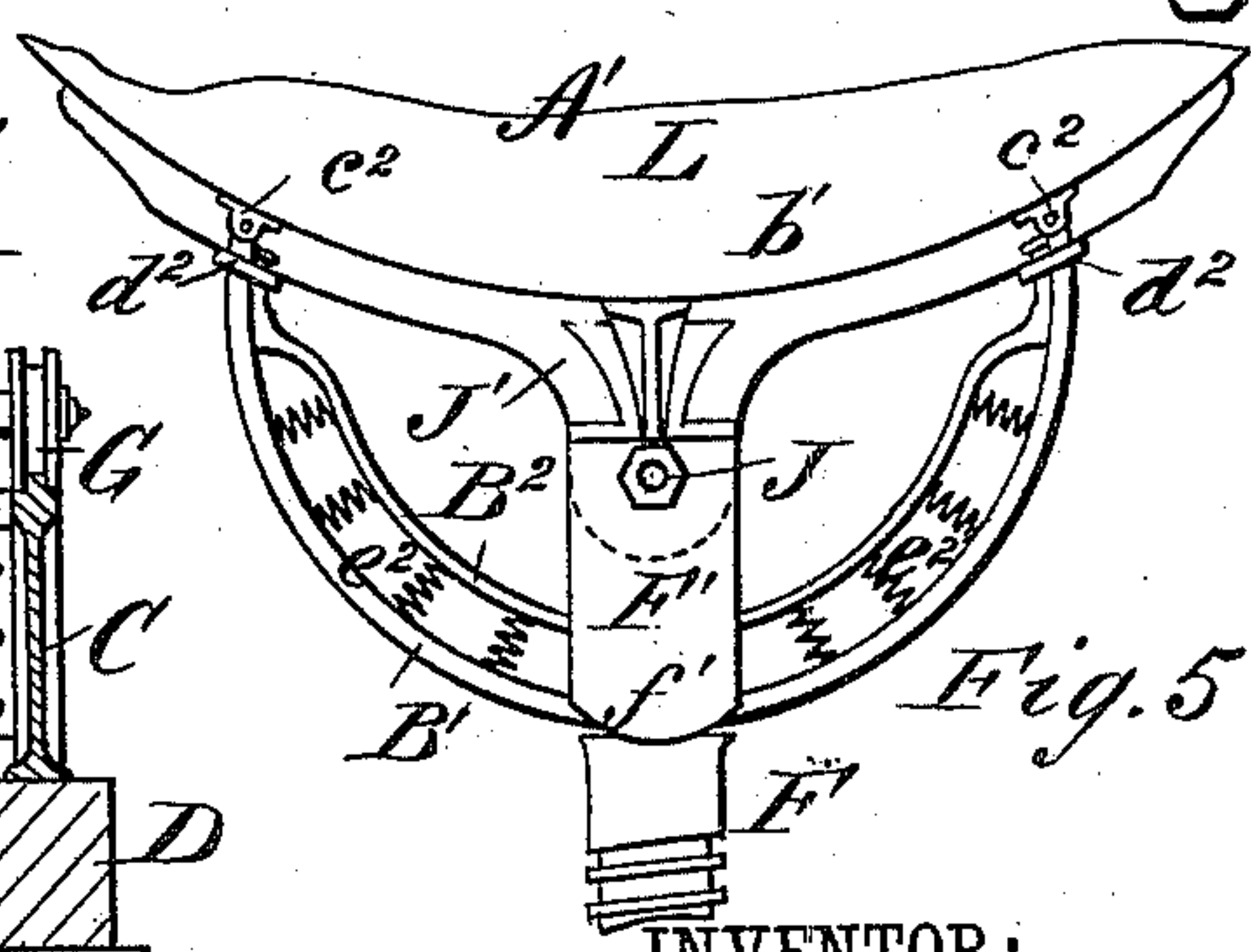
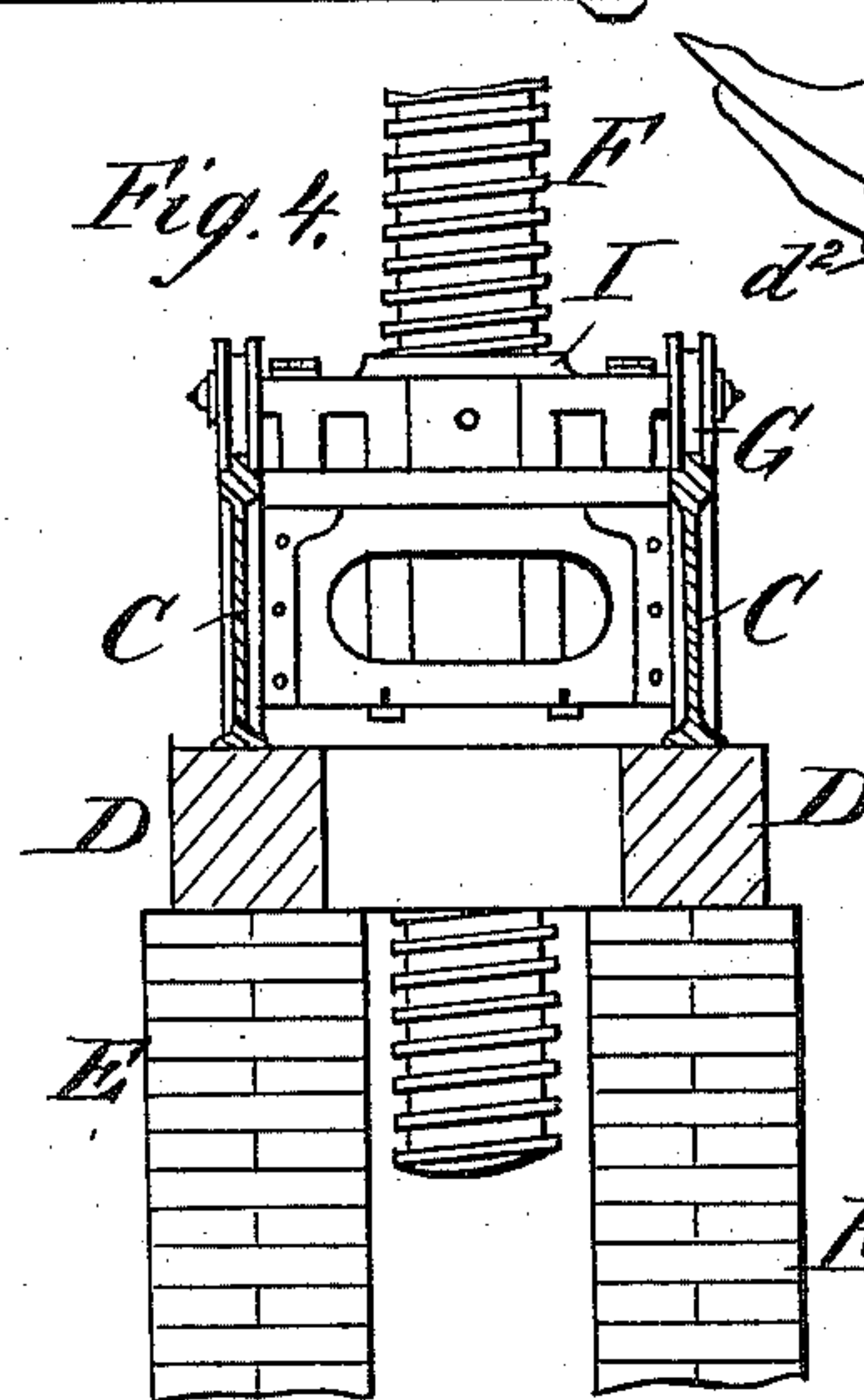
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WITNESSES:

Donn Twitchell.
W. Sedgwick



INVENTOR:

L. M. Campi
BY *Allen & Co*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

LUCAS M. CAMPI, OF HAVANA, CUBA.

VACUUM-PAN.

SPECIFICATION forming part of Letters Patent No. 299,112, dated May 27, 1884.

Application filed August 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, LUCAS M. CAMPI, of Havana, Cuba, have invented a new and Improved Vacuum-Pan, of which the following is a full, clear, and exact description.

This invention consists of the dome of the vacuum-pan and the receiver arranged upon a screw.

The invention also consists in supporting the receiver upon the upper end of a heavy vertically-placed screw, which works through a screw-threaded opening made in a heavy plate held upon a suitable truck which runs upon a suitable track, whereby the receiver may be moved to and from the dome upon the truck and raised up to and lowered from the dome by turning the screw.

The invention also consists in such construction of the dome and receiver at their edges that a steam and air tight joint may be formed between them when the receiver is elevated by turning the screw; also, in pivoting the receiver upon the upper end of the said heavy screw, thus adapting the receiver to be readily tilted for emptying out its contents; also, in providing the receiver with a brake arranged to prevent the receiver from turning on its pivot of its own accord or from being too rapidly tilted in the act of emptying its contents; and, also, in the construction, arrangement, and combination of parts, all as hereinafter described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional elevation of my new and improved vacuum-pan as it appears when arranged for operation. Fig. 2 is a detail sectional elevation, showing the preferred construction of the dome and receiver, whereby a steam and air tight joint may be formed between them, and showing the construction of the agitator and its connections, also showing the steam-inlet valve and coupling for admitting steam to the steam-jacket of the receiver. Fig. 3 is a plan view showing the ways or tracks and the trucks placed thereon and the frame-work for supporting the dome of the vacuum-pan. Fig. 4 is a transverse sectional

elevation of the track on which the trucks run and its foundation, a truck and screw being shown in elevation. Fig. 5 is a detailed side elevation showing the brake for holding the receiver upright and preventing too rapid tilting of the receiver, and Fig. 6 shows the form of standards or braces used for supporting the dome of the vacuum-pan from the frame-work.

The frame-work that I prefer to employ in connection with my new vacuum-pan is a superstructure supported upon the pillars *d d*, that rise from the floor *x*, the superstructure consisting of the iron side bars, *c*, arranged in the form of a square, the central circular bar, *d'*, and the radial bars *e e'*, that reach from the circular bar *d'* to the side bars, *c*, as shown in Fig. 3.

A represents the "dome" of the vacuum-pan. This is made in two parts—the upper part or casting, *a*, and the lower ring-casting, *a'*—and it is supported concentric with, but with its lower edge slightly above, the circular bar *d'* by the arms or braces B B, which are bolted or riveted to the ring-casting *a'* of the dome, and rest at their lower ends upon the radial bars *e' e'* of the superstructure.

Immediately below and in line with the diameter of the dome A and the circle formed by the circular bar *d'* is placed the parallel rails or plates C C, which rest upon the sills D D, which sills are supported by the walls, E E, of masonry, which are built a short distance apart for forming a clearance for the heavy screw F, as shown in Fig. 4, and as will be hereinafter described.

Upon the track formed by the rails or plates C C are placed the trucks G, preferably two, connected together by the connecting-rod H. These trucks are each provided with a heavy plate, I, which has a screw-threaded opening, *i*, made through it, in and through which a heavy screw, F, works, and upon the upper end of the screw F is swiveled the head F', to which is pivoted, by means of the bolt J and spider-casting J', the receiver A' of the vacuum-pan, so that by turning the screw F by means of a lever or rod passed through one or other of the holes *f* made through the screw F, or by other means, the receiver A' may be lowered out of contact with the dome A, and

also below the bars of the superstructure, to the position shown in dotted lines in Fig. 1, and then moved by the truck G along the track C C away from under the dome A. As just mentioned, there are by preference two of the trucks, G, which are connected together by the rod H, and it is designed to have each provided with a heavy screw, F, and receiver A', so that as one receiver is moved away upon one truck for cooling or emptying its contents, the other, charged with raw material, will at the same time be brought to place under the dome A, ready to be lifted by turning its screw F for closing the receiver with the dome A, for immediately continuing the evaporating process.

The receiver A' is made in two principal parts—the inner part, *b*, which is the receiver proper, and the outer jacket part, L, which, like the dome A, is made in two parts, the lower concaved casting, *b'*, and the upper ring-casting, *b''*; and the contents of the receiver are heated, primarily, by steam entering through pipe *g* the space *h*, formed by the jacket L around receiver proper, *b*, the steam passing out of the pipe *g'*, and secondarily by steam passing through the agitator K, to be hereinafter described. The lower concaved part, *b'*, of the jacket L is formed at its upper edge with the flange *j*, Fig. 2. The upper casting, *b''*, of the said jacket is formed at its lower edge with the corresponding flange, *j'*, which has the upwardly-projecting lip *j''* formed around its outer edge, which forms a seat, when the receiver A' is closed with the dome A, for the lower flanged edge of the surrounding ring-casting *a'*, of the dome A, as will be understood from Fig. 2. The flange *j'* is provided on its upper surface with the packing *j'''*, for the lower edge of the dome to rest upon, and the flanges *j j'* receive the bolts *k*, which unite the parts *b' b''* and make them practically one.

The ring-casting *a'* of the dome A is bolted fast to the lower edge of the upper casting, *a*, thereof by the bolts *l*, passing through the corresponding flanges, *l' l''*, formed, respectively, upon the upper edge of the casting *a'* and lower edge of the upper concave part, *a*, and the casting *a'* is of about the same width as the upper casting, *b''*, of the jacket L, but is of slightly larger diameter, so that the casting *a'* will close over the casting *b''*, as shown in Fig. 2, when the parts of the vacuum-pan are brought together for operation. When so brought together for operation, an air and steam tight joint is formed between the edges of the receiver and dome of the vacuum-pan by means of the packing N and lip O, the latter being formed around the lower edge of the dome A, the packing being held in the annular recess *m*, made in the lower edge of the dome A, back of the lip O, so that the upper edge of the upper casting, *b''*, of the jacket L will come fairly against the packing when the receiver A' is screwed up to the dome A. The lip O fits in the seat or recess *m'*, made around

the upper edge of the inwardly and downwardly projecting flange P, made around the upper edge of the casting *b''* of the jacket L, as shown clearly in Fig. 2. This inwardly and downwardly projecting flange P forms the top of the steam-heating space *h*, formed by the jacket L and receiver proper, *b*, and said flange is formed at its inner edge with the vertical plate Q, to which plate the upper edge of the receiver proper, *b*, is secured by the rivets *o*, as shown in Fig. 2.

The agitator K is journaled at its ends in and near the lower edge of the dome A in the journal-boxes composed of the flanged rings *k' k''*, and to outward appearance the agitator is composed of the arms R R and the shell S, to which the arms R are attached. The arms R by preference are pointed and made diamond-shaped in cross-section, and are each provided upon the inside with the inner partition or wall, *R'*, of the same shape as the outer wall of the arm, but smaller, and this inner wall or partition, *R'*, together with the outer wall, forms a steam-space, *R''*. In the shell S is placed the tube T. This is connected by short tubes T', Fig. 2, with the steam-spaces *R''* in the arms R, and the tube T receives steam from a suitable generator through the pipe T² and hollow journal U. The space *p*, formed between the outer surface of the tube T and the inner surface of the shell S, is connected with the exhaust-pipe U', Fig. 1, and this pipe U' and space *p* form the exhaust-passage for the steam that enters the space *R''* of each of the agitator-arms R, the steam passing from the said space *R''* through one or other or both of the flap-valves *q* and pipes *q'* into space *p*. The valves *q* are normally held closed by the springs *q''* with considerable force, for maintaining the necessary pressure of steam in the arms R of the agitator.

The agitator K is adapted to be revolved for agitating and heating the material being treated in the vacuum-pan by means of the large cog-wheel V and pinion V', Fig. 1, which meshes with the large cog-wheel, and is revolved by the chain V², coming from a suitable motive power, the large cog-wheel V being placed upon the hollow journal U, and made fast to the shell S by means of the outer nut, W, Fig. 2, and coupling and clutch nut W'.

W² is a packing-ring screwed upon the coupling-nut W' against the outer ring, *k'*, for making the journal-box steam-tight.

Y is the condenser. This is connected with the top of the dome A by the large pipe Y', and is supplied with water through pipe X, for condensing the steam and vapors which rise from the heated contents of the vacuum-pan, the surplus water and condensed matter being conducted out of the condenser through the waste-pipe X'.

The head F', swiveled to the upper end of the heavy screw F, is formed at two of its sides with the projections or lugs *f' f''*. (Shown

clearly in Figs. 1 and 2.) Under these lugs, but not in contact therewith, are placed the bows $B' B'$, which are secured at their ends, by means of the clips c^2 , to the outside of the jacket L of the receiver. Near their upper ends these bows $B' B'$ are formed or provided with the yokes $d^2 d^2$, which receive and hold loosely the upper ends of the curved chafe or brake irons $B^2 B^2$. These chafe or brake irons $B^2 B^2$ are made nearly concentric with the bows $B' B'$, and are held over the bows $B' B'$ by the yoke d^2 , and are pressed upward against shoulders formed inside of the lugs or projections f' by the coiled springs $e^2 e^2$, interposed between the bows B' and the brake-irons B^2 , so that the irons B^2 , acting against said shoulders, constitute a brake to prevent the receiver A' of the vacuum-pan from turning on its pivot J of its own accord, and to prevent the receiver from turning too rapidly upon its pivot when tilted for pouring out its contents.

The pipe g , through which steam enters the space h for heating the vacuum-pan, and the exhaust-pipe g' are each connected with the said space h by coupling-pipe g^2 , (shown clearly in Fig. 2,) which is screw-threaded, and enter screw-threaded openings made near the lower edge of the casting a' of the dome A, and the inner ends of these coupling-pipes are adapted to enter the holes i' , made in the upper casting, b^2 , of the receiver A' , so as to lock the dome and receiver together when they are closed together for operation, as will be understood from Fig. 2. In order to unlock the receiver from the dome when the receiver is to be lowered and moved away, it is only necessary to apply a wrench to the square portion g^3 and turn the coupling-pipes outward, this movement being accommodated by the space i^2 , made in the box h^2 , which space is elongated for that purpose.

w is a cock for cutting off the flow of steam through the pipe g when necessary.

In operation, supposing the receiver A' to be lowered to the position shown in dotted lines in Fig. 1, and the material to be treated to be cane-juice, the cane-juice will first be treated with lime and clarified, and then pumped into the receiver. The screw F will then be turned and the receiver A' raised into contact with the dome A. The coupling-pipe g^2 will then be screwed inward to connect steam-pipe g with space h and to lock the dome and receiver together. The cock w will then be opened to admit steam to the space h , and at the same time steam will be admitted to the agitator K and the agitator put in motion. The steam entering space h will rapidly heat the contents of the receiver at its outer surface, while the agitator K will heat the mass of juice in the receiver at the upper surface and in the center, and will agitate the material so that the whole mass will circulate in the receiver, which will cause a rapid and even evaporation, so that the juice may be concen-

trated much lower than by the ordinary form of vacuum-pan. When the juice in the receiver has become sufficiently concentrated, the coupling-pipes g^2 will be turned outward to unlock the receiver from the dome, and then the screw F will again be operated and the receiver A' lowered to the position shown in dotted lines in Fig. 1, and then the truck G will be moved along the track C C, for carrying the receiver A' from under the dome for cooling and emptying the contents of the receiver. If two trucks and two receivers are used, the second receiver will have been filled with cane-juice while that in the first was being concentrated, so that as the first receiver is moved away from the dome A the second, already filled, will at the same time be brought to place under the dome A, ready to be raised and locked with the dome, and heated as before. By this means it will be seen that the evaporating process may be made almost continuous; and by the use of the agitator K the evaporating process is greatly accelerated; and owing to the circulation caused by the agitator and the dry heat applied to the juice by the arms of the agitator, the juice may be evaporated down, so that in cooling the whole mass will crystallize, leaving practically no molasses, as is the case with ordinary vacuum-pans.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a vacuum-pan, the combination, with the stationary dome, of the receiver, movable to and from the dome, substantially as and for the purposes set forth.

2. In a vacuum-pan, the combination, with the stationary dome, of the receiver, movable vertically to and from the dome and horizontally from its vertical plane of movement, substantially as and for the purpose set forth.

3. In a vacuum-pan, the receiver pivotally connected to its support whereby it is adapted to be tilted to empty its contents, substantially as described, and for the purpose set forth.

4. In a vacuum-pan, the receiver pivotally connected to its support and held from accidentally tilting, and, when tilted, from being suddenly precipitated by the action of springs, substantially as set forth.

5. The combination, with the stationary dome A of the vacuum-pan, of the receiver A' , placed upon the screw F, whereby the receiver may be raised and lowered, substantially as and for the purposes set forth.

6. The receiver A' of the vacuum-pan, pivoted upon its support, whereby the receiver may be tilted for emptying out its contents, substantially as described.

7. The receiver A' , held upon the screw F, which works through the truck G, in combination with the supporting-track for the truck, whereby the receiver may be raised and lowered and moved to and from the dome A, substantially as and for the purposes set forth.

8. The trucks G G, placed upon tracks C C

and connected by rods or plates H, in combination with screw F, receiver A', and stationary dome A, substantially as and for the purposes set forth.

5 9. The dome A, having the lower ring-casting, a' , in combination with the receiver A', having the upper ring-casting, b^2 , the casting a' being adapted to inclose the casting b^2 , substantially as and for the purposes set forth.

10 10. The upper casting, b^2 , of the jacket of the receiver, formed with the flange j' and lip j^2 , in combination with the dome formed with the lower casting, a' , adapted to surround the casting b^2 and rest at its lower edge upon the flange j' , substantially as and for the purposes set forth.

15 11. The dome A, formed with the recess m , in combination with the packing N, placed in said recess, and the receiver A', adapted to be brought up to the packing, substantially as and for the purposes set forth.

12. In a vacuum-pan, the casting b^2 , formed with the flange P and vertical plate Q, substantially as and for the purposes set forth.

25 13. In a vacuum-pan, the casting b^2 , formed with the recess m' , in combination with the dome A, formed with the lip O, substantially as and for the purposes set forth.

30 14. The shell S and arms R, formed with the heating-space R^2 , in combination with the pipe T and short pipes T', through which steam is admitted to the spaces R^2 , the arms being provided with the valves q and short passages q' , for exhausting the steam from the space R^2 into the shell S, substantially as and for the purposes set forth.

35 15. In a vacuum-pan, the hollow agitator K, having hollow arms R, in combination with the hollow journal U, and means, substantially as described, for supplying steam to and revolving the agitator, substantially as and for the purposes set forth.

16. In a vacuum-pan, the coupling-pipe g^2 ,

arranged to connect the steam-pipe g with the space h and to lock the dome and receiver together, substantially as described. 45

17. The box h^2 , having the elongated space i^2 , in combination with the longitudinally-movable screw-coupling pipe g^2 , arranged to operate substantially as and for the purposes set forth. 50

18. In a vacuum-pan, the agitator composed of a series of hollow arms, R, connected to a shell, S, journaled in the lower edge of the dome, in combination with the pipe T and short pipe T', the former being inclosed in the shell S, and the latter inclosed in the arms R, substantially as and for the purpose set forth. 55

19. In a vacuum-pan, the combination, with the agitator provided with hollow arms R, connected to the shell S, having steam-tight packed journals, of the pipe U and gear-wheel V, gearing with the pinion V', driven by suitable means, substantially as and for the purpose set forth. 60

20. In a vacuum-pan, the combination, with the agitator provided with hollow arms R, having the short pipes T', and connected to the shell S, having the pipe T, of the hollow steam-tight packed journals, the pipes U and T², the gear-wheel V, and pinion V', driven by suitable means, substantially as and for the purpose set forth. 65

21. In a vacuum-pan, the combination of the shell S, inclosing the pipe T and carrying the agitator-arms R, provided with steam-spaces R^2 and short pipes T', the pipe U, pipe T², nut W, coupling and clutch nut W', packing W², ring k' , gear-wheel V, and pinion V', driven by suitable means, substantially as and for the purpose specified. 70 80

LUCAS M. CAMPI.

Witnesses:

H. A. WEST,
LOUIS DEUTSCH.