

J. B. LIVINGSTON.
 APPARATUS FOR HANDLING GARBAGE AND SIMILAR REFUSE.
 APPLICATION FILED JAN. 21, 1910.

999,507.

Patented Aug. 1, 1911.

3 SHEETS—SHEET 1.

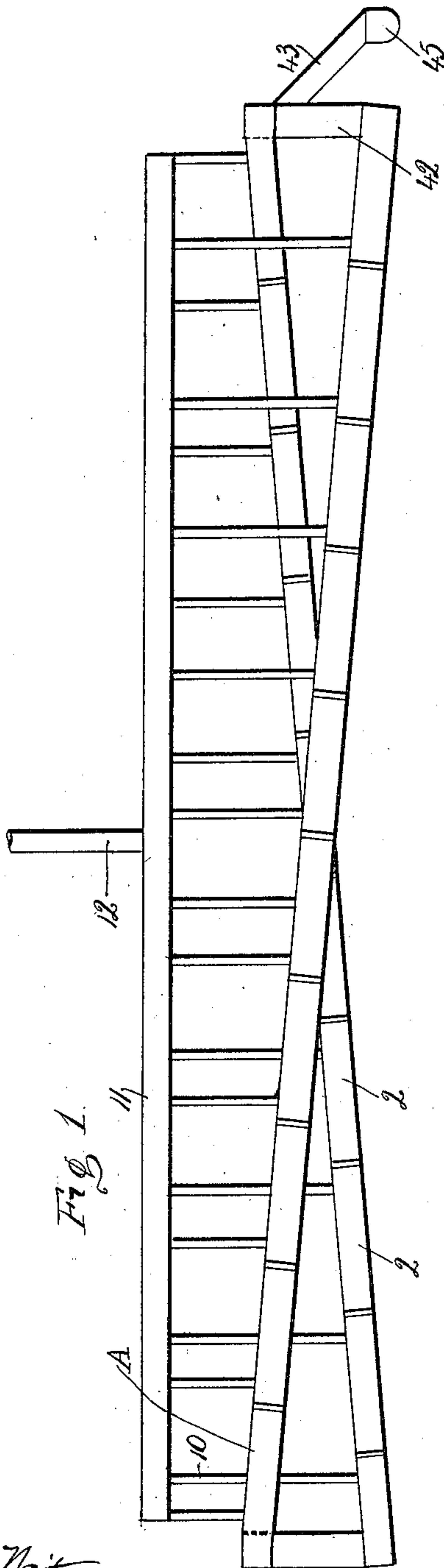


Fig. 1.

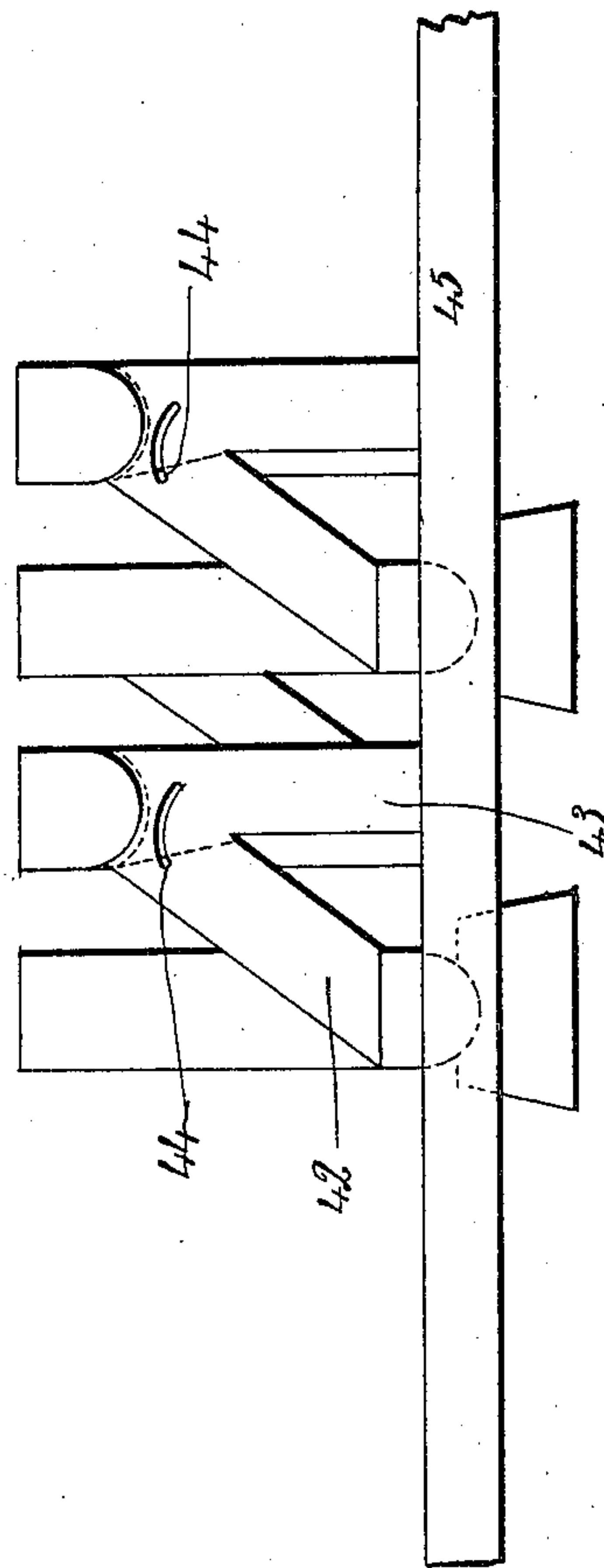


Fig. 2.

Witnesses
 C. J. Reed.
 C. L. Reed

Inventor
 John B. Livingston
 by Seymour H. Carter
 Atty

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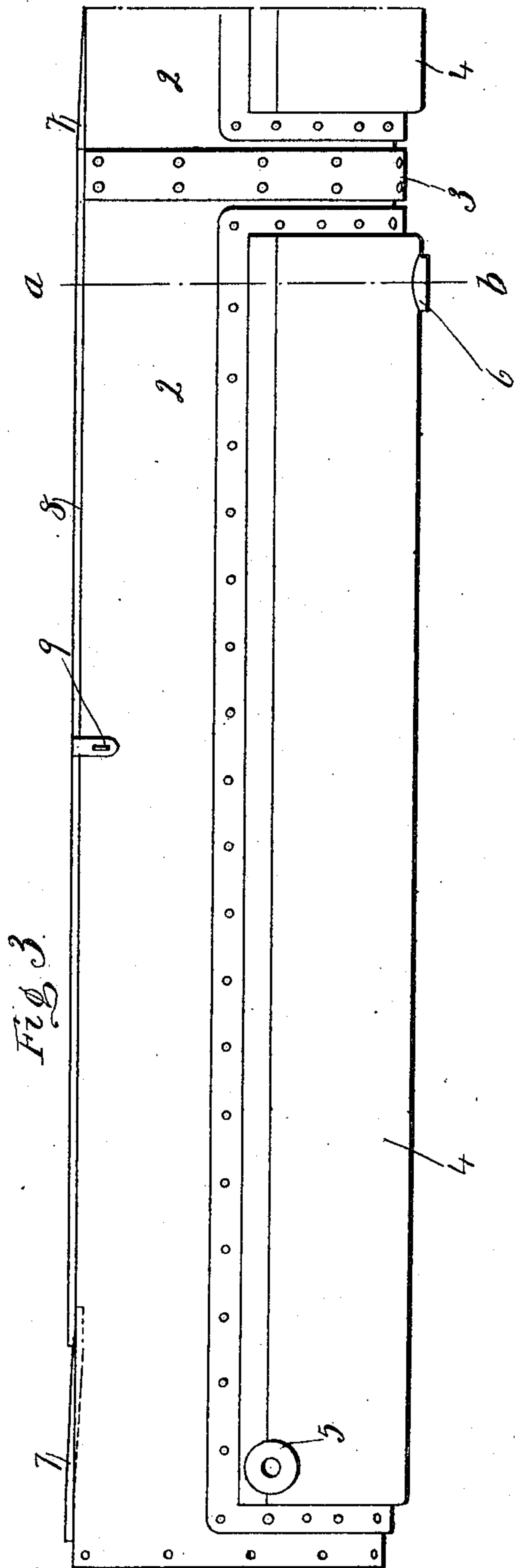


Fig. 3.

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 C. J. Reed.
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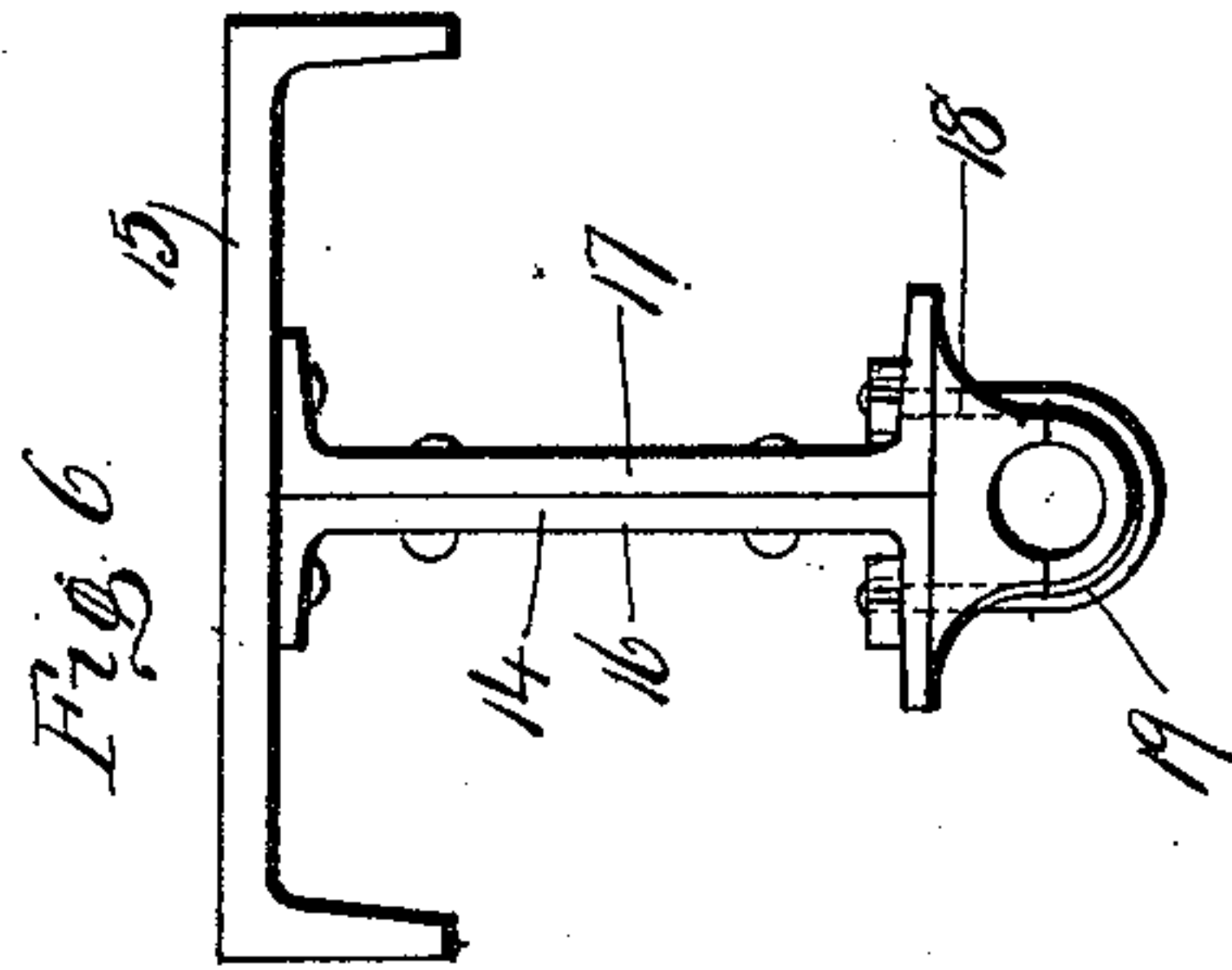


Fig. 6.

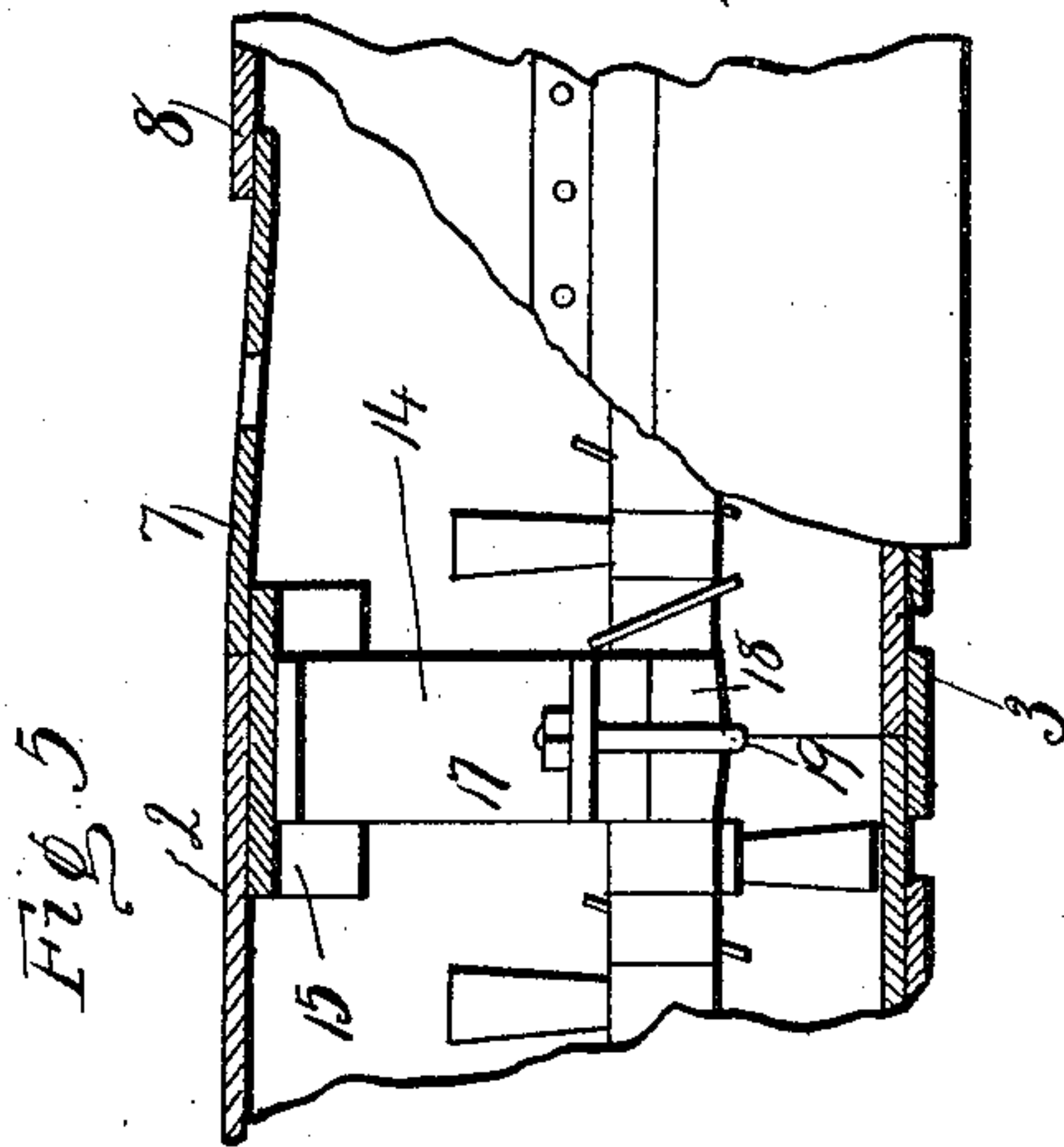


Fig. 5.

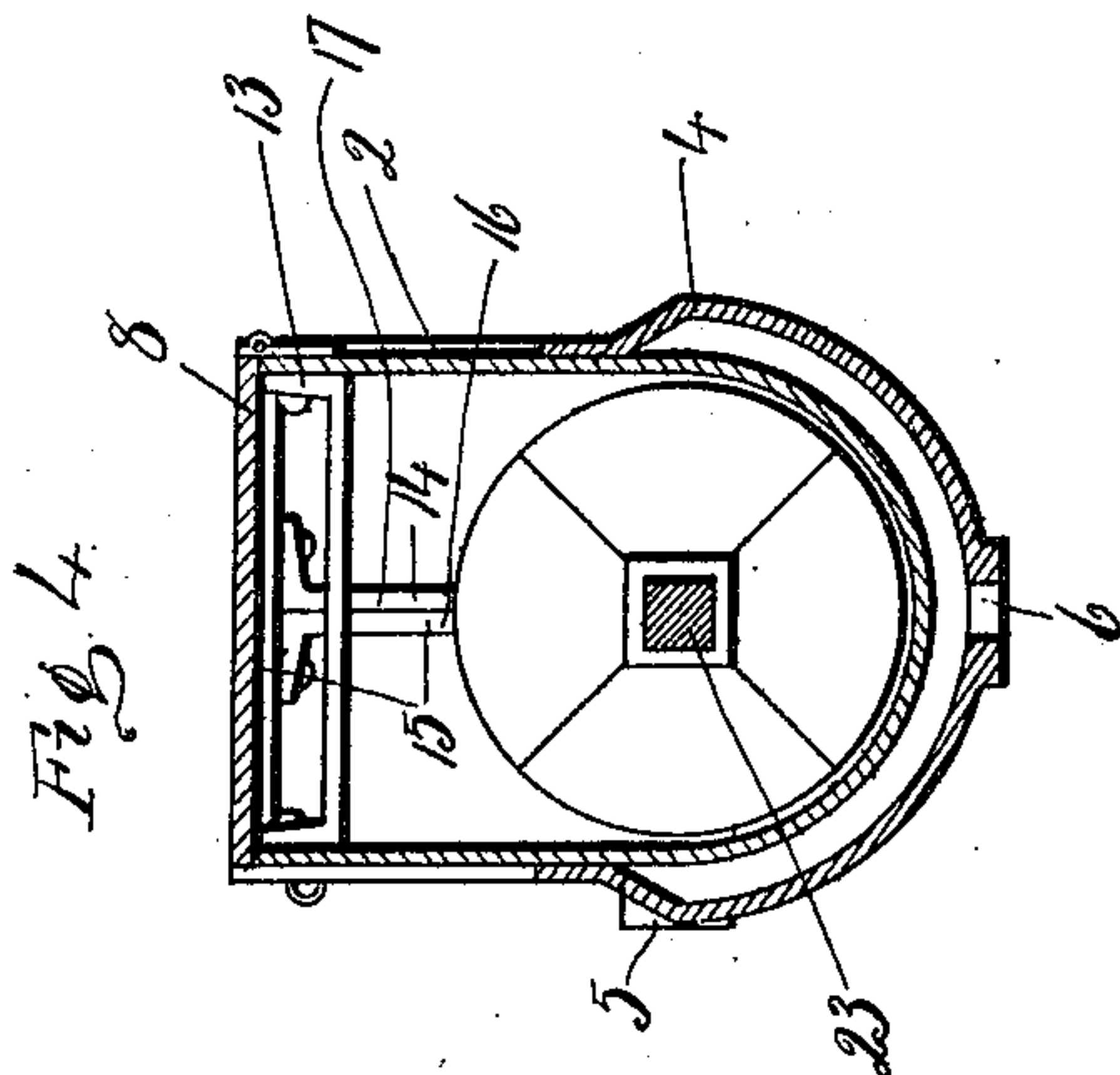


Fig. 4.

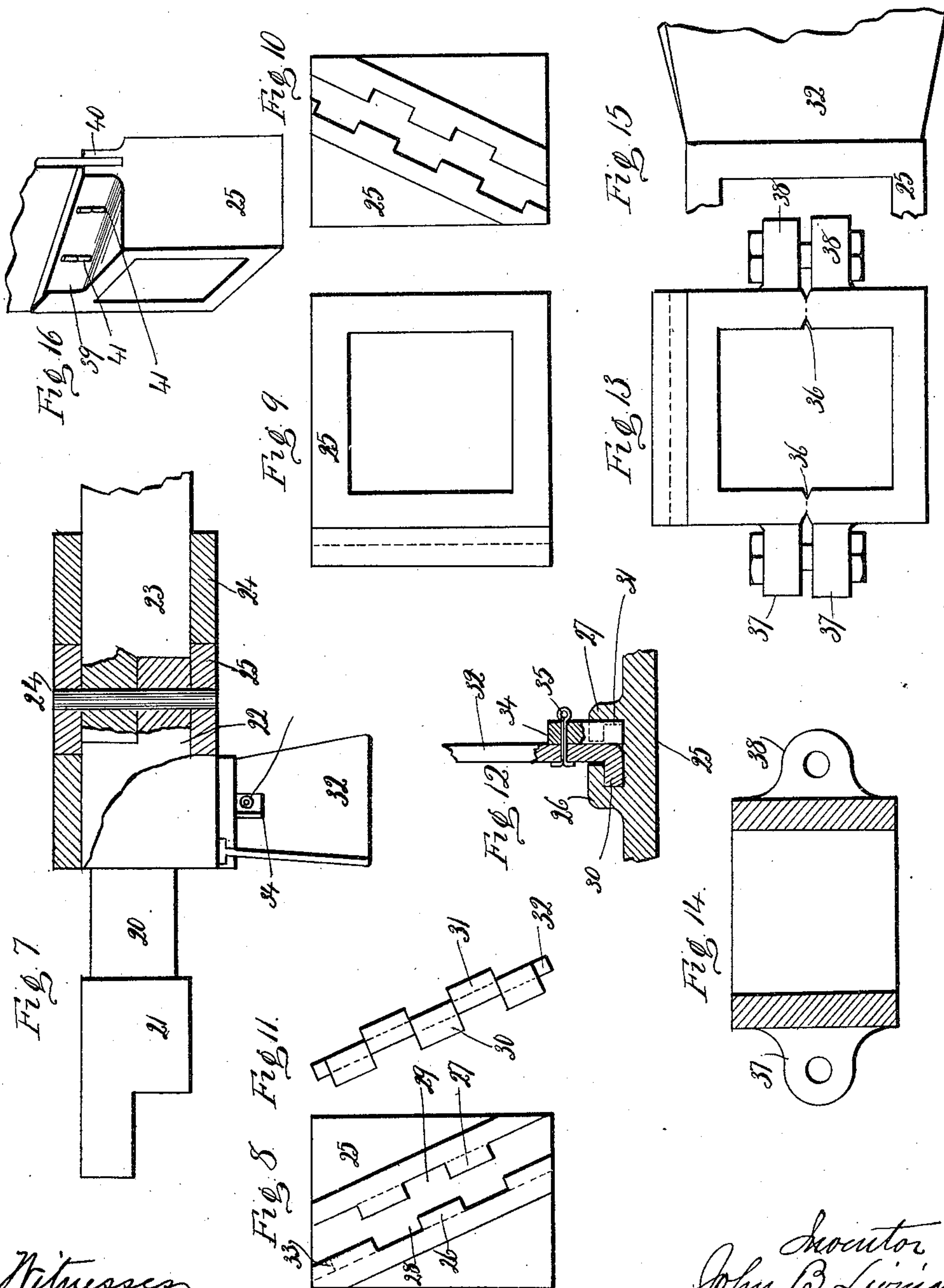
Inventor
 John B. Livingston
 by Seymour & Sears
 attys

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3 SHEETS—SHEET 3.



Witnesses
 C. J. Reed.
 C. L. Need.

Inventor
 John B. Livingston
 by Seymour T. Carey
 Atty

UNITED STATES PATENT OFFICE.

JOHN B. LIVINGSTON, OF NEW HAVEN, CONNECTICUT.

APPARATUS FOR HANDLING GARBAGE AND SIMILAR REFUSE.

999,507.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed January 21, 1910. Serial No. 539,334.

To all whom it may concern:

Be it known that I, JOHN B. LIVINGSTON, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented a new and useful Improved Apparatus for Handling Garbage and Similar Refuse; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1 a view in side elevation of a drier comprising two troughs. Fig. 2 an end view illustrating a drier having four troughs. Fig. 3 an enlarged side view of one section of one of the troughs and the end of the next adjacent trough. Fig. 4 a sectional view on the line *a—b* of Fig. 3. Fig. 5 a broken sectional view showing the adjacent ends of two sections. Fig. 6 an enlarged plan view of one of the hangers. Fig. 7 an enlarged view of a portion of the shaft showing the mitered connection and showing hubs mounted thereon. Fig. 8 a side view of one of the hubs. Fig. 9 an end view of the same. Fig. 10 a side view of a hub with flanges in the opposite direction from those shown in Fig. 8. Fig. 11 a view of the inner end of one of the blades detached. Fig. 12 a broken sectional view showing one of the blades in a hub illustrating means for securing it therein. Fig. 13 a plan view of a hub adapted to be separated. Fig. 14 a plan view of half of a hub. Fig. 15 a broken view illustrating a blade formed integral with a hub. Fig. 16 a broken perspective view illustrating a modified form of securing a blade in its hub.

This invention relates to an improvement in apparatus for handling garbage and similar refuse of such a nature that it may be dried and converted into fertilizing material, the apparatus being of such character that it may also be used for drying certain mineral substances.

The main object of this invention is to make a continuous drier of unlimited length that can be readily changed to conform to the kinds of material to be treated. Some materials contain more moisture than others and require more drying.

Another object is to arrange the drier in divisions placed side by side with trans-

ferring means between them, and to form each division in sections that can be bolted together so that any length may be obtained, and with outlets at intervals through which the material can be emptied so as to avoid over-drying, or in which more than one kind of material can be treated at the same time in the same structure.

A further object of the invention is to avoid certain objectionable features of construction and operation present in apparatus as heretofore used, and more particularly a construction in which the material being treated shall not pass through moisture distilled from the material during the heating treatment.

Another object is to provide an apparatus in which the material under treatment is kept constantly moving and at the same time be broken apart so that fresh portions of the mass are constantly brought into contact with the heated walls of the drier.

A further object is to provide an apparatus which permits ready access to any part for the purpose of inspection or repair.

A further object is to provide a plant made up as above stated of several divisions from which one or more may be subtracted, or to which others may be added without difficulty.

A still further object is to devise means whereby the wearing portions of the conveyor may be readily and cheaply replaced without loss of time; and the invention consists in the construction hereinafter described and particularly recited in the claims.

In handling garbage according to my method, it is first placed in a grinder or crusher from which it is led preferably by a closed conduit to a trough *A* which trough has within it a conveyor which will be hereinafter described. Preferably I employ at least two troughs arranged side by side and inclined in opposite directions, that is, one extends upward from left to right, and the other extends upward from right to left. These two troughs I will hereinafter term a division, and these divisions may be extended side by side to any extent desired. The trough of each division is preferably of U-shape in cross section, or of any other suitable shape, having a space above the conveyor into which the vapor rising from the material under treatment may pass. Each trough is made up of a series of sections 2

adapted to be secured together at the ends which abut, one end of each section having riveted to it a butt-strap 3 which is adapted to be bolted to the adjacent end of the next section. Secured to each section and partially surrounding the same is a steam or heating jacket 4 having a steam inlet 5 at one end, and an outlet 6 at the opposite end for the condensed water.

10 Connected to the sides of each section at the high end is a plate 7, while the rest of the section is closed by a cover 8 hinged to one side of the trough and secured by a clasp 9 to the opposite side. This permits
15 each separate section to be opened for examination or repair. In each plate 7 is an opening to receive a pipe 10 leading to an exhaust pipe 11 extending lengthwise of the apparatus and connected with a vertical pipe 12 from an exhaust fan, not
20 shown, and so that the vapor rising from the material passing through the trough under treatment is drawn off so that the material itself does not pass through the moisture rising from it. The sides of the
25 trough are held in place at intervals by transverse braces 13, while at the high end of each trough is a hanger 14. These hangers are preferably made of channel bars 15, 16 and 17 bolted together and to the sides
30 of the trough. A split cast iron bearing box 18 is fastened to the hanger by U-bolts 19. These boxes are tapered exteriorly. These hangers support the shaft which corresponds in length to the length of each division. This shaft is also made up in section comprising a round bearing portion 20
35 with square ends 21, 22, which are mitered for connection with the mitered ends 23 of the main portions of the shaft, the ends of the shaft being connected to the bearing portions by pins 24. Mounted on the shaft between the bearings are a series of hubs 25, the hubs at the ends being secured in
45 place by the pins 24 which are long enough to extend through the hubs. These hubs are formed on one side with diagonally arranged undercut flanges 26, 27, formed respectively with notches 28, 29, arranged alternately to receive lips 30, 31, turned from
50 opposite sides of the lower end of blades 32. The lips 30, 31, are entered through the notches 28, 29, and the blade moved so as to bring the lips beneath the undercut portion of the flanges, the movement of the
55 blade being limited by a stop 33 formed at the end of one of the flanges. To lock the blades in position, a sliding bolt or block 34 will be inserted through one of the notches and so as to extend between two of the lips
60 on the blade, this block being held in place by a cotter-pin 35. Whenever it is necessary to remove the blade for any purpose, the bolt or plug is removed and the blade
65 forced back between the flanges until the

tongues come in alinement with the notches at which point the blade may be lifted out and repaired and returned without delay, and without the necessity of disturbing any other blade or hub. It will be noted that
70 the taper of the boxes above referred to is such as to reduce the ends of the boxes to a size corresponding to the size of the hubs and so that there will be no projections to interfere with the passage of material in
75 the trough. These hubs are made with the flanges arranged in opposite directions, some extending across one side from left to right, as shown in Fig. 8, and others extending from right to left, as shown in Fig.
80 10. The flanges in one trough will all extend in the same direction, while those in the next adjacent trough will extend in the opposite direction, and the object of this is to permit the shafts to be turned in the same
85 direction, but to drive the material in the division in opposite directions. The succeeding hub in each section is turned a quarter round so that the blades extend at right angles to the next adjacent blades, this
90 series of blades not only feeds the material along, but also agitates or stirs it so that all portions are subject to heat, and the material is cut or ground to a more or less extent. When first installed these hubs are
95 preferably made solid, and the blades may be formed integral with them for use with material that contains no foreign substance such as irons, tins, etc., which might break the blades. To provide for repairs
100 the hubs may be made with weakened points 36 so that the hubs may be divided or split, as shown by broken lines in Fig. 13 and each section will be formed on opposite sides with ears 37, 38, which may be
105 bolted together and so that the hubs may be placed upon the shaft without separating the shaft. In this case if one of the hubs breaks, it is only necessary to remove that particular section and substitute a new
110 one in its place. Instead of forming the hubs with notched flanges, and the blades with lips as above described, the hubs may have a pair of outwardly extending flanges 39—40 between which the inner end of the
115 blade will closely fit as shown in Fig. 16 and the blade may be held in place by cotter-pins 41. The stock to be treated is fed into one end of the apparatus and is conveyed to the upper end of that division,
120 from which it passes through an inclined chute 42 which chute has a delivery chute 43 the entrance to the latter chute being controlled by a swinging gate 44. By the proper use of the gate the material discharged from one trough may be directed
125 into the next succeeding trough through the chute 42, or may be diverted through the chute 43 into a discharge conveyer 45. By this arrangement it is possible to cut out
130

certain of the divisions or units of the plant and deliver the material under treatment to the discharge conveyer at the end of either division.

5 The apparatus thus described lends itself to the cooking and drying of garbage by a continuous process without either freeing the vapor into the surrounding atmosphere or causing the garbage to pass through its
10 own vapor as the treatment progresses. It will be seen further that the continuous agitation and movement of the garbage is accomplished without the necessity of installing a plant of prohibitive length since the
15 various sections are of practical dimensions and easily compacted within a comparatively small space. As before stated, as many troughs as desired of suitable length may be arranged side by side. There is no
20 loss of heat in the process, and the material under treatment may be heated to exactly the temperature which is required for drying without injuring any of the valuable ingredients which are contained therein as
25 the steam pressure in the jackets may be regulated by suitable valves.

I may here make mention of the fact that I have discovered that raw garbage may be cooked in this apparatus in the manner described, and by reason of the steam and vapors being constantly withdrawn from the mass, it may be successfully dried as it passes through the apparatus without the necessity for its being pressed or for handling it in any other manner with a view to eliminating the moisture, as is necessitated in every other practical method of drying the cooked garbage. I propose to protect this method of treatment by an application
40 properly filed, and do not wish to be understood as disclaiming it.

I claim:—

1. A continuous drier composed of a plurality of divisions secured together end to
45 end, a cover for each division, and an opening between the covers for the escape of steam arising from material passing through the drier, whereby the vapor can be readily drawn off so that the material will not pass
50 through it.

2. A drier comprising a trough composed of a plurality of sections the ends of which are abutted and secured together, each section provided with an independently formed
55 steam jacket, a conveyer in the trough, the sides of the trough extended above the conveyer, a readily removable cover over each section forming a steam space above the conveyer.

60 3. A continuous drier comprising two or

more divisions, each division formed from a plurality of sectional troughs connected end to end, each section having an independently formed steam jacket, the said troughs together forming a vapor chamber extending
65 throughout the length of each division and a longitudinal conveyer.

4. A drier comprising two or more divisions arranged side by side each division including an inclined trough formed in sections, and means for transferring material
70 from one trough to the next.

5. A drier having a conveyer therein comprising a shaft with hubs thereon, said hubs being provided with a receiving channel or groove having overhanging edges alternately notched, and a conveyer blade having tongues alternately projecting in opposite directions fitted into said receiving
80 channel.

6. In a drier, a trough, a blade conveyer therefor, said conveyer comprising a shaft, hubs on said shaft, said hubs formed with two parallel flanges extending diagonally across one side, and propeller blades said
85 blades each having a projection adapted to pass between the flanges on the hub and be connected therewith, whereby said blades are detachably secured to the shaft.

7. A drier having a trough with a conveyer therein, a series of hangers in said trough to support said shaft, said hanger formed from a plurality of channel irons secured to each other and to the trough.
90

8. A drier comprising a trough, hangers in said trough, split bearing boxes having beveled sides suspended by said hangers, a conveyer in said trough, the shaft of the said conveyer passing through said split
95 boxes.
100

9. A drier comprising a trough with centrally arranged hangers in said trough, externally tapered split bearing boxes secured to said hangers by U-shaped bolts, a conveyer shaft supported by said split boxes,
105 hubs on said shaft of no greater diameter than the diameter of the ends of the boxes, and conveyer blades carried by said hubs.

10. In a drier, a blade conveyer having a shaft with a separable bearing member, and
110 a conveyer blade hub located over the joint between the bearing member and the shaft and secured thereto.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.
115

JOHN B. LIVINGSTON.

Witnesses:

FREDERIC C. EARLE,
CLARA L. WEED.