

No. 702,235

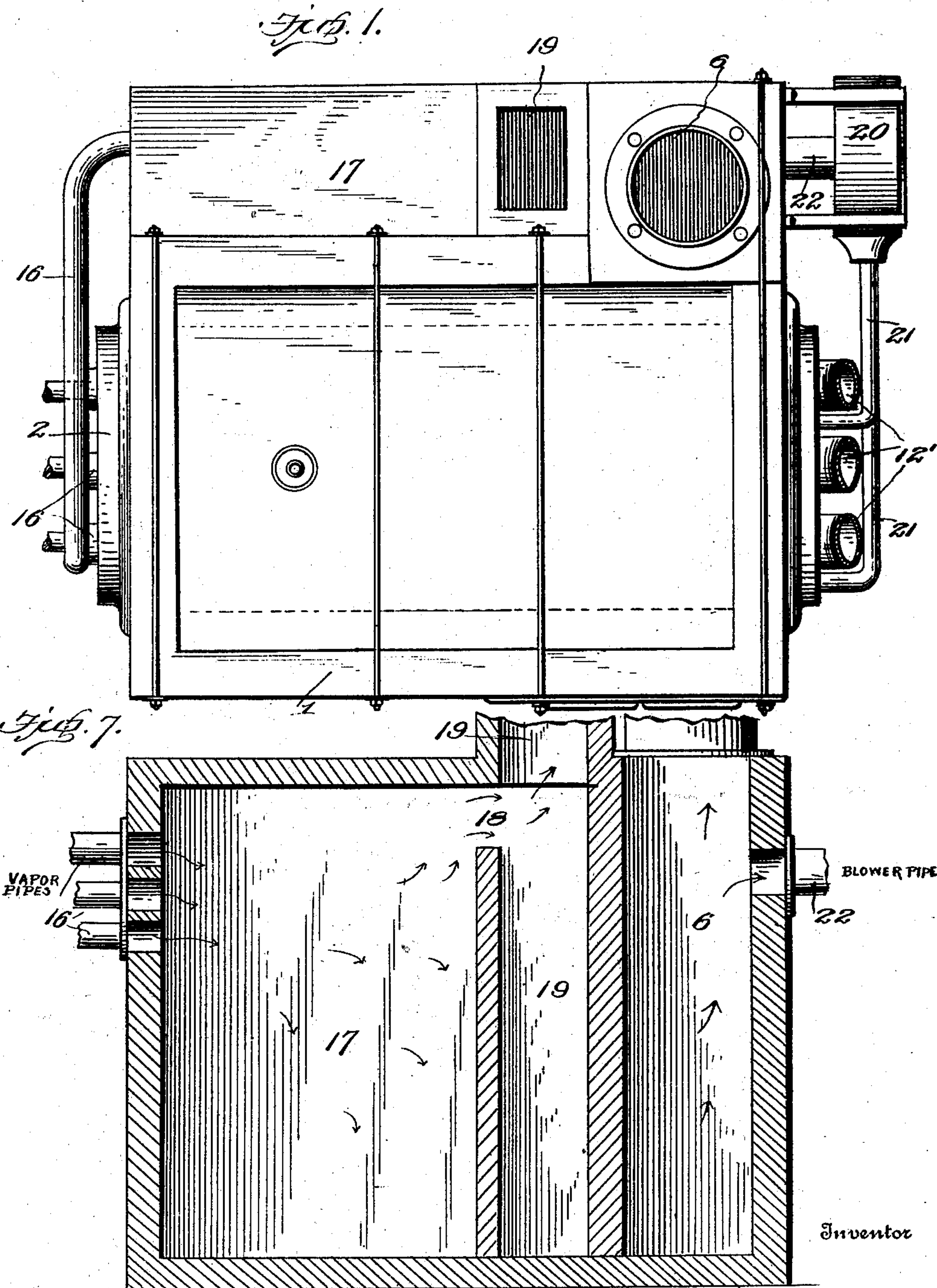
Patented June 10, 1902.

A. MORRIS.
FISH DRYING APPARATUS.

(Application filed Feb. 27, 1902.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses
E. C. Hunt,
J. P. Hill

By *Albert Morris*
A. B. Wilson & Co.
Attorneys

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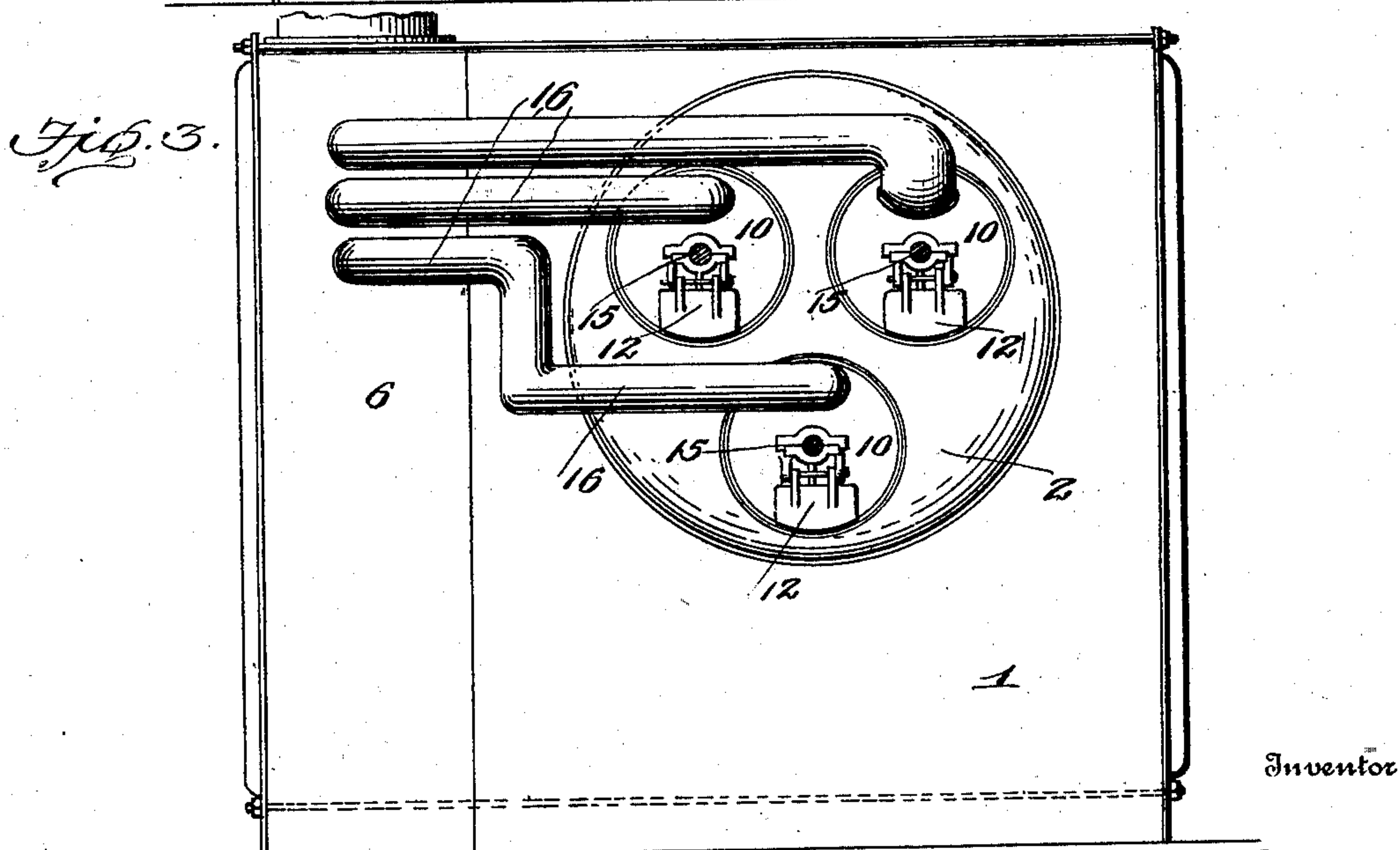
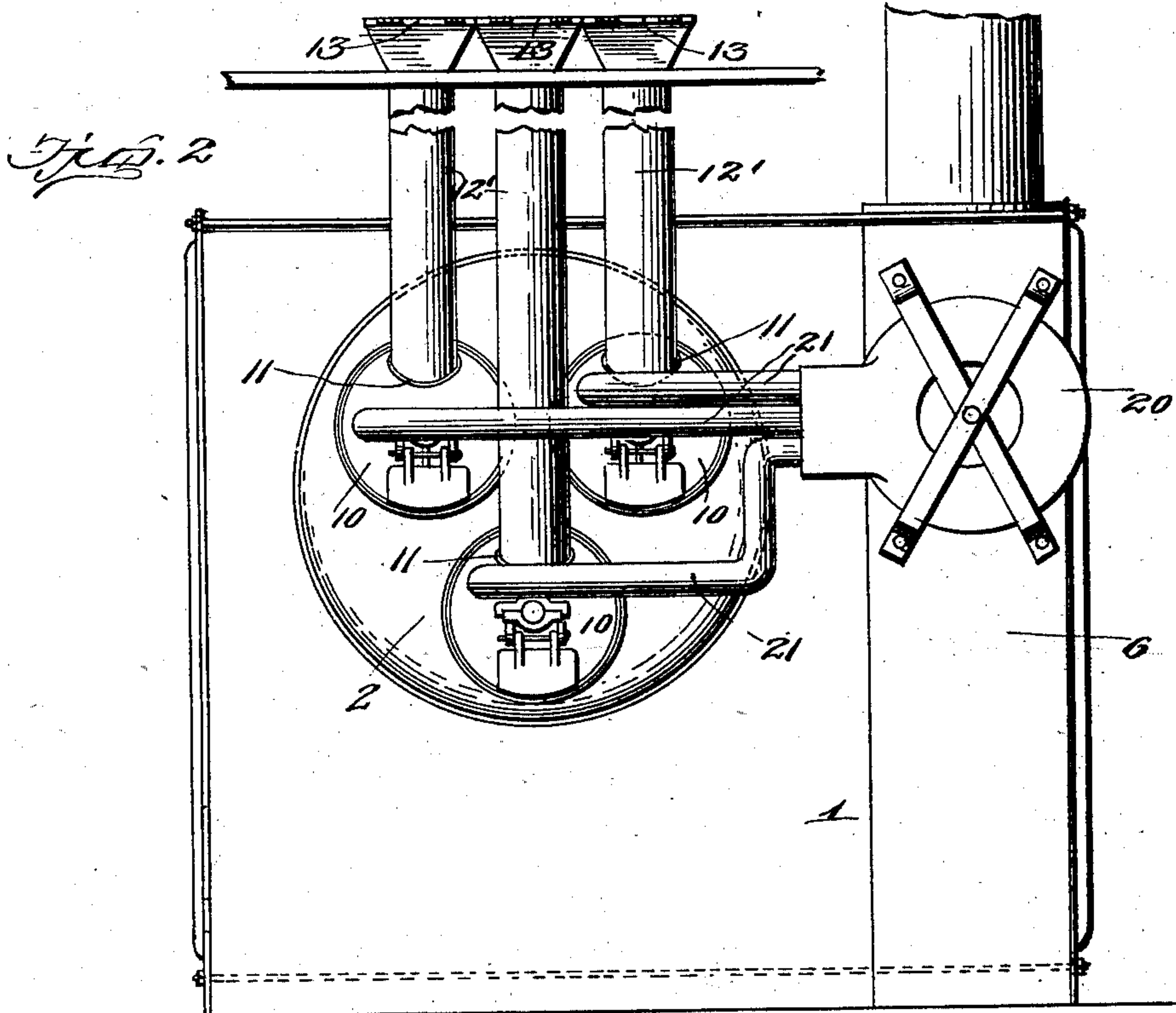
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Witnesses
E. Hunt
J. Wilson

Albert Morris:-
By *A. B. Wilson & Co*
Attorneys

No. 702,235.

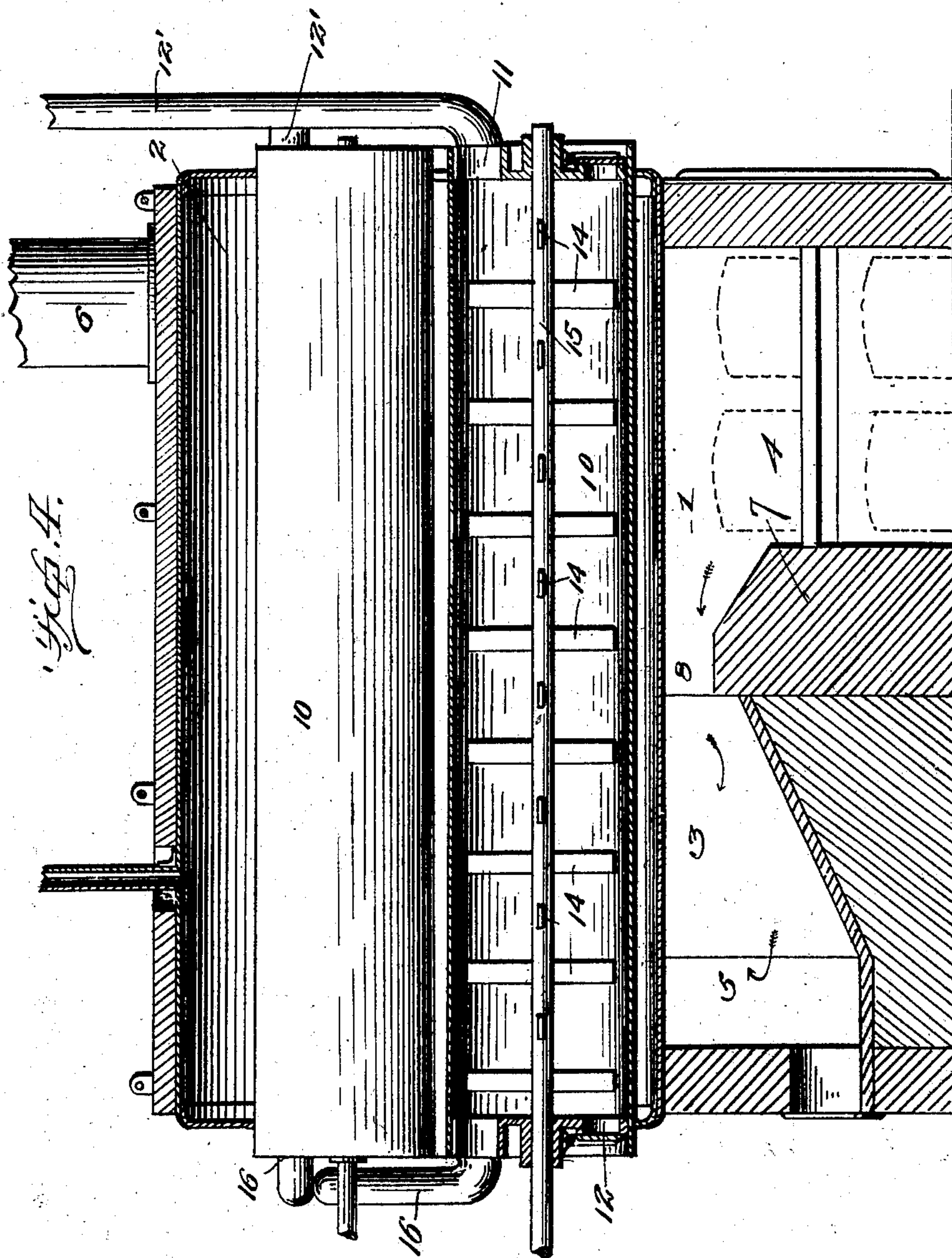
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4 Sheets—Sheet 3.



Inventor

Albert Morris

Witnesses

E. C. Hunt,

J. P. Wilson

By

A. P. Wilson & Co

Attorneys

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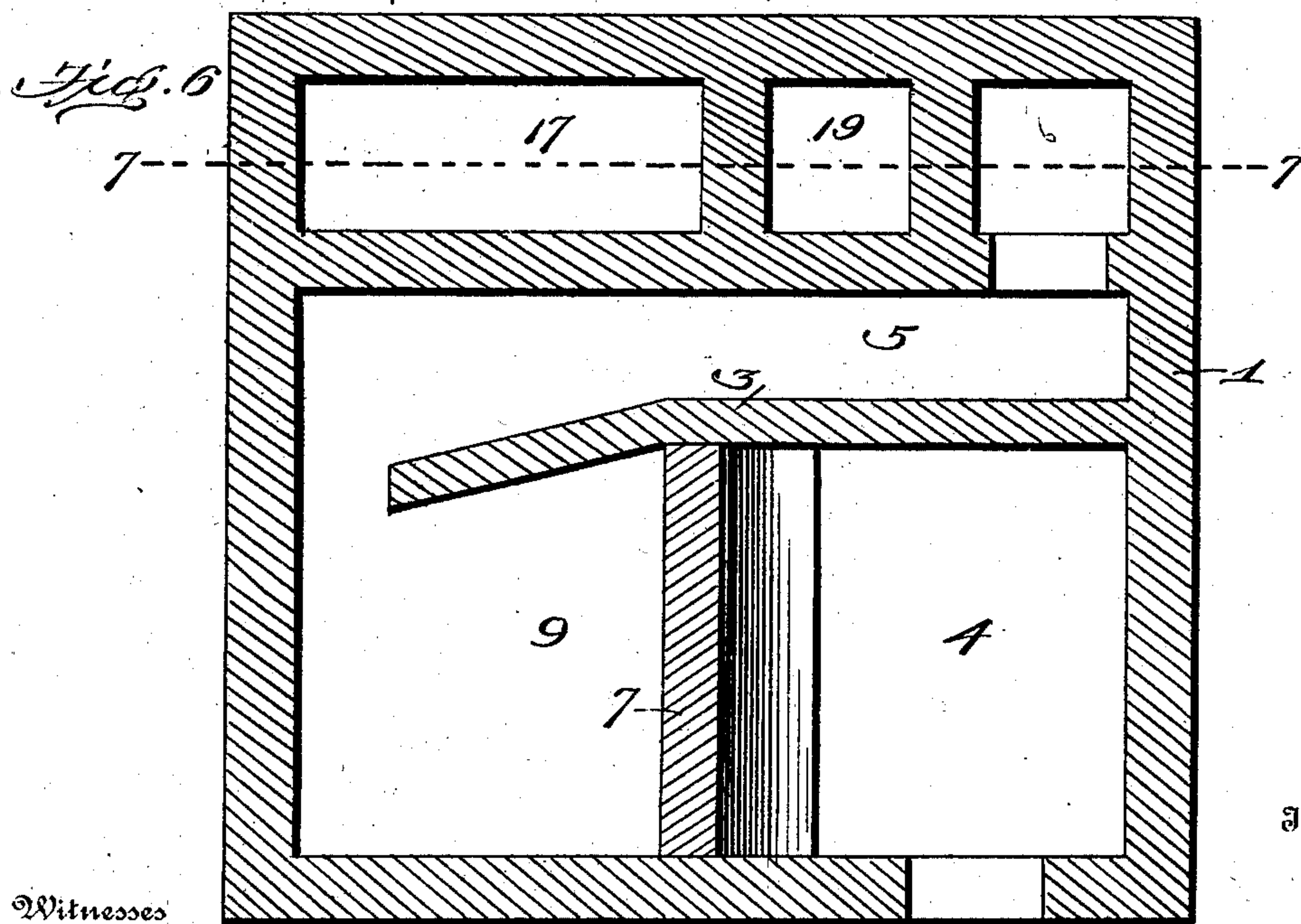
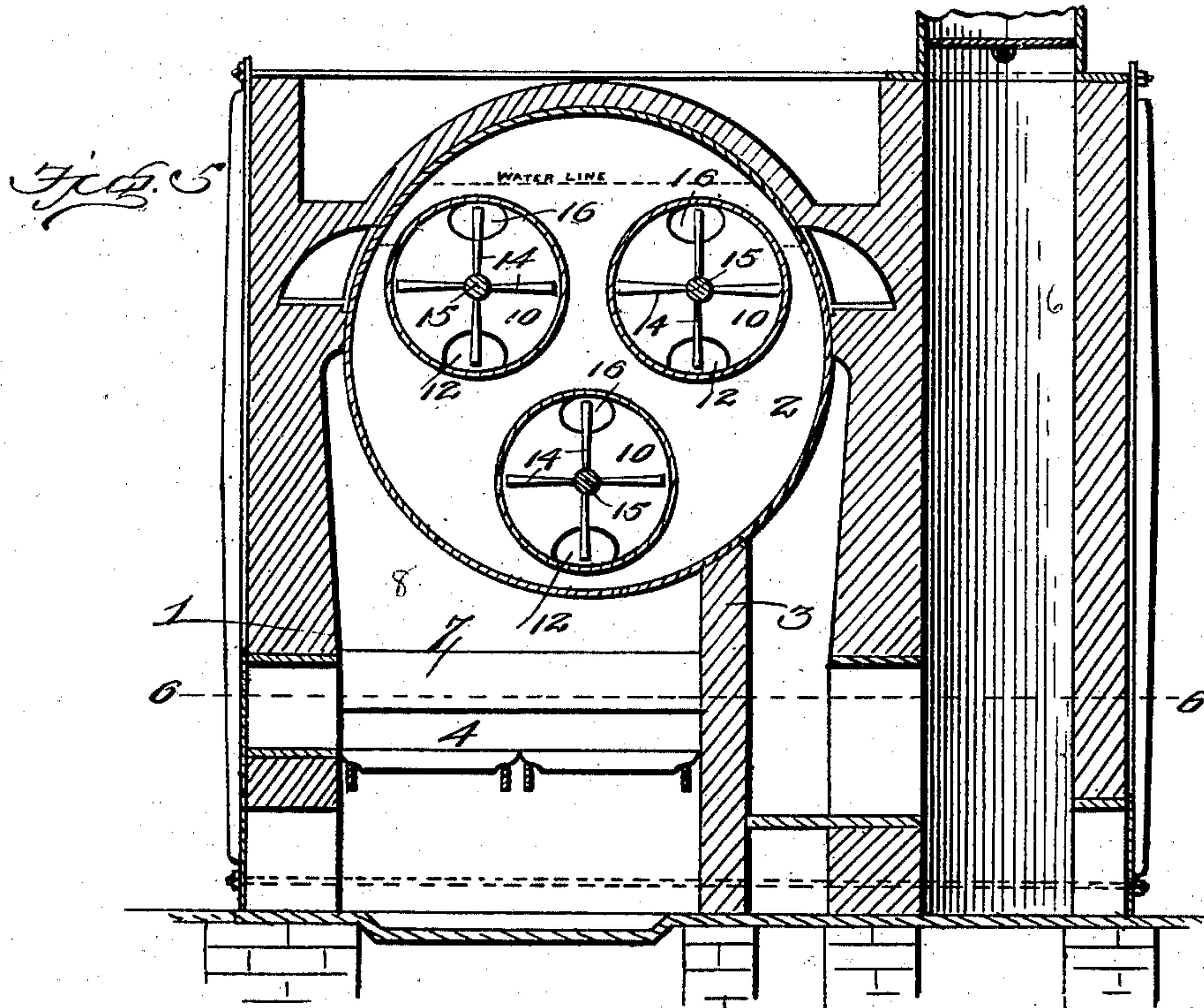
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(No Model.)

4 Sheets—Sheet 4.



Inventor

Witnesses
Edmund J. Wilson

By *Albert Morris*
A. R. Wilson & Co.
Attorneys

UNITED STATES PATENT OFFICE.

ALBERT MORRIS, OF REEDVILLE, VIRGINIA.

FISH-DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 702,235, dated June 10, 1902.

Application filed February 27, 1902. Serial No. 95,894. (No model.)

To all whom it may concern:

Be it known that I, ALBERT MORRIS, a citizen of the United States, residing at Reedville, in the county of Northumberland and State of Virginia, have invented certain new and useful Improvements in Fish-Drying Apparatus; and I do 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.

This invention relates to an apparatus for drying fish in the manufacture of fertilizer.

The object of the invention is to provide an apparatus of this character which is comparatively simple of construction and inexpensive of production, of maximum efficiency in use, and designed to effect economy in the saving of time, fuel, and labor in the drying process.

A further object of the invention is to provide a drying apparatus in which provision is made for the rapid and efficient discharge of the gases and vapors driven off from the fish, the collection of the particles carried off by such gases and vapors to prevent waste, and the utilization of the waste heat and products of combustion from the furnace to facilitate the drying of the fish.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the said invention consists in certain novel features of construction and combination and arrangement of parts, as will be hereinafter fully described, defined in the appended claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a top plan view of a drying apparatus embodying my invention. Figs. 2 and 3 are front and rear end elevations of the same. Fig. 4 is a vertical longitudinal section. Fig. 5 is a vertical cross-section. Fig. 6 is a horizontal section through the furnace on the line 6 6 of Fig. 5. Fig. 7 is a vertical longitudinal section on the line 7 7 of Fig. 6.

Referring now more particularly to the drawings, the numeral 1 represents a furnace within which is supported a boiler 2, extending longitudinally of the furnace-chamber, said boiler resting at its ends upon the fur-

nace-wall or supported at its ends in any other approved manner and resting intermediately upon a bridge-wall 3. This bridge-wall forms one side of a fire-box 4 and also one side of a passage 5, which communicates with a smoke-stack 6. The rear wall 7 of the fire-box terminates below the boiler, leaving a passage 8 for the circulation of the heat, gases, &c., rising from the bed of fuel about the bottom of the boiler and to a space or chamber 9 at the rear end of the furnace. The bridge-wall 3 terminates short of the rear wall of the furnace, so that the passage 5 communicates with the said chamber 9. The smoke and products of combustion are thus caused to pass to the front again before passing out into the stack, so as to utilize a large proportion of the heat in heating the boiler, and provision is also made for preventing the entire waste of the remainder of the heat carried by the products of combustion before they pass out of the stack and utilizing the same for augmenting the heat from the boiler in the drying process, as will be hereinafter described.

The boiler 2 contains water up to the level indicated in the drawings, and extending longitudinally through said boiler are a number of drying cylinders or chambers 10, which are provided at their front ends with feed-inlets 11 and at one or both ends with one or more discharge-outlets 12', which may be closed by suitable doors. These cylinders are to contain the fish or other material to be subjected to the drying process, such material being supplied thereto through the feed-inlets 11 and chutes or conductors 12', which project upwardly through a floor or supporting-platform above and are provided with doors or lids 13, which are closed after the material has been entered therein to prevent the fumes and odors arising from the cylinders from escaping to the atmosphere or within the drying-rooms of the building or structure in which the apparatus is placed. The fish or material contained within each drying-cylinder is kept in agitation and caused to feed back and forth from end to end of the cylinder by stirrers 14, extending longitudinally within said cylinder, said stirrers being mounted upon a shaft 15, journaled to rotate in suitable bearings and

having its rear end extending beyond the furnace-wall for the application thereto of suitable driving means. The water in the boiler is heated by the flames and heat from the bed of fuel in the fire-box and in turn heats the drying-cylinders, whereby the material contained therein is subjected to a cooking and drying process, which is kept up until all the vapors have been eliminated and discharged and the material thoroughly dried in a condition to adapt it for use as fertilizer.

The gases and vapors eliminated or escaping from the mass of material under treatment in each cylinder discharge from the cylinders through tubes or ducts 16, which communicate between the forward ends of the drying-cylinders and the forward end of a vapor-chamber 17, formed within the furnace-casing. In this chamber the particles of fish or material passing out with the gases and vapors from the drying-cylinders are precipitated and retained, so as to prevent any waste of the material, and the gases and vapors after circulating around in said chamber discharge therefrom through a port or passage 18, connecting the vapor-chamber with a vapor-stack 19, arranged just in advance of the smoke-stack 6 and between the same and said vapor-chamber. The gases and vapors entering the stack 19 are discharged therefrom to the atmosphere.

In order to augment the heat from the boiler and to utilize a large proportion of the heat usually allowed to escape with the products of combustion in securing the quick and thorough drying of the material, I provide means for heating and forcing currents of hot air through the drying-cylinders, these currents serving not only to promote the drying action, but also to effect the rapid carrying off of the vapors and gases, which, if allowed to remain, would deter the drying action. To this end I will employ a blower 20, which is in communication with the forward ends of the drying-cylinders through tubes or ducts 21 and with the smoke-stack through a suction-pipe 22. This blower is operated through the medium of any suitable mechanism and in action forces air through the pipes 21 into the drying-cylinders and at the same time draws a large proportion of the hot air and heated products of combustion from the stack 6. This hot air and the products of combustion admix with the air drawn in through the blower 20, and the hot air thus created is forced by the blower through the pipes or ducts 21 into the forward ends of the drying-cylinders and through said cylinders and discharges into the vapor-chamber through the tubes or ducts 16 and from the vapor-chamber passes into the vapor-stack 19, whence it exhausts to the atmosphere. In thus passing through the drying-cylinders the hot air promotes the liberation and discharge of the gases and vapors, and thus materially hastens the process of drying.

In removing the dried material from the

drying-cylinders the discharge-doors at the ends of the cylinders are opened, and a large proportion of the material is forced out by the action of the stirrers. That which remains is raked out by means of a rake or suitable tool inserted through the doorways.

From the foregoing description, taken in connection with the accompanying drawings, it is thought that the construction, operation, and advantages of my invention will be readily apparent without requiring a further explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. In an apparatus of the character described, the combination with a furnace or heater having a smoke-stack for the discharge of the products of combustion; of a boiler arranged therein, a drying-cylinder arranged within the boiler, a vapor-chamber in communication with the drying-cylinder and provided in its upper portion with an outlet whereby the particles of material carried along with the vapors and gases will be precipitated in said chamber, means for agitating the material within the drying-cylinder, and means for forcing air and a part of the products of combustion passing into the stack through the drying-cylinder, substantially as described.

2. In an apparatus of the character described, the combination with a furnace; of a boiler arranged therein, a drying-cylinder extending longitudinally within the boiler and provided at its ends with inlets for the supply of the material thereto, and outlets for the withdrawal of the material, means within the cylinder for agitating the material, a vapor-chamber in communication with one end of the drying-cylinder and provided with an outlet to the atmosphere, and means for supplying air and a portion of the products of combustion from the smoke-stack of the furnace to the opposite end of the cylinder, whereby the heated air and products will be caused to pass through said cylinder and from the cylinder to the vapor-chamber and thence discharge to the atmosphere, whereby the driving off of the gases and vapors is facilitated, substantially as specified.

3. In an apparatus of the character described, the combination with a furnace provided with a smoke-stack, and a passage communicating between the fire-box and smoke-stack for the outlet of the gases and products of combustion; of a boiler supported within the furnace-casing, drying-cylinders arranged within the boiler, means for supplying the material to be dried to said cylinders, stirrers within the cylinders for agitating the material under treatment, a vapor-chamber, means

5 for conducting the gases and vapors from the drying-tubes to said chamber, an outlet communicating with the upper portion of the vapor-chamber, whereby the particles of material carried along with the vapors are caused to be precipitated in said chamber, and means for utilizing the heat from the products of combustion entering the stack and supplying the same to the drying-cylinders for promot-

ing the drying action, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ALBERT MORRIS.

Witnesses:

C. S. TOWLES,
JAMES C. FISHER.