

(No Model.)

F. C. ROBERTS.  
HOT BLAST STOVE.

No. 511,253.

Patented Dec. 19, 1893.

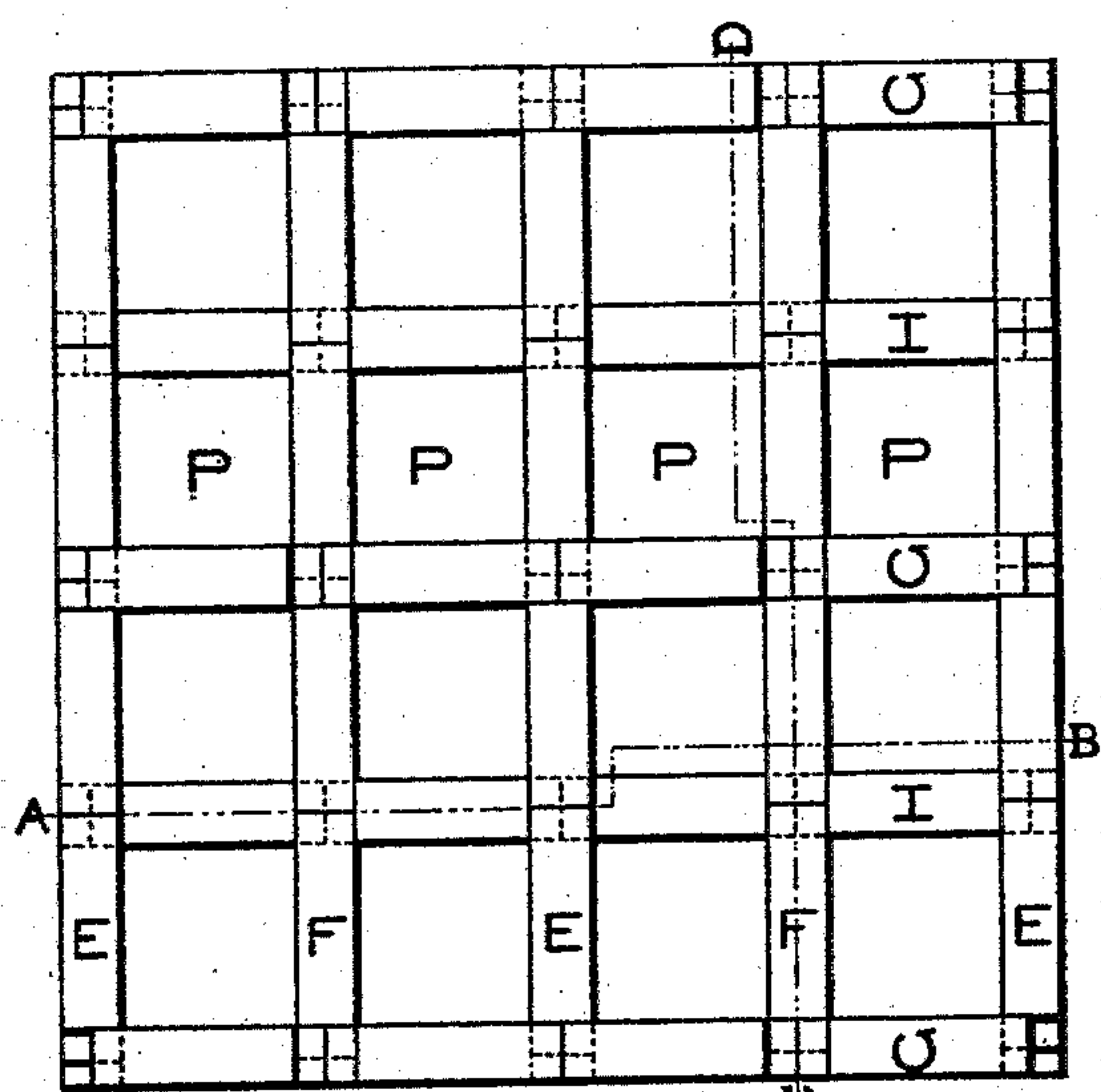


FIG. 1  
PLAN

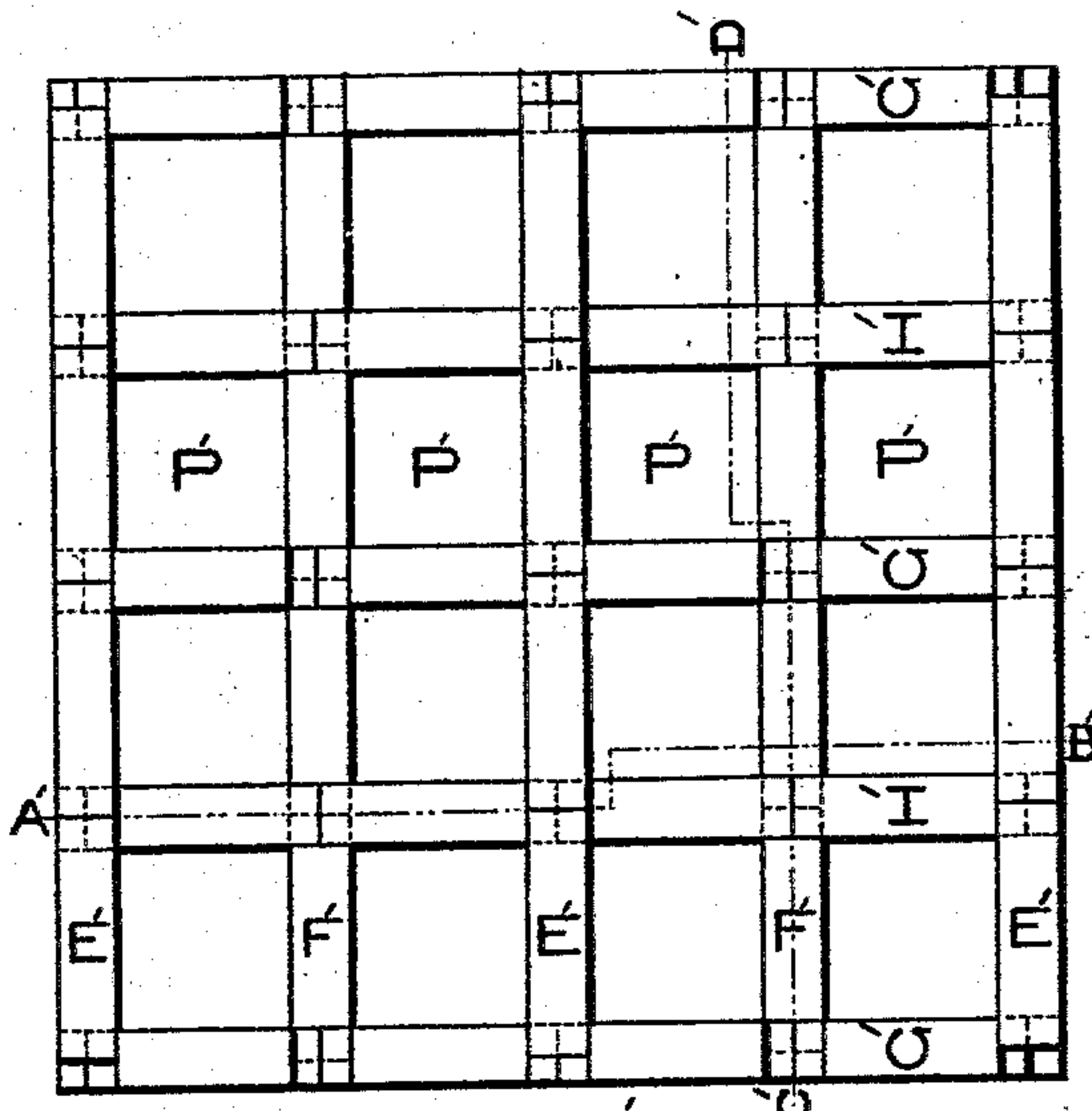


FIG. 1'  
PLAN

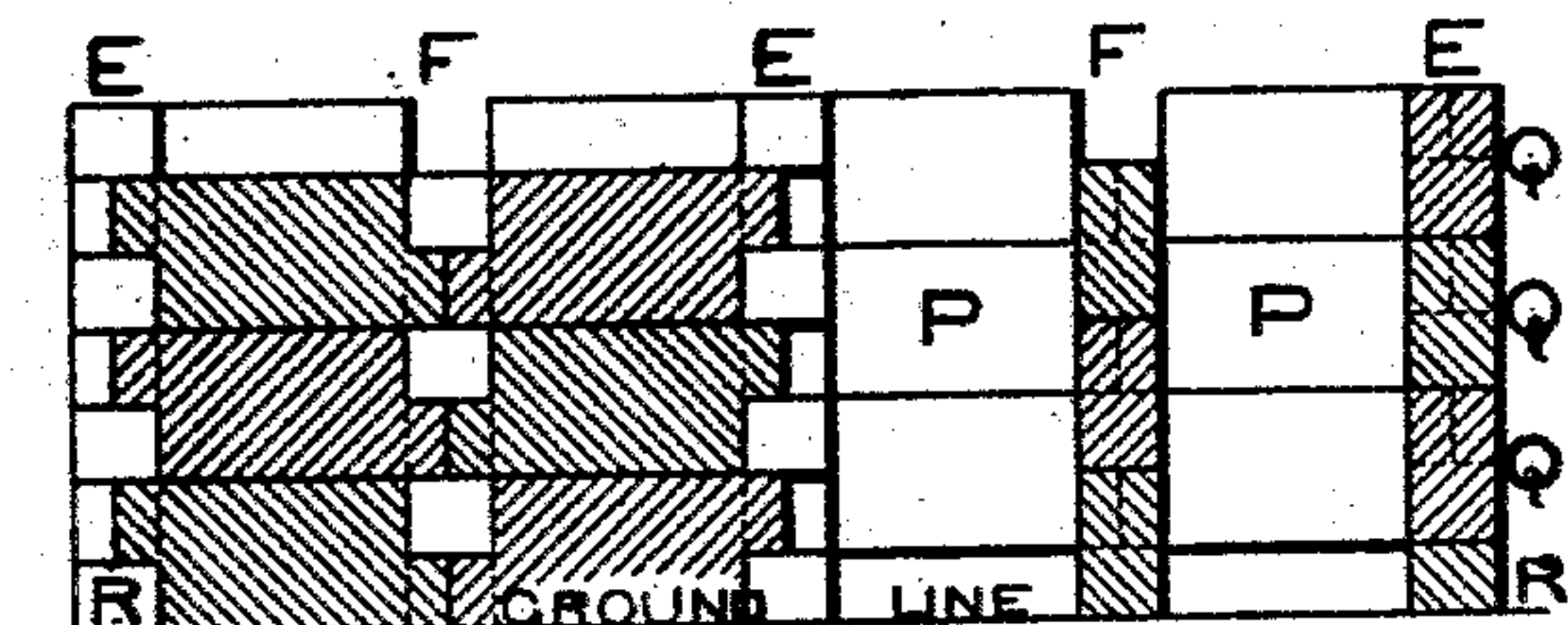


FIG. 2  
SECTION A-B

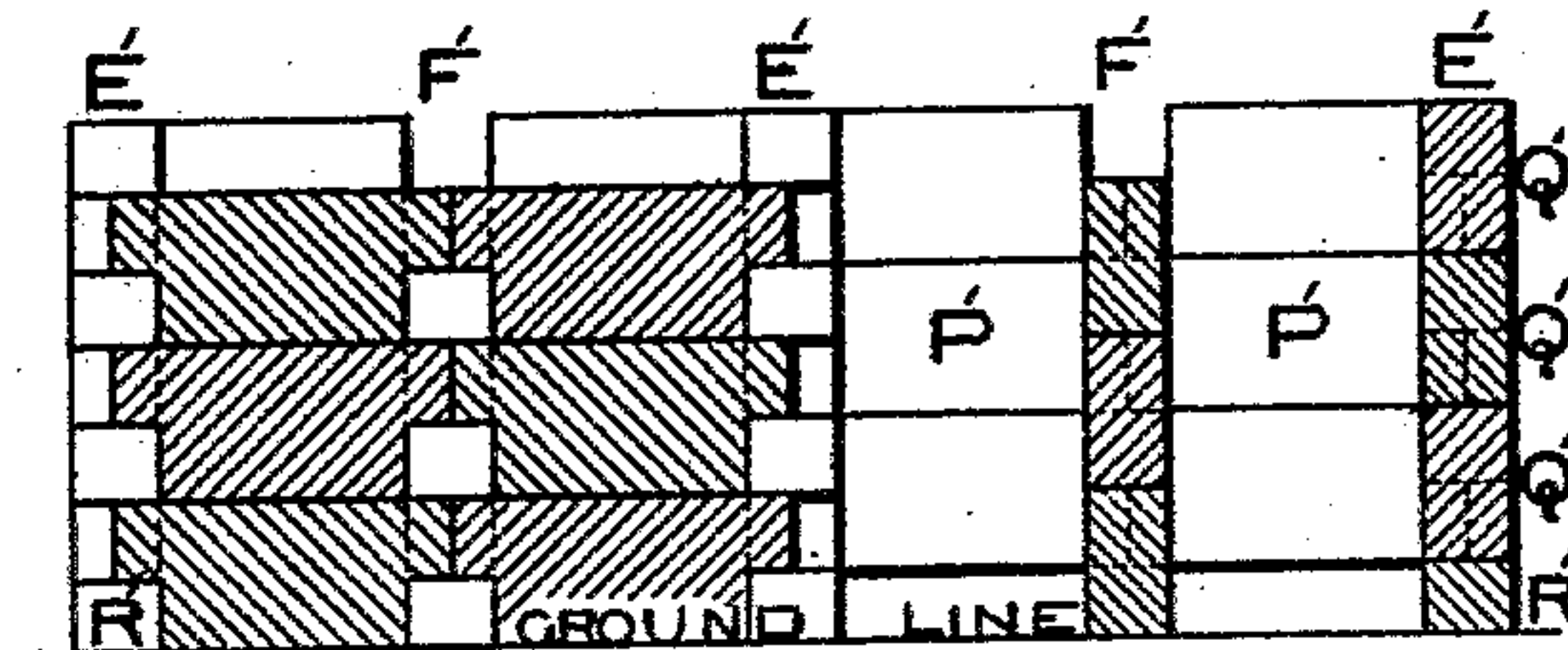


FIG. 2'  
SECTION A-B

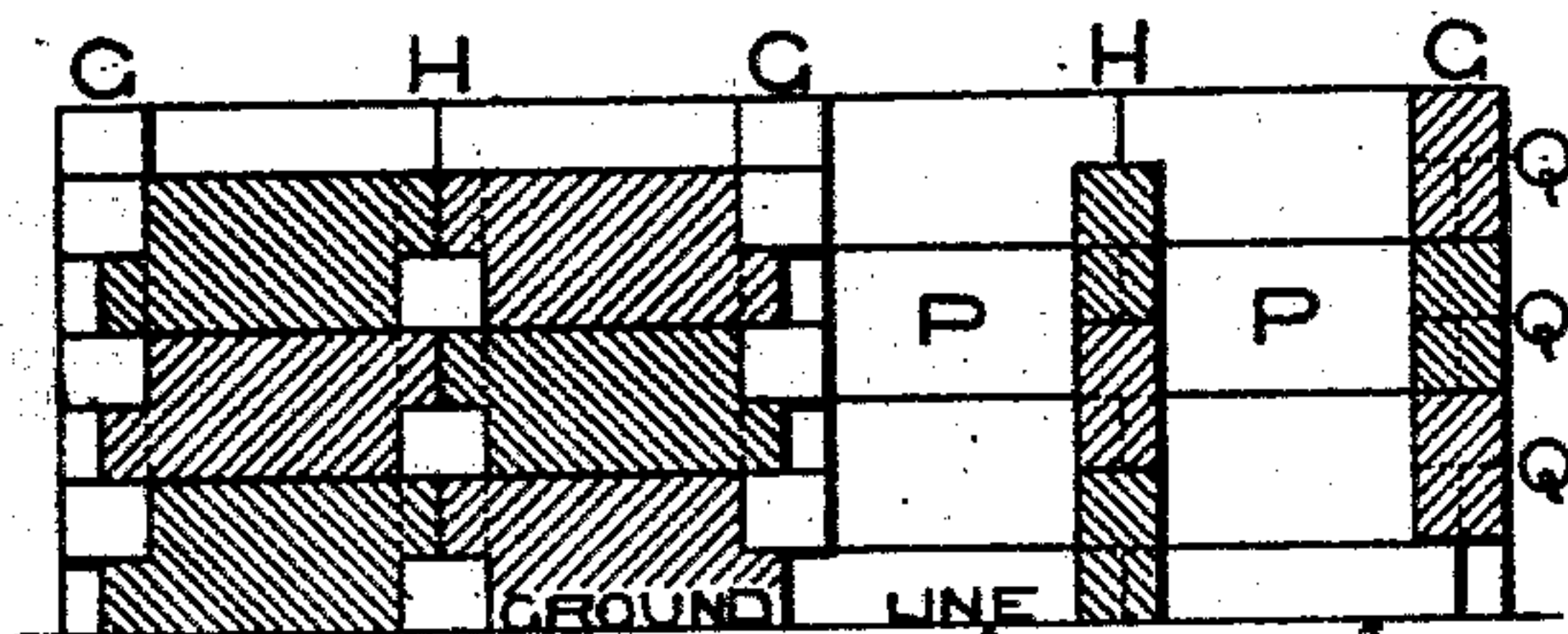


FIG. 3.  
SECTION C-D

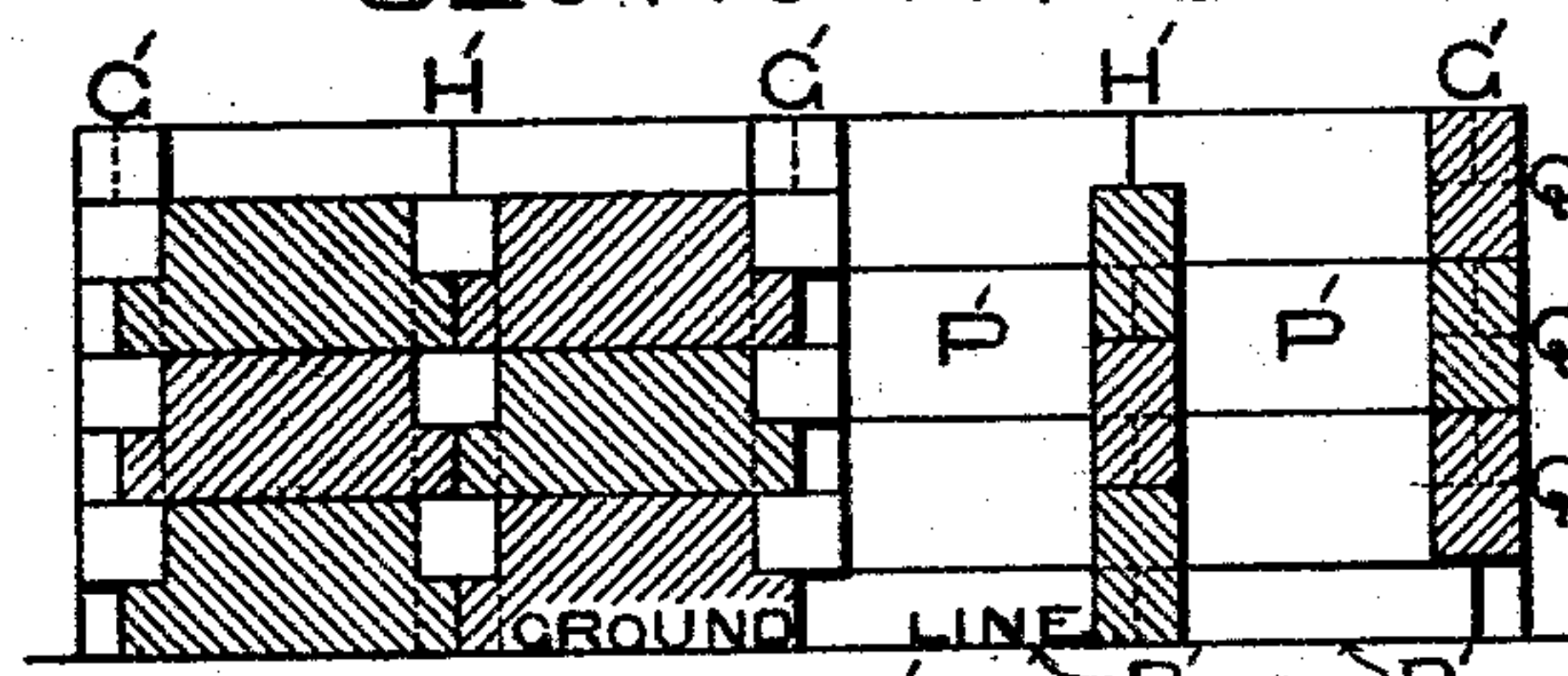


FIG. 3'  
SECTION C-D

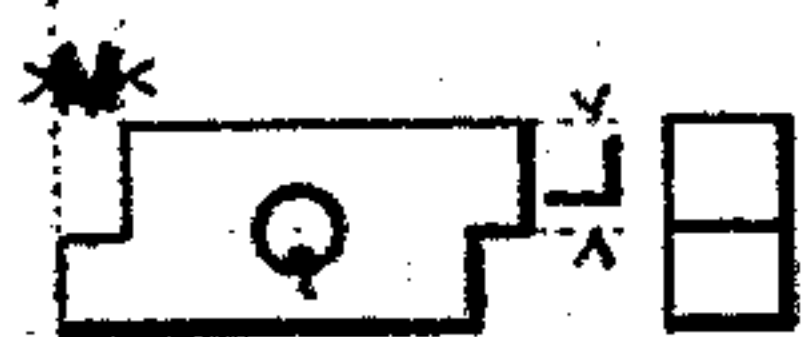


FIG. 4

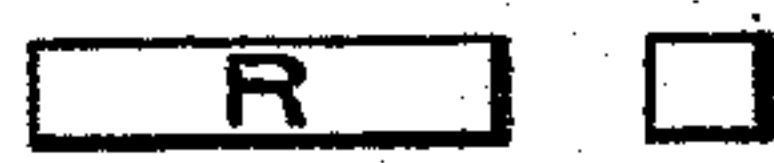


FIG. 5

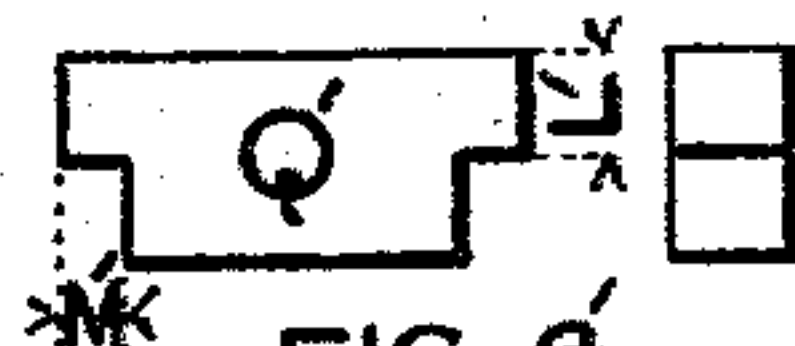


FIG. 4'

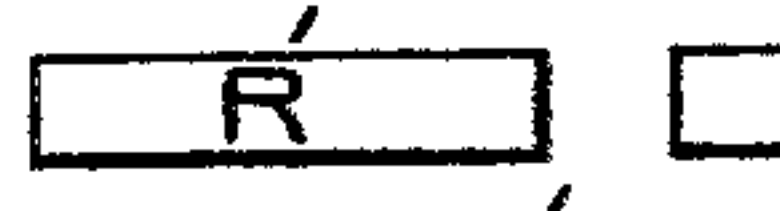


FIG. 5'

WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## HOT-BLAST STOVE.

SPECIFICATION forming part of Letters Patent No. 511,253, dated December 19, 1893.

Application filed September 8, 1893. Serial No. 485,106. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK C. ROBERTS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Fire-Brick Hot-Blast Stoves for Heating Air, Steam, or other Gases, which improvement is fully set forth in the following specification, taken in connection with the accompanying drawings.

My invention relates to hot blast stoves of the character used in heating the air for blast furnaces and in which fire brick surfaces are arranged to act as regenerators for absorbing and giving off heat. These regenerators are built with fire bricks so laid as to form a series of vertical flues through which the highly heated gases are drawn by the chimney draft; the heat of the gases is, in this process, partly absorbed by the brickwork. When the brickwork has become highly heated, the necessary valves are operated whereby the flow of gases is discontinued and air or other medium forced through the flues composing the regenerator; in this manner the heat absorbed by the brickwork in the first described process is given off to, or absorbed by, the air in the second described process.

Manifestly the above described processes submit the brickwork to alternate heating and cooling, and consequently to alternate expansion and contraction. Further, it is well known that the heated gases in their passage through the regenerators necessarily carry a considerable quantity of dirt, which if allowed to accumulate in the flues impairs the heating capacity of the regenerators by reducing the amount of brick surface brought into contact with the heated gases. As a result, it is essential that the brickwork of the regenerators be constructed in as solid and permanent form as possible in order that the flues shall maintain their original shape and thus prevent the formation of projecting surfaces upon which the dirt contained in the gases would be deposited and the heating capacity of the stove thus impaired.

The object of my invention is therefore to provide a regenerator composed of bricks which when laid together as hereinafter described, form a structure which will allow the necessary expansion and contraction to take

place without materially affecting the original shape and alignment of the flues. I attain this object by the designs and arrangements of brickwork illustrated in the accompanying drawings in which—

Figure 1 is a plan of a portion of a regenerator; Figs. 2 and 3, sections through the regenerator on the planes indicated; Figs. 4 and 5 details showing the shapes of the brick used in building the regenerator shown in Figs. 1, 2 and 3. Fig. 1' is a plan of a portion of a regenerator built with a different type of brick from that shown in Fig. 4; Figs. 2' and 3', sections through this regenerator on the planes indicated; Figs. 4' and 5' details showing the shapes of the brick used in building the regenerator shown in Figs. 1', 2' and 3'.

Similar letters refer to similar parts throughout the several views and the two modes of construction.

The regenerator flues P are formed by the intersection of two series of parallel walls, the one series of parallel walls, E F E F E being normal to the other series of parallel walls G H G H G, (Fig. 1.)

In order that the regenerator may meet the specified requirements it is essential that the two following conditions of construction be fulfilled: First, that the individual brick be held rigidly in their original relative positions; second, that all the horizontal layers of brick be held rigidly in their original relative positions. These conditions are satisfied as follows:

First. The shape of the individual brick Q is shown in Fig. 4. As shown, the two ends of the brick Q are provided with equal offsets or projections. These offsets extend entirely across the least dimension of the brick and in the direction L (see Fig. 4) are equal to one-half or less than one-half the depth of the brick, and in the direction M (see Fig. 4) are equal to one-half or less than one-half the least dimension or thickness of the brick. One method of laying the brick Q is indicated in Figs. 1, 2, and 3, where it is evident that the projections and recesses formed by offsets constitute when the bricks are laid together as indicated, a locked system whereby each brick Q is held securely and rigidly at its end and the distortion of the flues by



the movement of individual brick is prevented.

Second. The series of parallel walls E F E F E and the series of parallel walls G H G H G (Fig. 1) are constructed with the brick Q and additional brick R. The section A. B. as indicated is taken partly through wall H and partly through two regenerator flues P and the walls F and E. The walls E E E are built by starting from the ground line (see Fig. 2) with brick R (Figs. 2, 3, and 5) which brick are made half the depth of the brick Q; the brick Q are then laid upon the brick R in the indicated manner thus raising the first layer of Q brick one-half course above the ground line. The walls F F are started from the ground line with Q brick. Section C D (Fig. 3) is taken partly through wall F, two flues P and walls H and G. In this case the walls G G G are started one-half course above the ground line by supporting the projection or offset of the lowest brick Q in walls G upon the offset of the lowest brick Q in walls F. In the above construction the horizontal joints in walls E and G occur on one level and the joints in walls H and F on a level one-half course above the former. Another disposition of joints may be secured by starting the walls G (section C D) from the ground line with Q brick, and by starting the walls H (section C D) from the ground line with R brick.

The construction above described causes the horizontal joints between the brick Q in each alternate parallel wall of each series to occur one-half course or depth of brick below or above the horizontal joints in the adjacent parallel walls of the same series, and as a consequence all horizontal layers of brick are held rigidly in their original relative positions.

Figs. 1', 2', and 3' show the form and construction of a regenerator which may be built with the bricks shown in Figs. 4' and 5'. The same letters are used to refer to similar parts throughout this construction as in the construction above described.

The principles governing the system shown in Figs. 1', 2', 3', 4' and 5' are identical with those governing the system shown in Figs. 1, 2, 3, 4 and 5, and the reference letters being the same in both cases, the description of the latter system as given is applicable to the system of construction shown in Figs. 1', 2', 3',

4' and 5', excepting only that the Q brick in each alternate parallel wall of each series are reversed (turned upside down) with reference to the position of the Q brick in the adjacent parallel walls of the same series.

The term "ground line" is used in order to simplify the description; in practice the regenerations rest upon lintels, arches or other suitable supports whereby free access is afforded to flues P.

I do not limit the application of the brick Q shown in Figs. 4 and 4' to the methods of constructing the regenerator herein described; it is possible to employ other systems of construction with these brick.

I do not limit the application of one of the bricks shown in Figs. 4 and 4', in the construction of a regenerator to the exclusion of the other; both shapes may be employed in the same regenerator.

I do not limit the application of the brick shown in Figs. 4 and 4' to use in connection with the brick R Figs. 5 and 5'; a regenerator may be built without the use of the brick R.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In the construction of hot blast stove regenerators the formation of the flue structure by the intersection of two series of parallel walls, one series being normal to the other, said walls being built with bricks so laid that the horizontal joints between the bricks in each alternate parallel wall of each series shall occur one-half course or depth of brick above or below the horizontal joints in the adjacent parallel walls of the same series.

2. In a hot blast stove regenerator a flue structure composed of bricks having their upper and lower surfaces parallel and provided with an offset or projection in each of their two ends extending across the breadth of the brick and which offsets in their vertical direction are equal to one-half or less than one-half the depth of the brick, and which offsets in their horizontal direction are equal to one-half or less than one-half the breadth of the brick.

FRANK C. ROBERTS.

Witnesses:

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W. M. SHANNON.