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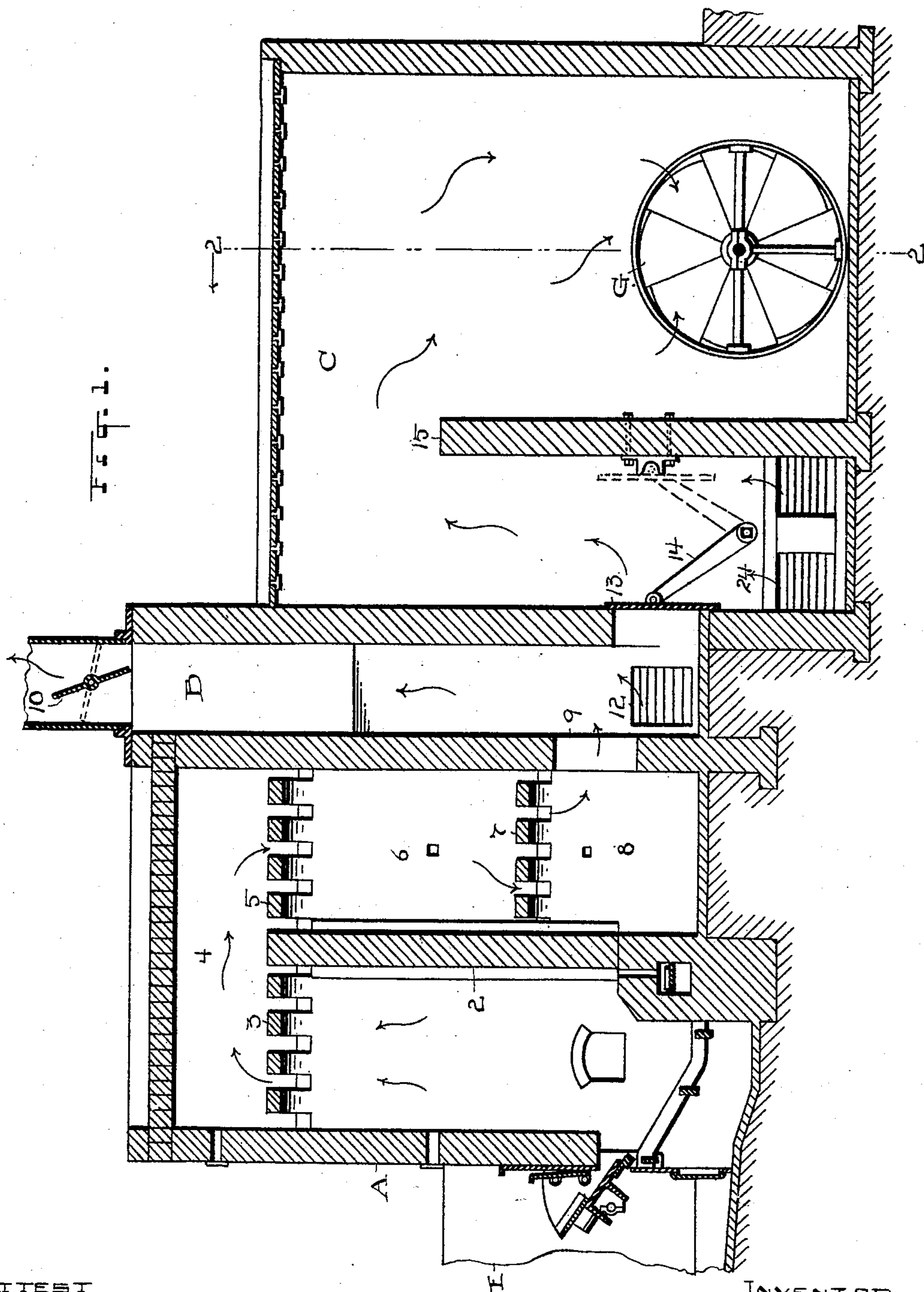
Patented Sept. 19, 1899.

F. D. CUMMER.
DRYING KILN.

(Application filed Nov. 22, 1895.)

(No Model.)

5 Sheets—Sheet 1.



ATTEST

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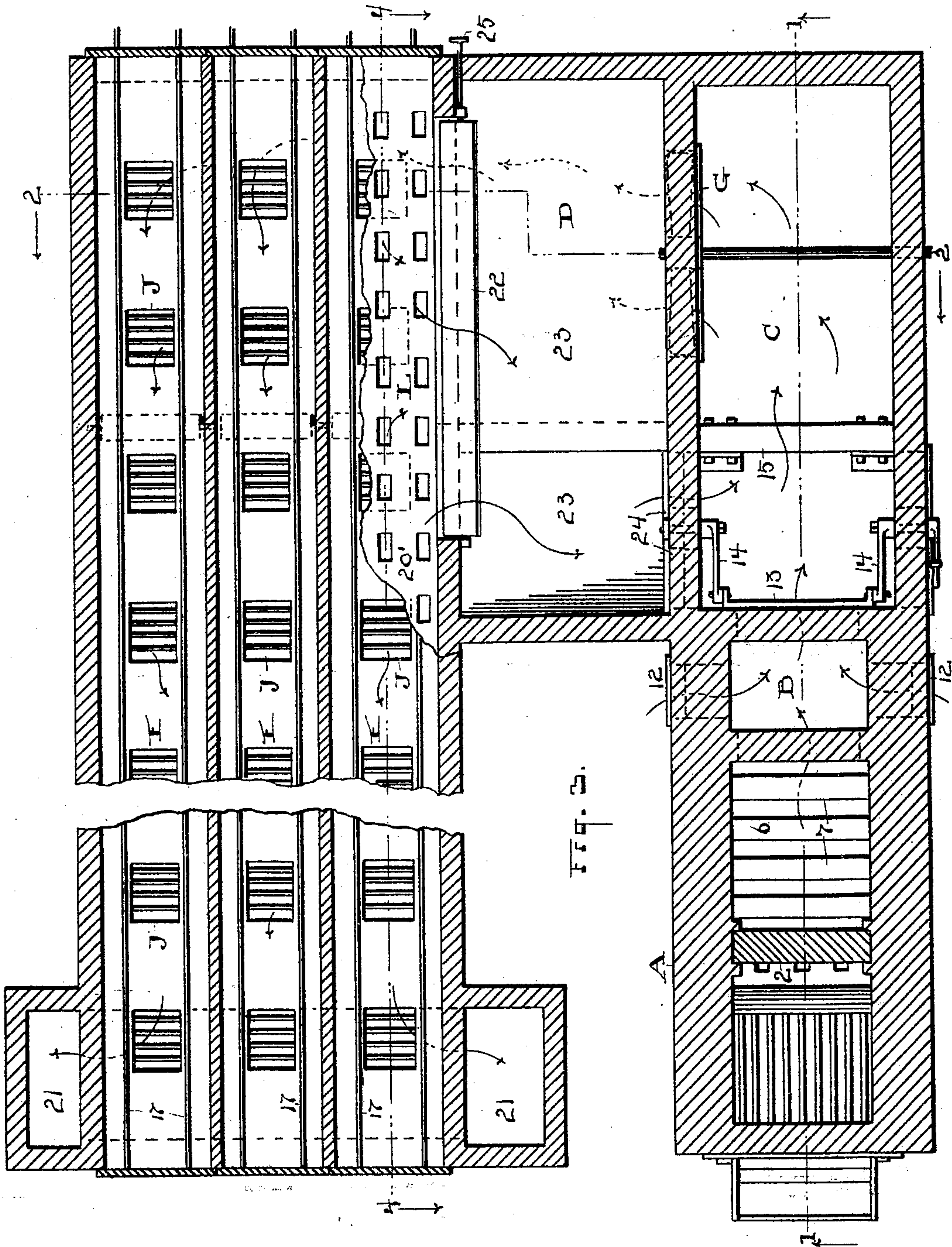
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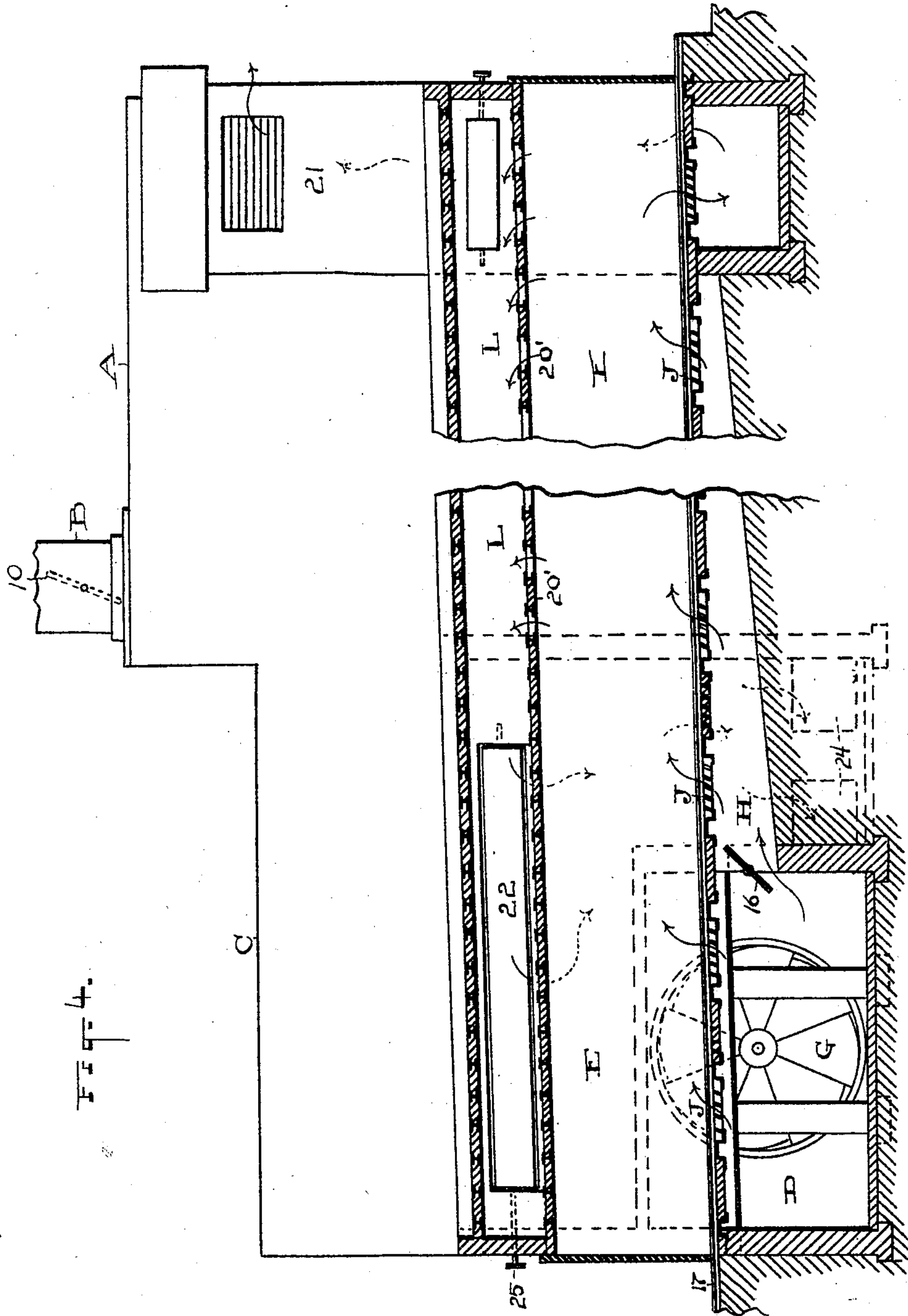
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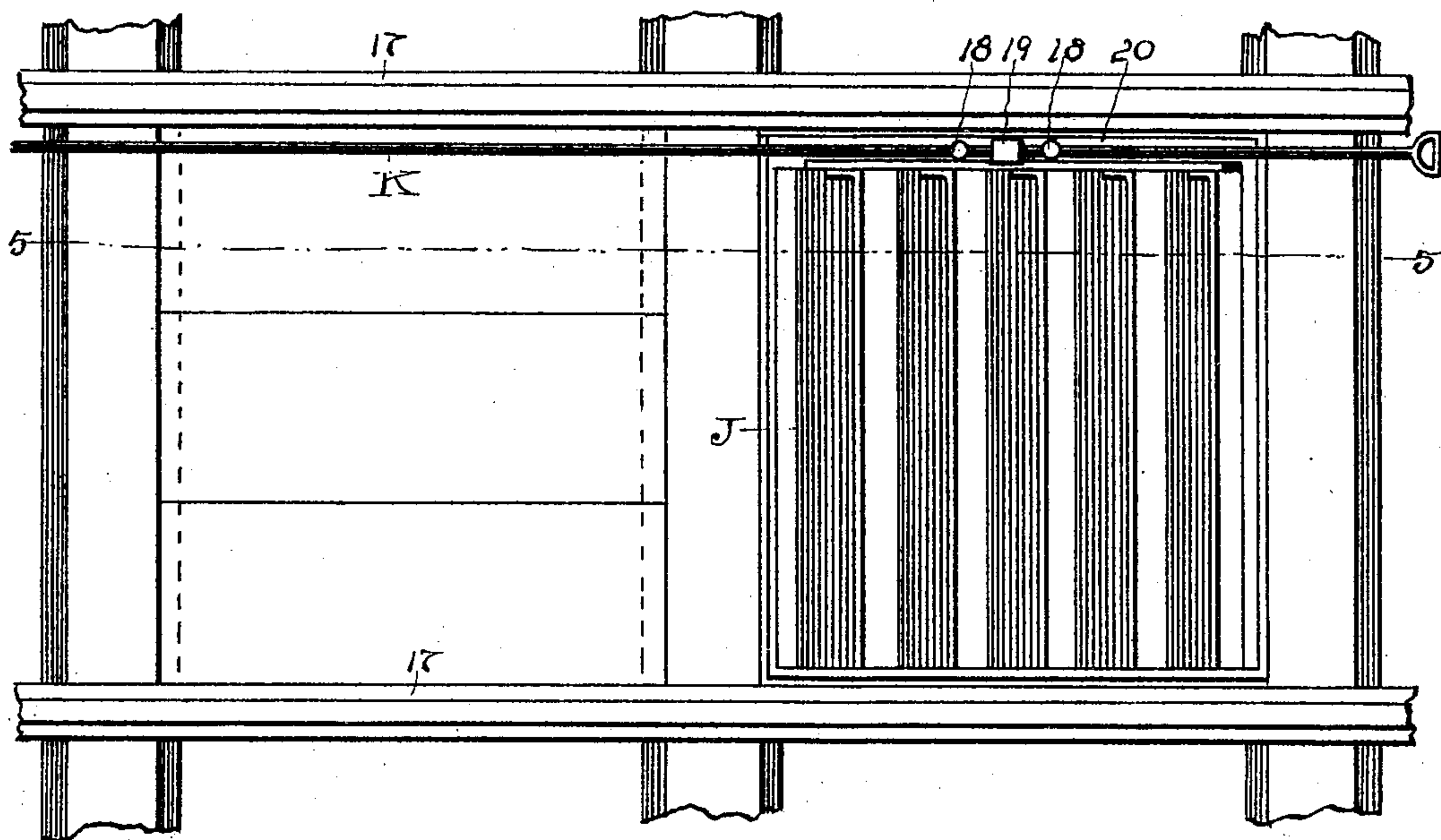
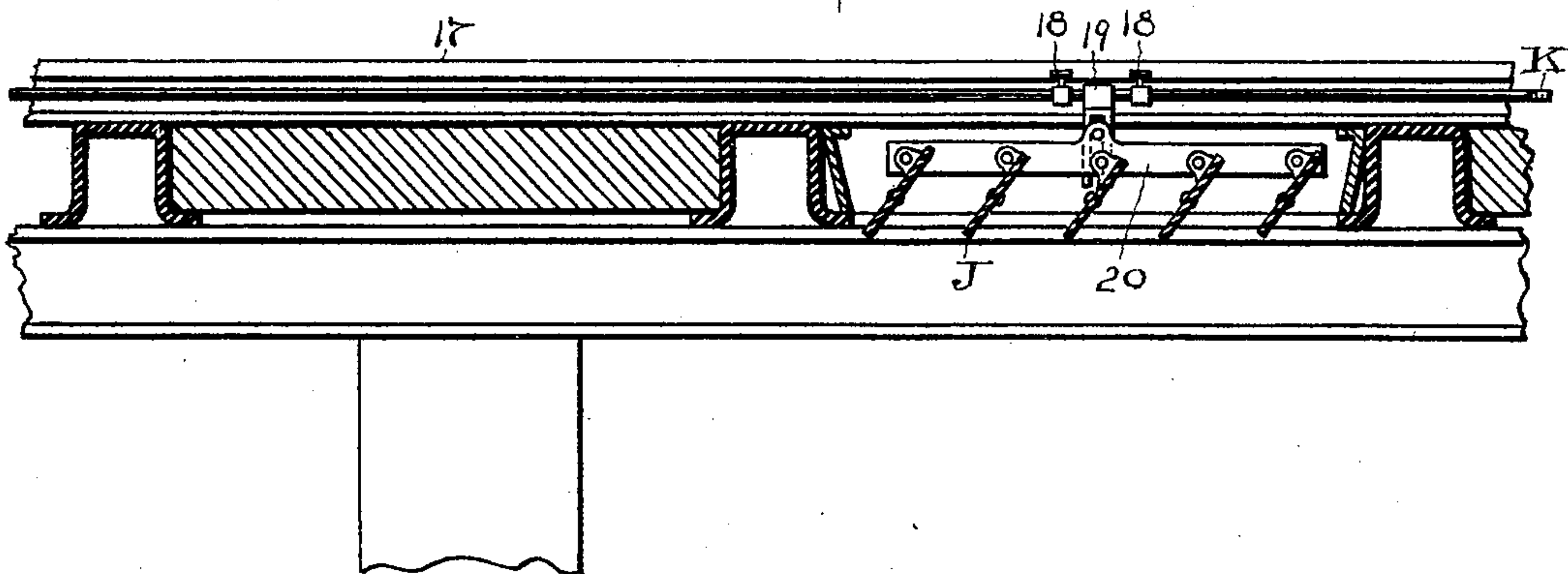


Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANKLIN D. CUMMER, OF CLEVELAND, OHIO, ASSIGNOR TO THE F. D. CUMMER & SON COMPANY, OF SAME PLACE.

DRYING-KILN.

SPECIFICATION forming part of Letters Patent No. 633,122, dated September 19, 1899.

Application filed November 22, 1895. Serial No. 569,787. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN D. CUMMER, a citizen of the United States, residing in Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in a Combined Furnace and Drying-Kiln; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention has reference to a combined furnace and drying-kiln for drying bricks and the like; and the invention consists in the construction and combination of parts, substantially as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional elevation of a furnace, commingling-chamber, and smoke-stack combined and showing these parts of my invention in one of its forms. Fig. 2 is a transverse sectional elevation of the commingling-chamber on line 2 2, Fig. 1, and of the passage-ways, tunnels, and drying-chambers connected therewith and lying beyond the said commingling-chamber, and hence not seen in Fig. 1. Fig. 3 is a horizontal sectional plan view of a complete system or plant according to my invention and showing sections of the furnace and smoke-stack and commingling-chamber and passage-ways therefrom and thereto, as disclosed in Figs. 1 and 2, and of the drying chambers or kilns beyond and with which the passage-ways and tunnels aforesaid are connected, the view being on line 3 3, Fig. 2. Fig. 4 is a vertical sectional elevation of the apparatus as shown substantially on a line corresponding to 4 4, Fig. 3. Fig. 5 is a plan view of a portion of one of the drying-car tracks, showing a register between the tracks and means for operating the same; and Fig. 6 is a sectional elevation on line 5 5, showing a side view of the said operating mechanism, as hereinafter more fully described.

The apparatus as thus shown and described contemplates the use of a suitable furnace A, a smoke-stack B, a commingling-chamber C to mix the products of combustion and any air that may be admitted, a passage-way D from the commingling-chamber, and one or

more drying compartments, kilns, or chambers E. One style or manner of arrangement of these essentials of the invention is shown in the drawings; but obviously different arrangements and relations of said parts may be employed and different constructions of one or another thereof in the same arrangement without departing from the spirit of the invention.

It will be observed that the drying chambers or compartments E are provided with tracks or rails which are adapted to support cars that are supposed to be loaded with the material to be dried—such, for example, as bricks, lumber, or the like—and of course materials which may require drying and are adapted to be dried by this method.

Referring now again to the furnace A, it will be noticed that it has what may be termed a “continuous but subdivided” combustion-chamber in the line of draft, the same extending upward from the fireplace in front of the bridge-wall 2, through the grate or cross-bars 3, into the space or compartment 4 above, and thence down on the other side of wall 2, between the cross-bars or grate 5, into the space 6, and thence down between the cross-bars 7 into the space 8 beneath, and thence out into the base of the smoke-stack B. By thus breaking up and retarding the products of combustion in their passage from the furnace to the smoke-stack and employing these subdivisions of the combustion-chamber, as shown, I am enabled at last to consume all or substantially all that is combustible in fuel and to deliver the products thereof practically clean and clear at the entrance from the tail of the combustion-chamber into the smoke-stack. Having reached this point the products of combustion may go directly out through the smoke stack or stacks, because there may be more than one, or they may be drawn into the commingling-chamber, according as to whether they are to be used or not. If not used, the products of combustion will proceed up the chimney and the valve 10 will be opened. If they are used for drying purposes, the said valve 10 will be closed and the registers 12, one at each side of the stack at its bottom, opened. However, in case less heat and more air is wanted valve

10 may also be opened more or less. A passage having valve 13 leads from the base of stack B into the commingling-chamber C, and this valve has a pivoted arm 14, adapted to swing and hold the valve closed, as in Fig. 1, or open and out of the direct heat, as seen in dotted lines, Fig. 1. A bridge-wall 15 is provided in the commingling-chamber to compel the air and products of combustion to rise together to the top of the said chamber and then pass down again before they escape from the chamber, thus contributing to the commingling of the fresh air and heat. At the bottom of the commingling-chamber is a fan or blower G, driven by any suitable power connection and occupying the mouth of the passage-way from said chamber to the passage or flue D, which leads to the drying-chambers. This passage discharges into the tunnels beneath drying chambers or compartments E, Fig. 2. If the drying-chambers were of greater length than could be advantageously supplied from one passage D and one furnace, there might be two or more such passages to different parts of the chambers and the same blower or two or more blowers be used, if desired. It is obvious that the principle shown may be extended and elaborated without departing from the spirit of the invention.

The passage-way D is designed to supply heat equally to each of the several compartments E and discharges primarily into tunnels H along the bottom of said chambers, which extend the full length thereof. Each of these tunnels has its own valve or damper 16, so that heat may be turned on or off at each chamber, as desired. In the floor or bottom of these chambers, between the tracks 17 for the drying-cars, are a series of registers J, communicating with the tunnels beneath, so as to admit heat at one point or another or at all points in the said chambers, as may be found desirable. In some instances a single chamber may be used or only a portion thereof, and in that case only the registers corresponding to such use would be opened. In other cases all the chambers may be used at the same time and all the registers opened uniformly or not, as occasion may require. Now in order that the said registers may be operated from without the said chambers and as occasion may require, so as to open them alike or not, I employ a long rod K for each chamber having its handle preferably outside the chamber-wall and connected at each of the registers with the register-operating mechanism seen in Fig. 6. In this instance I show a single example of mechanism suitable for this purpose, and obviously other means operating with like effect could be substituted and serve the same purpose and all be within the invention. Thus the rod K has adjustable stops 18 thereon and a sliding hanger 19, with a vertical slot and a pin connecting it with the operating-bar 20 of each of the registers. Now if I wish to close any one register and leave

others open I can adjust the stops 18 nearer together or farther apart one way or another, as may be wanted, and I may actuate the given register or not at all, as I may see fit. I can in this way close all but one, if I wish, or I can close one and leave all the others open, and I may close as many as may be required or partly close them. If I am drying a single car, I may have two or more registers open beneath that car and none others, and in any event I am enabled to arrange the registers so as to do what I desire by first adjusting them and then operating them together according to adjustment and all at the same time through the rod K from the outside of the drying-chamber. Any style of register and any adjusting mechanism that will serve my purpose may be used.

The heat having been used in the drying-chambers E may be carried off into the outer air at once through the stack 21 or returned to the commingling-chamber to be used over again. Obviously if green bricks were being dried there would be considerable moisture carried off with the heat, and I have learned that it is possible to dry some bricks too rapidly by this system, so that they are liable to become cracked on the surface. To overcome any possible trouble on this account, it is desirable at times to return the moisture from the drying-chambers with the fresh heat and air, and thus save the bricks from injury. To this end I discharge the heat from the several chambers E into a common return-space L over said chambers through the perforated ceiling 20' of said chambers and provide the valve or damper 22 to admit the heat into the passage-way 23, (indicated by arrows in Figs. 2 and 3,) whence it passes into the commingling-chamber through an opening at its base through valve or damper 24, Fig. 3. A connection of operating rods and levers 25 extends to the outside of the apparatus and serves to control said damper.

When the furnace is being started and before combustion is made practically complete, it of course is not desirable to carry the products of combustion through the drying-chambers, and in that case the passage-way to said chambers would be closed by the valve 13 and the valve 10 in the smoke-stack opened. If preferred, I might have a passage-way from the combustion-space 4 directly into the smoke-stack, so as to make a more direct draft from the furnace for starting the same.

By locating the registers for the inlets of air substantially as shown and by means of the valves for controlling the direction of draft I am enabled to regulate the amount of cold air admitted regardless of any high speed at which the fan or fans may run, so as to have large or little suction upon the fire, and I can control the temperature of the heat as it goes to the drying-chambers by letting in more or less air, as may be desired. If all the air-inlets be closed, the suction of the fan of course would be wholly on the furnace, and

that would give a very intense heat to the drying-chambers.

If desired, cold air may be admitted into the return-space immediately over the drying-chambers and carried around to the fan with the heat and moisture that are driven from the said chambers around on their circuit. It will of course be understood that by the numerous valves and dampers and means of controlling the air-inlet requisite judgment must at all times be exercised, so as not to overload the fan and thus render the system inoperative; but the possibilities of regulation are sufficient for all purposes, and I can at any time admit as much or as little heat into the drying-chambers as I want, and I can control the temperature therein to a fraction of a degree, if preferred. Usually I employ a fan or fans having a surplus capacity beyond what would be necessary for all ordinary purposes.

What I claim is—

1. In a drying-kiln, a furnace provided with a subdivided combustion-chamber in the line of draft, having open grate-bars in each section, a space above the division-wall and said grate-bars and a space below said grate-bars in both sections, in combination with a smoke and air stack provided with a controlling-damper, an inlet from the lower portion of said chamber to said stack, a commingling-chamber next to said stack, a bridge-wall in said commingling-chamber to compel the air

and products of combustion to rise to the top of the chamber before passing over said wall, a valved inlet from the bottom of said stack to said chamber, a drying-chamber, an air-conduit leading from said commingling-chamber to said drying-chamber and means to force the mingled air and products of combustion forward to the drying-chamber, substantially as described.

2. A furnace, a commingling-chamber for the products of combustion and air and a smoke-stack provided with a passage-way from the furnace and a valved passage to said commingling-chamber, in combination with a drying-chamber beyond said commingling-chamber, a passage between said chambers and a blower in said passage, substantially as described.

3. The construction of drying apparatus described consisting of the furnace and commingling-chamber in combination with the drying-chamber and a passage from the commingling-chamber to the drying-chamber and a blower in said passage, and a return-passage from the drying-chamber to the commingling-chamber, substantially as described.

Witness my hand to the foregoing specification this 3d day of August, 1895.

FRANKLIN D. CUMMER.

Witnesses:

H. T. FISHER,
H. E. MUDRA.