

(No Model.)

2 Sheets—Sheet 1.

T. F. MORRIN.

GRATE.

No. 364,841.

Patented June 14, 1887.

Fig. 1.

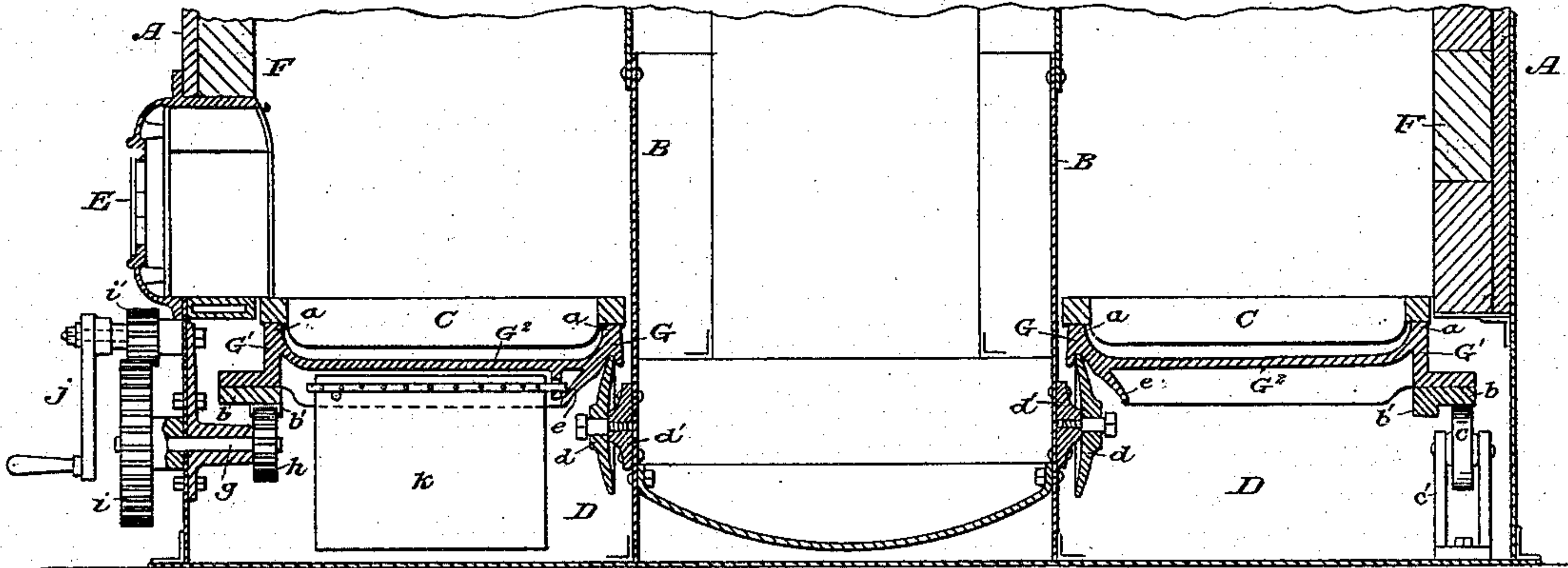
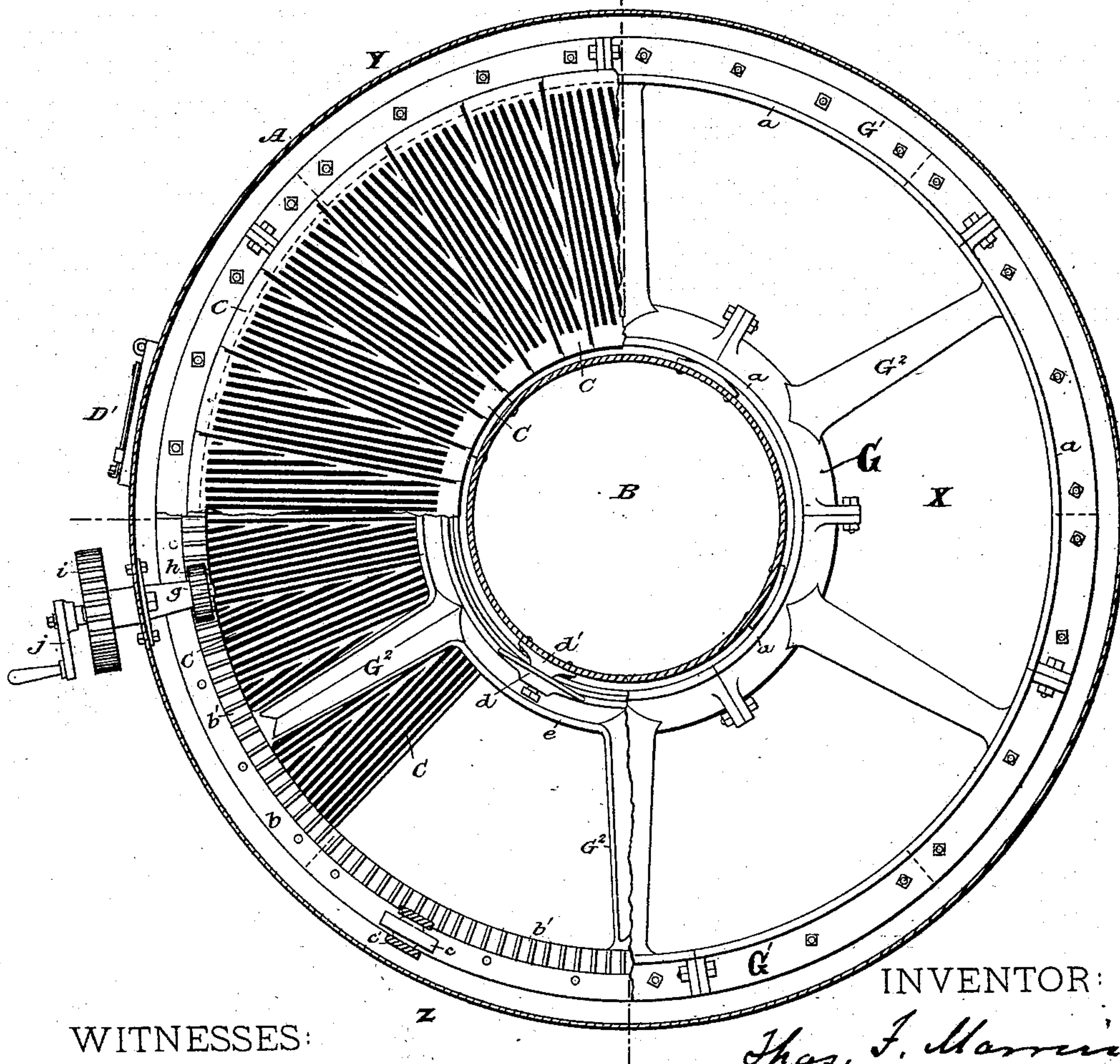


Fig. 2.



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By his Attorney,

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Fig. 3.

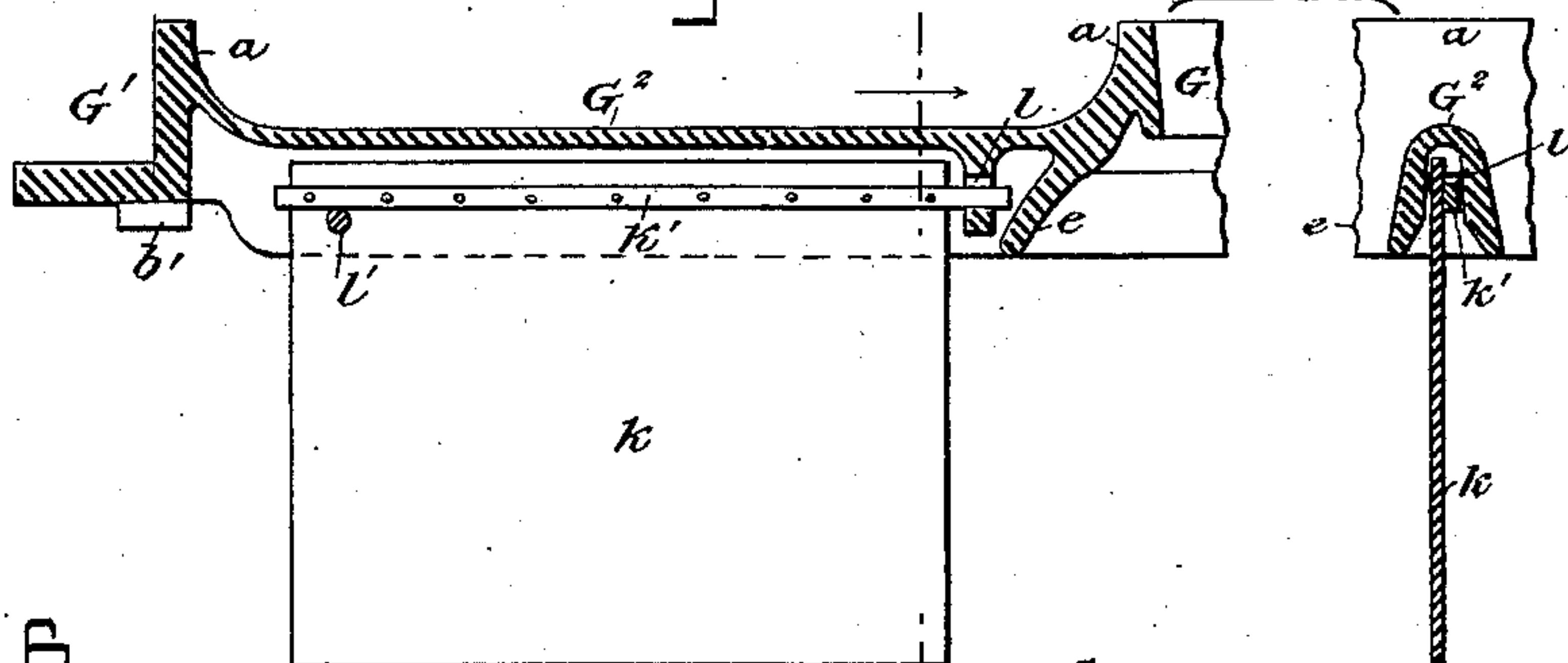


Fig. 6.

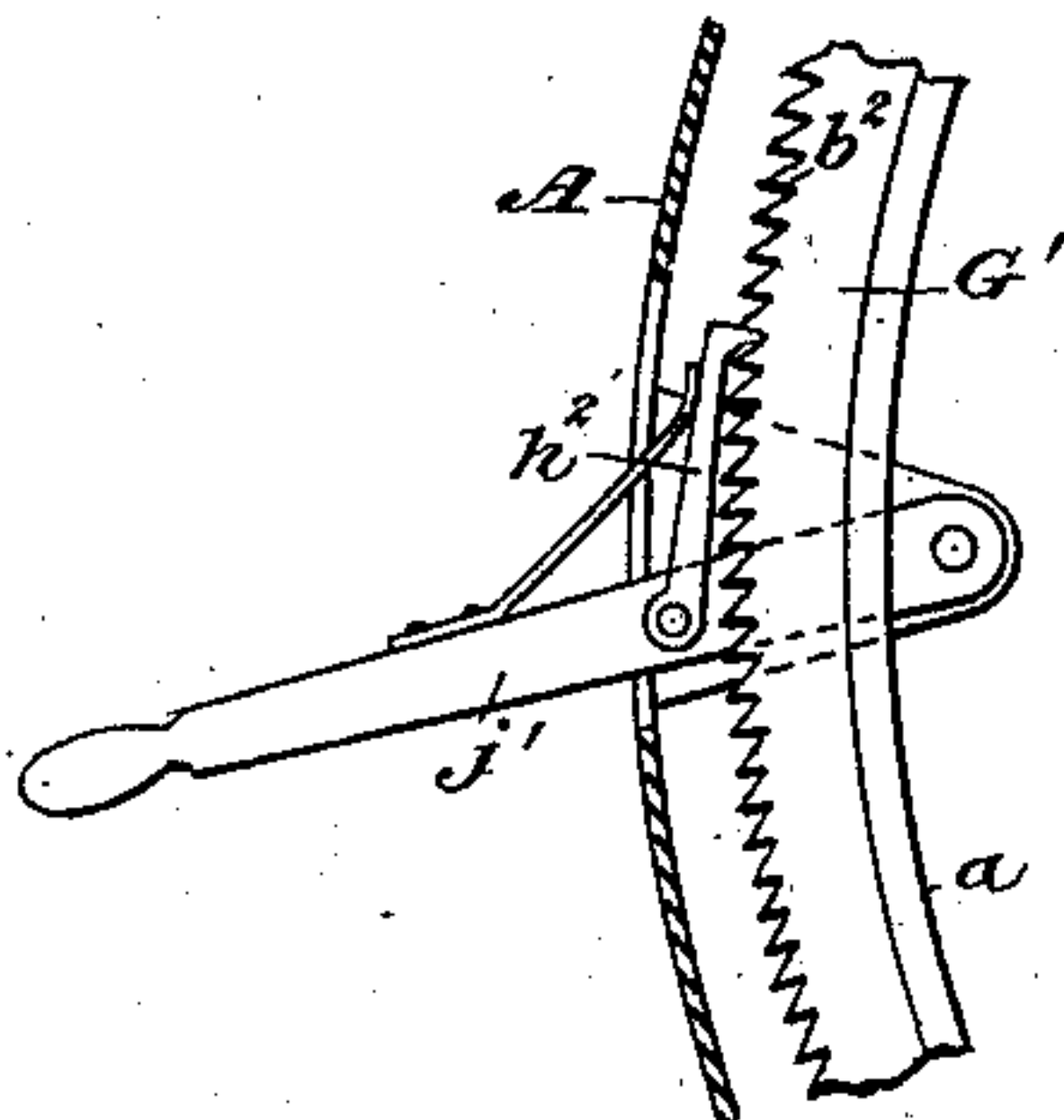


Fig. 4.

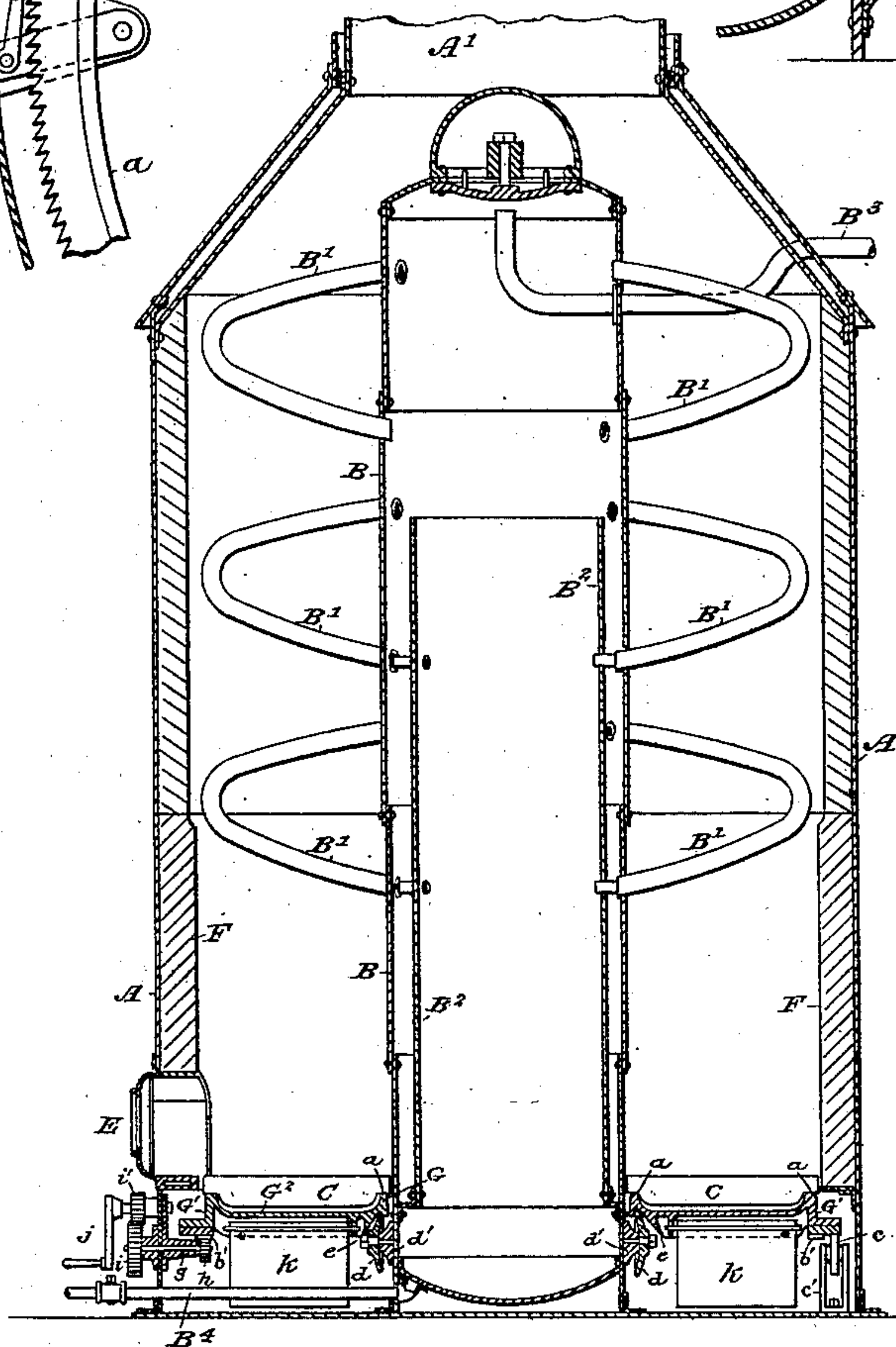
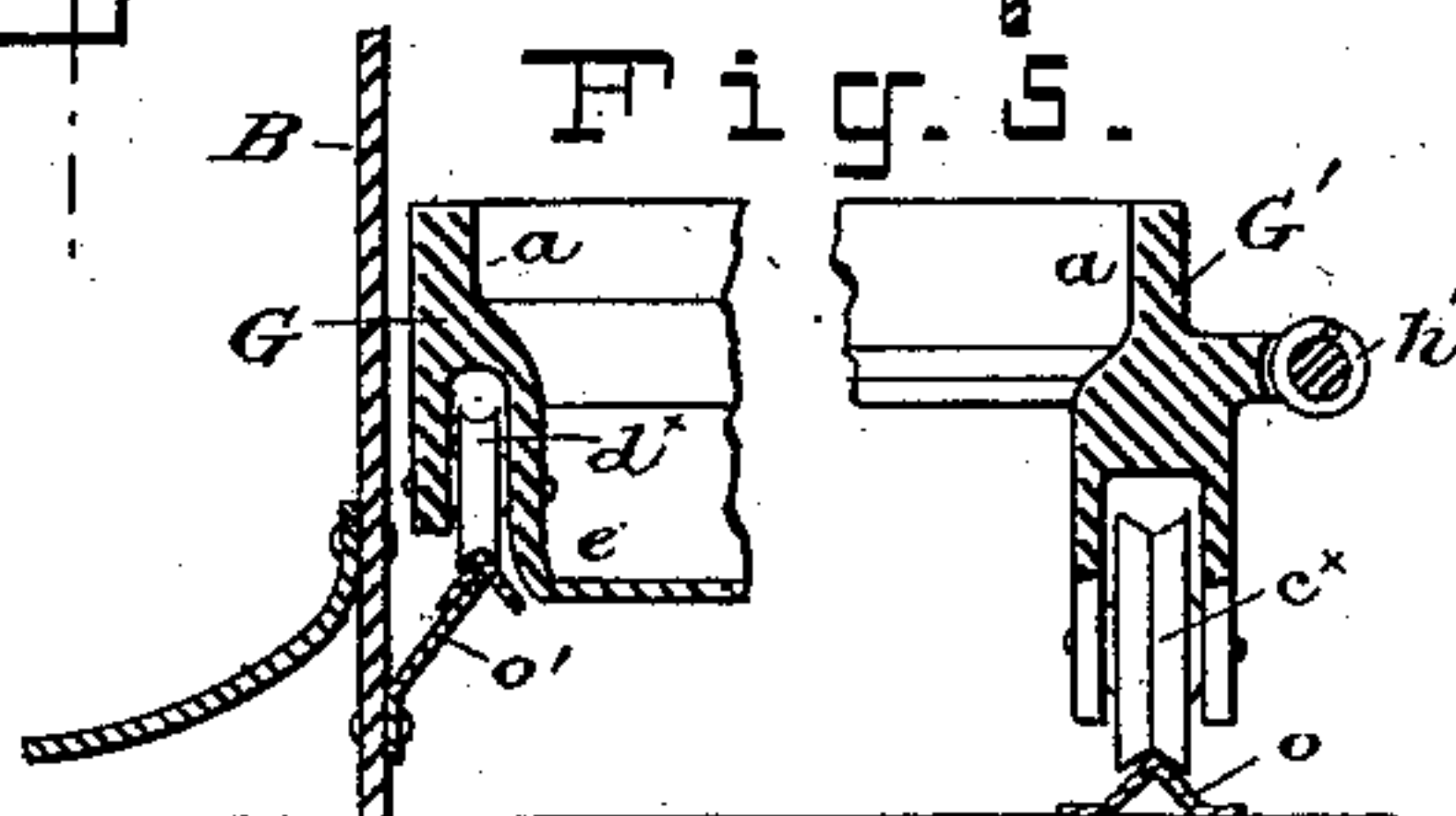


Fig. 5.



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UNITED STATES PATENT OFFICE.

THOMAS F. MORRIN, OF JERSEY CITY, NEW JERSEY.

GRATE.

SPECIFICATION forming part of Letters Patent No. 364,841, dated June 14, 1887.

Application filed July 31, 1886. Serial No. 209,657. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. MORRIN, a citizen of the United States, and a resident of Jersey City, Hudson county, New Jersey, have
5 invented certain new and useful Improvements in Rotary Grates for Furnaces, of which the following is a specification.

My invention relates to that class of furnace-grates wherein the grate or fire-bed is annular in form and is mounted to rotate in a horizontal plane, being provided with means for effecting such rotation; and the object of my invention is to adapt such a grate to the furnaces of that class of steam-generators which
15 have a cylindrical outer shell or furnace-wall and an inner vertically-arranged central drum or generator-cylinder, the grate or fire-bed occupying the annular space between said shell and generator-cylinder. In some cases—as in
20 yachts, for example—these steam-generators are so situated that access can be had only to one side thereof, in which side the furnace-door and ash-door are placed, and when so situated it is difficult to reach all parts of the fire-bed or grate-surface for stoking. My construction enables all parts of the fire-bed or grate-surface to be conveniently and quickly brought to the front or opposite to the door of the furnace, in order that the fireman may get at it to
30 supply fuel and stir the fire. By this means the fire may be kept uniform, as it should be, over the whole grate-surface. My object is, also, to provide improved means for bringing the ashes that may collect at the back part of
35 the ash box or chamber to the front, so that it may be readily got at and removed.

My invention will be hereinafter described, and its novel features carefully defined in the claims.

40 In the drawings which serve to illustrate my invention, Figure 1 is a vertical diametrical section of a steam-generator furnace provided with my improved grate. This view is on a large scale and shows only the lower portion
45 of the generator. Fig. 1^a is an enlarged detail view, which will be referred to hereinafter. Fig. 2 is a plan view designed to illustrate the construction of my annular rotary grate. The right half, X, shows in plan the annular
50 platform only, the grate-bars being removed.

Of the left half the upper quadrant, Y, shows the platform in plan with the grate-bars in place, and the lower quadrant, Z, shows the under side of the platform with a portion of the grate-bars in place. Fig. 3 is a detached
55 view designed to illustrate the attachment of a detachable hoe or scraper for moving the ashes from back to front. Fig. 4 is a similar view to Fig. 1, but on a smaller scale, and shows more fully the generator to which my
60 grate is adapted. The well-known "Hazelton" boiler and the generator described in United States Patent No. 309,727, of December 23, 1884, are examples of this class of generators. Figs. 5 and 6 illustrate modifications
65 that will be hereinafter described.

Referring first to Figs. 1, 2, 3, and 4, A represents the outer shell or wall of the furnace, which may be of sheet metal, as shown, or of brick, tiles, or other suitable material.

B is the generator cylinder or drum arranged centrally in the said shell A.

B' are the usual lateral bent generator tubes or branches projecting from cylinder B out into the path of the hot furnace-gases. I have
75 only shown a portion of these in Fig. 4; but United States Patent No. 309,727 may be referred to for a further illustration.

B² is the cylinder inside of cylinder B, to aid the water-circulation within the latter.

B³ is the steam-supply pipe, and A' is the chimney of the furnace.

C are the grate-bars forming the annular fire-bed, and D is the ash box or chamber.

E represents the furnace-door formed in the
85 shell A in the usual manner, and D' in Fig. 2 represents the door of the ash-box. Where the shell is made of sheet metal the fire-box will be lined with fire-brick or tiles, F, as shown in Fig. 1.

I will now describe my improved grate or rotary fire-bed.

In carrying out my invention I employ a platform of annular form to support the grate-bars. This platform comprises an inner ring,
95 G, an outer ring, G', and arms G², similar to wheel-arms, connecting said rings. For convenience, I cast the rings in sections and bolt them together. These rings have formed on them raised ledges *a a*, on which the grate-bars
100

C rest and bear at their ends, and the rings are supported on wheels or rollers, as will be described, so that the platform may be rotated. To the lower face of the outer ring, G' , is secured a ring-plate, b , at the inner edge of which is formed an annular rack, b' , the purpose of which will be hereinafter explained. The plain lower face of ring-plate b rests on three or more bearing-wheels, c , which are rotatively mounted in suitable fixed supports, c' . These rollers bear up the outer ring or rim of the platform. The inner ring, G , of the platform is supported on three or more bearing-wheels, d , rotatively mounted in brackets d' , which I prefer to secure to the generator-cylinder B by rivets.

In order to form a track-groove for the wheels d to run in, I cast an annular hollow or groove in the under side of the ring G , as clearly shown in Figs. 1 and 1^a, and in order to keep the ashes and cinders from falling down on the wheels d , I cast on said ring G a pendent apron-like flange, e , which extends down outside of said wheels, as shown. Thus mounted the annular grate or fire-bed may be readily rotated in a horizontal plane, so as to bring any part of it to the front or opposite to the door E . My object in thus providing two sets of supporting-wheels for the grate is that the grate itself for a generator of this character will be quite heavy, and the great quantity of fuel thereon will so increase its weight that it would be difficult, if not impossible, to rotate it without two sets of rolling supports.

As a convenient means of rotating the grate, I mount in a suitable bearing a shaft, g , which extends radially through the shell A and bears on its inner end a pinion, h , which meshes with the rack b' on the ring-plate b . By rotating this shaft and pinion the grate will be rotated.

In order to conveniently rotate the shaft g , I mount on the outer end of said shaft a spur-wheel, i , and mount on a stud above it a pinion, i' , which meshes with the spur-wheel, and is provided with a crank, j , whereby it is rotated. This pinion and spur-wheel give the stoker power to rotate the grate with ease.

In Fig. 1 I have shown the door E arranged directly over the gearing for rotating the grate. This is for convenience of illustration only. I usually arrange the furnace-door E and ash-box door D' one over the other, and arrange the gearing for rotating the grate a little to one side, as indicated in Fig. 2. However, the respective arrangement of these parts is not a matter of importance.

In order that the ashes which collect at the back of the ash-box may be brought to the front from time to time, for convenience of removal, I provide a scraper, k , of sheet metal, which I attach removably to one of the arms G^2 of the platform. Fig. 3 is a longitudinal mid-section of one of said arms, showing a mode of attaching the scraper k . To the sheet of metal forming the scraper is attached by

rivets a bar, k' , the end of which projects beyond the plate and enters a hole at l , formed in a web on the arm G^2 . The outer end of the plate is attached by a pin, l' , to the arm. Any convenient mode of attachment will serve.

My reason for making the scraper readily detachable is that there is usually a blow-off pipe, B' , in Fig. 4, in the ash-box, leading out from the generator-cylinder B , and this will prevent the scraper k from making a complete rotation or revolution in the ash-box. The scraper depends into the ash-box, and when the grate is rotated it rakes the ashes to the front.

Fig. 1^a illustrates the preferred mode of mounting the wheels d . The bracket d' has a screw-threaded socket, and a shouldered screw, d^2 , is screwed through the wheel and into the said socket to the shoulder, forming an axis for the wheel to rotate on. As the screw d^2 is liable to unscrew or work out I fix it by a set-screw, d^3 .

I do not wish to limit myself to the precise details of construction herein shown, as these may be varied to some extent without materially departing from my invention. For example, other mechanism than the rack and pinion shown in Figs. 1, 2, and 4 may be employed for rotating the grate. In Fig. 5 I have shown teeth formed on the edge of ring G' of the platform and a worm, h' , gearing therewith. This worm or screw may be rotated by hand or power, as may also the shaft g . (Seen in Fig. 1.) In Fig. 6 I have shown a ratchet, b^2 , formed on the edge of ring G' of the platform, and a lever, j' , carrying a spring-pawl, h^2 , arranged to rotate the platform in the same manner that a ratchet-drill is rotated. In Fig. 5 I have also shown another mode of mounting the platform on wheels. In Figs. 1, 2, and 4 the wheels are shown as rotatively mounted in fixed bearings and the tracks on the platform as arranged to face downward, so as to keep them free from ashes and cinders, and this is the arrangement I prefer; but the wheels may move with the platform, as shown in Fig. 5, where c^x is the wheel supporting the ring G' and carried thereby, and d^x is the wheel supporting ring G and carried thereby. These wheels are grooved and roll on tracks o and o' , respectively, arranged in the ash-box in any convenient manner. I usually employ six outer and six inner wheels, arranged at equal distances apart; but the number is immaterial.

In constructing and mounting my rotary grate due allowance must be made for expansion and contraction under the influence of changes of temperature. The arms G^2 of the platform I usually so construct that in cross-section the arm will have the form of an inverted ∇ , whereby they are lightened and prevented from collecting ashes.

I am aware that rotary grates, both annular and circular, have been used in stoves and heaters, and that these have been provided

with wheel-supports at their outer margins and racks and pinions for rotating them. Therefore I do not claim these features, broadly; nor do I claim, broadly, providing such a grate with
 5 a fixed radial scraper for collecting the ashes, as such scrapers have been before proposed. My grate, however, is constructed materially different from these, with a view to its adaptation to large generator-furnaces of a peculiar
 10 class, wherein the grate and its charge of fuel will weigh from two to three tons, and where pipes obstruct the ash-pit.

The grates C may be of any kind, and may be renewed when burned out.

15 Having thus described my invention, I claim—

1. An annular rotary grate provided with two sets of supporting-wheels, one set arranged under its inner margin and the other set under its outer margin, and provided also with
 20 an apron-like pendent flange, *e*, said pendent flange being arranged to project down over the wheels which support its inner margin, as and for the purposes set forth.

25 2. The combination, with the generator-cylinder B, of the inner set of wheels, *d*, mounted thereon, the annular rotary grate-platform provided with a track-groove where it rests on said wheels, and with an apron-like pro-

jecting flange, *e*, and wheels arranged under the
 30 outer margin of said platform, substantially as set forth.

3. The combination, with the platform of the rotating grate, comprising the inner ring, G, provided with a ledge to receive the grate-
 35 bars, a track-groove on its under side and an apron-like flange, *e*, the outer ring, G', provided with a ledge to receive the grate-bar, and the arms G², connecting said rings, of the outer bearing-wheel, *c*, and the inner bearing-wheels, 40
d, all arranged substantially as set forth.

4. The combination, with one of the arms G² of the rotary-grate platform, which arm has a longitudinal hollow or groove in its under side and a cross-web with an aperture, *l*, of
 45 the scraper *k*, with a bar, *k'*, at its upper edge, and a pin, *l'*, to support the outer end of said scraper, whereby the upper edge of said scraper is detachably secured in the hollow or
 50 groove in said arm, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THOMAS F. MORRIN.

Witnesses:

HENRY CONNETT,
 FRANK MOULIN.