

No. 696,154.

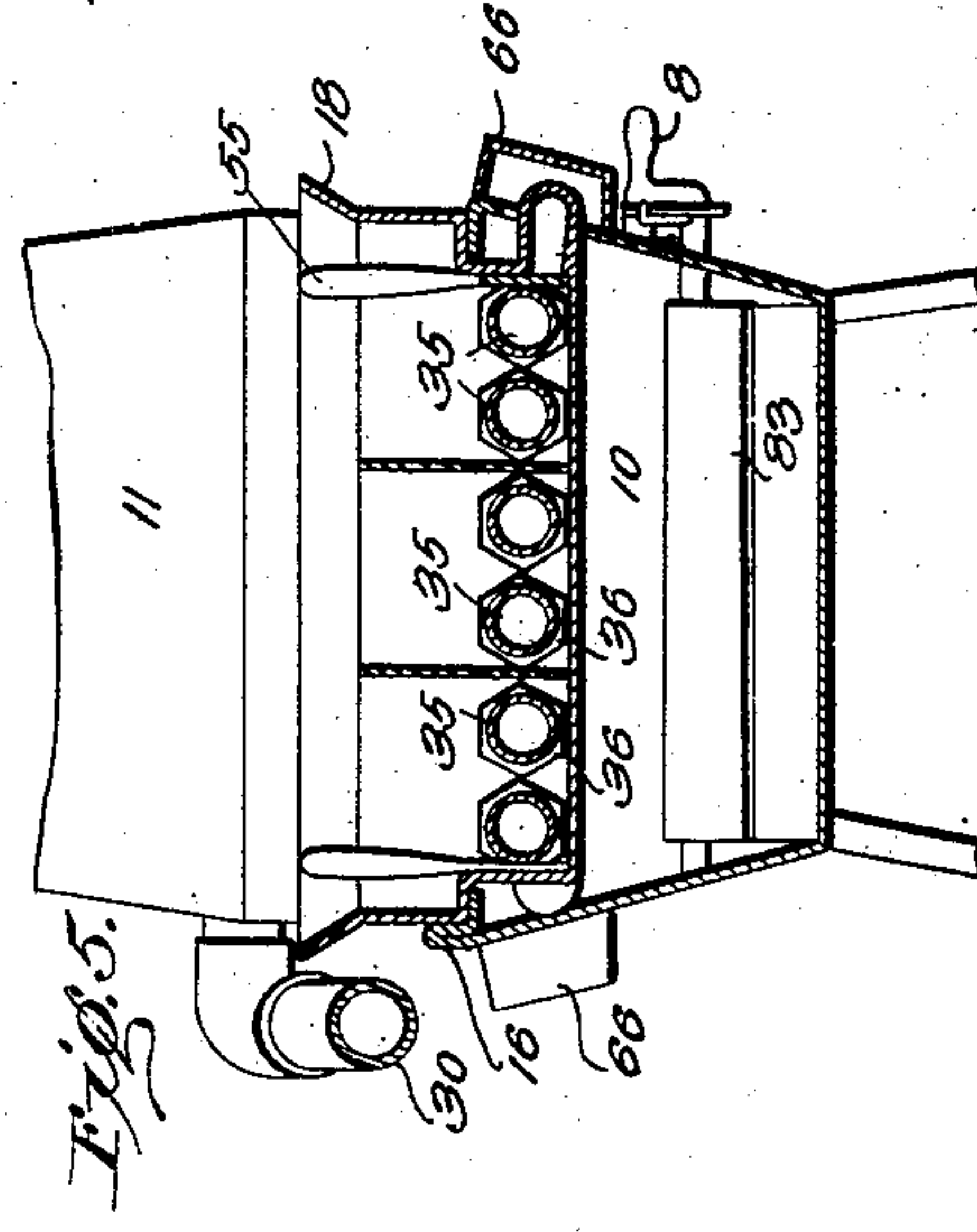
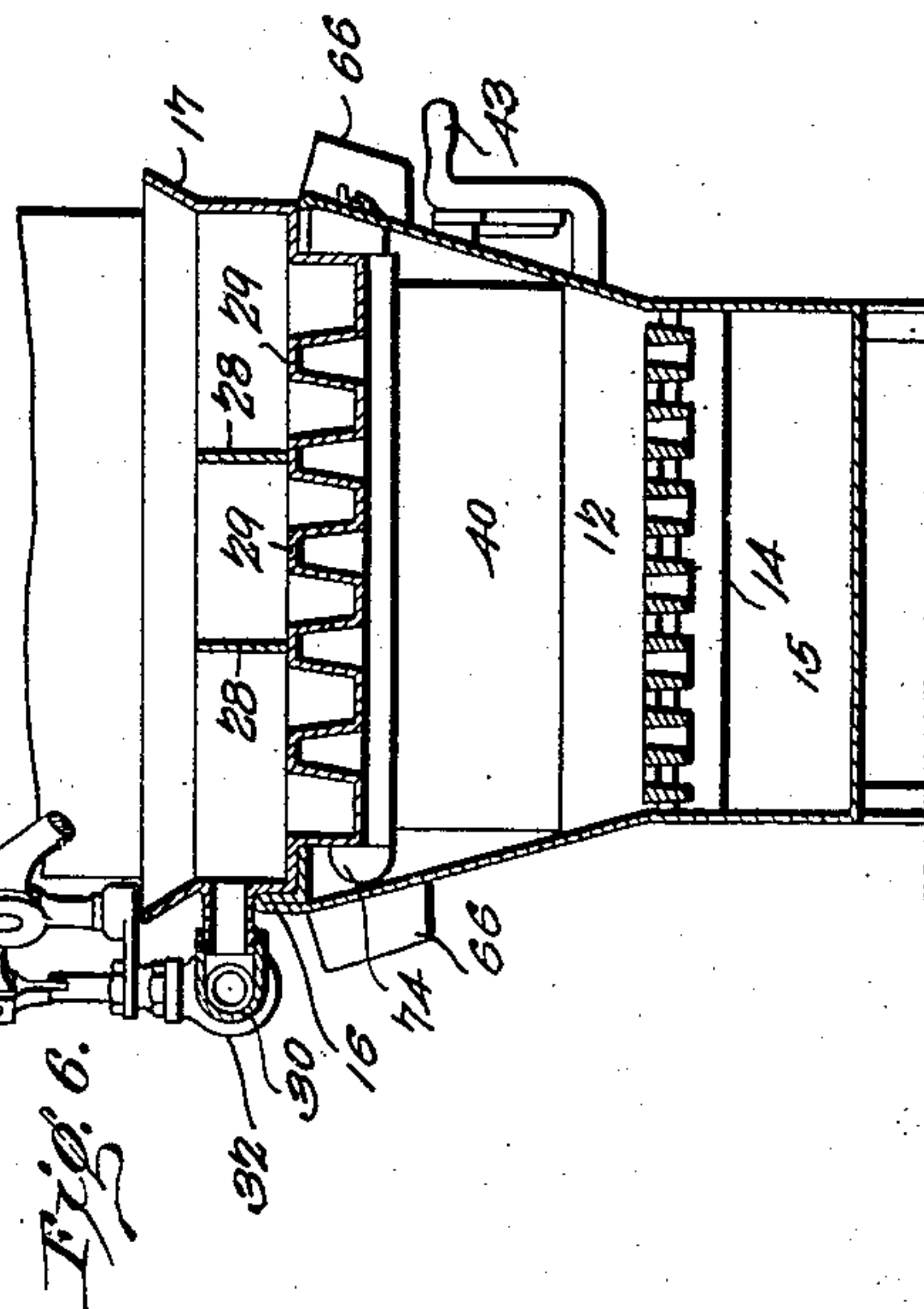
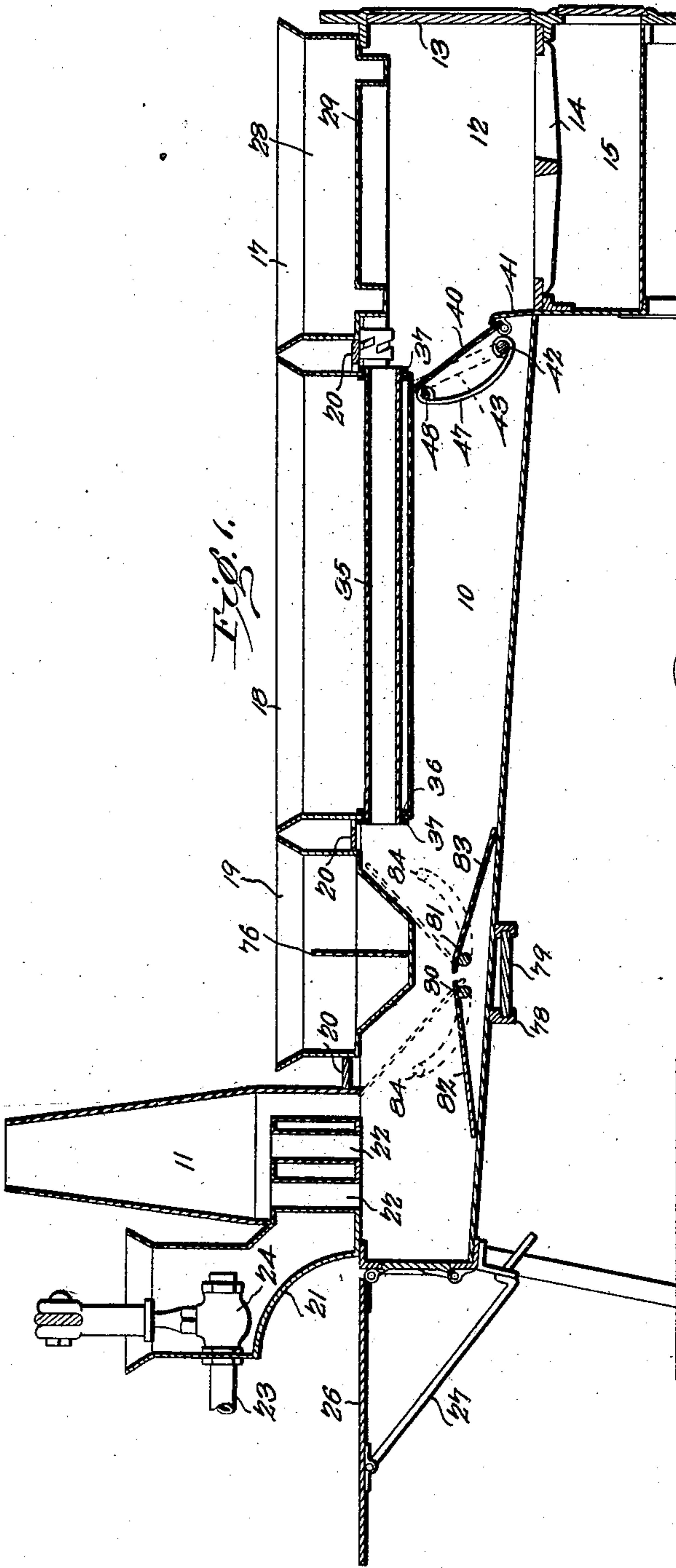
Patented Mar. 25, 1902.

C. L. WILCOX.
EVAPORATOR.

(Application filed Sept. 25, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
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John E. Parker

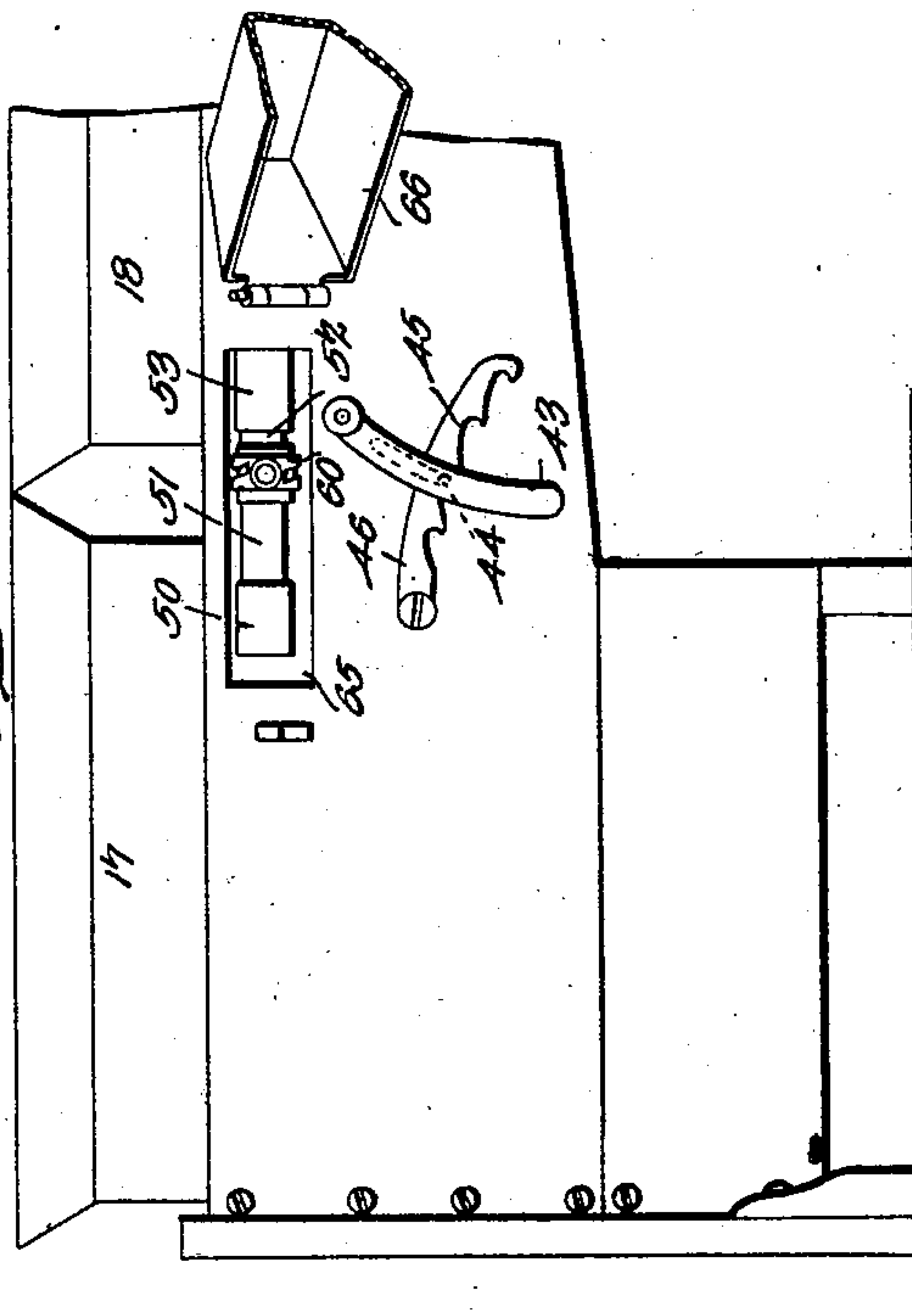
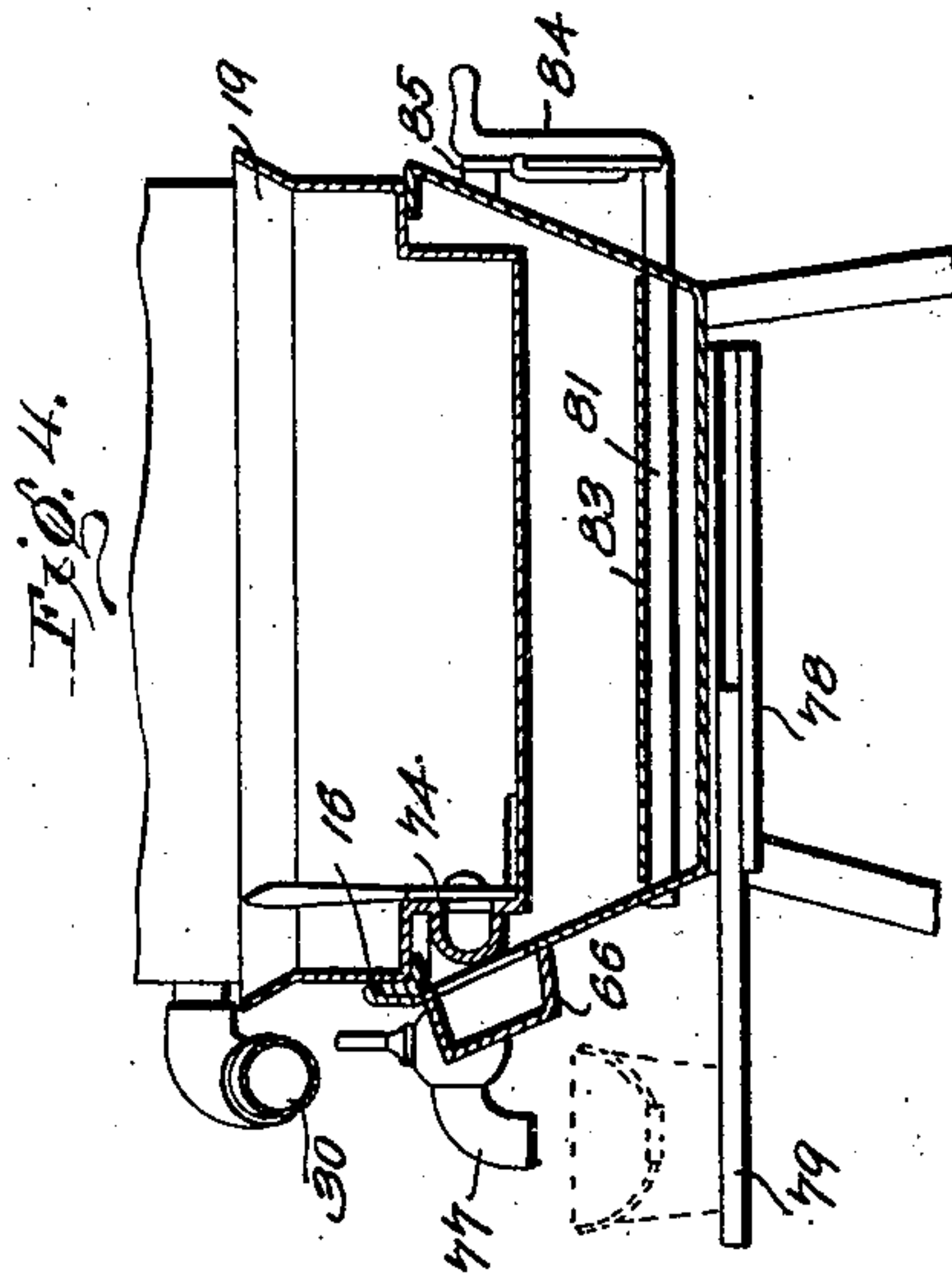
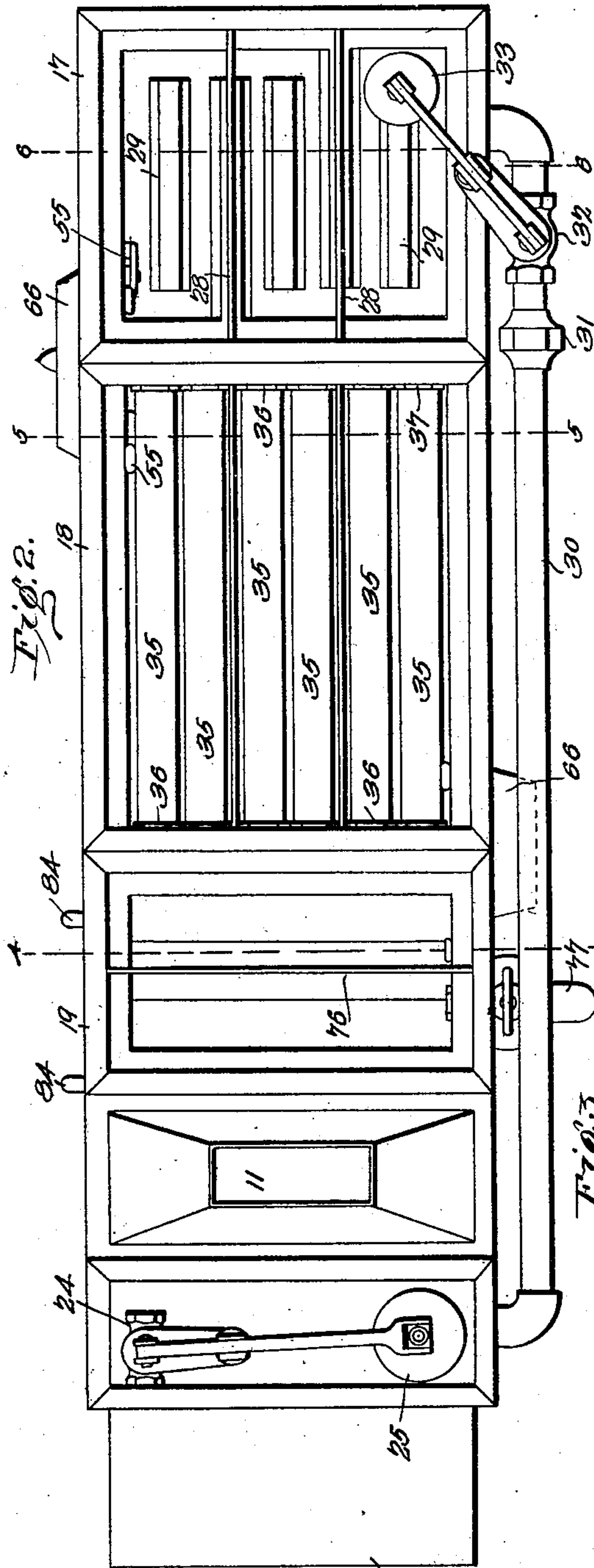
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3 Sheets—Sheet 2.



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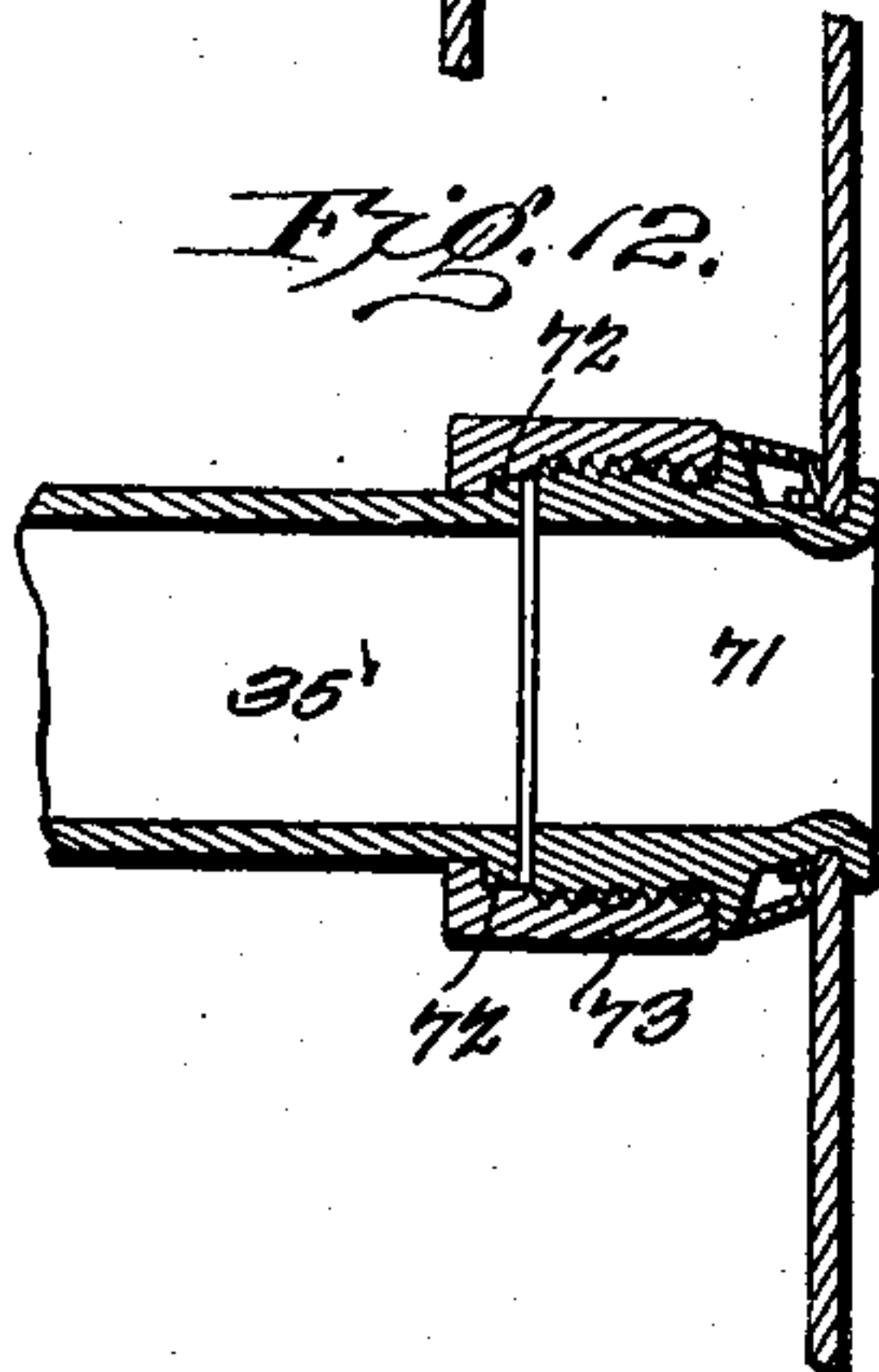
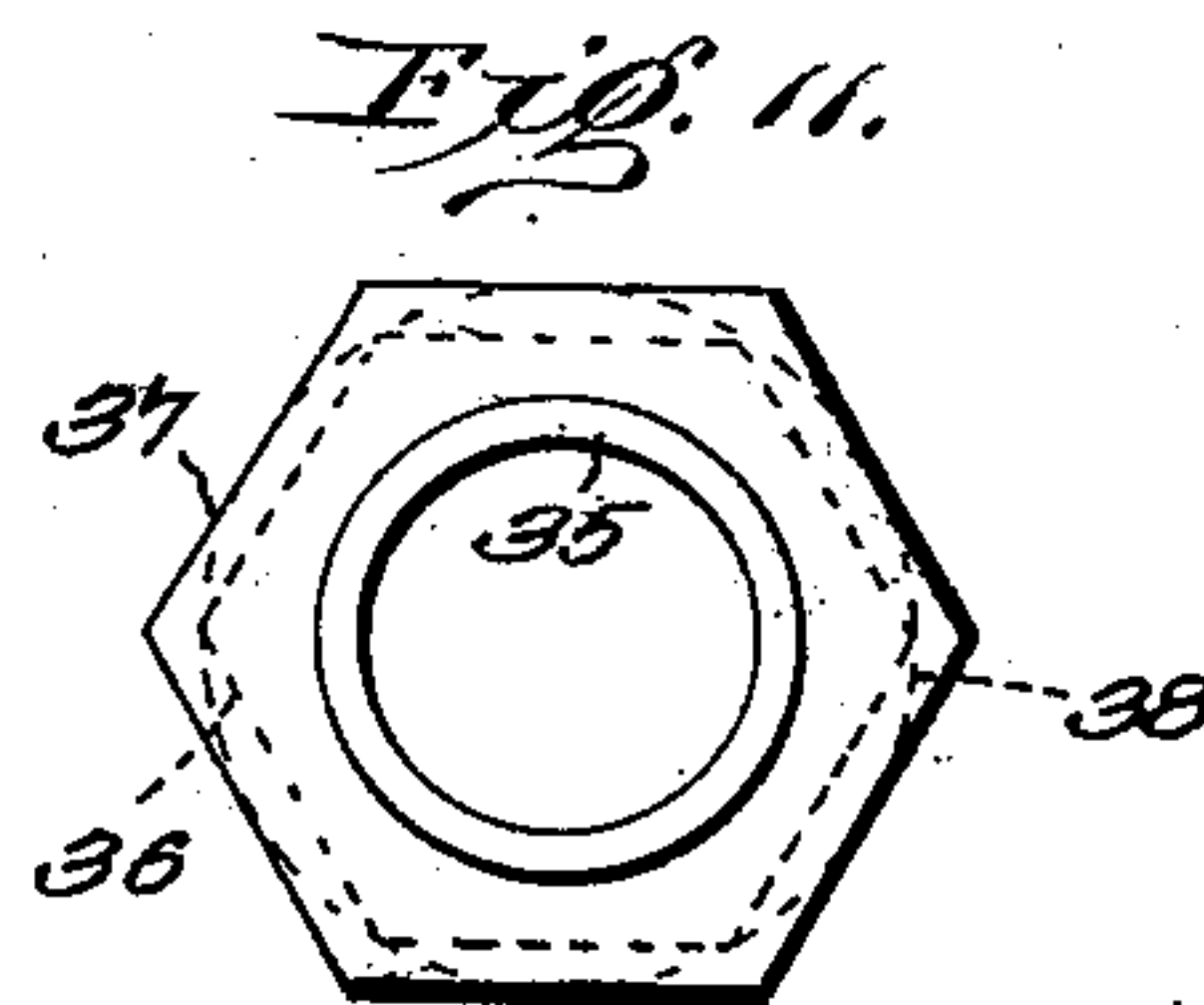
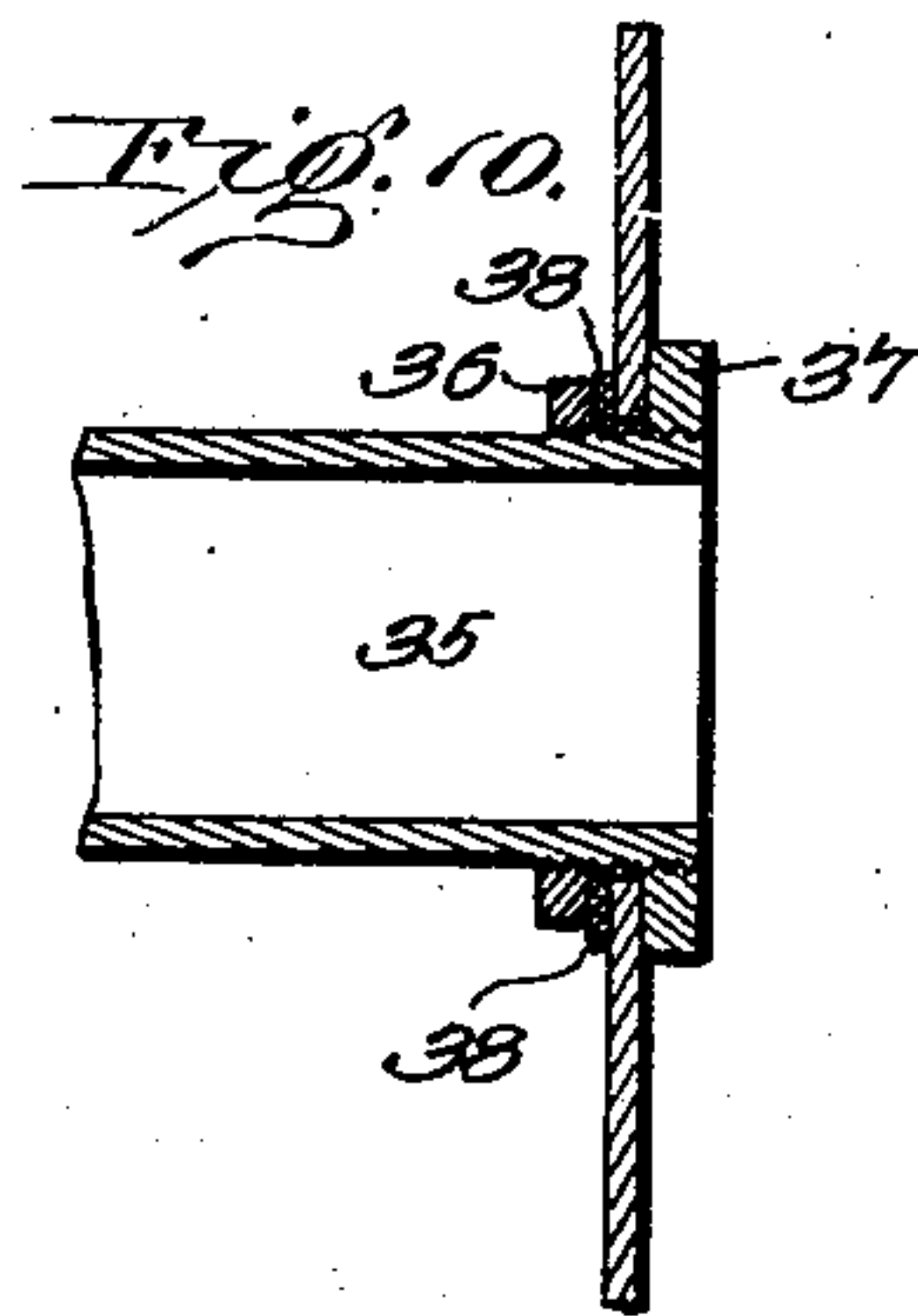
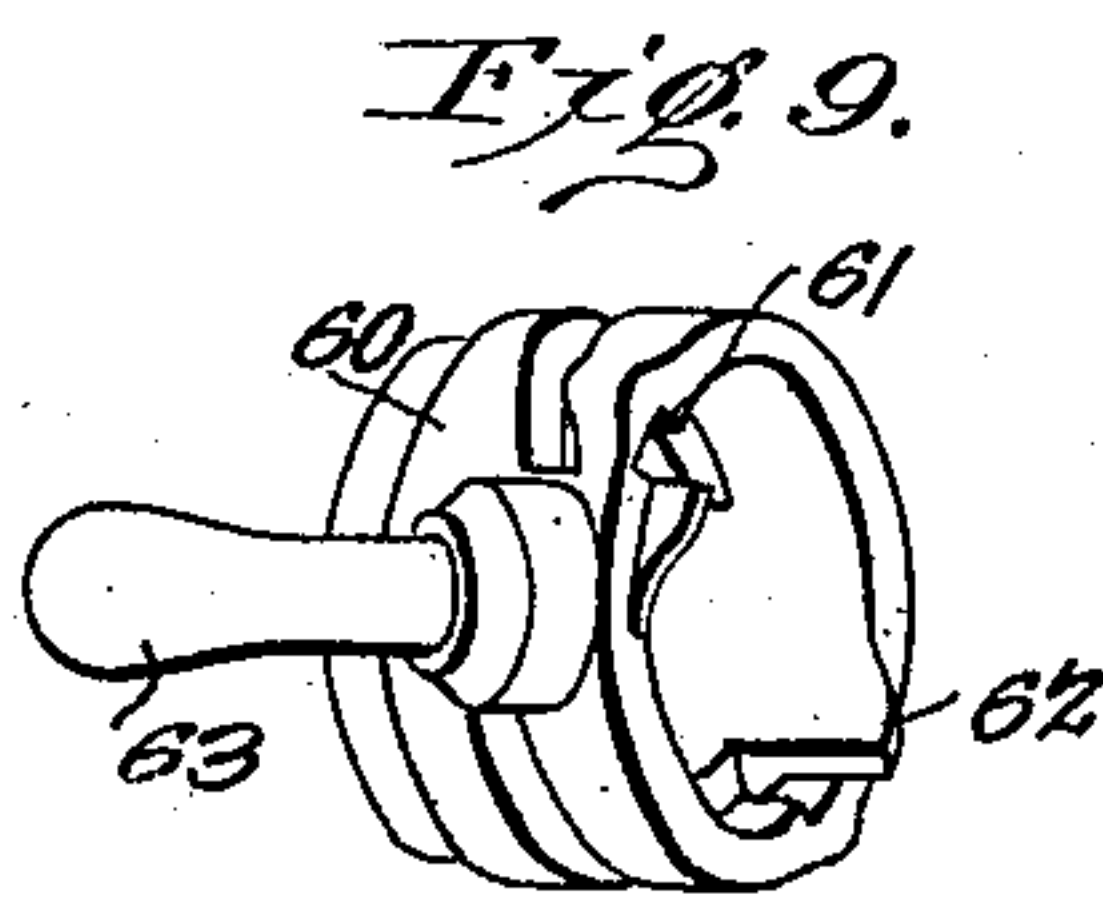
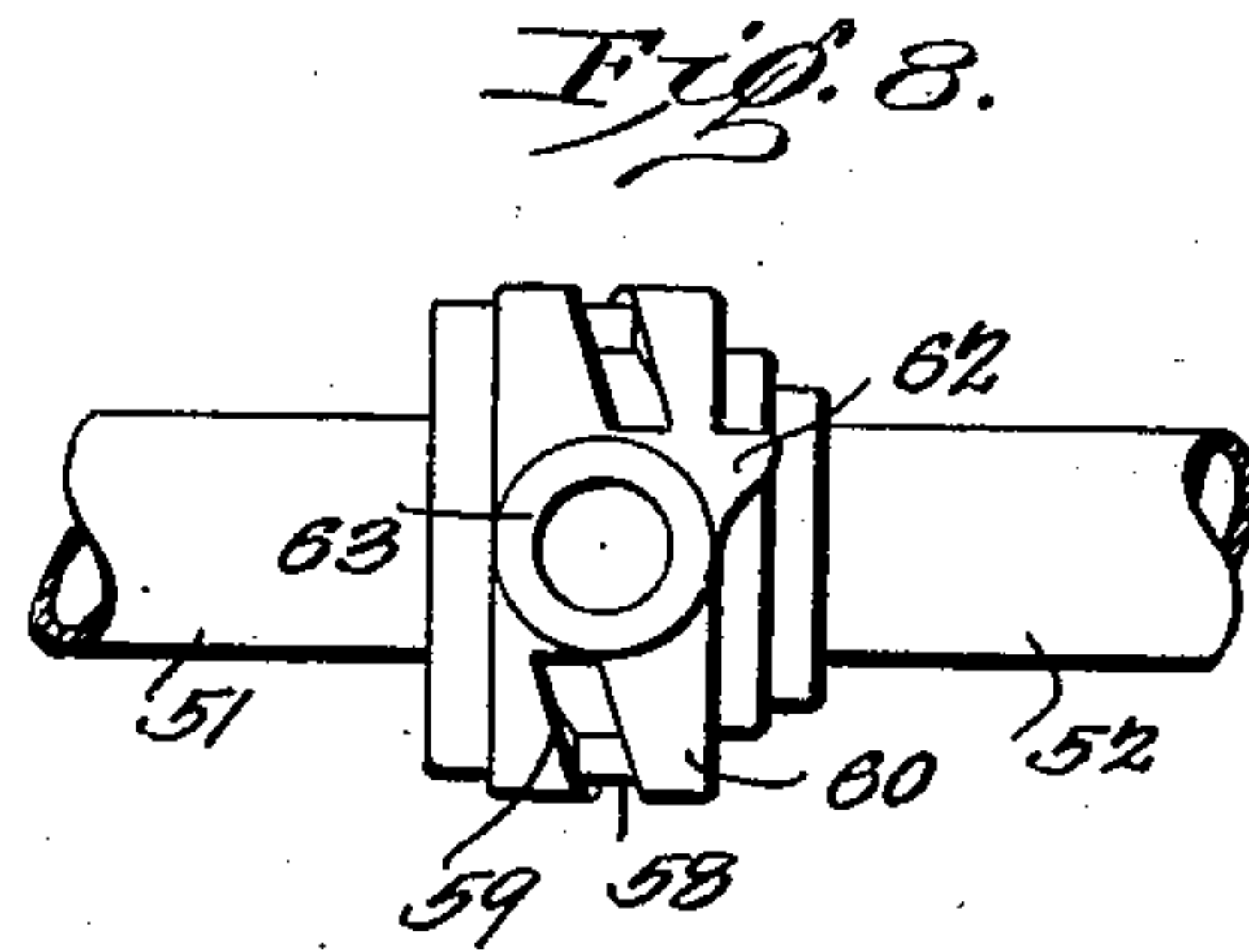
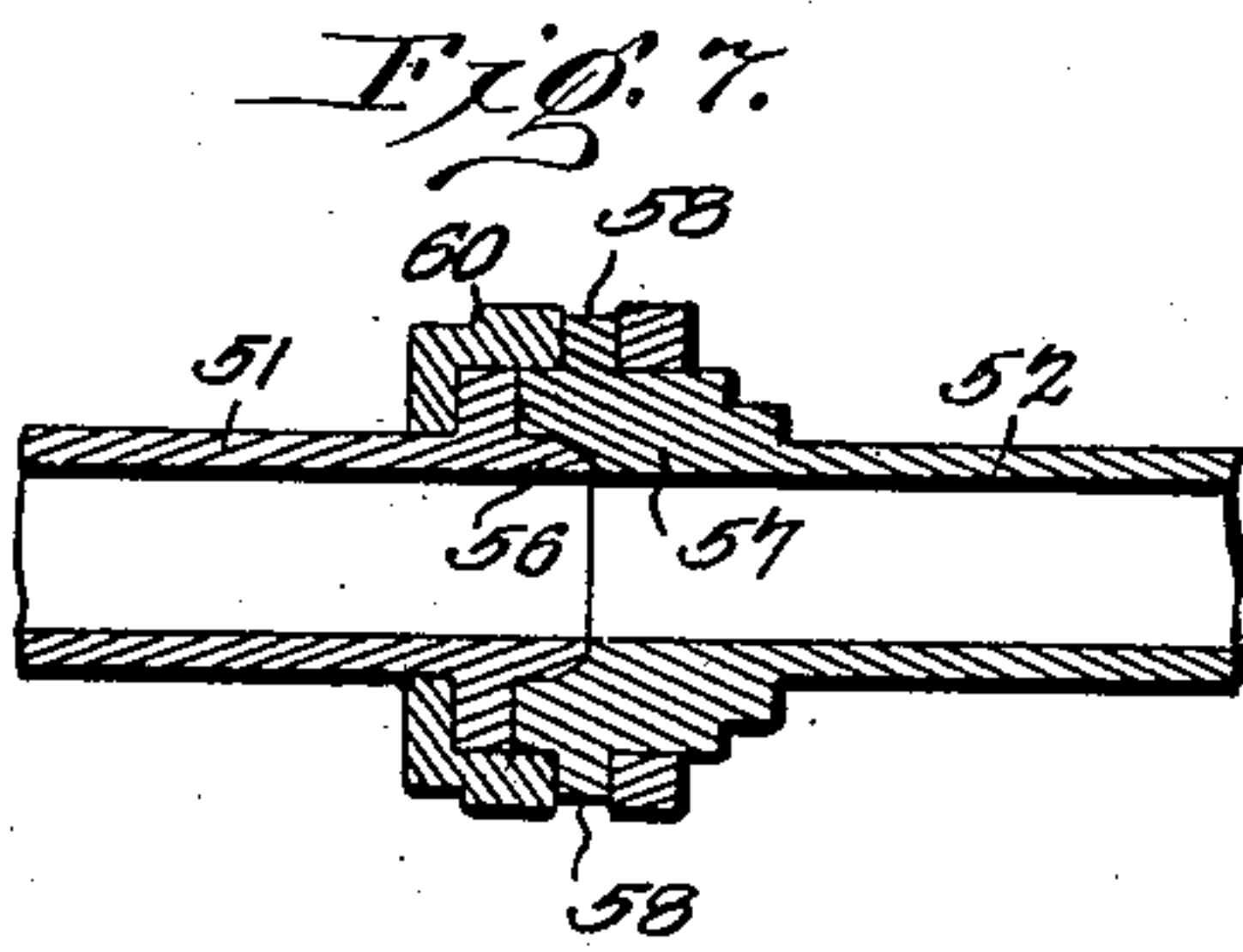
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

CAMDEN L. WILCOX, OF WEST WILLIAMSFIELD, OHIO.

EVAPORATOR.

SPECIFICATION forming part of Letters Patent No. 696,154, dated March 25, 1902.

Application filed September 25, 1901. Serial No. 76,489. (No model.)

To all whom it may concern:

Be it known that I, CAMDEN L. WILCOX, a citizen of the United States, residing at West Williamsfield, in the county of Ashtabula and State of Ohio, have invented a new and useful Evaporator, of which the following is a specification.

My invention relates to certain improvements in evaporating apparatus, and especially in that class of apparatus designed for use in connection with the manufacture of maple syrup and sugar, although it may be used to advantage in the boiling of cane, sorghum, or other sugar juices, saline solutions, and for other purposes where a percentage of water is to be eliminated by evaporation.

One object of the invention is to provide for the regulation of the heat applied at different stages of the boiling of the juices, the application of the heat being governed by the density and temperature of the juices at different points in the apparatus as well as by the condition of the fire, so that boiling may progress with a fire of greater or less intensity and without danger of the formation of caramel.

A further object of the invention is to so construct the various portions of the apparatus that they may be separately removed from position and cleaned when necessary, and, further, to provide for the ready coupling and uncoupling of the various pans, so that any one pan may be removed without danger of loss of juice.

A still further object of the invention is to provide one or more pans with flues for the passage of the products of combustion and to provide for the ready removal of such flues when the pan or flues are to be cleaned.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of an evaporating apparatus constructed and arranged in accordance with my invention. Fig. 2 is a plan view of the same. Fig. 3 is a side elevation of a portion of the apparatus looking

in the direction of the arrow, Fig. 2. Fig. 4 is a transverse sectional elevation of the apparatus on the line 4 4 of Fig. 2. Figs. 5 and 6 are views similar to Fig. 4, the sections being taken on the lines 5 5 and 6 6, respectively, of Fig. 2. Fig. 7 is a longitudinal sectional elevation of a form of coupling employed to connect the pipes between adjacent pans. Fig. 8 is an elevation of the same. Fig. 9 is a detail perspective view of the movable sleeve of the coupling. Fig. 10 illustrates in detail, on an enlarged scale, the connections of the removable flues. Fig. 11 is an elevation of the same. Fig. 12 illustrates a modification of the flue and its connection.

Similar numerals of reference are employed to indicate corresponding parts throughout the various views of the drawings.

10 designates an arch communicating at its rear end with an uptake 11, leading to a suitable stack. At the forward end of the arch is a fire-box 12, having a fuel-door 13, a grate 14, and an ash-pit 15. The arch is of gradually-lessening height from the front to the rear, and its side walls diverge to some extent and at their upper end are provided with flanges 16 for the reception and support of a series of pans 17, 18, and 19, which when in position completely close the open top of the arch. Transversely-disposed braces 20 are arranged between the pans and serve to hold and brace the side walls.

The rear face of the uptake 11 is provided with an opening through which may be passed the lower portion of a heater 21, such lower portion being provided with horizontally-disposed upper and lower plates and having vertical flues 22 for the passage of the products of combustion, the object being to effect a preliminary heating of the juices in the heater before subjecting them to the action of heat in the various pans. The heater is connected by a suitable pipe 23 to a tank or other source of supply and at a point within the tank is provided with a valve 24, adapted to be opened and closed automatically by a float 25, the height of the juice in the heater being at all times the same. The heater may be removed by withdrawing its lower portion from the opening in the uptake, and to provide for its support when thus removed I arrange at the rear of the apparatus a hinged

table 26, which may be maintained in horizontal position by adjustable braces 27 or may be lowered to a vertical position when not in use.

5 The preliminary evaporating-pan 17 is rectangular in form and is situated directly over the combustion-chamber. This pan is divided into three compartments by partitions 28, having openings so arranged that the
10 juice will be compelled to traverse the pan three times before it escapes therefrom. The bottom of the pan is further provided with a series of raised portions 29, terminating short of the ends of the pan and forming channels
15 for the flow of the juices and at the same time materially increasing the surface exposed to the heat. This pan 17 receives a supply of heated juice from the heater 21 through a pipe 30, having a suitable coupling
20 31, which may be unscrewed when the pan is to be removed, and in said pipe is a suitable valve 32, connected to a float 33, arranged within the pan 17 to automatically open and close the valve and maintain a constant quantity of juice in said pan.
25

The second pan 18 of the series is rectangular in form and is supported at its opposite sides on the flanges 16. The lower portion of this pan extends within the arch 10
30 and is provided at a point within the limits of the arch with a series of tubes 35, forming flues for the products of combustion. The flues 35 extend from end to end of the pan 18 and project through suitable openings formed in the end walls of said pan. The ends of
35 the tubes are externally threaded for the reception of the nuts 36 and 37, between which the end wall of the pan is confined, a suitable packing 38 being placed within the pan at a point between the end wall and the inner nut
40 36 in order to form a tight joint. The addition of these flues increases to a very considerable extent the quantity of juice exposed to the action of the heat, and in order to regulate the heat in accordance with the density
45 of the juice and its temperature I employ a damper 40, extending completely across the arch and pivoted at its lower edge at a point immediately to the rear of the rear wall 41 of the combustion-chamber. This damper may
50 be moved to any angular position from the horizontal to a point in contact with the bottom of the pan 18 and when in the latter position will divert all of the products of combustion through the flue 35. This damper is
55 operated by a shaft 42, extending out through the side wall of the arch and provided with an operating-crank 43, on which is a pin or guide 44, adapted to engage in any one of a series of holding-teeth 45 on a pivoted arm
60 46. The shaft at a point within the arch is provided with arms 47, connecting it with a transverse bar 48 in contact with the damper 40. The damper may be moved to any position and locked in said position by the engagement of the pin 44 in one of the teeth 45,

and a greater or less proportion of the products of combustion may be directed through the flues 35 of the pan 18.

Projecting from one side of the pan 17 is a
70 hollow boss 50, to which is connected a short pipe 51, extending rearwardly and adapted for connection with a similar pipe 52, projecting from a hollow boss 53 on the side of
75 the pan 18. The hollow bosses communicate with the respective pans, and the openings thereto may be closed by suitable gate-valves 55 of any ordinary construction, so that by closing the valve all communication between
80 the pans will be cut off, and the coupling between the two pipes 51 and 52 may be disconnected. The adjacent ends of the pipes 51 and 52 are provided with interfitting male and female portions 56 and 57, and on the periphery of the latter are diametrically-op-
85 posed pins 58, adapted to be engaged by cam-slots 59, formed in a coupling-sleeve 60, supported by the pipe 51. To permit of the entrance of the pins 58 to the cam-slots, the edge of the sleeve is provided with notches
90 61, and at the edge of each notch is a projecting stop 62, which engages with the pin 58 in order to facilitate the coupling of the section. The coupling-sleeve 60 is provided with an operating-handle 63, by which the
95 sleeve may be moved over the section 57 until its outer edge strikes the pins 58. The sleeve is then turned until the pins are caught by the stops 62, and the pins being then in alinement with the recesses 61 may readily
100 be entered in the cam-slots 59. A slight turning of the sleeve then serves to draw the two sections of the coupling closely together and forms a liquid-proof joint. To facilitate the coupling and uncoupling of the sections,
105 an opening 65 is provided in the side of the arch, and the coupling members project through this opening in convenient position for manipulation. The opening is closed when the apparatus is in operation by a suitable hinged
110 door 66. When it is desired to remove and clean the pan 18, the coupling is disconnected, as is also a similar coupling at the rear end of the pan, and said pan is removed from the arch. By unscrewing the nuts 36 and 37 the
115 various flues may be removed and separately cleaned, leaving the interior of the pan free from all projections where dirt could lodge.

The structure of the flues may in some instances be of the form illustrated in Fig. 12,
120 in which a coupling member 71 is permanently secured to the end wall of the pan and the flue 35' is provided with an end flange 72 to permit its being coupled to the member 71 by the usual threaded sleeve 73. This construction is in some respects an improvement upon the form of flue illustrated in Fig. 10.
125

The finishing-pan 19, into which the juice flows through a pipe 74 from the pan 18, has an inclined bottom extending downwardly
130 within the arch in such position as to present an extended surface for the action of the

products of combustion. This pan is provided with the central partition 76 and at one end is provided with a tap 77, through which the contents of the pan may be withdrawn.

5 The coupling between the pipe-sections connecting the pans 18 and 19 is similar in all respects to the coupling employed between the pans 17 and 18, and further description of this feature is unnecessary.

10 On the underside of the arch, immediately below the tap 77, are guiding-brackets 78 for the reception of a slidable bucket-rest 79, which may be pushed back under the arch when not in use or may be drawn out to the position shown in Fig. 4 for the reception of a bucket or other suitable receptacle being filled from the pan.

Extending transversely of the arch at a point below the pan 19 are two shafts 80 and 20 81, carrying dampers 82 and 83, respectively, which may be moved to the position shown in full lines in Fig. 1 or to that illustrated by dotted lines in said figure, or the dampers may be moved through any angular distance 25 between these two points and locked in any adjusted position by means of suitable cranks 84, secured to the shafts and having toothed locking-arms 85 for engagement with pins or similar stops carried by the crank. This ad- 30 justment of the position of the dampers is very important, in that it permits of the application of a greater or less amount of heat to the finishing-pan, and it is at this point where the greatest danger is incurred from the application of too much heat, the juice 35 being of great density and likely to caramelize. When the dampers are in horizontal alinement, a portion only of the heat will be deflected into contact with the bottom of the 40 pan. If the damper 83 be lowered and the damper 82 raised, all of the products of combustion will be directed against the pan, and vice versa.

The evaporator as constructed may be em- 45 ployed for the condensation of any liquid, but is of particular value for the boiling of maple, sorghum, and other sugar juices, its principal advantages residing in the perfect control of the heat and in the ease with which 50 the various parts may be disassembled for cleansing purposes.

While the construction herein described, and illustrated in the accompanying drawings, is the preferred form, it is obvious that 55 many changes in the form, proportions, and minor details of construction may be made without departing from the spirit or sacrificing any of the advantages of my invention.

Having thus described my invention, what I claim is—

1. In an evaporator, the combination with the arch, of a series of pans carried by said arch and having their bottom portions projecting within the arch, one of said pans having flues for the escape of the products of 65 combustion therethrough, and an adjacent pan beyond the escape end of said flues having its bottom portion directly in alinement with the flues and inclined to deflect said products of combustion, and a damper arranged 70 adjacent to the bottom of said pan to govern the course of the products of combustion.

2. In an evaporator, the combination with the arch, of a series of pans carried by said arch and having their bottom portions pro- 75 jecting within the same, flues arranged in one of said pans for the passage of the products of combustion therethrough, and an adjacent pan beyond the escape end of said flues having an inclined bottom portion, and 80 a pair of adjustable dampers located within the arch, at a point under said inclined bottom and adapted to govern the course of the products of combustion, substantially as specified. 85

3. In an evaporator, the combination of the arch having side openings, a series of evaporating-pans supported by said arch and having their bottom portions extending within the same, coupled pipe-sections forming commu- 90 nicating passages between the lower portions of said pans at a point below the top of the arch, said coupling-sections being so disposed as to partly extend through the side openings of the arch, and doors for closing said open- 95 ings, substantially as specified.

4. In an evaporator, the combination of the arch, a series of evaporating-pans 17, 18 and 19 supported by said arch, a series of flues 35 carried by the pan 18, a damper 40 pivoted 100 within the arch at a point to the rear of the combustion-chamber and adapted to deflect a portion or all of the products of combustion through said tubes, and adjustable dampers 82 and 83 arranged within the arch at a point 105 under the pan 19, said dampers being adjustable to deflect a portion or all of the products of combustion into contact with the bottom of said pan 19.

In testimony that I claim the foregoing as 110 my own I have hereto affixed my signature in the presence of two witnesses.

CAMDEN L. WILCOX.

Witnesses:

E. A. WILCOX,

N. C. SATTERLEE.