

(No Model.)

2 Sheets—Sheet 1.

W. KETCHAM.
DRY KILN FURNACE.

No. 543,531.

Patented July 30, 1895.

Fig 1

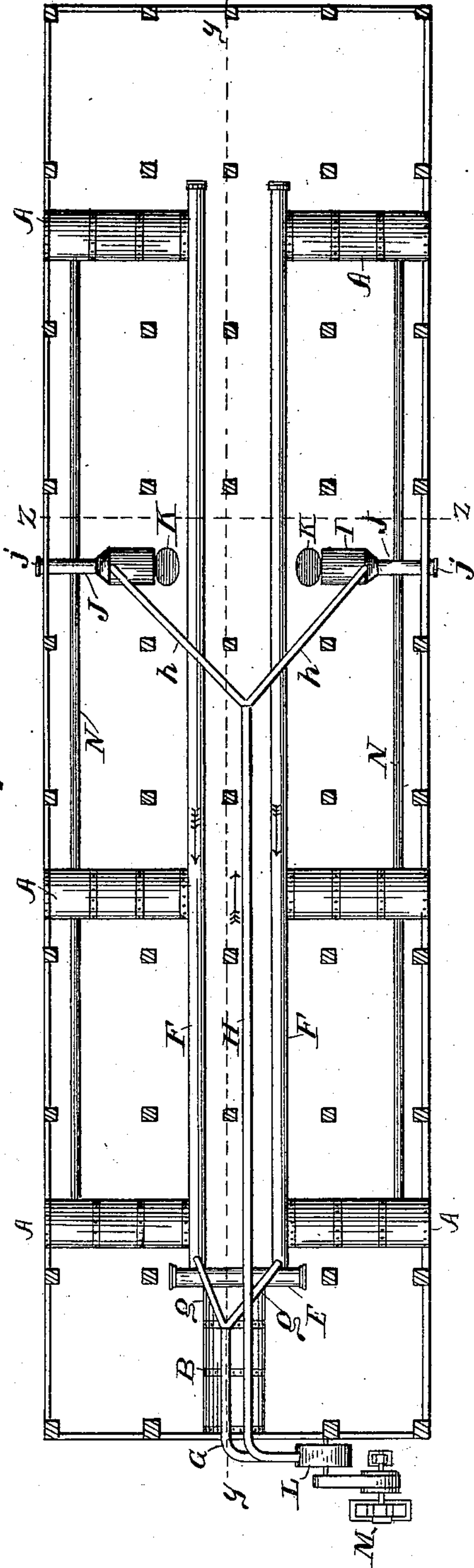
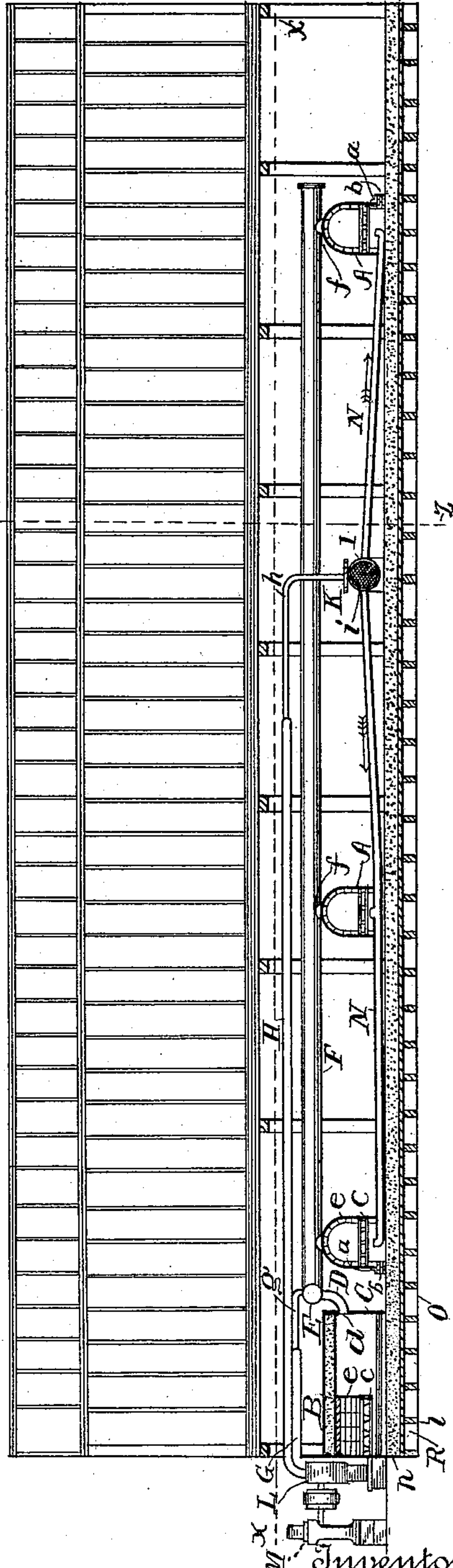


Fig 2



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his Attorney

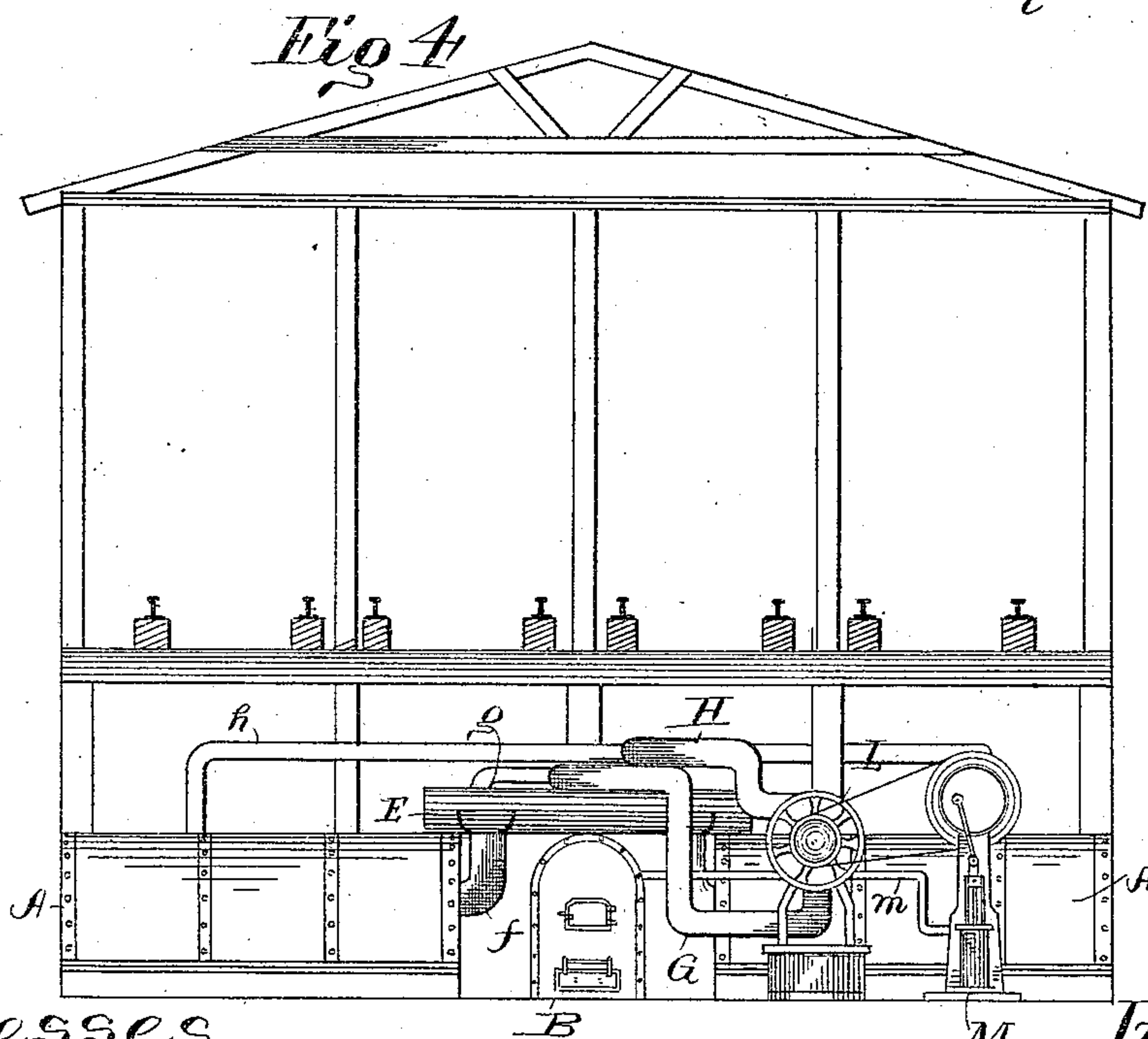
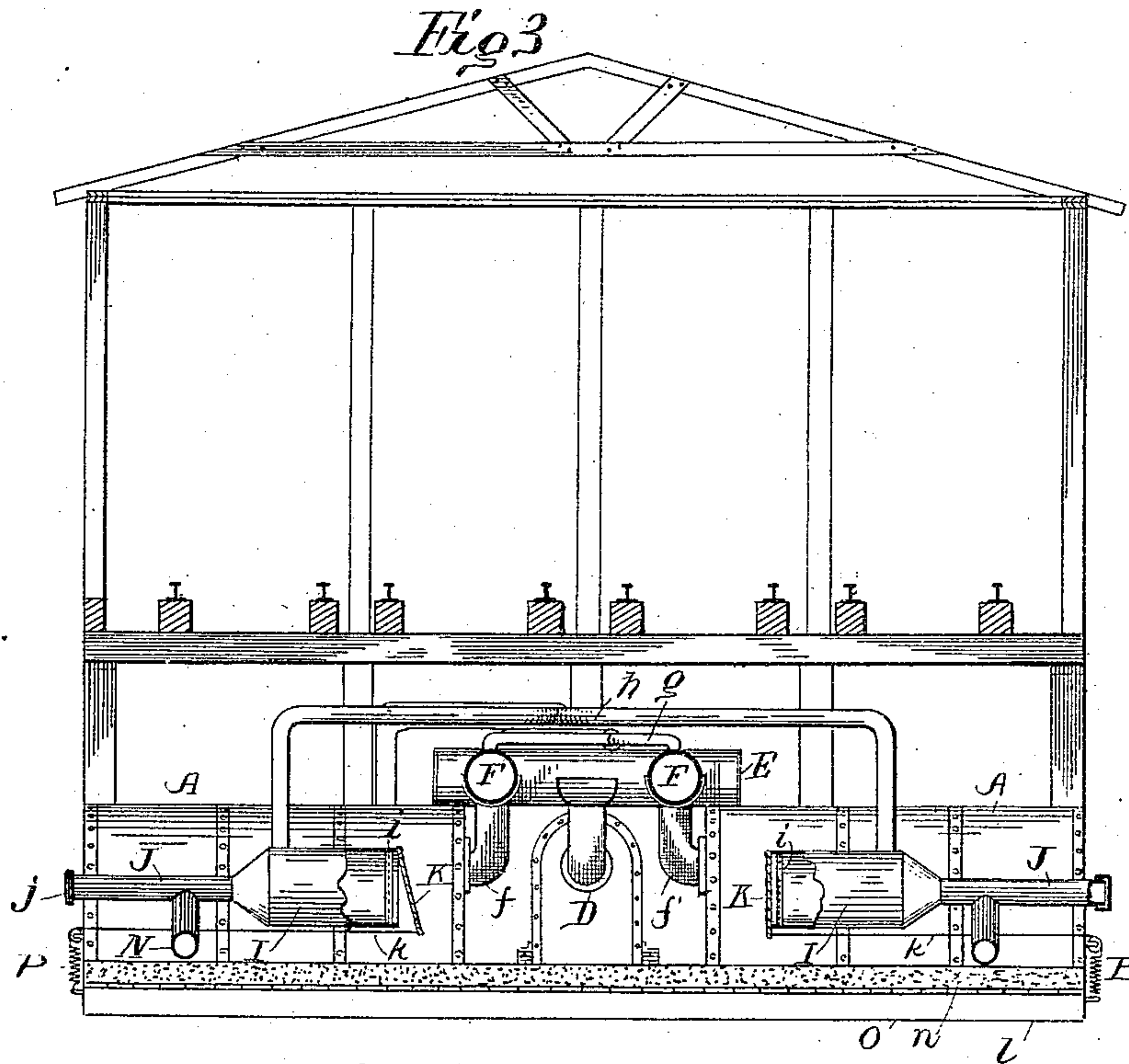
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UNITED STATES PATENT OFFICE,

WILLIAM KETCHAM, OF DALLAS, TEXAS.

DRY-KILN FURNACE.

SPECIFICATION forming part of Letters Patent No. 543,531, dated July 30, 1895.

Application filed August 1, 1891. Serial No. 401,352. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KETCHAM, a citizen of the United States, residing at Dallas, in the county of Dallas and State of Texas, have invented certain new and useful Improvements in Dry-Kiln Furnaces; and I do hereby 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, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to drying-kilns, and has for its object the improvement of the heating and hot-air circulating devices for such structures, whereby all or nearly all the heat generated is utilized, thereby effecting an economy in the use of fuel and also increasing the capacity of the kiln.

My invention consists in the several details of construction and arrangement of parts hereinafter fully set forth in the specification and particularly pointed out in the claims.

In the drawings, Figure 1 is a sectional plan of my improved kiln, taken on the line *xx* of Fig. 2. Fig. 2 is a vertical longitudinal section taken on the line *yy* of Fig. 1. Fig. 3 is a vertical transverse section with parts broken away taken on the line *zz*, Figs. 1 and 2, looking to the left. Fig. 4 is a front end view of the kiln, the covering of the frame being removed.

Similar letters of reference indicate corresponding parts on the respective figures of the drawings.

A represents a series of furnaces at the sides of the kiln, arranged in parallel rows with their rear ends facing each other, and B the furnace at the front end thereof. The furnaces A are made of single sheet or plate iron, and are preferably about eight or ten feet in length, thirty inches wide, and forty-five inches high, and have straight sides and a rounded top. I do not, however, restrict myself to these dimensions or the particular form described, as both may be varied at pleasure.

The furnaces rest on suitable brick-supports *b*, which also form the ash-pits, and to which access may be had through suitable doors in the outer ends. The furnaces are

lined with fire-brick *e* as far as the grates *c* extend.

The furnace B is made of two shells, one within the other, a space being left between them for the reception of water from which steam is generated to supply a small engine, for a purpose hereinafter specified. Otherwise the furnace B is constructed similarly to the furnaces A.

In the end C of the furnace B is formed an opening or smoke-outlet *d*, over which one end of the elbow D is bolted, its other end being connected to a cross-flue head E, which also connects the two main smoke-flues F, which extend behind and at right angles to the furnaces A. The furnaces A discharge their smoke into the flues F through the elbows *f*, which connect the furnaces to the flues.

G is a pipe connected to the flues F by the branch pipes *g*. This pipe G leads to the receiving side of a fan L, located outside the kiln. Another pipe H, which may be designated a "return-pipe," leads from the discharge side of the fan L and extends some distance into the kiln.

The end of the return-pipe H inside the kiln connects two branch pipes *h h*, leading to smoke-receiving funnels I. The outer or reduced extension J of these funnels pass through the wall of the kiln and are provided with removable caps *j* for the purpose of giving access to the interior to remove any dust and soot that may accumulate therein.

The inner and larger end of each funnel I is provided with a hinged door K, and within the end there is a wire screen *i* to retain the dirt and cinders. From the door a wire or small chain *k* leads outside the kiln and is connected to a coil-spring P, one end of which is attached to a fixed part of the kiln. The tendency of this spring is to keep the door of the funnel closed. Its tension, however, may be so adjusted by any suitable and well-known means as to enable the door K of the funnel to be opened a short space by the internal pressure of heat and smoke to admit the desired quantity into the kiln.

The small or reduced extensions J of the funnels on the inner side of the kiln have smoke-pipes N communicating therewith that

extend under the grates of the furnaces A, which receive from the funnels the unconsumed smoke and return it into the furnaces.

M represents a small engine which receives its steam through a pipe *m* from the boiler around the furnace B, as before described, and this engine drives the fan L by suitable belt connections or otherwise.

The floor O of the kiln is constructed in the following manner: A series of sleepers *l* are laid on the ground, and on these sleepers a board covering R, and on this covering about six inches of loose dirt *n* is placed. This floor will cool and condense the vapors in the kiln and absorb all falling moisture, and is a very essential element to the successful operation of my kiln, should the kiln be located where the natural soil is of such a character as not to readily absorb moisture.

In operating my system of heating, a fire is first made in the furnace B, and when sufficient steam is generated to run the engine the revolutions of the fan L create a draft from the furnaces A, and these furnaces are then fired up and closed.

The smoke from the furnaces A is drawn into the flues F, and that from the furnaces B into the cross-flue E, and thence through the pipe G into the fan L, and then thrown back by the fan through the pipe H to the funnels I, and on to the furnaces A. During its passage through the flues F and pipes G and H, the smoke will radiate much of its heat into the kiln. When the smoke reaches the funnels I, the pressure will have a tendency to open the funnel-doors K, and the extent of this opening will be regulated by the tension of the springs P. The doors being opened, much or little, as the case may be, a certain amount of the smoke will pass through the wire screen *i*, which will cleanse it of dust and soot, past the door K into the kiln, for the purpose desired. The balance of the smoke will be forced through the pipes N to the ash-pit of the furnaces A and thence to the burning fuel, where it will be consumed.

I propose to keep the furnaces A closed tight except when necessary to renew the fuel or remove the ashes, and will supply air to the furnace B only. The fan will draw a sufficient amount of oxygen through the furnace B and force it, with the smoke, to the furnaces A, in order to maintain combustion. The advantages of this arrangement are as follows: All or nearly all of the available heat generated by the combustion of the fuel is radiated into the kiln either from the furnaces direct or from the flues and pipes through which the smoke circulates. There is no circulation of heat in the kiln, but, on the contrary, a still, dead, uniform heat, which draws the moisture from the center of the stick and converts it into steam which dries the lumber, but at the same time effectually prevents baking and checking the lumber, and leaves it with its full strength.

Having thus fully described my invention,

what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a dry kiln the combination with a series of furnaces normally closed to the admission of atmospheric air, and a furnace open for the admission of atmospheric air, of a flue head, smoke flues leading from all of said furnaces to said flue head, and means for returning to the furnaces normally closed to atmospheric air the smoke from all the furnaces and the unconsumed air which passes through the furnace open to atmospheric air, substantially as and for the purpose specified.

2. In a dry kiln the combination with a series of furnaces normally closed to the admission of atmospheric air, smoke flues leading from said furnaces and a flue head common to all of said smoke flues, of a furnace open for the admission of atmospheric air, a flue leading therefrom to the flue head, a fan having its receiving end connected with the flue head, a return pipe leading from the discharge end of the fan, and a series of branch pipes leading from the return pipe to the series of furnaces normally closed to atmospheric air, whereby the latter are supplied with the unconsumed products of combustion including the unconsumed air which passes through the furnace open to the atmosphere, substantially as and for the purpose specified.

3. In a dry kiln, the combination with a series of furnaces normally closed to the admission of atmospheric air, and a furnace open for the admission of atmospheric air, of a flue head, smoke flues leading from all of said furnaces to the flue head, a blower and return pipes connecting the flue head and the series of furnaces normally closed to atmospheric air, whereby the smoke from all the furnaces and the unconsumed air passing through the furnace open to the atmosphere are forced from the flue head through the return pipes, and a device interposed in the return pipes between the flue head and the furnaces to permit the escape of a portion of the unconsumed products of combustion into the kiln, substantially as and for the purpose specified.

4. In a dry kiln the combination with a series of furnaces having smoke circulating flues, a fan and return pipe communicating with the furnaces, of receptacles interposed in the return pipe, said receptacles having doors opening into the kiln and adjustable spring connections between said doors and a fixed part of the kiln whereby the tension of the springs is regulated to keep the doors closed, or partially opened by the internal pressure of heat and smoke, as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM KETCHAM.

Witnesses:

S. G. MUNN,

CHAS. S. BARRY.