

(No Model.)

2 Sheets—Sheet 1.

E. FALES.  
DUMPING GRATE.

No. 529,066.

Patented Nov. 13, 1894.

Fig. 1

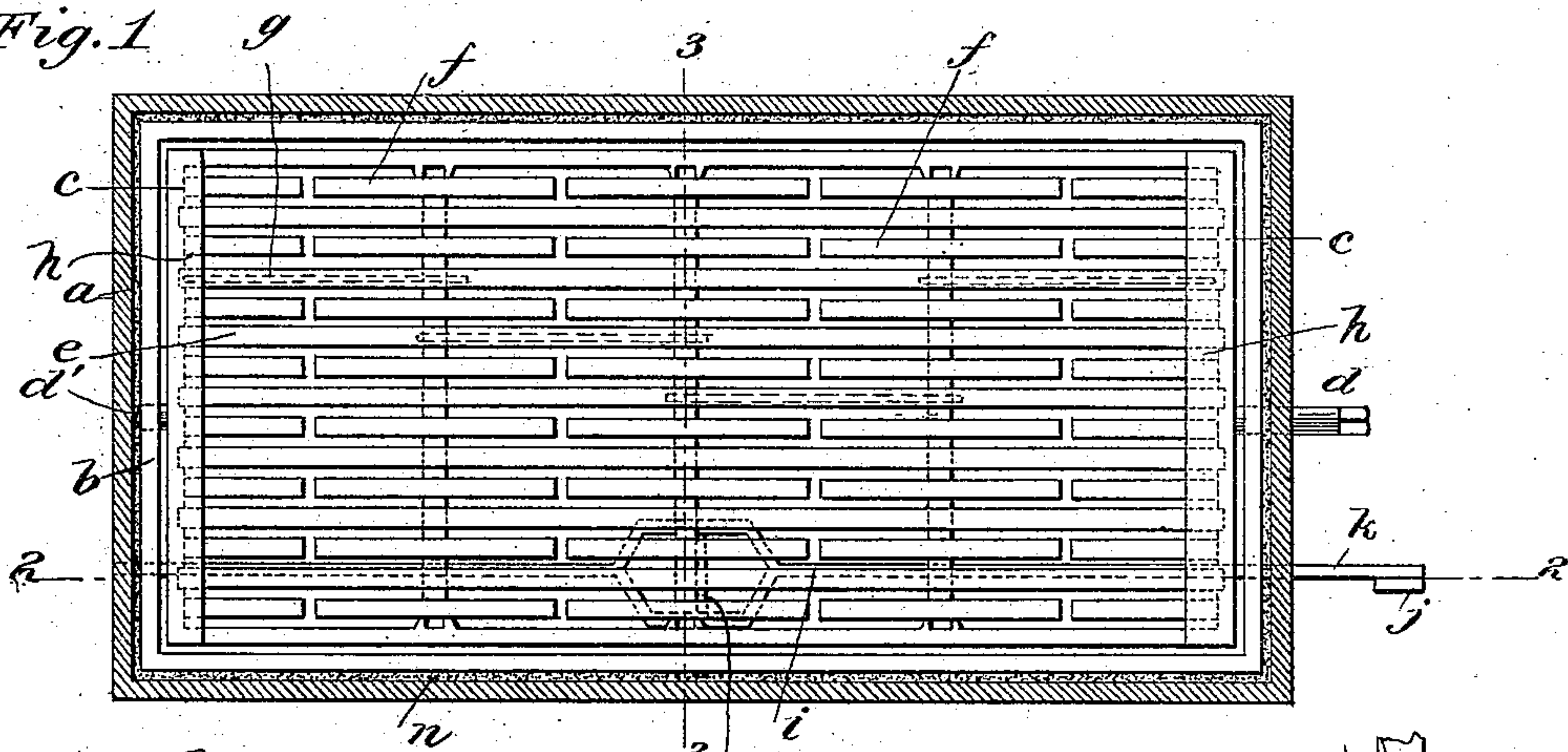


Fig. 2

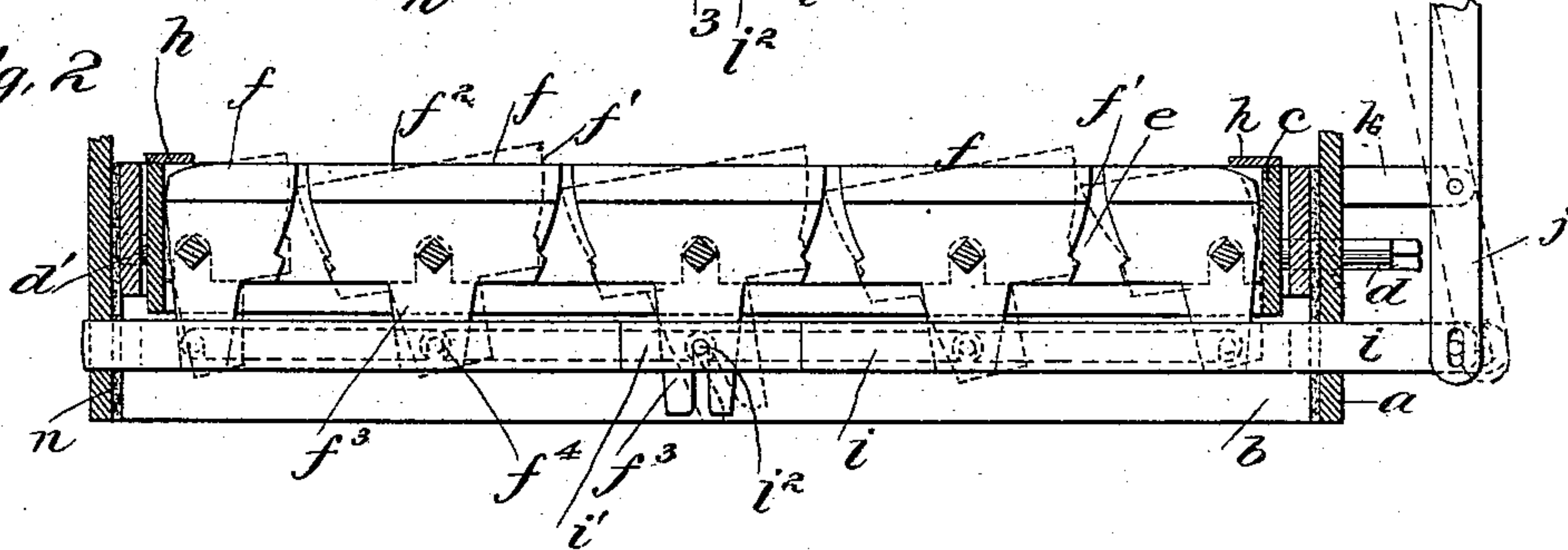


Fig. 3

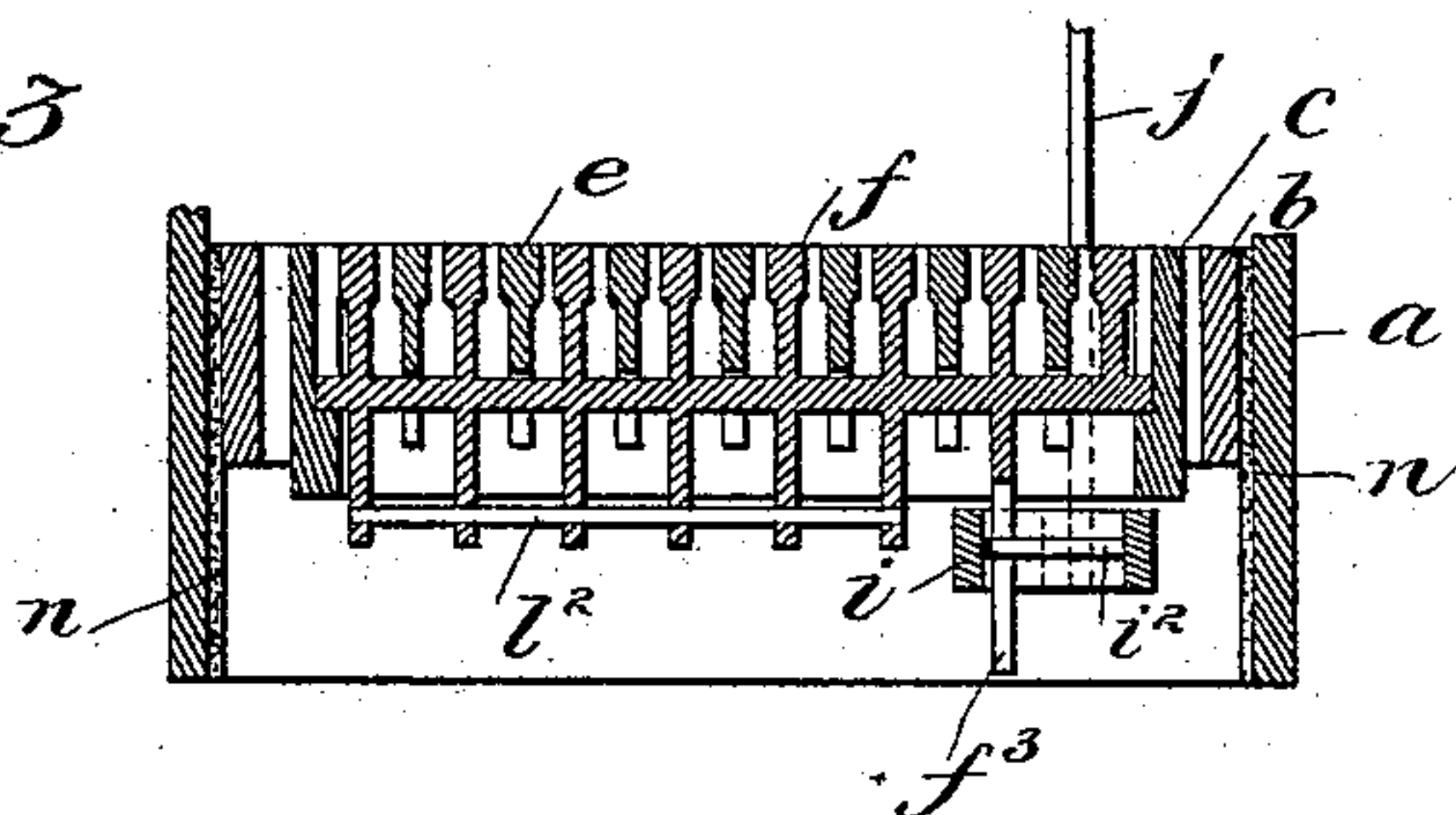
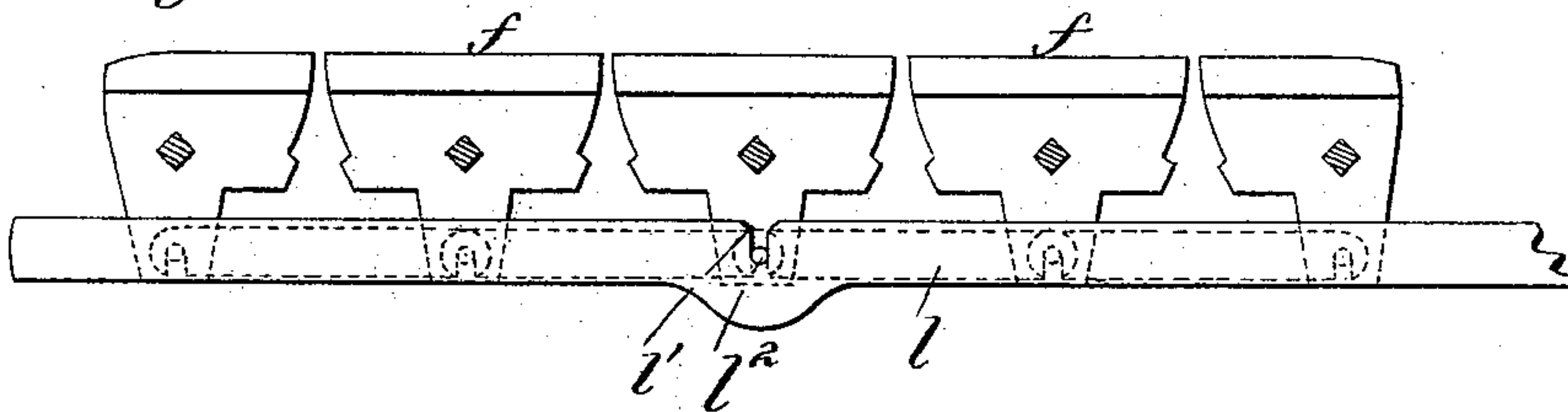


Fig. 4



Witnesses

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(No Model.)

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Fig. 5

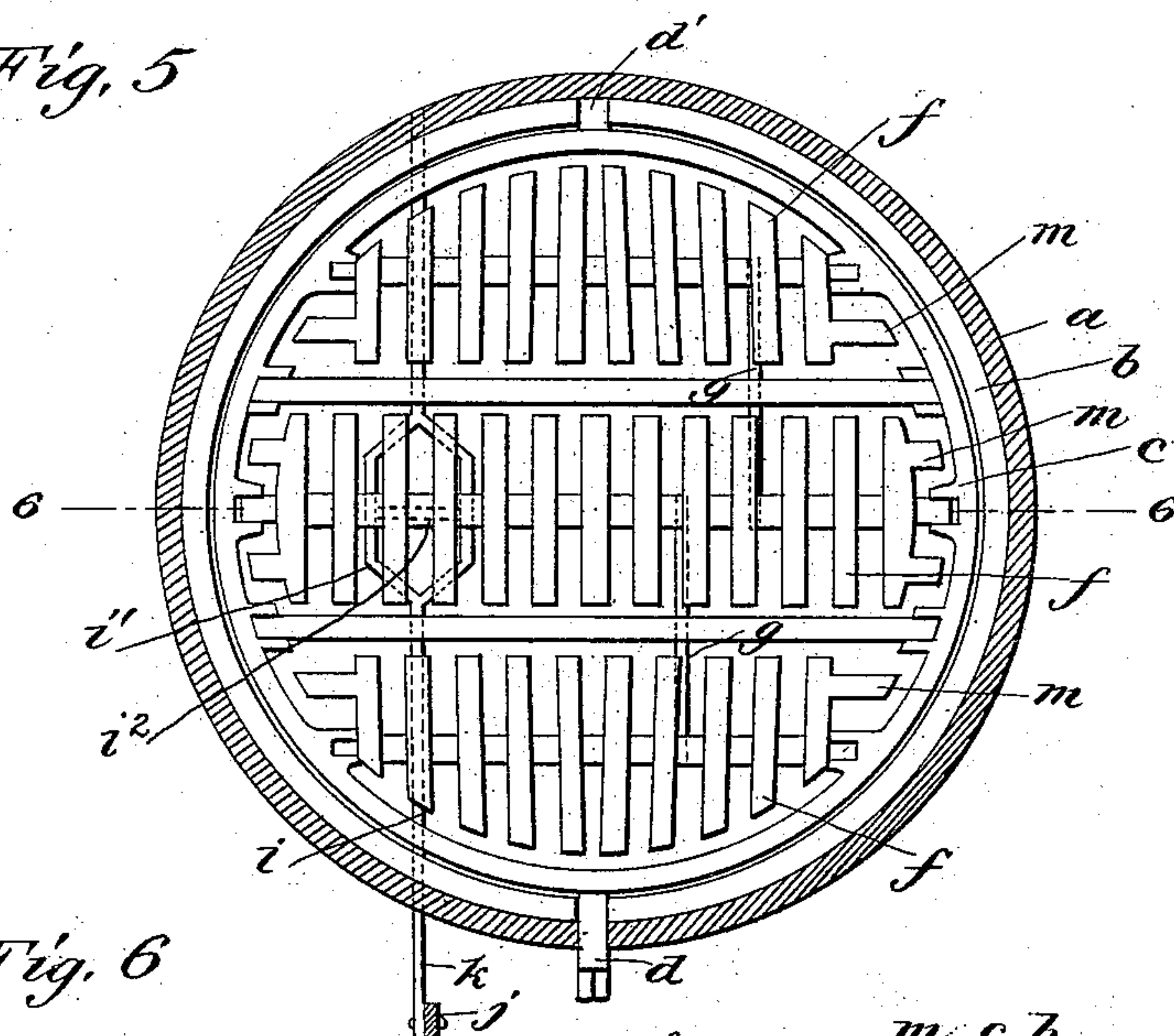


Fig. 6

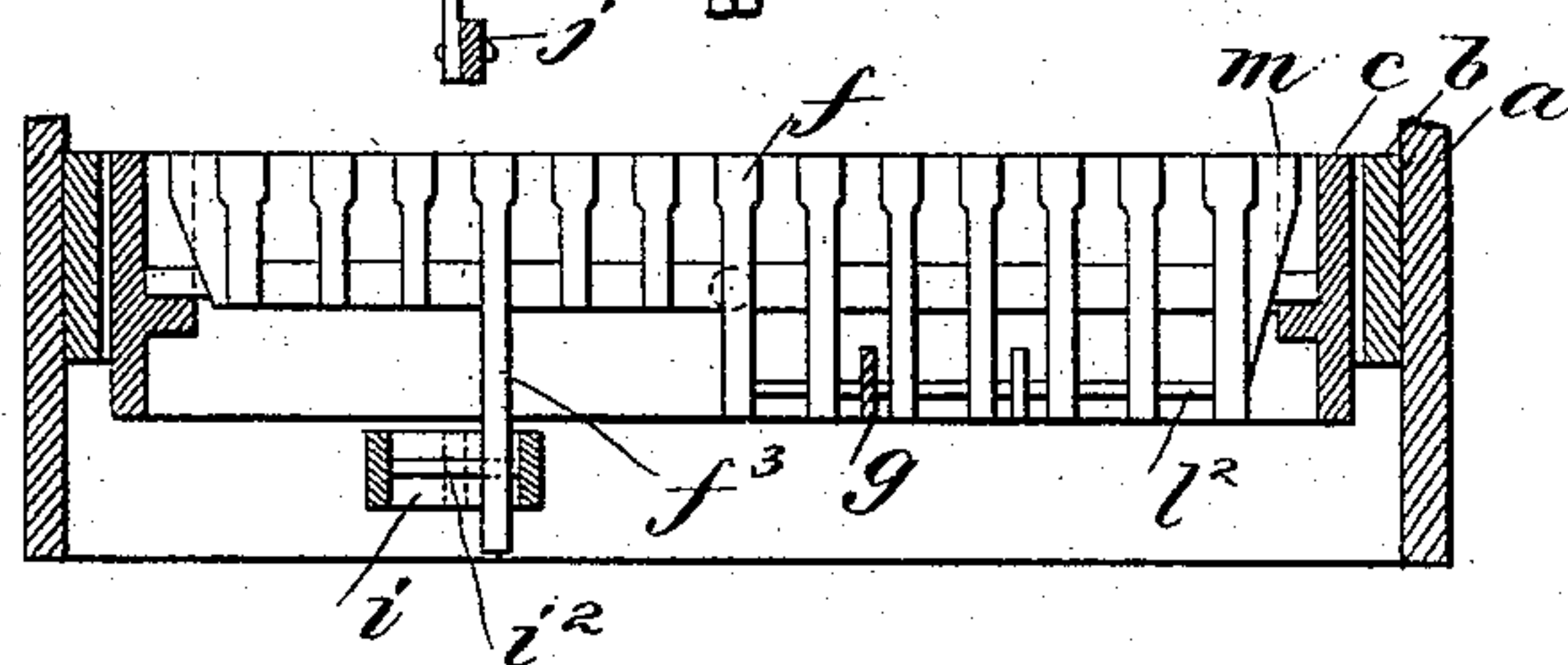


Fig. 7

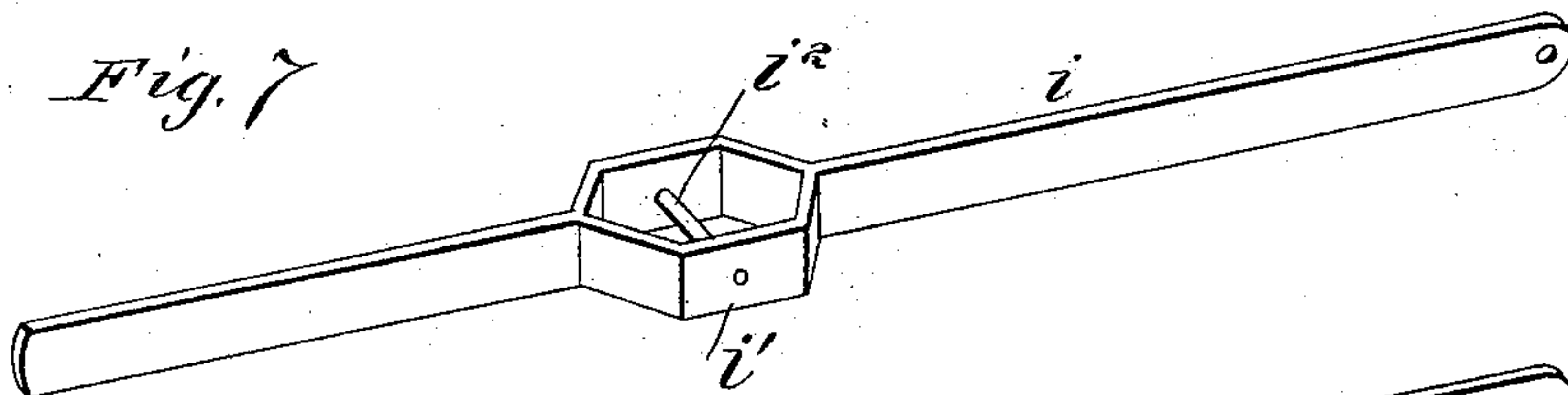
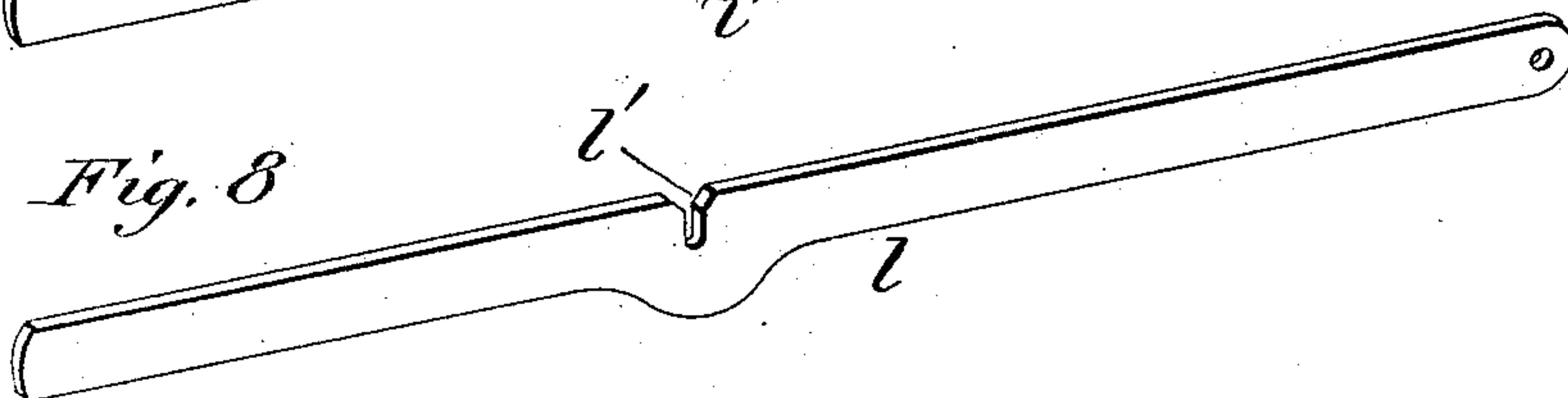


Fig. 8



Witnesses

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# UNITED STATES PATENT OFFICE.

EDWARD FALES, OF WINTHROP, MASSACHUSETTS.

## DUMPING-GRATE.

SPECIFICATION forming part of Letters Patent No. 529,066, dated November 13, 1894.

Application filed February 15, 1894. Serial No. 500,264. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD FALES, a citizen of the United States, residing at Winthrop, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Dumping-Grates, of which the following is a full, clear, and exact description.

In my application for Letters Patent for fuel support or grate, filed January 2, 1894, Serial No. 495,393, I have set forth a combination of peculiarly shaped rocking grate-bars or sections with stationary grate bars arranged in a stationary or fixed frame which may be supported in the furnace or heater in any appropriate manner.

The present invention relates to a construction whereby a grate such as that set forth in the said application, or a grate of analogous construction, may be dumped as well as shaken in order to remove the ash and cinders from the bed of fuel.

In the present invention, the grate bars are supported in a suitable frame, and this frame is pivoted within a box, and the said box is arranged within the cylinder or shell of the heater, and the grate bar frame is provided with a journal or arbor, which is accessible from outside of the heater for the application of a crank, handle, shaker, or other device for tilting or tipping the grate upon its axis in order to dump it; and the shaking bar is detachably connected with the rocking bars of the grate at one side of the axis, so that when the grate has been dumped and returned again to the horizontal position, the grate bars will automatically engage with the shaking bar in order to put them in position to be shaken for riddling the fire.

For purposes of illustration, I have shown the present invention as applied to a shaking grate of the same general character as that shown in my application aforesaid, but I do not mean to be understood as thereby limiting the present invention to its use in connection with a grate of the character described in the aforesaid application, but mean to be understood as including within my invention all applications of which it is susceptible.

Having thus stated the principle of my in-

vention, I will proceed now to describe the best mode in which I have contemplated applying that principle, and then will particularly point out and distinctly claim the part, improvement or combination which I claim as my invention.

In the accompanying drawings illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is a plan view of an angular grate. Fig. 2 is a longitudinal section taken in the plane of line 2—2, Fig. 1. Fig. 3 is a transverse section taken in the plane of line 3—3, Fig. 1. Fig. 4 is a longitudinal section similar to Fig. 2, showing a modified form of shaking bar. Fig. 5 is a plan view of a circular grate. Fig. 6 is a transverse section taken in the plane of line 6—6, Fig. 5. Fig. 7 is a perspective view of the form of shaking bar shown in Figs. 1, 2, 3, 5, and 6; and Fig. 8 is a perspective view of the form of shaking bar shown in Fig. 4.

$\alpha$  may represent the external casing, jacket or fire pot or combustion chamber of a furnace or other heater. Within this device  $\alpha$  is arranged a similarly shaped frame  $b$  which may be made to fit the device  $\alpha$  more or less closely; and within this frame  $b$  is arranged another frame  $c$ , upon a longitudinal axis composed of the journals  $d$  and  $d'$ , the journal  $d$  being extended through or into the device  $\alpha$  and having its end squared to receive a crank or handle or other operating device, or such operating device may be applied permanently to such journal  $d$ , both of these forms being old and well known. Both of the journals  $d$  and  $d'$  have bearings within the frame  $b$ .

As illustrated in Figs. 1, 2, 3, and 4, the grate proper is composed of continuous longitudinal fixed bars  $e$ , supported in the frame  $c$  and series of parallel rocking bars  $f$  supported transversely in the frame  $c$ . As in the application referred to, so here, the rocking bars  $f$  will have their adjacent aligned edges curved so that as the said bars are rocked their said aligned edges will always preserve a uniform distance from one another and thus prevent the entrance of refuse between the said bars. These bars  $f$  are also provided with the flat upper surfaces  $f^2$ , and the said bars are of proportionately great depth so as



to afford an extended heating surface by means of which the air fed from below through them up into the fuel is heated before reaching the fuel. These rocking bars  $f$  have depending lugs  $f^3$  which are connected by cross-bars  $f^4$  and the several series of rocking bars are connected by means of the longitudinal links  $g$ , shown in dotted lines in Fig. 1, so that motion imparted to one of the series of rocking bars will be transmitted thence to all the others of the series that may be connected in series. The end series of rocking bars  $f$  have their edges next to the frame cut away and fitted closely to said frame so that there may be a practically continuous support for the fuel from end to end of the frame; and in order to cover the space between the ends of the frame and the ends of the end bars  $f$  to prevent the entrance of refuse or the undue escape of fuel, cover-plates or spurs  $h$  may be arranged crosswise of the frame  $c$  above the ends of the rocking bars. One or more of the series of rocking bars may have their depending lugs  $f^3$  considerably elongated and slotted longitudinally, as indicated at the center of Fig. 2, and as clearly shown in Fig. 3, and with one or the other of such elongated end lugs is engaged the shaking bar  $i$ . This shaking bar extends beneath the frame  $c$  longitudinally of the grate and parallel with its axis and is provided with a loop  $i'$ , Fig. 7, and a pin  $i^2$ , with which pin one of these elongated slotted end lugs engages. This shaking bar  $i$  may be given a longitudinal movement in any suitable manner, as, for instance, by means of a lever  $j$  pivoted to a projection  $k$  from the heater and adapted to be vibrated upon its pivot.

As will be understood, by the longitudinal movement of the shaking bar  $i$ , the various grate bars  $f$  are rocked, as indicated by the full and dotted lines, to riddle the fire. By the application of a rotary motion to the journal  $d$  the grate may be tilted or dumped upon its axis away from the shaking bar, as indicated by the dotted lines in Fig. 3, the slotted end lug freely leaving the pin  $i^2$  of the shaking bar for this purpose. When the grate has been dumped and returned to the horizontal position, the slotted end lug finds its contact and engagement with the pin  $i^2$ , and thus the grate is restored into shaking engagement with the shaking bar in a very simple and expeditious manner.

Instead of the looped shaking bar, shown in Figs. 1, 2, 3, and 7, I may employ a straight shaking bar, as shown in Figs. 4 and 8, and this straight shaking bar  $l$  is provided with a notch or notches  $l'$ , with which a pin  $l^2$  or the cross bar  $f^4$  of the rocking bars engages.

In Figs. 5 and 6, I have shown my dumping shaking grate applied in a circular heater, and in this form of grate either the looped shaking bar or the straight notched shaking bar may be employed, as desired. The rocking bars will be modified to the extent of having the end series made of different lengths

on the outside, so as to conform to the circle of the heater or the frame within the heater; and in order to fill up the intermediate spaces lateral lugs  $m$  may be provided.

As indicated in Fig. 6, the end lugs of the rocking bars on that side of the grate on which the shaking bar is arranged may be omitted from all of such rocking bars except one, in order to avoid any obstruction with the frame or the shaking bar in the tilting or dumping of the grate. It will be observed of Figs. 5 and 6, that the stationary bars are arranged transversely of the grate, that is to say, parallel with the rocking bars, but it is obvious that they may be arranged as in the angular grate.

In the angular as well as in the circular grate the grate-supporting frame  $c$  may be provided with inwardly-projecting fingers or lugs  $o$  common in many forms of grates; and in this connection I wish to be understood as not limiting my invention to any of the accessories of grates now in common use which are applicable in connection with my combined shaking and dumping grate.

It will be observed that when the frame  $c$  in which the grate bars are arranged is vibrated the superposed fuel is agitated, and thus the said frame may be made to assist in shaking the fuel as well as performing its function of dumping the grate.

The outer box or frame  $b$ , as already stated, is fitted tight to the shell or other portion of the heater; and in order to render the joint air-tight, it may be packed with any refractory substance. This construction will obviate the passage of cold air into the fuel or combustion chamber at this point and divert the air from the outer shell of the furnace toward the grate and between the frame of the grate and the outer box; and inasmuch as the outer frame forms a ledge on a level with the fuel-receiving surface of the grate, the fuel will rest upon such ledge as well as on the grate. The air, therefore, instead of passing upwardly into the fuel along the wall of the combustion chamber, passes around the box and between the box and the frame of the grate and thence over the ledge before it can reach the walls of the combustion chamber. The temperature of the air, therefore, is increased and maintained practically uniform by passing over this ledge before it reaches the combustion chamber above the coal, and hence combustion is actively and uniformly maintained.

By my construction the formation of cinders or clinkers is practically prevented and the fuel is entirely consumed or reduced to ash, and so the full value of the fuel is obtained.

In Figs. 1, 2, and 3 I have shown the inner box or box frame arranged in the shell with an intermediate packing  $n$  of plastic, refractory or other suitable air-tight substance, while in Figs. 5 and 6 I have shown these parts as fitted tight. I do not limit my invention in this respect to any particular means



for securing a tight joint between these two parts.

What I claim is—

5 1. A combined dumping and shaking grate, comprising a box or outer frame, an inner frame journaled within the said box or outer frame and adapted to be tilted or rotated upon such journals within the frame, rock-  
10 ing bars arranged within said tilting frame and provided with a suitable number of depending lugs, means to connect such lugs to cause all of the rocking bars to move together and a shaking bar arranged beneath  
15 said rocking bars in fixed bearings and in separable connection with one of the said depending lugs, to rock all of said rocking bars and permit the tilting frame to be tilted into and out of contact with it, the said shaking bar, substantially as described.

20 2. A combined dumping and shaking grate, comprising a box or frame adapted to be arranged within a heater, a grate-supporting frame pivoted within said box or frame and adapted to be tilted or rotated upon such  
25 pivot, rocking grate-bars pivoted within said pivoted frame, a slotted end-lug depending from one of said rocking bars, and a shaking bar arranged for longitudinal movement be-

neath the said grate and having a loop into which the depending lug projects and a pin 30 which is in separable connection with the slot in said depending lug, substantially as and for the purpose described.

3. The combination with the shell or outer wall of a heater, with an internal box arranged 35 within the fire pot or combustion chamber and terminating in a ledge within the combustion chamber, upon which ledge a portion of the fuel rests, and a grate frame and grate arranged within said box, the box and shell 40 or outer wall of the heater being joined airtight, below the ledge and the fuel-receiving surface of the grate whereby the air is diverted from the shell and passes between the box and the grate frame and thence over the 45 ledge before reaching the walls of the combustion chamber and its temperature increased and maintained, substantially as described.

In testimony whereof I have hereunto set 50 my hand this 14th day of February, A. D. 1894.

EDWARD FALES.

Witnesses:

WM. H. FINCKEL,  
HARRY Y. DAVIS.