

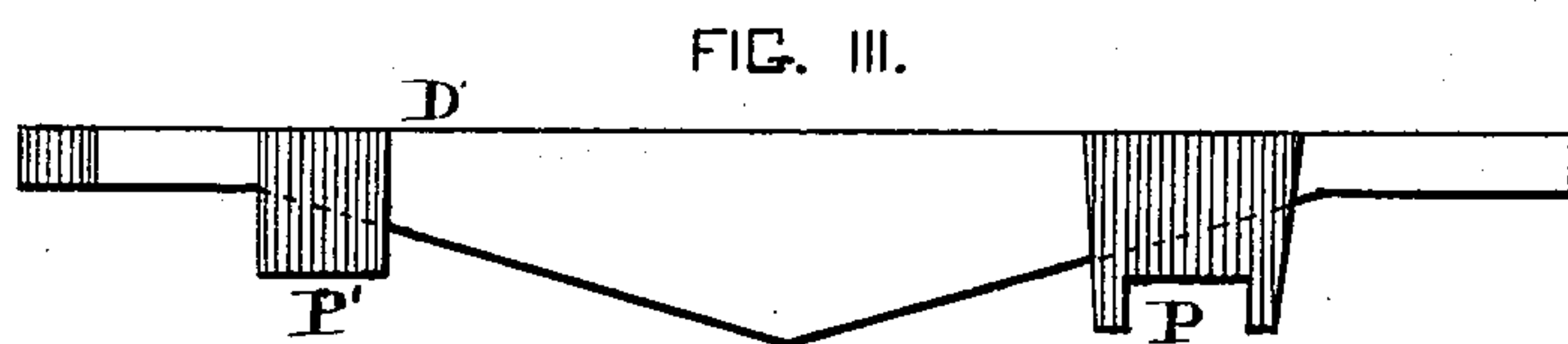
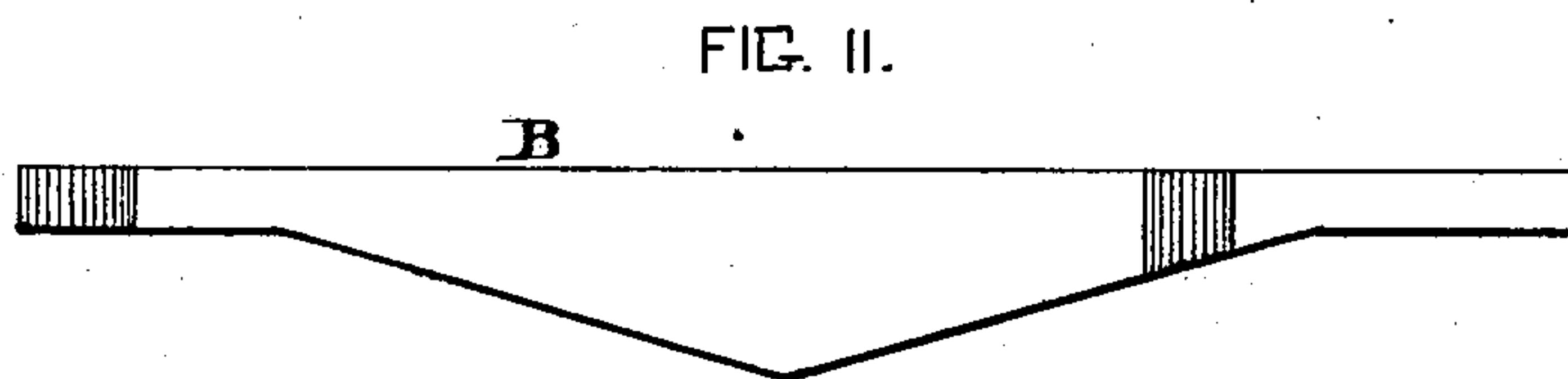
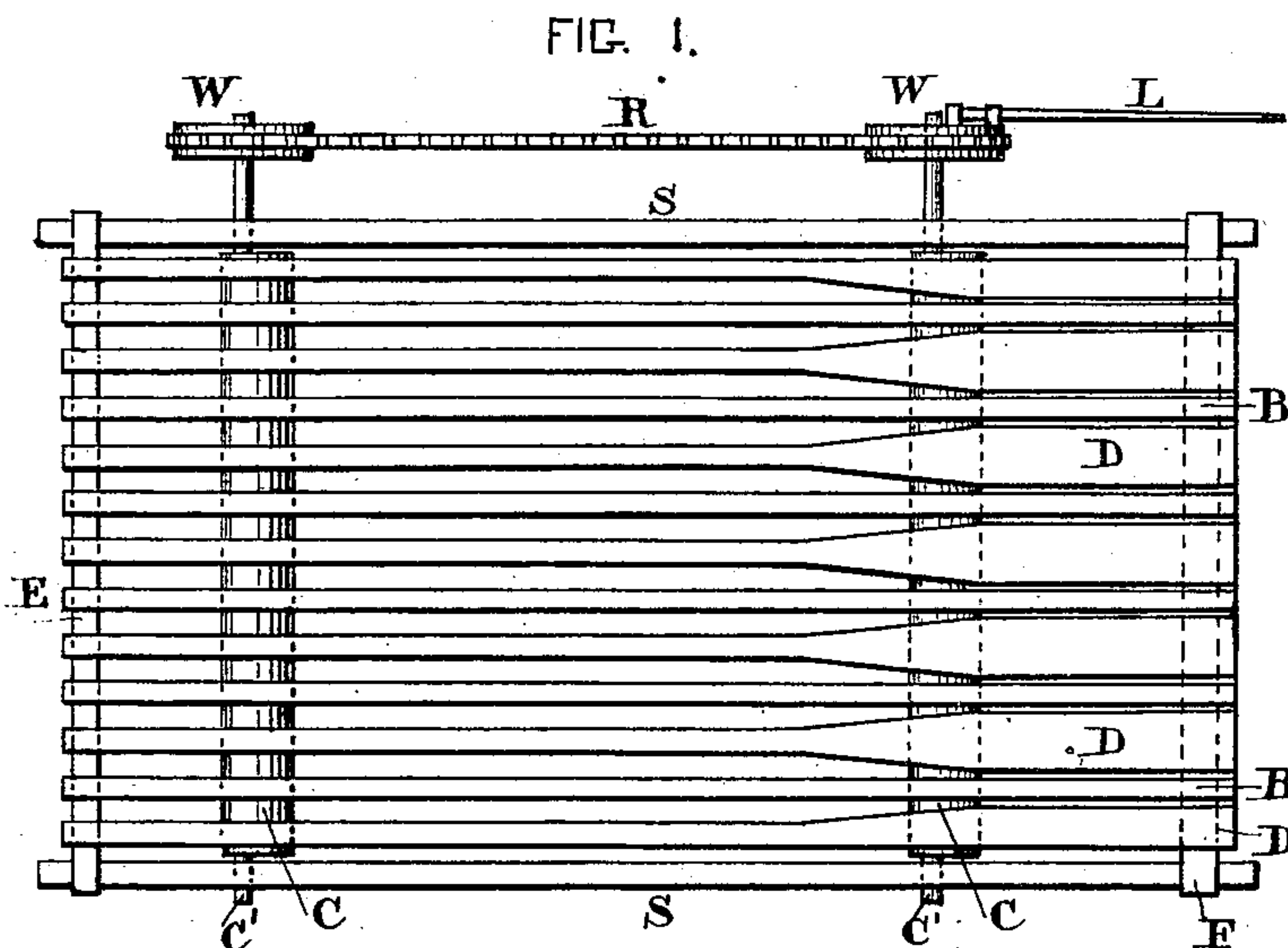
(No Model.)

2 Sheets—Sheet 1.

H. M. PIERCE.
Grate.

No. 243,300.

Patented June 21, 1881.



WITNESSES:

Alex. Scott
W. Hendley

INVENTOR:

Henry M. Pierce
by F. W. Ritter Jr
att'y.

(No Model.)

2 Sheets—Sheet 2.

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FIG. VI.

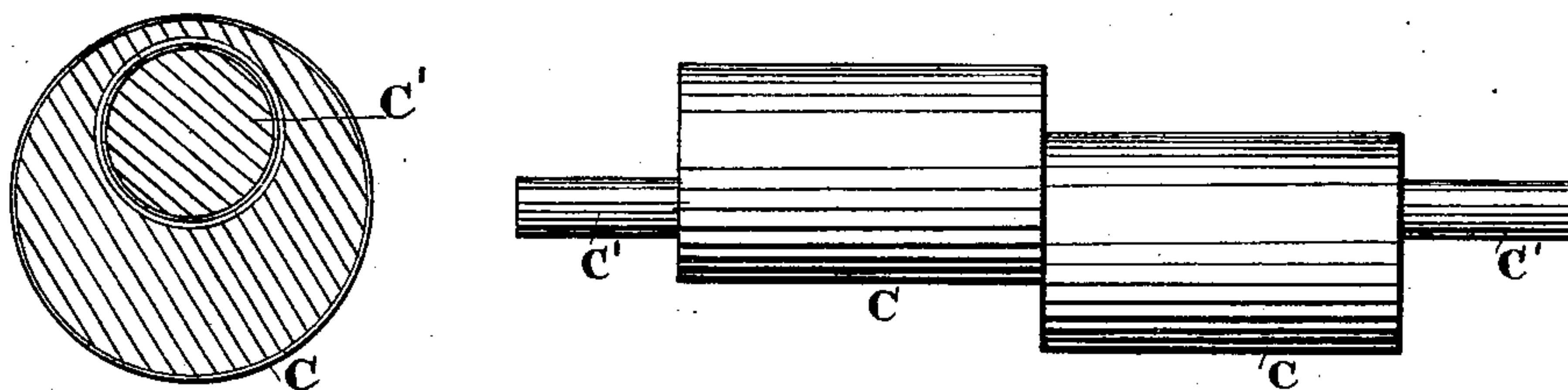


FIG. V.

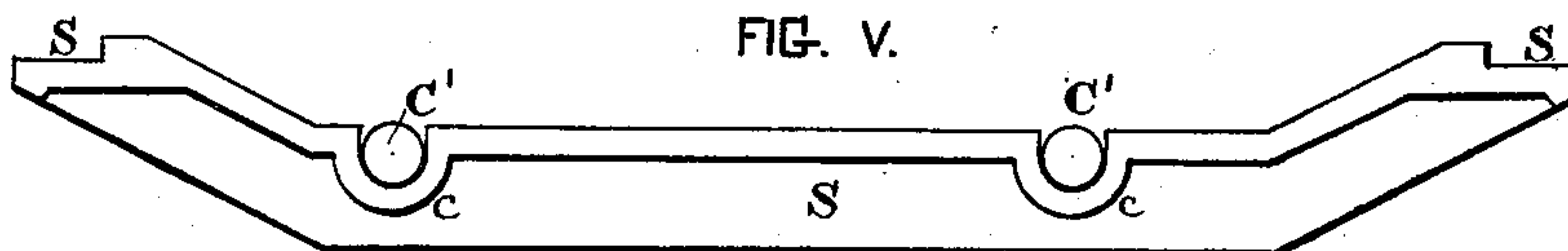
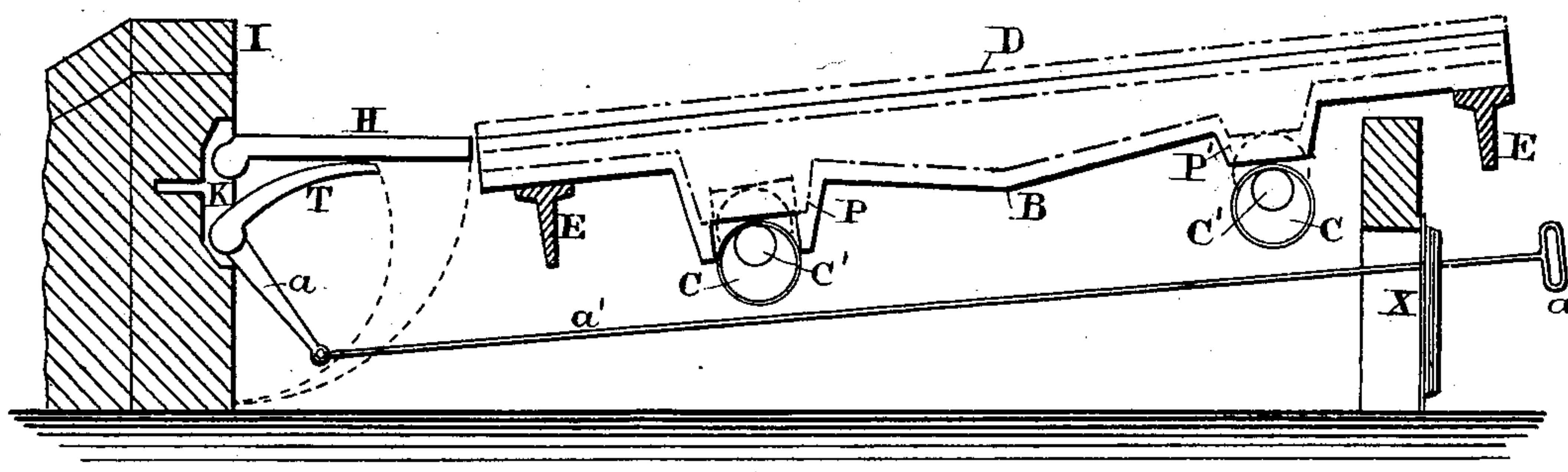


FIG. IV.



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UNITED STATES PATENT OFFICE.

HENRY M. PIERCE, OF GRAND RAPIDS, MICHIGAN.

GRATE.

SPECIFICATION forming part of Letters Patent No. 243,300, dated June 21, 1881.

Application filed June 9, 1880. (No model.)

To all whom it may concern:

Be it known that I, HENRY MILLER PIERCE, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Grates; 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 ap-
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pertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification. In the drawings, Figure I is a plan view of a grate embodying my invention. Fig. II is a side elevation of one of the stationary or fixed bars. Fig. III is a like view of one of the movable bars. Fig. IV is a sectional view of the grate as set for use. Fig. V is an elevation of one of the side bars of the grate-frame. Fig. VI is an elevation and sectional view of the eccentrics for operating the movable bars.

Like letters refer to like parts wherever they occur.

My invention relates to that class of grates wherein a rising-and-falling motion is given to the bars by means of eccentrics; and has for its object, first, such a construction of the parts as will give to the movable bars when operated an upward, forward, downward, and backward motion, so as to cause the fuel to move from before backward, whereby it is spread evenly over the surface of the grate and finally delivered upon a dumping-grate, whence the expended fuel, clinkers, &c., can be discharged; and, secondly, in details of construction and specific combinations, hereinafter more fully set forth.

I will now proceed to describe my invention, so that others skilled in the art to which it ap-
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pertains may apply the same. In the drawings, S and E indicate the frame upon which the grate-bars B and D, constituting the grate, are placed.

S, Fig. V, represents one of the side bars, which is provided with bearing-notches *c* for the shafts of the eccentrics C, which operate the movable bars, and said side bar has raised ends with seats *s* for the transverse or bearing
50 bars E.

E indicates the transverse or bearing bars of the frame, which are supported by the raised ends of the side bars, S, so as to be above the level of the eccentric-shafts.

B and D represent the grate-bars, those indicated by B being stationary or fixed bars, which are supported by the end bars, E, of the frame, and may be of any appropriate form which will not interfere with the operation of the eccentrics C. The bars D are movable bars, or those which are operated by the eccentric, and are each formed with two lugs, P P', which project from the under surface of the bar, one of said lugs, P, being notched to receive the eccentric, while the other has a plain surface, which can slide or move freely on the eccentric. In the drawings the movable bars D are shown as being wider for from one-fifth to one-quarter their length, commencing at the front end of the bar, as at *d*. They are so made in order to fill or nearly fill the space between the fixed bars and form a surface upon which fine coal, slack, or dust can rest until it becomes coked or agglomerated. The same result may be attained, but not so satisfactorily, by widening the corresponding portion of the fixed bar; but in the latter case the rise and fall of the movable bars would have a tendency to break up the mass of fine coal and permit it to sift through the grate.

For the purpose of operating the movable bars, a series of eccentrics, C, secured to or formed on a common shaft, C', are employed. The diameter of the eccentrics and their relation to the shaft C' will determine the distance through which the movable bars rise and fall, and it is preferable to so gage this that the movable bars shall rise above the fixed bars and fall below the same equally. The position of the eccentrics with relation to each other will also determine the relative motion of the several bars. For instance, if the alternate eccentrics are reversed, one movable bar will be moving upward and forward while the next bar is moving downward and backward, so that by properly arranging the eccentrics C the bars may be caused to rise and fall together or separately, as preferred.

W W indicate pulleys, having pins upon their peripheries, which, through the medium of a

chain, R, enable the two eccentric-shafts to be operated simultaneously. In lieu of said devices, other well-known gearing may be employed for the purpose.

5 The frame S E having been properly set in the brick-work of the furnace, with a slight inclination from front to rear, the eccentrics are laid transversely, with their journals in the bearing-notches *c c* of the side bars, S, and the
10 grate-bars B D are then arranged as follows: first, a movable bar, D, supported by the eccentrics C C; next, a fixed bar, B, supported by the bearing or end bars, E, of the frame, and so on, the fixed and movable bars alter-
15 nating until the grate is completed. This constitutes the main grate, which supports the mass of fuel; but the same is combined with a dumping-grate, which I will now describe.

20 I indicates a bridge-wall at the rear of the grate, to which is attached a wall-plate, *k*, to afford bearings for the dumping-grate and the cam for operating the same.

H indicates a dumping-grate, pivoted on the bridge-wall, (or wall-plate,) and of such width
25 as is desired or is proportionate to the grate-surface of the main grate. Its function is to receive the refuse from the main grate, and to discharge it into the ash-pit.

T represents a cam, with bearings on the
30 wall-plate *k* of the bridge-wall I just below the dumping-grate H, and from said cam extends an arm or lever, *a*, which is operated by a rod, *a'*, said rod extending to the front of the grate, so that through the medium of the
35 rod and lever the cam may be operated to raise or lower the dumping-grate. The rod *a'* should be notched at its forward end, or other means provided for locking the dumping-grate in position.

40 The operation of my improved grate will be as follows: A fire having been started in the fire-box, the fuel—coal, fine coal, slack, or whatever fuel is used—is fed upon the front of the grate in the usual manner, and if slack or
45 fine coal-dust is used the expanded ends of the bars will prevent it from sifting through and give it time to coke and agglomerate. The eccentrics, being rotated or oscillated, will operate the movable bars, giving them an up-
50 ward, forward, downward, and backward motion, which causes the fuel to spread itself evenly over the grate, and at the same time gradually travel backward toward the dumping-grate. By the time the fuel reaches the
55 rear end of the main grate and moves onto the dumping-grate it is almost, if not entirely, expended, so that only refuse, clinkers, &c., will remain, which latter can be dumped into the ash-pit from time to time by operating the
60 dumping-grate H.

I am aware that an inclined grate composed of a series of transverse bars or grate-sections pivoted so as to have a backward and upward motion, and thus roll or feed the fuel back-
ward to a dumping-grate, has heretofore been 65 devised, and do not claim the same, for the reason, first, that its action has a tendency to roll over and break up the mass of fuel and cause the loss of much unconsumed fine fuel, and secondly, because it has a tendency to 70 bank the fuel rather than spread it evenly over the grate-surface.

I am also aware that the extremities of grate-bars, where they passed under the dead-plates or side walls of the fire-chamber, have 75 been widened out to form a continuous surface for a limited extent, in order to prevent the entrance of coal, clinkers, and other obstructions which would impede the movements of the bar, and do not herein claim the same, 80 as the widening of such a limited extent of the bar, and in such position, would entirely fail of the object I have in view.

Having thus described my invention, what I claim, and desire to secure by Letters Pat- 85 ent, is—

1. A grate composed of alternate fixed and movable longitudinal bars set at an inclination from front to rear, the movable bars being operated by eccentrics which impart an 90 upward, forward, downward, and backward motion to said bars, whereby the fuel is gradually fed from the front to the rear of the grate, substantially as and for the purpose specified.

2. The inclined grate composed of alternate 95 fixed and movable longitudinal bars, the movable bars being operated by eccentrics which give the movable bars a feed motion, in combination with a dumping-grate arranged at the lower end of the inclined grate, substan- 100 tially as and for the purpose specified.

3. The combination, in a grate, of a frame, S E, the eccentrics C, and the bars B D, the bars D having the lugs P and notched lugs P' for the reception of the eccentrics, sub- 105 stantially as specified.

4. A grate composed of a series of longitudinal bars, the alternate bars of the series having expanded upper surfaces for one-fourth, (more or less,) of the length of the bar, to form 110 a close surface at the front of the grate for the retention of fine dust or slack, substantially as specified.

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

HENRY MILLER PIERCE.

Witnesses:

HENRY J. PIERCE,
MARTIN BEEM.