

(No Model.)

2 Sheets—Sheet 1.

W. McCLAVE.

STOVE, RANGE, OR FURNACE GRATE.

No. 393,844.

Patented Dec. 4, 1888.

Fig 1.

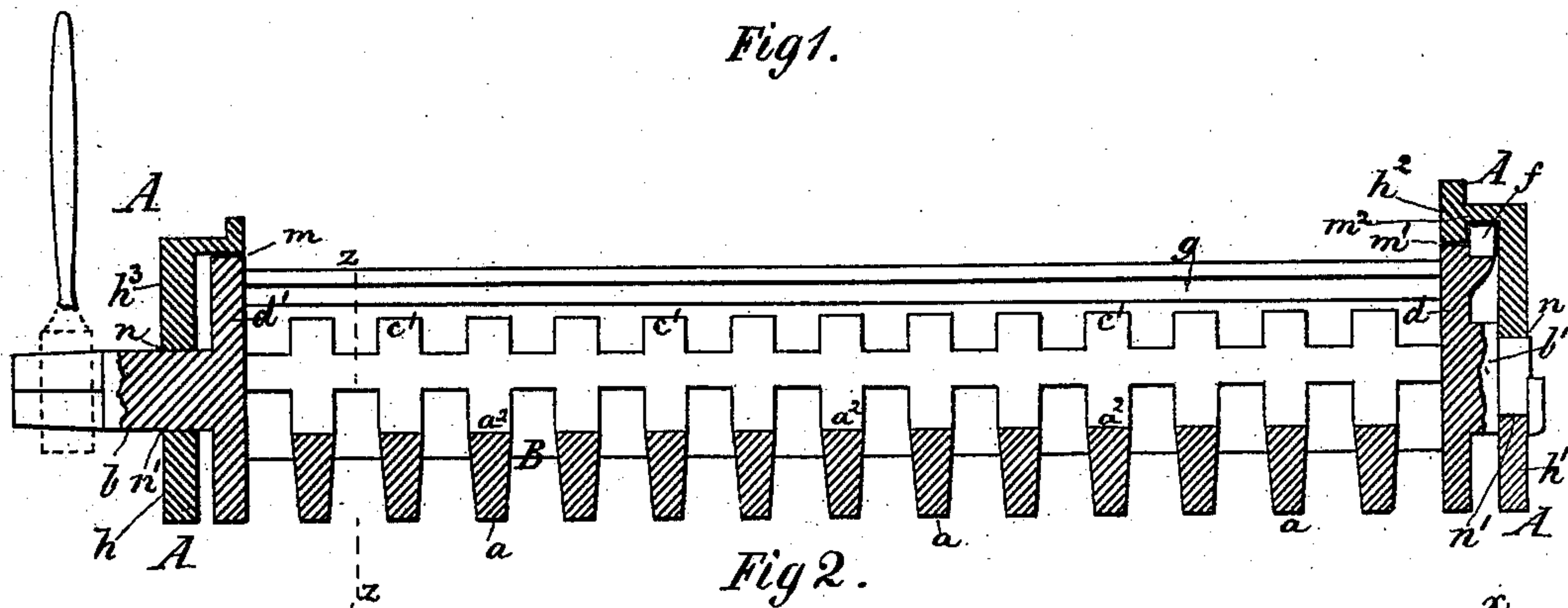


Fig 2.

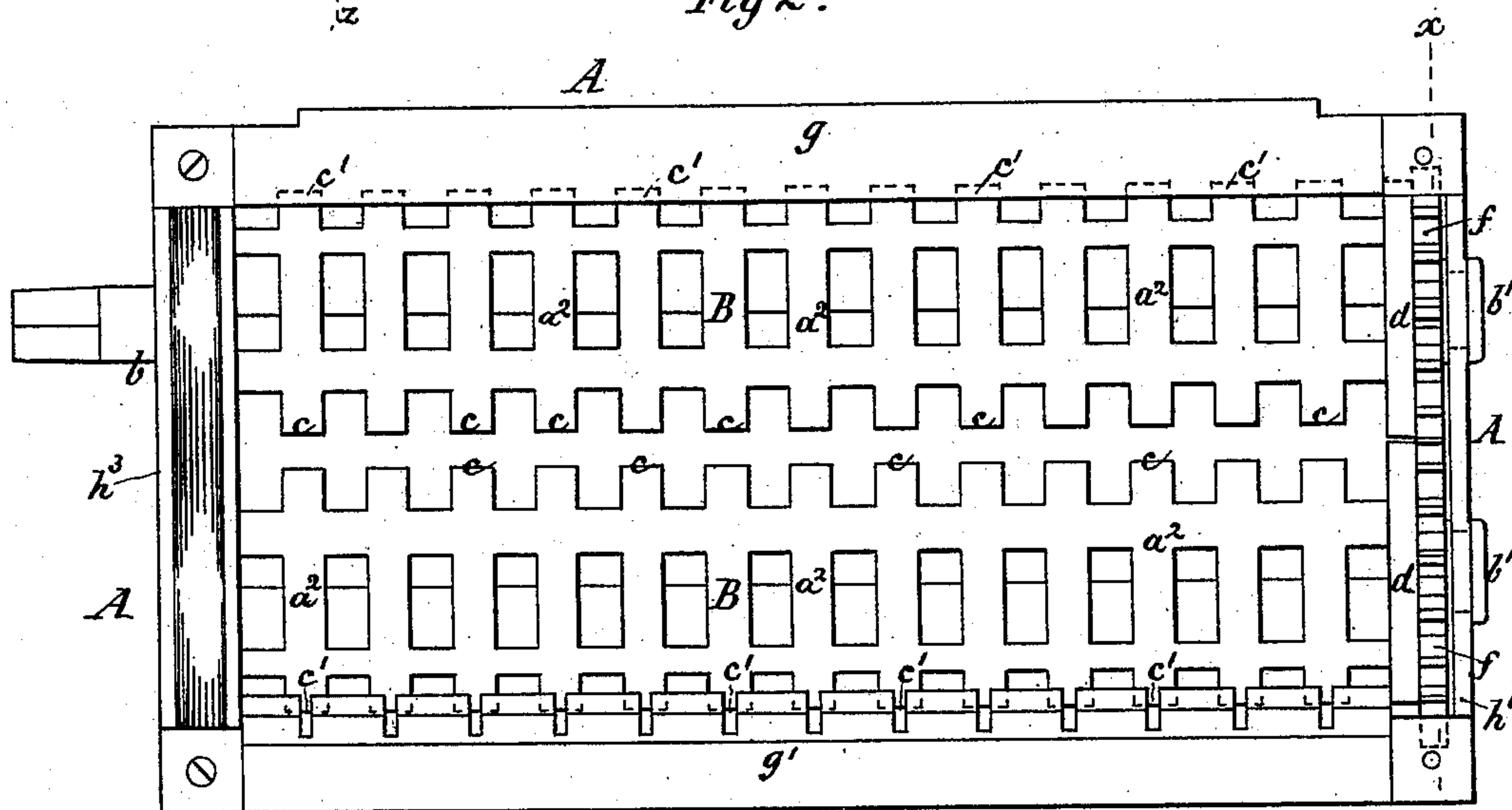


Fig 3.

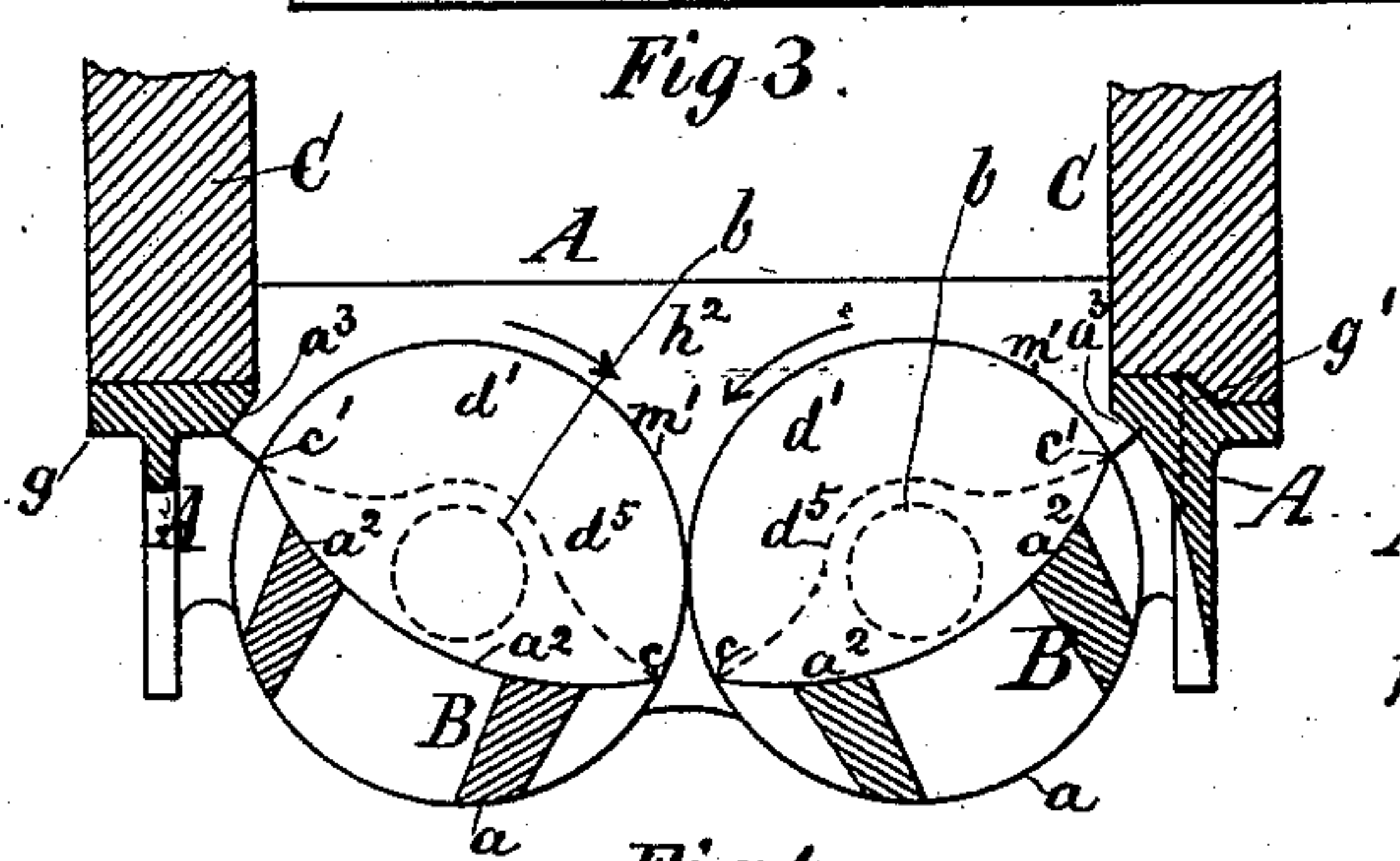


Fig 4.

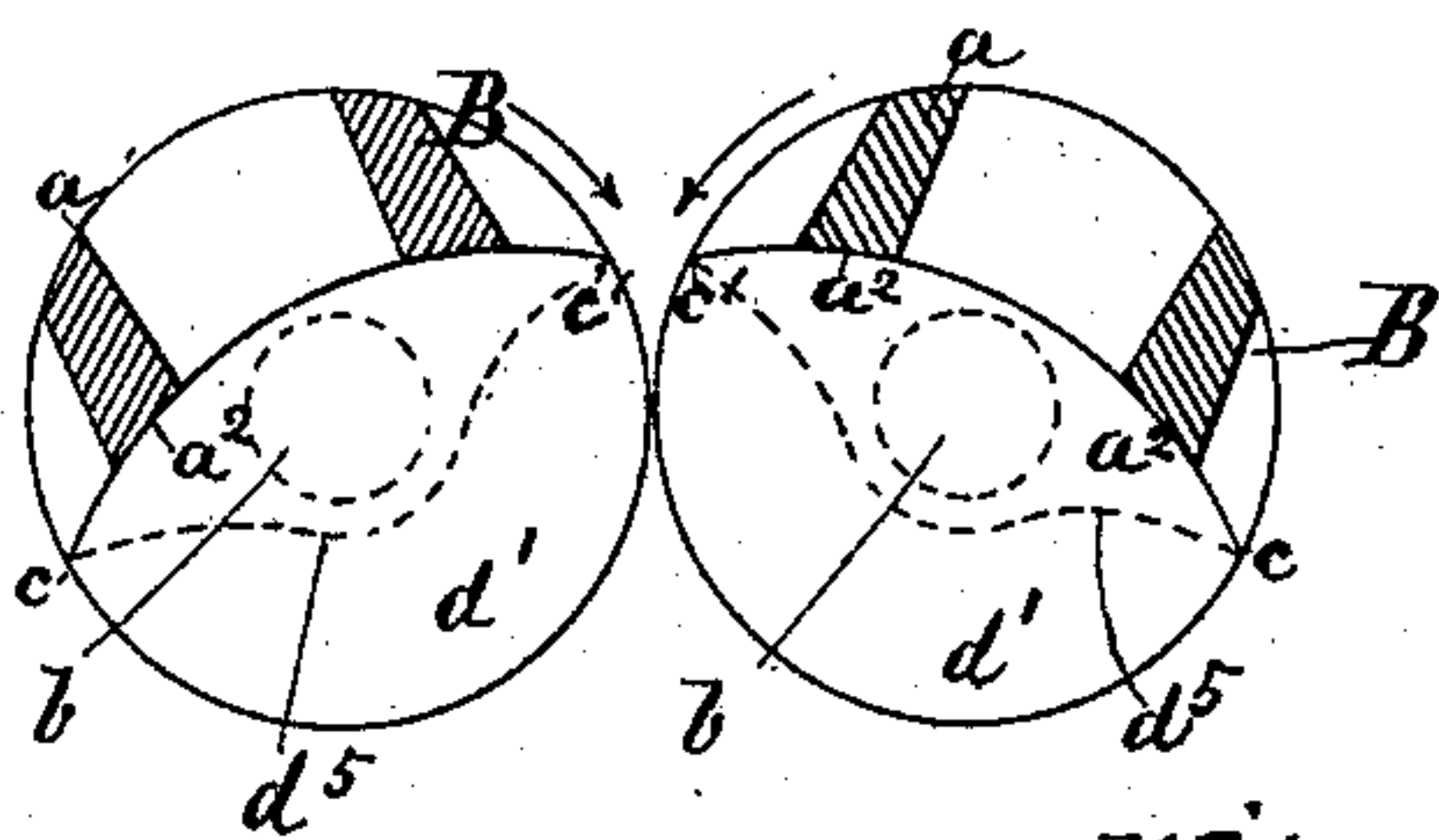
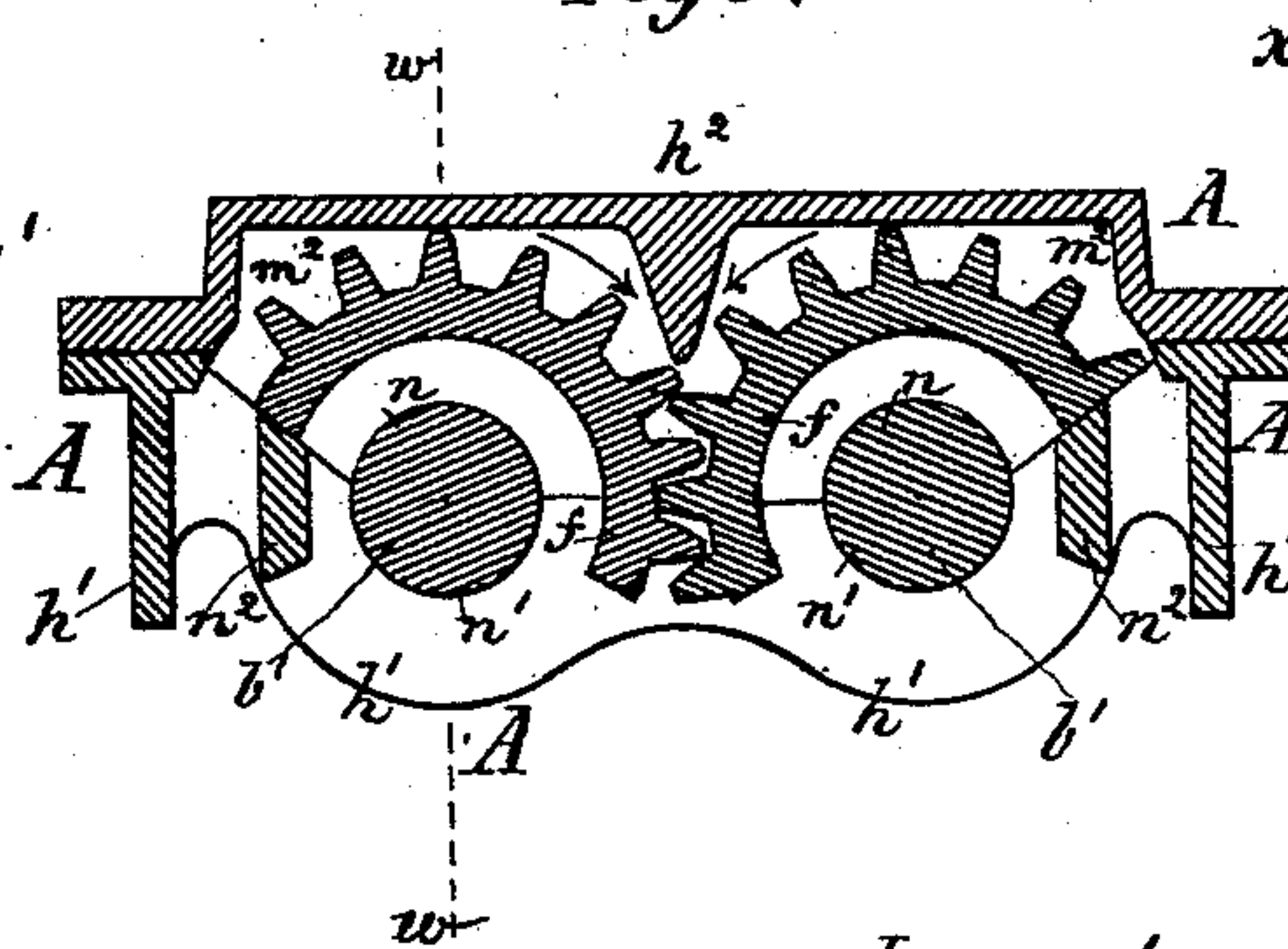


Fig 5.



Inventor:

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by his Attorneys
Mason, Fenwick & Lawrence

J. P. Theo. Lang.

Witnesses: E. J. Fenwick,

(No Model.)

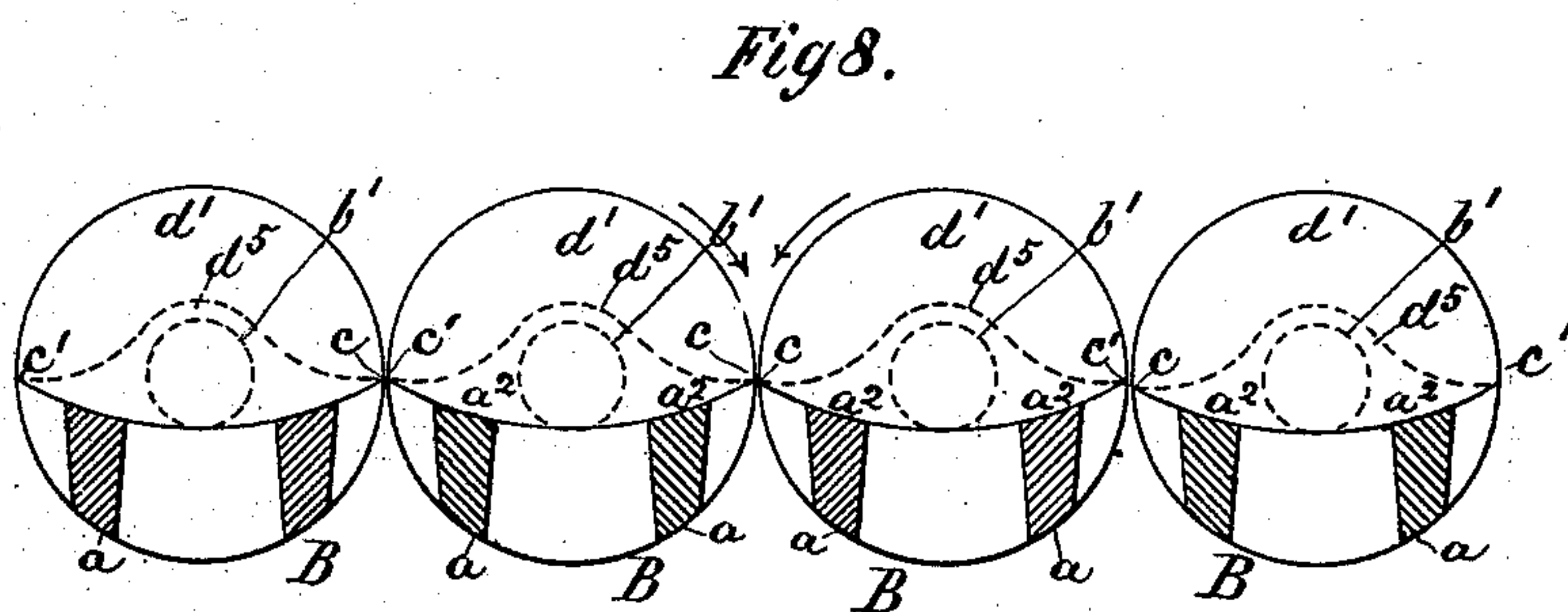
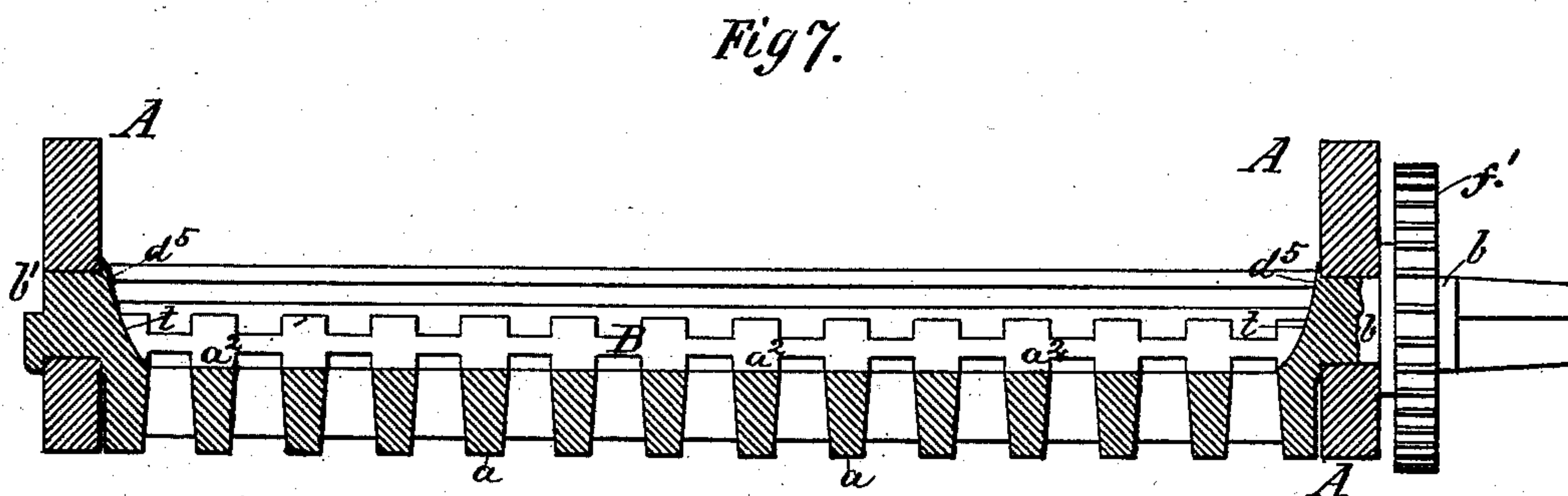
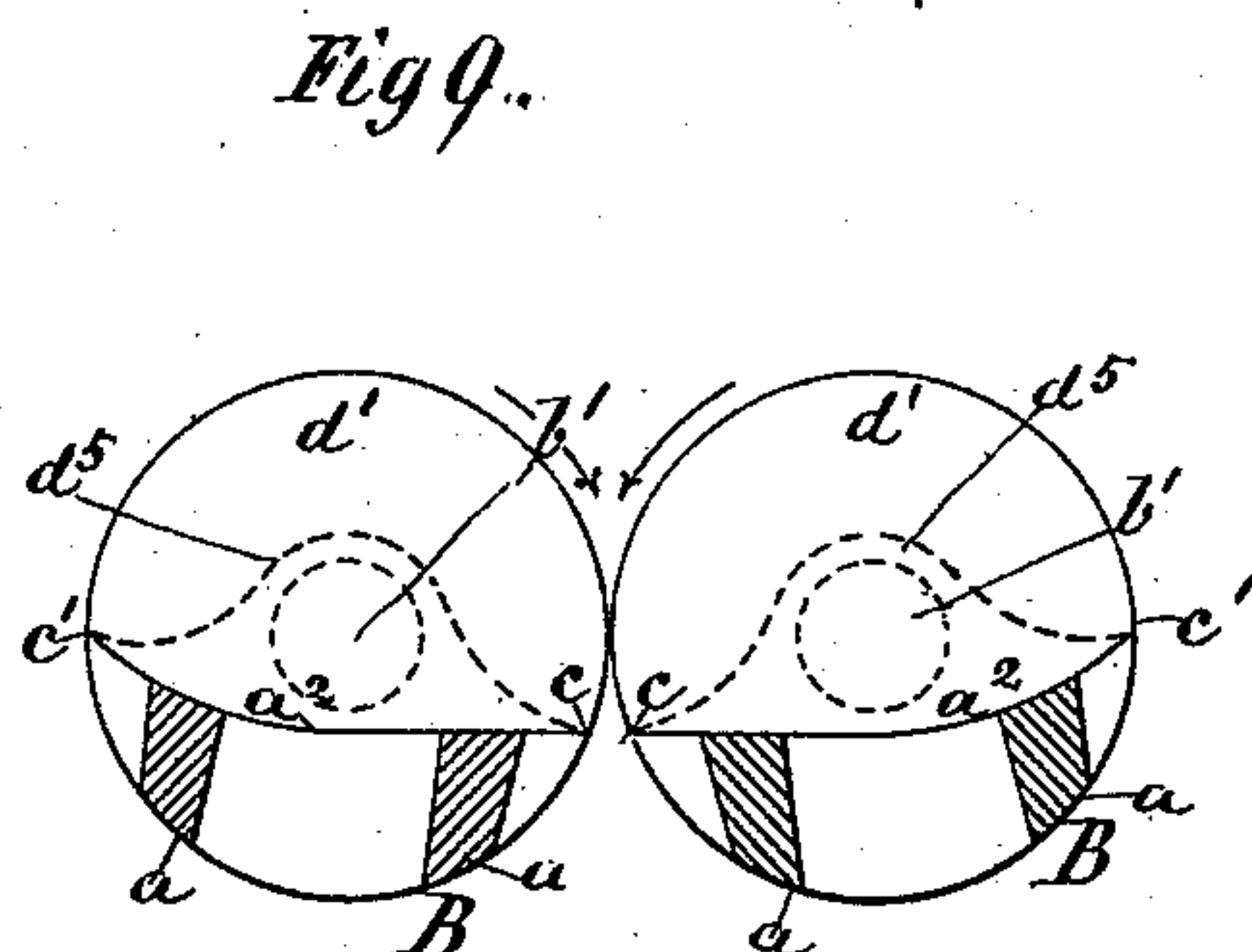
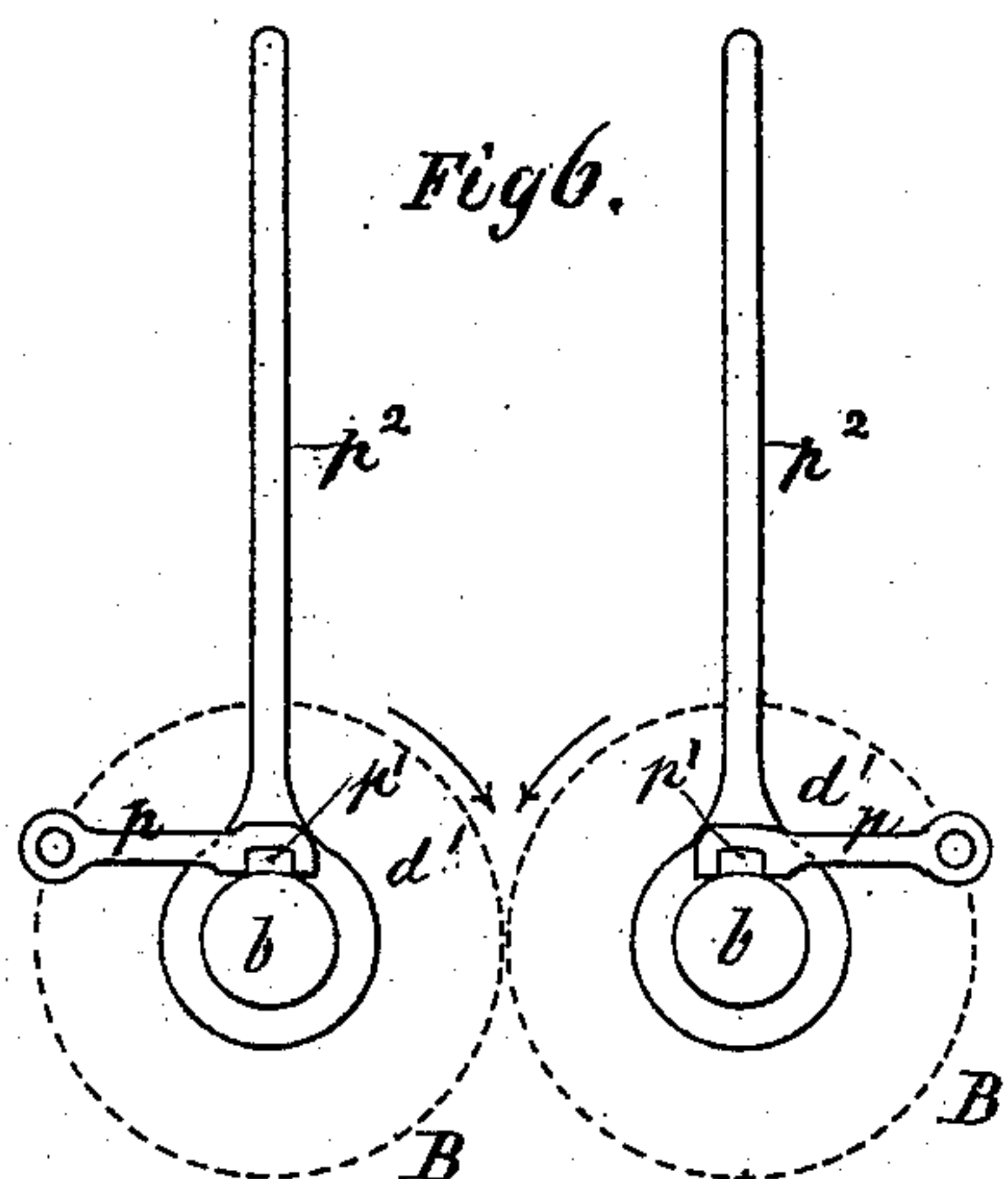
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Inventor:
William McClave,
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UNITED STATES PATENT OFFICE.

WILLIAM MCCLAVE, OF SCRANTON, PENNSYLVANIA.

STOVE, RANGE, OR FURNACE GRATE.

SPECIFICATION forming part of Letters Patent No. 393,844, dated December 4, 1888.

Application filed April 17, 1888. Serial No. 270,904. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MCCLAVE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Stove, Range, or Furnace 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 appertains to make and use the same.

My invention consists in certain constructions, combinations, and arrangements of parts of a stove, range, or furnace grate, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a broken longitudinal section, and Fig. 2 a top view, of my invention as employed in a stove, range, or furnace, two grate-bars only being shown, and one of the removable journal covering, protecting, and confining caps being removed in the latter view. Fig. 3 is a vertical cross-section of the two-bar grate and a portion of a stove, range, or furnace with which the grate is adapted for use. Fig. 4 is a diagrammatical view of the two bars reversed in position. Fig. 5 is a vertical cross-section of one of the end portions of the frame in the line xx of Fig. 2, showing more plainly the segmental cog-gearing for vibrating the grate-bars and the lugs for limiting the extent of vibration of the grate-bars. Fig. 6 is a detail view showing, as a modification of my invention, pivoted catches attached to the grate-frame and lugs on the grate-bar journals, which may be used with the improved grate formed of two bars in the event of the bars being constructed to vibrate singly by separate handles instead of being coupled or geared and operated by one handle, as in the other figures. Fig. 7 is a broken longitudinal section of a modification of my invention, showing a portion of the grate-frame, a grate-bar with end portions not complete circles, and a cog-gear which is keyed upon the journal of the bar. In this construction the inner surfaces of the end portions of the bars are curved and form a support for banking burning fuel at the ends of the grate. Fig. 8 is a diagrammatical cross-section illustrating the manner of using more than one pair of

grate-bars coupled in pairs, as in Figs. 1, 2, 3, and 4, for forming a grated fire-bed of any desired length. The grate-bars in this instance are made less concave on top than either those shown in Figs. 3 and 4, and their end portions are of the shape on top indicated by dotted lines, as $d^5 d^5$ in Figs. 3 and 4, or as illustrated by the modified construction shown in Fig. 7; and Fig. 9 is another diagrammatical view showing two bars with the form of their top surface slightly changed, said surface being partly curved and partly flat.

In the views of the drawings, A is the grate-frame; B, the grate-bars; C, the lower portion of a stove, range, or furnace having its lower end or lining portion resting upon the top surface of the frame A.

The grate is composed of not less than two bars, and this number may be increased according to the size of the fire-bed required. Each bar is of crescentic form, and it may be of open-work metal, the spaces of which are bounded by transverse crescentic-shaped portions and longitudinal connecting portions, all having surfaces which partake of the form of a crescent in transverse section, or each bar may be similar, so far as the construction of passages through them is concerned, to those in general use; but their exterior or bottom surfaces, a , must be concentric with their journals $b b'$ and the major portions of their top surfaces, a^2 , between their ash cut-out edges $c c'$ considerably below the horizontal axes of said journals, while one or both of the said cut-out edges $c c'$ of the respective bars may be either slightly above, below, or about on a plane with said axes of the journals.

At the ends, respectively, of the grate-bars circular solid plates $d d'$ are constructed, and on the respective faces of these plates d segmental cog-gears $f f$ are cast, and centrally from the plates $d d'$ and segmental gears $f f$ the journals $b b'$ are extended, being cast on the bars, and one of them, on one or both bars, being made longer than the others, and formed with a square end, so that a handle or lever may be applied to it for the purpose of vibrating the grate-bars through the gears.

The frame A is formed with longitudinal side bars, $g g'$, both of either the plain form shown at g or the slotted construction shown at g' , and provided with the end portions, h ,

h' , h^2 , and h^3 , the caps $h^2 h^3$ of which may be of the plain top-surface formation shown at h^2 or of the grooved formation shown at h^3 . The cap-pieces $h^2 h^3$ are recessed, as at $m m'$, m^2 , and are removable, while the portions h h' are cast with the side bars, $g g'$. The recesses $m m'$ are to accommodate snugly the circular end plates, $d d'$, of the grate-bars, while the recess m^2 is to admit the cog-gears, so that they shall be covered and excluded from ashes by that portion of the cap in which the recess m' is formed and be free to vibrate. Through the respective portions h h' and h^2 h^3 semicircular journal-box passages $n n'$ are provided for the journals $b b'$; the same forming, when the caps are in place, complete circular journal-boxes, concentric with and fitting the journals snugly. At suitable points, lateral to the journals $b b'$, lugs $n^2 n^3$ are cast on the inner side of the portion h' of the frame A, said lugs being adapted for limiting both the forward or inward and the backward or outward movements of the grate-bars whenever they are vibrated and for aiding in supporting and keeping the bars firmly in their normal position of use.

By referring to the drawings it will be seen that the axes of the journals of the grate-bars are elevated considerably above the top or inner surfaces, a^2 , of the bars, and that the sharp ash and débris cut-out edges $c c'$ can consequently be made to form much more acute angles than is possible when the journals are located below said top or inner surface of the grate-bars, and thus grate-bars are provided which will more readily and perfectly cut through the ashes and débris than those bars which have their cutting-edges formed on angles which are comparatively very obtuse; also, that the exterior surfaces, a , of the grate-bars can be formed concentric with the axes of the journals, and being thus formed these bars will maintain an equidistant relation with the lower surface, a^3 , of the lower end or lining of the combustion-chamber C of the stove, range, or furnace, and this without the aid of curved extension-bars of the grate, which occupy lateral room in the ash-pit, as in Letters Patent No. 143,856. By journaling and shaping the grate-bars as described the cut through the ashes and débris can be on a higher curved line, and the very sharp edges $c' c'$, when used as in Figs. 3 and 4, will divide the ashes from the fuel, thereby making a clean cut with little liability of obstruction from the fuel during the cleaning operation.

If the ordinary curved extension-bars used on grate-bars hung on journals located below the top surfaces of the grates, as in Patent No. 143,856, were cut off, and the construction I have adopted not resorted to, the space between the bottom or exterior surfaces of the bars would become gradually enlarged in operating upward and inward, and consequently in going back the large pieces of coal and other matters would offer an obstruc-

tion and arrest the return of the grate-bars to their normal position of use. It is of great importance in stoves and ranges to dispense with the aforesaid curved extension-bars, for when the grate-bars are constructed as I show they occupy no extra room lateral of the combustion-chamber, and consequently the ash-pit can be made smaller and the room lost by the use of the curved bars can be added to the length or width of the bake-oven, and thus more room secured for baking purposes in a given-sized stove or range than when the curved bars are used.

In connection with grate-bars of the construction and form shown it is necessary, in order to secure the advantages set forth and accomplish the "cut-out" of the ashes and débris, to have the sharp edges $c' c'$ of a pair of bars, B B, placed on the extreme right side of one bar and the extreme left side of the other bar, as shown in Figs. 3 and 9, or to have the intermediate pair of bars of a grate-bed formed of four bars, as in Fig. 8, provided with sharp edges $c c'$ and $c' c'$, one sharp edge c' being at the extreme right side of one bar and the other sharp edge c' at the extreme left side of the other bar of a geared pair of bars; and it is also necessary in all cases that the bars shall be so constructed and arranged with respect to the lower portion of the stove, range, or furnace, and to one another, and to limitation-stops for insuring proper vibratory movements, and to the means provided for vibrating the bars that the sharp edges $c' c'$ shall move on curved lines upward and inward from the position shown in Fig. 3 to the position shown in Fig. 4, and then, having by this movement cut out the mass of ashes and débris at the bottom of the superincumbent body of burning fuel, move outward and downward from the position shown in Fig. 4 to that shown in Fig. 3. If the grate-bars were constructed, respectively, with a single sharp edge, as in German Letters Patent No. 10,773, of 1880, and said sharp edge of one bar was placed adjoining a dull edge, or next to a lower edge which is on a horizontal plane of the bar, as in said patent, instead of being placed in the relation to one another as shown in Fig. 9 of my drawings, and all of said sharp edges were vibrated so as to turn in the same direction, as illustrated in said patent, the cut-out of the mass of ashes and débris could not be effected. My construction in all the figures of my drawings is capable of and is specially designed for not only shaking down the ashes but also cutting out the entire mass of ashes and débris beneath the burning body of fuel in the stove, range, or furnace.

In Fig. 8 four grate-bars are shown as forming a fire-bed, and from this illustration it is obvious that any desired number of pairs may be adopted, and also, as will presently be shown, that three or any desired number of the grate-bars may be adopted in forming a fire-bed. If four bars are used, the intermediate pair may be geared together and vibrated,

and limited in their vibrations, same as the pair shown in Figs. 1, 2, 3, 4, and 5, and the end bars of the same may be operated by separate handles, such as are shown in Fig. 6, or by other suitable means; or, instead of gearing together the intermediate pairs of the series of bars, the respective pairs of bars on either side of the center line of the fire-bed, Fig. 8, may be geared in the same manner as shown in Figs. 1, 2, 3, 4, and 5, and the extreme outer sharp edge of each bar of each of said pairs made to move upward and inward, as illustrated in Fig. 4, and after having cut out the mass of ashes and débris caused to readjust themselves to the position shown in Fig. 3. In this latter operation (having reference to Fig. 8 and the letters of reference thereon) the extreme sharp edge c of one bar would turn toward the extreme sharp edge c' of the other bar, while the sharp edge c' would move toward the sharp edge c of the bar carrying it.

When four bars are used and the intermediate two are geared together in the manner shown in Figs. 1, 2, 3, 4, and 5, the exterior bottom surfaces of the pair being moved will maintain a uniform distance from one of the extreme edges of each of the contiguous end bars.

If three bars are used and two of them are geared together, the bars of the pair will operate in the same manner as described with respect to one another and the contiguous end bar, while the end bar of the pair and the separately-operated end bar will operate with respect to the bottom portion, a^3 , of the furnace in the manner before described.

If five bars are used, the central bar can be operated separately, as in Fig. 6, while the respective bars forming the two outer respective pairs may be geared together and operated in the same manner as the pair shown in Figs. 1, 2, 3, 4, and 5.

It will be seen that the action of the grate-bars in all the modes of use described is such that no inconvenience will be experienced from large matters or débris gathering in enlarged spaces between the bars which are moving and those which are not moving, and consequently the use of ridge-bars above and curved extension or end bars below, as shown in Letters Patent No. 259,183, is not necessary with my construction.

In Fig. 6 I have shown that the grate-bars of my construction and arrangement can be used in pairs to cut out ashes and débris without being geared or coupled, a catch, p , attached to the grate-frame, and a lug, p' , formed on the journal, being provided for locking one or the other of the grate-bars while either is being moved by a hand-lever, p^2 . I prefer to have the bars geared or coupled and both operated by a single lever.

In Fig. 7 by full lines and in some of the other views by dotted lines I have shown the circular plates $d d'$ cut away, so as to simply leave curved hangers, as d^5 , for the journals

to pass through. I have also set these hangers entirely within the combustion-chamber and closed up the recesses $m m'$, provided in the other views for the accommodation of the circular plates $d d'$ and the cog-gears. The gears, as f' , are also shown made separate from the grate-bars, so as to be keyed upon the journals. By this construction the hangers d^5 are made to form a banking or supporting surface, t , at each end of the grate for the burning fuel.

I have shown and described the different modifications in order to have it understood that the improved grate-bars are not necessarily vibrated by cog-gears cast with the grate-frame, nor necessarily provided with the circular plates $d d'$ set in recesses, nor to be arranged in a single pair in stoves, ranges, or furnaces of dwellings, nor to have any precise amount of concavity on their inner or top surfaces, nor to have any precise distance between said surfaces and the axes of the journals. It, however, is very essential to have the major portion of said surfaces below the axes of said journals in order to obtain sharp edges, as $c c'$, for cutting out ashes, &c., and to form a concave or concaved or pocket-like ash and débris supporting bed below said cut-out edges, and thus insure the entrance into the mass above its base of the cut-out edges as said cut-out edges are moved upward and inward for the purpose of cutting out the ashes and débris; neither do I confine my invention to any precise construction and location of stops or detents for preventing the grate-bars being turned improperly from their normal positions, in which they form a concave or concaved or pocket-like fire-bed, as any equivalent stop or detent and any location thereof to that shown which will prevent the bars being turned improperly or wrong is intended to be embraced as my invention.

From the foregoing specification it will be seen that the grate-bars are made with their exterior surfaces of segmental form and concentric with the axes of the journals on which they vibrate, with their extreme ash and débris cut-out edges sharp, and the highest outer extreme ash cut-out edges of said bars vibrated so as to move first toward and then from one another, while the lowest extreme edges of said bars are caused to move first from and then toward one another, and in thus moving (if placed in a stove, range, or furnace) do not change the distance between their concentric exterior bottom surfaces and the lower portions of the combustion-chamber or the lining thereof, and if placed in several pairs to form a long grated fire-bed, with their extreme outer ash cut-out edges all on the same plane or on a plane with the axes of their journals, the bars do not change the distance between their concentric exterior or bottom surfaces and the extreme outer ash and débris cut-out edges of those bars which are not being moved. The con-

struction, combination, and arrangement are such that both of the extreme outer edges of each grate-bar can be made with upwardly-pointing sharp edges, and the grate-bars alone rendered capable of serving for forming a support for the fuel, not only previous to but during the performance of the ash cut-out operation, and hence there is no necessity of having the bars arranged to make complete revolutions, nor of constructing them with three sharp wings, the sharp edges of which successively stand upward in the combustion-chamber and downward in the ash-pit, as in Letters Patent Nos. 202,249 and 208,767, nor to have the bars vibrate and constructed with two wings having reversed extreme outer edges, one of which edges points upward and acts as an ash and débris cut-out edge, while the other and the exterior bottom surface of the bar is not adapted for nor intended for maintaining a uniform distance between the extreme edges of the grate-bars (not in motion) on either side of a given pair of bars which may be in motion, nor for maintaining a uniform distance between the exterior or bottom surfaces of the grate-bars and the lower portion of the lining of the combustion-chamber. It will also be seen that by my invention the vibration of the inwardly and then outwardly moving cut-out bars can be controlled and improper vibrations prevented; that the respective bars, their end circle-plates, and the respective toothed segments or wheels by which they are vibrated can be made in one piece, and that the end pieces of the grate-frame can be made in two pieces and with recesses adapted for the reception of the cog-gears and circle-plates, each of said pieces being formed with half journal-boxes and a semicircular recess, and the upper pieces serving as removable caps for covering, protecting, and holding the grate-bar journals down in position, while they are readily removable to permit access for repairs or withdrawal and renewal of burned-out bars.

What I claim is—

1. A grate comprising two crescentic grate-bars arranged alongside one another so as to form a concaved fire-bed, and having, respectively, journals, an upturned sharp cutting-edge, and an exterior bottom surface concentric with the axes of the journals, stops for preventing the bars from being moved improperly out of their normal positions, and gears for vibrating the bars and thereby moving the sharp cutting-edges first upward and inward toward each other far enough to cut out the ashes and débris and then outward and downward from each other to their normal positions, substantially as described.

2. A grate comprising two crescentic bars arranged alongside one another so as to form a concave fire-bed, and having, respectively, journals, an upturned sharp cutting-edge about on a line with the axes of said journals, an exterior bottom surface concentric with the axes of the journals, an inner or top sur-

face, the major portion of which is below the axes of the journals, stops for preventing the bars from being moved improperly out of their normal positions, and gears for vibrating the bars and thereby moving the sharp cutting-edges first upward and inward toward each other far enough to cut out the ashes and débris and then outward and downward from each other to their original positions, substantially as described.

3. A stove, range, or furnace grate comprising crescentic grate-bars arranged alongside one another so as to form a concaved fire-bed, and having, respectively, journals, two upturned sharp cutting-edges, and an exterior or bottom surface concentric to the axes of the journals, and stops for preventing the bars from being moved improperly out of their normal positions, and gears for vibrating the bars and thereby moving the sharp cutting-edges first toward each other far enough to cut out the ashes and débris and then downward and outward from each other to their original positions, substantially as described.

4. A stove, range, or furnace grate comprising bars of crescentic shape arranged alongside one another so as to form a concave fire-bed, and having, respectively, journals, two upturned sharp cutting-edges about in a line with the axes of said journals, an exterior bottom surface concentric with the axes of the journals, an inner or top surface, the major portion of which is below the axes of the journals, and stops for preventing the bars from being moved out of their normal positions, and gears for vibrating the bars and thereby moving the sharp cutting-edges first upward and inward toward each other far enough to cut out the ashes and débris and then downward and outward from each other to their original positions, substantially as described.

5. A stove, range, or furnace grate comprising crescentic bars arranged alongside one another so as to form a concaved fire-bed, and having, respectively, journals, an exterior bottom surface concentric with the axes of the journals, and a top or inner surface between the extreme outer sharp edges of the bars and lying below the axes of the journals, gears for connecting the bars in pairs, and stops for preventing the bars from being moved out of their normal positions, and gears for operating the bars and thereby moving the sharp cutting-edges first toward each other far enough to cut out the ashes and débris and then downward and outward from each other to their original positions, substantially as described.

6. The combination, with the lower portion or lining of the combustion-chamber of a stove, range, or furnace having the construction as at a^3 , of a grate comprising two crescentic grate-bars arranged alongside one another, so as to form a concave fire-bed, and having, respectively, journals, one or more upturned sharp cutting-edges, an exterior or bottom surface

which is concentric with the axes of the journals, and an inner or top surface between said sharp edges which is below the axes of said journals, stops for preventing the bars 5 when in their normal positions from being moved in the wrong direction, gears for connecting said bars, and suitable means for vibrating the bars, substantially as described.

7. A grate comprising two open-work grate- 10 bars arranged side by side, each bar consisting of journals, a series of crescent-shaped spaced transverse portions located out of line with and having their outer curved surfaces concentric with the journals, and suitable 15 longitudinal portions for connecting the transverse portions, in combination with the intermeshing gears on the journals at one end, substantially as described.

8. As a new article of manufacture, a grate- 20 bar of crescent shape in cross-section made

with an inner fire-bed or top depressed surface, a segmental outer or bottom surface, and with journals at its ends above the middle of the depressed surface, and with toothed gears and circular end plates, all the parts 25 constructed integrally with one another, substantially as described.

9. A grate-bar crescentic in form transversely and having journals, the top surface of said bar inside its cutting-out edge being 30 below the journals, and the bottom or exterior surface concentric with the axes of said journals and also below the journals, substantially as described.

In testimony whereof I hereunto affix my 35 signature in presence of two witnesses.

WILLIAM McCLAVE.

Witnesses:

JNO. P. ALBRO,

R. H. PATTERSON.