

No. 617,959.

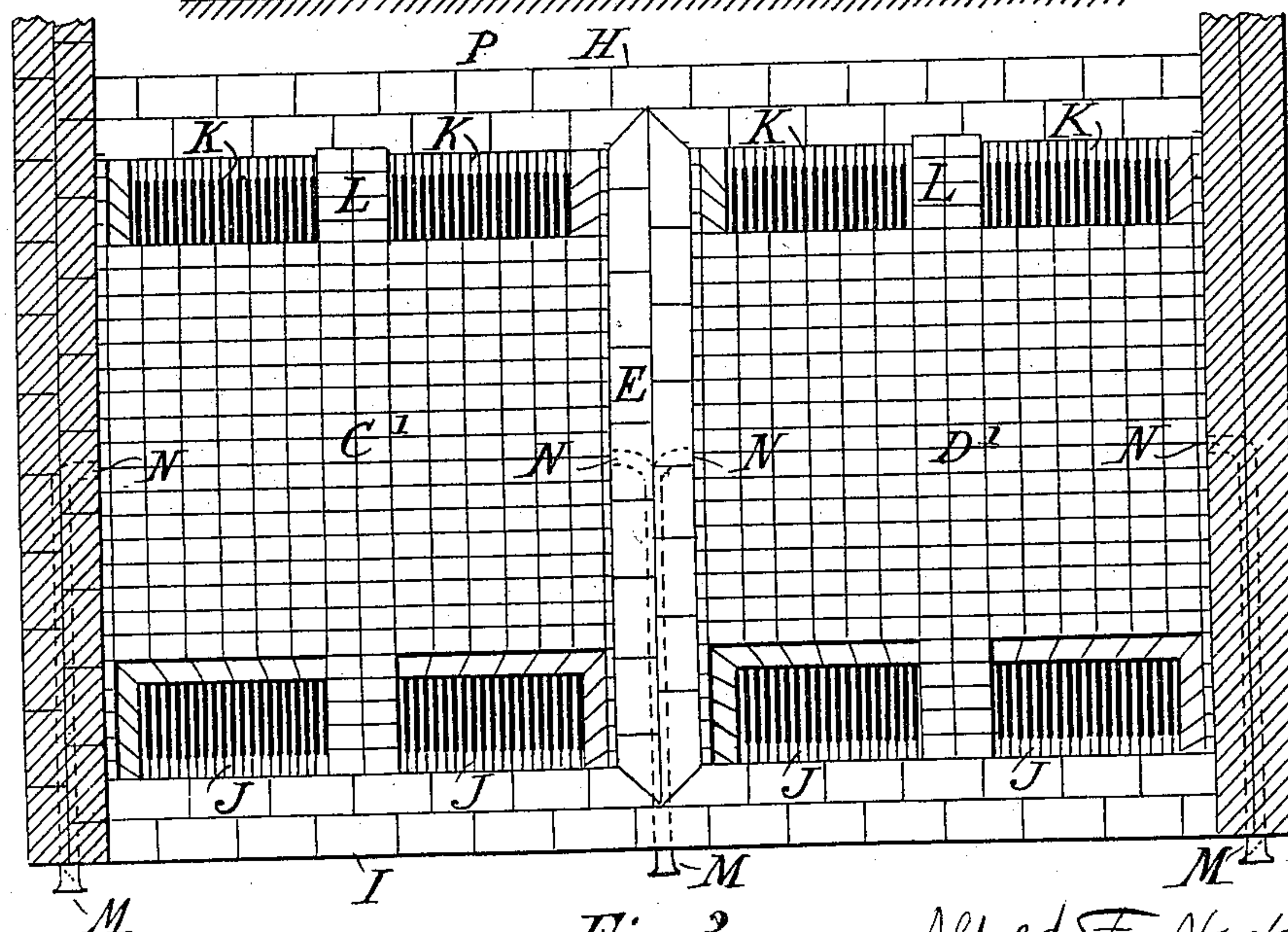
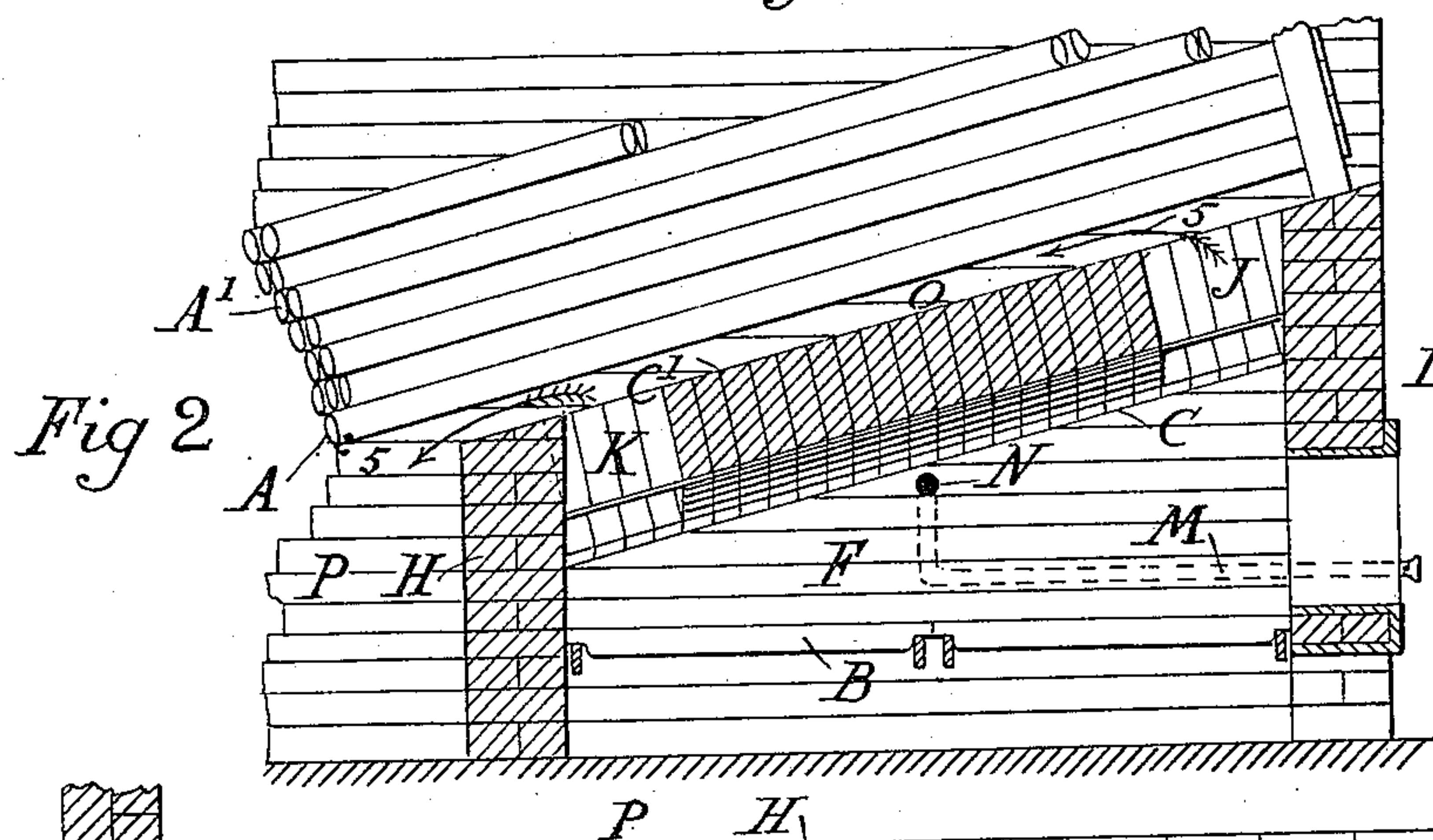
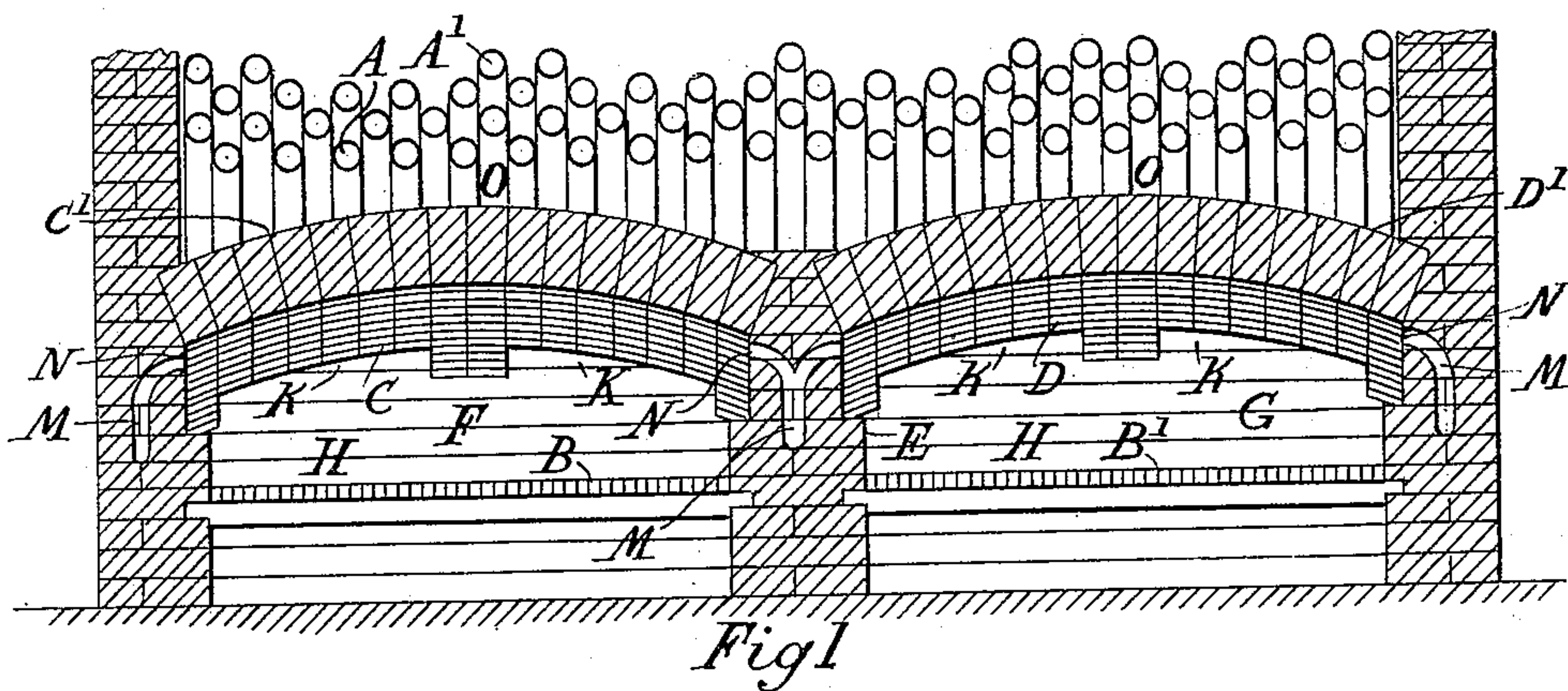
Patented Jan. 17, 1899.

A. F. HACK.

FIRE BOX FOR WATER TUBE BOILERS.

(Application filed Oct. 20, 1898.)

(No Model.)



Witnesses:

J. Stephen Kinsten
J. A. Pateman.

E. A. Pateman.

Fig 3

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UNITED STATES PATENT OFFICE.

ALFRED F. HACK, OF MELBOURNE, VICTORIA.

FIRE-BOX FOR WATER-TUBE BOILERS.

SPECIFICATION forming part of Letters Patent No. 617,959, dated January 17, 1899.

Application filed October 20, 1898. Serial No. 694,151. (No model.)

To all whom it may concern:

Be it known that I, ALFRED F. HACK, a subject of the Queen of the United Kingdom of Great Britain and Ireland, residing at Melbourne, in the Colony of Victoria, have invented certain new and useful Improvements in the Construction of Fire-Boxes for Water-Tube Boilers; 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.

The object of this invention is to provide improved means of promoting the combustion of fuel in fire-boxes, particularly those of water-tube boilers of the Babcock and Wilcox type, though the invention is applicable also to other steam-generators.

The invention consists in the arrangement and details of construction within such fire-boxes of certain arches, bridges, and flues, as hereinafter explained. The effect of this special construction is to divide the fire-box into certain chambers and to advantageously divide, concentrate, and direct the flames.

The fire-box is divided into two distinct but similar chambers immediately above the fire-grate by arches, the arches being so located that the arch backs or surfaces leave a narrow but clear space or chamber just underneath the lowest tubes of the water-tube boiler. This space I speak of as a "third" chamber. The arches extend rearwardly and parallel to the tubes (in side elevation) to a bridge or wall at the inner end of the fire-grate. The flames after entering the third chamber will dip on the other side of the said bridge into what may be termed a "fourth" and enlarged chamber or area of combustion. The bridges have large transverse openings entirely through their front and back ends for the passage of heat, flame, and gases, and there are flues (fitted with dampers) leading from the outside of the fire-box into the lower chambers in such position as to deliver air therein over the fuel. These flues are of special utility in combination with the other parts of the construction.

Referring now to the accompanying drawings, which illustrate this invention as applied to a water-tube boiler of the Babcock and Wilcox type, Figure 1 is a vertical transverse section. Fig. 2 is a side sectional elevation,

and Fig. 3 is a plan view from beneath the tubes of the boiler.

In the figures the same letters of reference denote like parts.

A shows the lowest row of water-tubes of the boiler, A' the tubes above said row, and B B' the fire-grate. Between these tubes and the grate there is usually no division; but by my invention divisions are made by means of arches C and D springing from side supports and central wall E, or one arch with its crown at the top of said wall E. The backs C' D' of the arches are close to the lower tubes A. The best distance to adopt depends upon the dimensions of the water-tube boiler and its fire-box; but where the transverse width from side to side of the tubes is eight feet and the tubes are comparatively close to the grate, as in the drawings, the distance in question may be about five inches. With such a distance the flames and heat passing through the arches from below are so directed as to effectively heat the tubes A and A' and also partly to take a course indicated by one of the arrows marked 5 in Fig. 2—i. e., dipping from the aforesaid third chamber (marked O) into the aforesaid fourth chamber (marked P) over the bridge H, which is intermediate between the front end of the furnace and the rear end I, the said bridge extending transversely completely across the furnace. By means of the arches there are produced two chambers F and G immediately over the fire-grate, each of course supplied with a door for the admission of fuel, &c., and the wall E serves to prevent cold draft entering one of these chambers when the door of the other is opened.

J J are pairs of rearward apertures, and K K pairs of forward transversely-extending apertures, through the arches C D. The divisions L between these apertures may, if desired, be omitted. M are flues from the atmosphere into the fire-box to a plurality of points N within the fire-boxes close beneath the arches C and D—that is to say, well above the fuel, which will rest upon the fire-bars B. There is shown one inlet N into each side of each chamber F G from the flues M; but in practice I shall usually provide a plurality of inlets, so as to deliver air not only under the middle of the said arches, but also at a short

distance from the edge of the apertures J, as well as at a short distance from the edge of the apertures K. Each flue M is controlled by a damper. (Not shown.) The apertures
5 N by delivering air as described at points where the heat will be intense supply an important gaseous fuel and help to produce also a powerful draft of flame and gases upward through the respective apertures J J K K.

10 What I claim is—

1. In the fire-box of a water-tube boiler, arches having apertures at either end, a bridge-wall, and the water-tubes arranged a short distance above the said arches, substan-
15 tially as described.

2. In the fire-box of a water-tube boiler, arches having apertures at either end, a dividing-wall between the said arches, a bridge-wall, and the water-tubes arranged a short
20 distance above the said arches, substantially as described.

3. In the fire-box of a water-tube boiler, the combination with arches having apertures at either end, a bridge-wall, and the water-tubes arranged a short distance above the said
25 arches; of air-flues opening into the chambers beneath the said arches, substantially as described.

4. In the fire-box of a water-tube boiler, the combination with arches having apertures at
30 either end, a bridge-wall, and the water-tubes arranged a short distance above the said arches; of air-flues opening into the chambers beneath the said arches, and dampers for controlling the flow of air through the said flues,
35 substantially as described.

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

ALFRED F. HACK.

Witnesses:

W. H. DAWSON,
C. H. BARBER.