

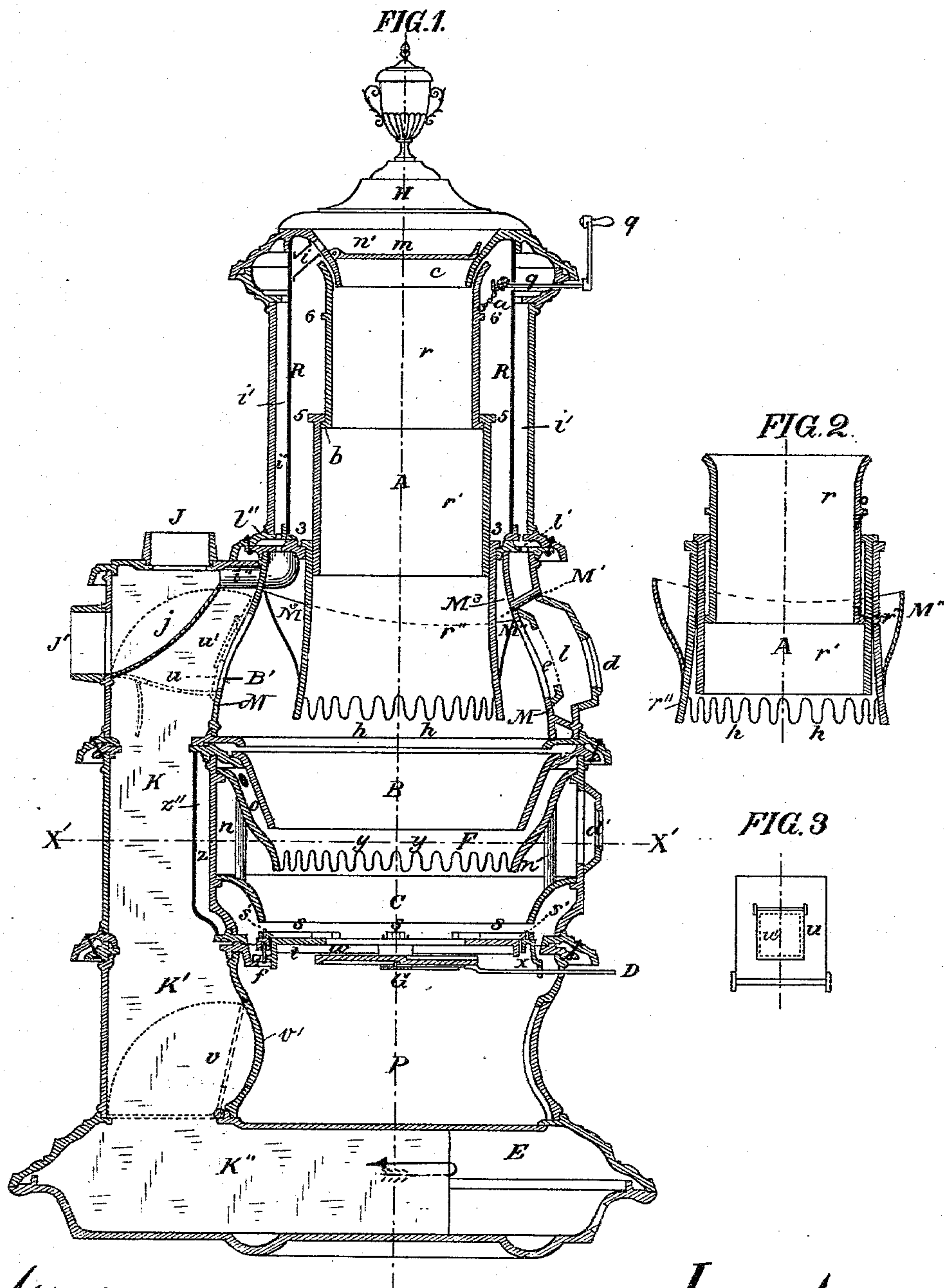
(No Model.)

3 Sheets—Sheet 1.

S. H. LA RUE.  
COAL STOVE.

No. 286,315.

Patented Oct. 9, 1883.



Attest:

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Holmes & Co. La Rue

Inventor:

Silas Huffman La Rue

(No Model.)

3 Sheets—Sheet 2.

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FIG. 4.

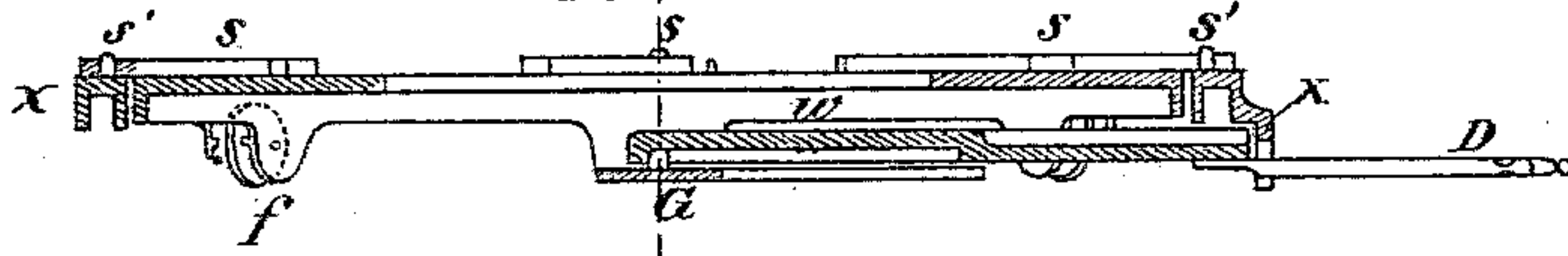


FIG. 5.

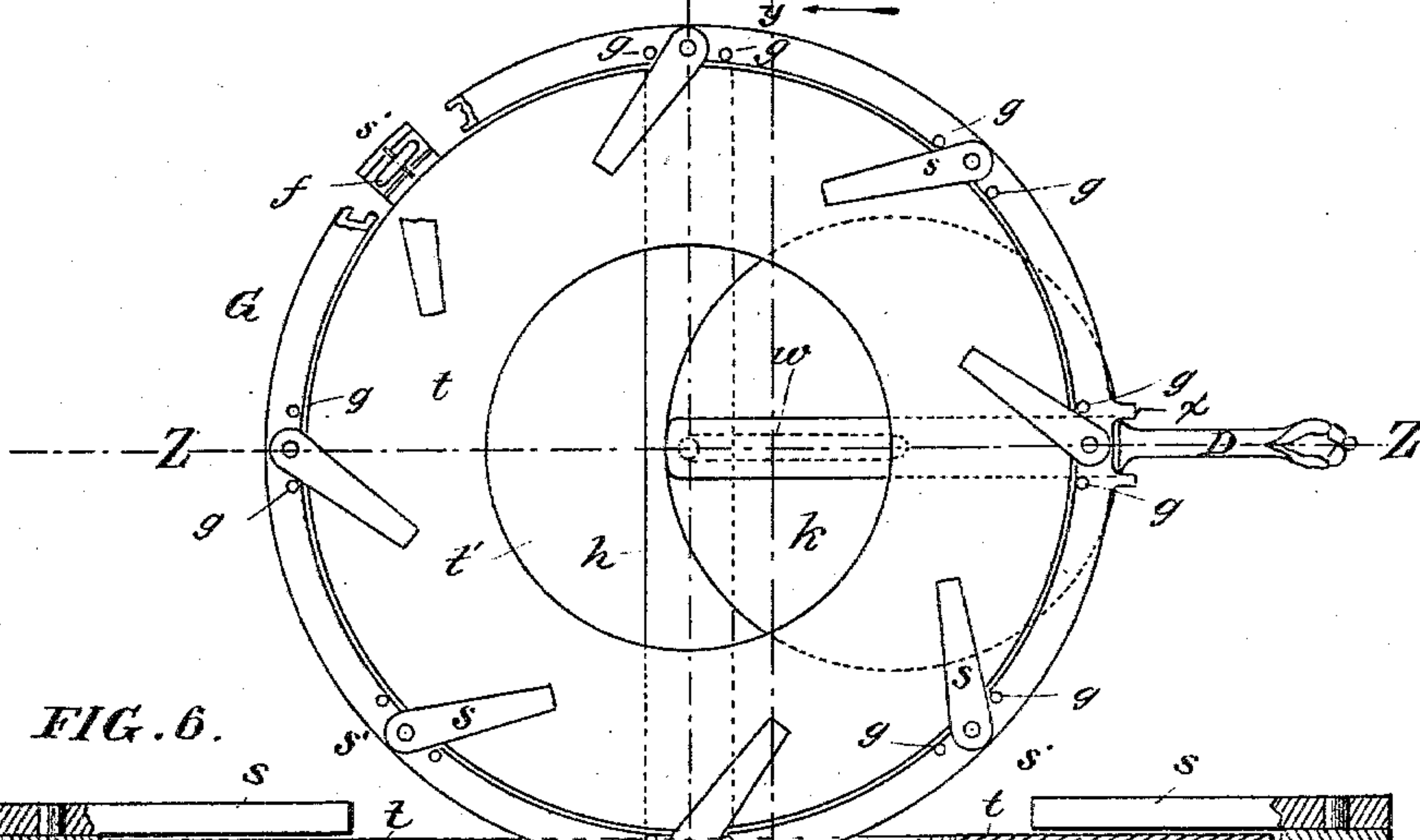


FIG. 6.

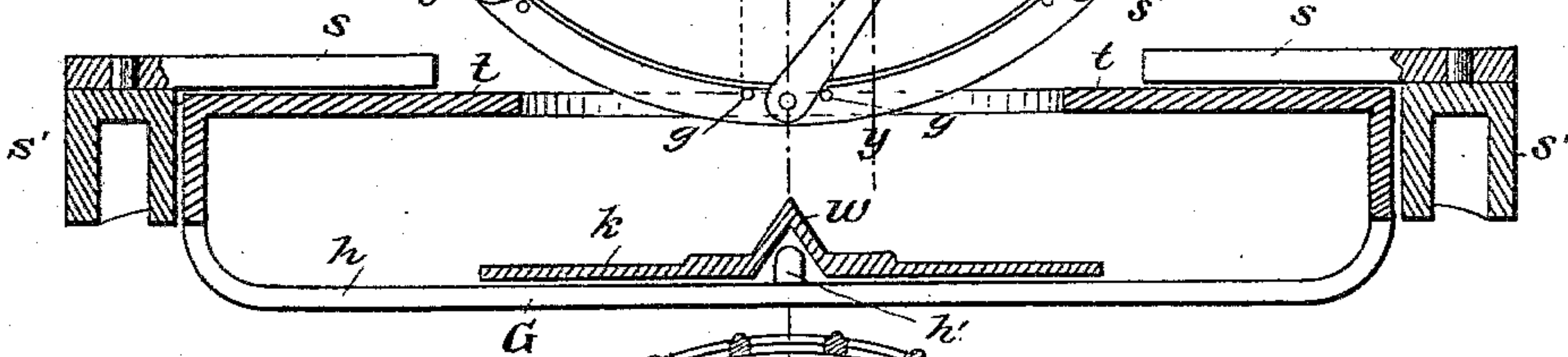
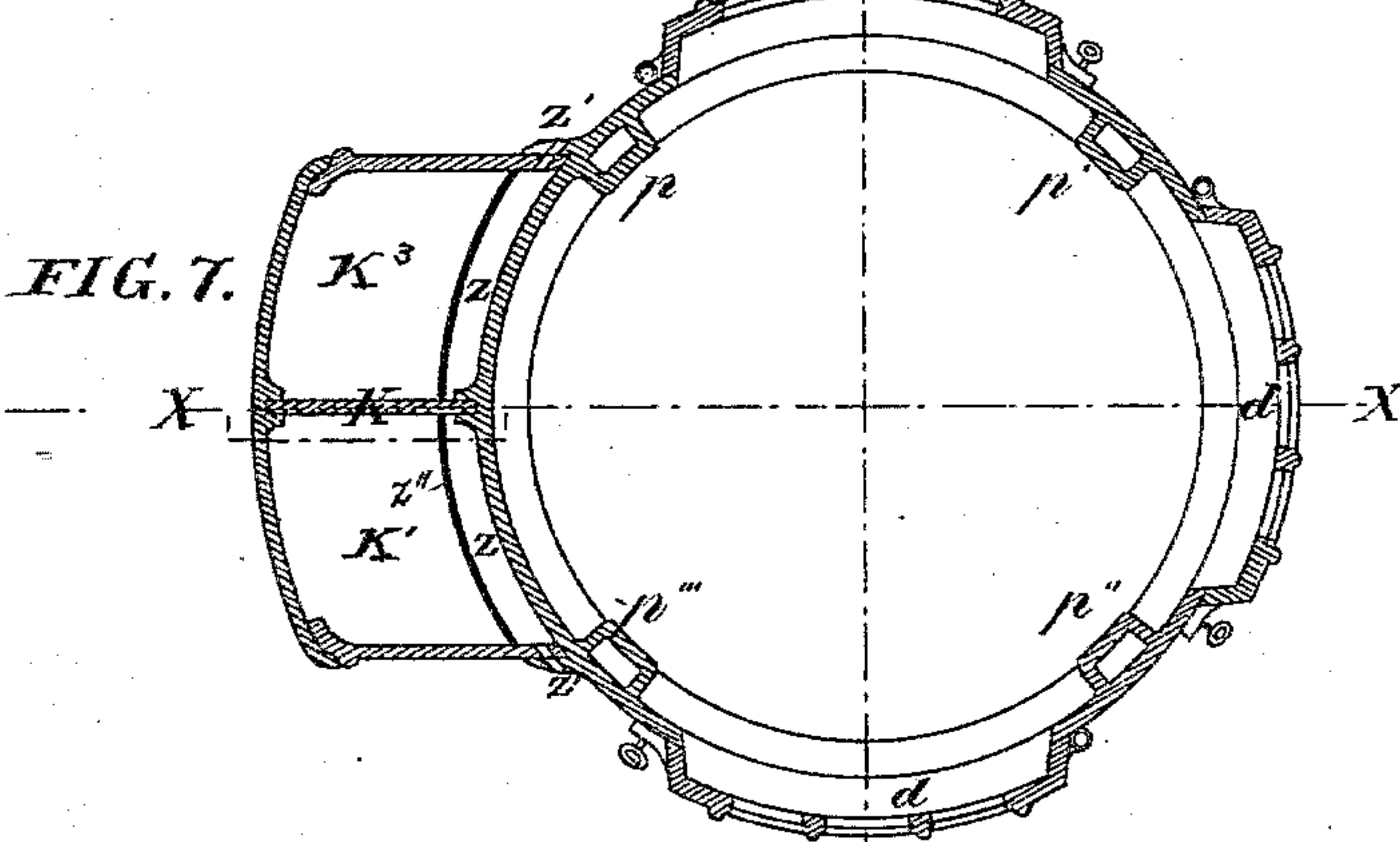


FIG. 7.



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(No Model.)

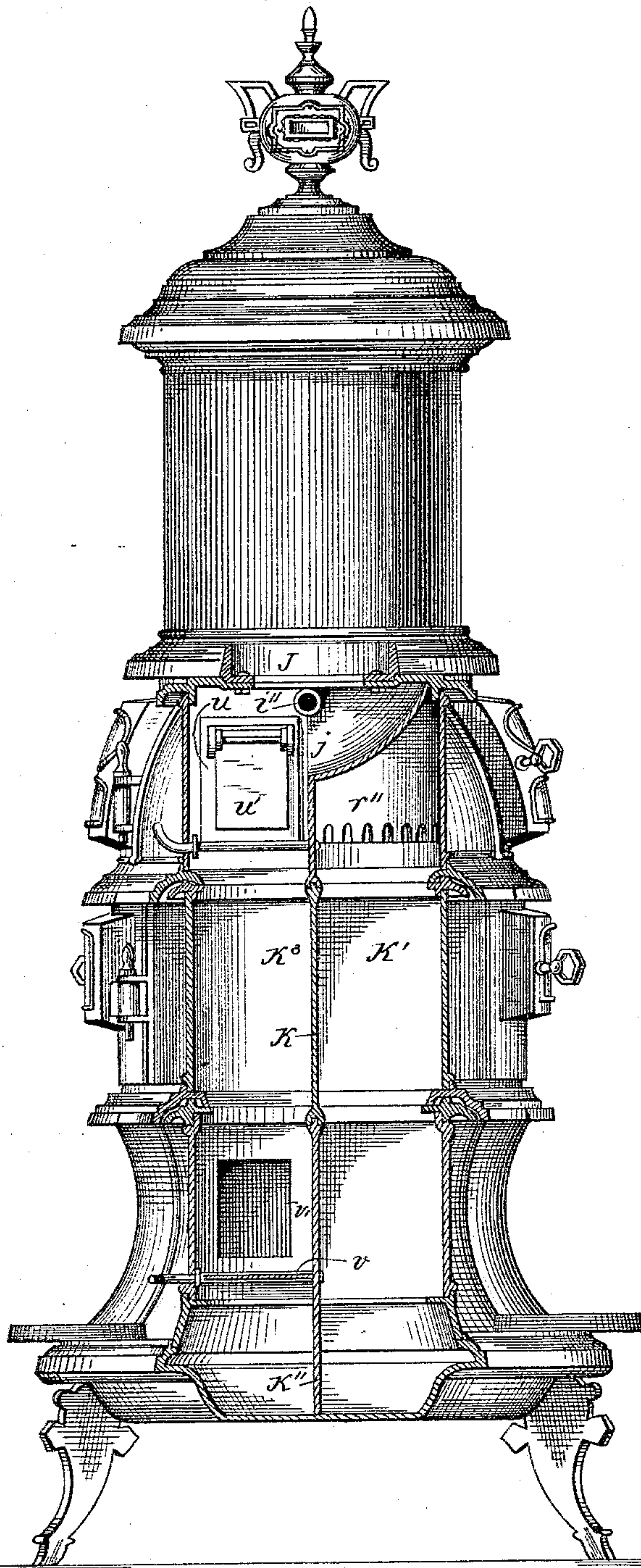
3 Sheets—Sheet 3.

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Fig. 8.



WITNESSES

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# UNITED STATES PATENT OFFICE.

SILAS H. LA RUE, OF FRENCHTOWN, NEW JERSEY.

## COAL-STOVE.

SPECIFICATION forming part of Letters Patent No. 286,315, dated October 9, 1883.

Application filed April 14, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, SILAS HUFFMAN LA RUE, a citizen of the United States, residing at Frenchtown, in the county of Hunterdon, in the State of New Jersey, have invented certain new and useful Improvements in Coal-Stoves, of which the following specification is a full, clear, and exact description.

My invention relates to heating apparatus adapted for the employment of either hard or soft coal or coke; and the invention consists in means for insuring the descent or proper feeding of the fuel; also, in means for carrying off the gas from the stove and the absolute prevention of its escape into the apartments, whether the stove be under full draft or "banked;" also, of means for regulating and directing the escape of the products of combustion; also, in means for supplying air in a warm condition to the zone of intensest combustion, and, also, in improvements in means for discharging the exhausted fuel, ashes, and clinkers, all substantially as hereinafter specifically set forth and claimed.

In the accompanying drawings, illustrating my invention and forming part hereof, in the several figures of which like parts are similarly designated, Figure 1 is a vertical section on line XX of Fig. 7 of a magazine-stove embodying the features of my invention. Fig. 2 is a vertical longitudinal section of the telescopic magazine. Fig. 3 is a plan of my safety-valve damper for insuring the exit of the gases through the smoke-flue. Fig. 4 is a cross-section of the grate, taken on line ZZ of Fig. 5. Fig. 5 is a top plan view of my grate. Fig. 6 is a cross-section on line YY, Fig. 5, looking in the direction of the arrow, of the grate, the scale of drawing being enlarged. Fig. 7 is a horizontal cross-section on the line X' X' of Fig. 1, looking down, and with the grate and fire-pot removed; and Fig. 8 is a rear elevation of the stove with the back wall covering the flues broken away.

The letter A designates my improved magazine. It is composed of sections, the upper one or ones of which telescope into the lower, which latter is stationary. The upper section, *r*, is adapted to receive the mouth of the funnel *c*, and is provided with a chain, *a*, connected with a winch, *q*, which latter has a

bearing in the stove-shell—say in its cap-plate—and may be held in any given position in any usual manner. The section *r* has at its lower end an external flange or rim, *b*, and at or near its upper end a similar flange or rim, 6, for purposes hereinafter explained. If three sections or more be used, the next section, *r'*, if it terminate in the lowermost or fixed section, will have a T-head, 5, under the inner member of which the flange of the upper section takes to hold the two together in lifting and when raised, and its bottom will be straight or flangeless and fit in the lowermost section.

The lowermost section, *r''*, rests permanently on a joint of the shell, and is provided with a flange, 3, for this purpose. When lowered, the uppermost section will drop into the next, and be held by its flange 6, resting on the head of the lower section, which latter will drop into the lowermost section, and be supported therein by the outer member of its head resting on the head of the last, substantially as shown in Fig. 2. In dropping or lowering the magazine the section *r'* will descend first, and thus move the fuel that may have stuck in the lowermost section by reason of the expansion of such fuel, and then the top section similarly clears the next.

It is a well-known fact that it is very difficult, and well nigh impossible, to feed soft coal in ordinary magazine-stoves, by reason of its expansion. By my telescopic magazine I am enabled to positively move the coal, however it may be expanded, and to thus insure the proper feed of the same. Two or more sections may constitute my magazine. It will be noticed that the lowermost member of my magazine is stationary, and hence in the moving of the sections this member and the zone of combustion are undisturbed, and the fire, hence, will not be subjected to any other than a proper treatment. This constitutes a very essential point in my construction of stoves. The lower section, *r''*, may be outwardly flared or bell-mouthed at its lower end, so as to aid in the discharge of the fuel, and also to increase the area of fresh combustible fuel, and is provided with the usual fingers, *h h*. The magazine is removable in any ordinary manner.

R is a wall arranged about the magazine,



and forming a dead-air space about it, so as to prevent it becoming unduly heated. A chamber, *i*, is formed between this wall and the shell of the stove, which chamber communicates by pipe *i* with the chamber *m'* between the top and cover of the magazine, by openings *l'* with the gas-chamber *l* between an inner skin and the shell of the stove, and by openings *l''* and pipe *i''* with the draft-flue to exhaust the stove of gas. The lower end of the lowermost section of the magazine may be provided with a hood, *M''*, to prevent rise of the heat about the magazine, and to aid in the deflection and control of the gases. This hood also forms about the lower end of the magazine a chamber, *M'*, which subserves a purpose similar to the dead-air spaces surrounding the upper sections of the magazine; and to increase its efficiency in this respect, it may communicate, as by pipes *M'*, with the external atmosphere. By this provision of dead-air spaces, or a cooling-chamber surrounding the magazine, that member of a stove is protected against deterioration and burning, and where a telescopic magazine is employed it prevents such a warping of the sections as would render them difficult of operation.

The smoke-box is provided, as usual, with the partition *K*, which is extended into the draft-chamber *E* at *K''*, and makes a divided flue thereof, and these divisions constitute, respectively, the diving or down and return or up flue. The down flue *K'*, facing in Fig. 1, has a hood, *j*, thrown across it, whereby it is shut off from the exits *J J'*, so that the draft shall always be down said flue, around the wall *K''*, and up and out the other flue, *K''*, through the exits *J* or *J'*. The gases, however, that get into the chamber *i'* will be drawn directly through the pipe *i''* into the exit, and so be conducted away. The gases that may escape into and ascend the magazine enter the chamber *i'* by passing around the edge of the cover *m* through the pipe *i*, and as said magazine and the chamber above it are thus in direct line of draft, the escape of the gas is largely promoted.

The fire-pot is surrounded by a skin, *M*, provided with mica or tin doors *e*, perforated or not. The outer shell is provided with two tiers of mica doors, *d d'*. The gas that escapes about and through the doors *e* is caught in the chamber *l*, before referred to, and escapes thence into the chamber *i'*, and is drawn out with the smoke.

*B'* is the outlet from the combustion-chamber into the down flue *K'*, said outlet being simply an opening in the skin *M*.

In the rear part of the skin *M* in the uptake-flue *K''* is a door or damper, *u*, hinged at its lower end, and of a width and height to close the up flue when lowered, as shown in dotted lines in Fig. 1. In this door is arranged a flap, *u'*, hinged at its upper end to open outwardly from the fire-pot and to close automatically against the door *u*. This flap performs the functions of a safe-

ty-valve, and is so referred to herein. The door *u* serves as the direct-draft damper, and it is so hinged as to be held both in the open and closed positions by gravity. The safety-valve, for convenience herein shown in this damper, will be located preferably in the shortest passage to the exit-flue, and it is essential that its location and arrangement be such that when the direct damper is closed this safety-valve may automatically, with even a slight pressure of the gases of combustion, open into the exit-flue and permit the escape of such gases. In this manner the drafts of the stove may be closed and the fire practically banked or allowed to smolder, and yet the safety-valve will act perfectly to permit the escape of products of combustion under their pressure, so when lively combustion is desired, if the safety-valve be in the direct damper, and such damper be dropped, as shown in dotted lines in Fig. 1, the safety-valve will automatically open and permit the proper travel of the draft. The return (uptake) flue is provided with the damper *v*, to shut off said flue from draft around the base. In this flue is also arranged a dust damper or slide, *v'*.

I wish it to be understood that I do not limit the application of my safety-valve to the precise construction and combination herein shown, as it is of general utility in all classes of heating apparatus where provision must be made for the escape of the gases of combustion into the smoke or exit flue. I do not herein claim this safety-valve, broadly, but reserve the right to hereafter make application for Letters Patent therefor. I do, however, herein claim this safety-valve arranged between an exit-flue and a combustion-chamber, and combined with an independent gas-flue, composed in this instance of the chambers *l* and *i'*, and opening at a point beyond the damper, whereby the stove is exhausted of gas automatically, irrespective of the state or condition of the usual dampers, for by this combination I am enabled in this class of stoves to get the results hereinbefore mentioned.

By my provision of the telescopic magazine, which is self-clearing, it will be seen that the feed of the magazine is positive and entirely under control from the outside without opening the stove at any point. There is no combustion within the magazine for any considerable distance above the fingered end thereof. It is kept from undue heating and the evils resulting therefrom, and, being put in the line of draft by the tube *i* and chamber *i'*, is exhausted of overpressure of all gases arising therein.

The fire-pot is composed of the shells *B* and *F* and the ring *C*. The shell *B* is removably suspended below the discharge end of the magazine, and the shell *F* suspended below it in such manner as to leave a space or chamber, *o*, between the two. This shell *F* is provided with fingers *y y*, and the said shell *F* and ring *C* are connected by vertical tubes *n*,



which, it will be noticed, are located in the border of the zone of intensest combustion, whereby the air passing through them is well heated. The ends of these tubes *n* open, respectively, below the ring C and above the shell F, and conduct air from the grate-space through the combustion-zone, where it is heated, and discharge it into the chamber *o*, where it is further heated, and then fed into the bed of practically incandescent fuel. It will thus be seen that the fire is not at any time subjected to the chilling effect of the inflow of cold air, and hence the radiated heat will be more intense. The pipes *n* may take the air from the ash-pit also, or may at their lower ends open outside the stove to take the air-supply direct from the atmosphere. The rear wall of the fire-pot is protected from overheating by the admission of external air into chambers *z* through openings *z'*, these chambers *z* being formed by shells *z''* (see Figs. 1 and 7) arranged within the smoke-flue.

The chambers *z'* and *l* may, when suitable fuel is used, be utilized as an air-heating drum, from which the air may be discharged, as by a pipe, into another room.

The cover or top H of the stove may be of ordinary construction, as in magazine-stoves.

The cover *m* of the magazine is hinged, as usual, and when raised to permit the supplying of fuel said cover is turned back and covers the tube *i*, thereby preventing the escape into said pipe of particles of fuel.

P is the ash-pit, and E the base of the stove, air-being supplied in accordance with any approved plan.

The grate G, that I find acts most satisfactorily with this form of stove, is composed of a ring, *s'*, of  $\Gamma$  shape, supported upon rollers *f*, the axes of which rest in lugs on an annular flanged disk, *t*, which disk in turn is supported upon projections or brackets *p p' p'' p'''* from the shell of the stove, or otherwise suitably sustained stationarily, and is arranged within the ring *s'*. The ring *s'* has pivoted to it a number of fingers, *s*, limited as to their vibration by pins *g g* on the revolving ring *s'*. The disk *t* constitutes, with the ring C and plate K, the fire-bed, and the vibration of the fingers *s* serves to clear this bed of clinkers, ashes, &c., and to throw the same through the center opening, *t'*, of said disk. The movement of the ring *s'* is effected by a handle, D, extending through and outside the stove to serve as the ordinary shaker and engaging a lug or fork, *x*, projecting downwardly from the said ring. The fingers *s*, acting positively, cut into the cinder or slag, break it up, and discharge it from the fire-bed *t*. The disk or fire-bed *t* has beneath it and parallel with it a horizontal diametric stirrup, *h*, which supports a disk, *k*, to which the handle D is attached, and said disk *k* is connected with the said stirrup by a pin, *h'*, which enters a groove formed by a diametric elevation, *w*, of the said disk. By means of the handle acting through this pin and groove

the disk *k* may receive a longitudinal or back-and-forth movement under the opening *t'* in the fire-bed *t*, to uncover more or less of said opening; but the uncovering of this opening is only necessary when it is desired to discharge any considerable quantity or all of the fuel, the discharge of the ashes, similar to the operation of "raking" a grate, being effected laterally between the disks *t* and *k*, sufficient space between the two being left for this purpose, the center of the fire resting through the opening *t'* upon the disk or plate *k*. The pin *h'* also serves as a pivot for the oscillation of the handle in operating the ring *s'*. The elevation *w* of the plate or disk *k* serves as a scatterer for the consumed fuel in the movement of the plate. The length of the groove for the pin *h'* is indicated by dotted lines in Fig. 5. By my grate the ashes are removed without danger of spilling through the doors.

Now, in the operation of my stove, where a grate is employed such as I have herein shown and described, the division of the fire-pot, the division of the fire-bed, the means for controlling the condition of the fuel thereupon, and the telescopic magazine form a combination whereby the fire is brought under absolute control. As the lower part of the coal in the magazine burns away, the upper sections descend, forcing down the fuel and preventing the adhesion of the fused portion to the walls of the magazine. The movement upward of the sections will act similarly.

The grated fire-bed, means for moving the ashes therefrom, and the ring C, extending upward from the fire-bed to the lower portions of the mica doors *d'*, constitute an effectual preventive of the accumulation of ashes near the windows, and hence admit of the retention of bright doors, unclouded by the effects of heated fuel.

I do not herein broadly claim the present form of grate of itself, but reserve the right to make a future application for Letters Patent therefor.

What I claim is—

1. A fuel-magazine constructed of telescoping sections, substantially as set forth, whereby an upper section is adapted to be moved downward within another section.

2. A fuel-magazine constructed of telescoping sections, substantially as set forth, the upper sections being adapted to slide into a lower, and all the sections being made removable.

3. In a telescoping magazine, a lower stationary section and a downwardly-sliding upper section combined substantially as described.

4. A fuel-magazine made in telescoping sections, the upper section of which is supported by means for lowering and raising the same, the next lower section of which is supported from a flange on said upper section, and the lowest section of which is independently supported.



5. A fuel-magazine made in telescoping sections, the upper section of which is supported by means for lowering and raising the same, and the lower section of which is independently supported. 5
6. The combination of the funnel *c*, a hinged inner cover, *m*, and an escape-flue, *i*, the cover being located as set forth, whereby, when it is open, it closes the escape-flue, to prevent the fuel being fed from entering said flue. 10
7. In a stove, a fire-pot having two concentric shells, B F, with an intervening space, *o*, combined with tubes *n*, arranged to convey air through the zone of intensest combustion and discharge it in a heated condition in the space *o*, at a point between the top and bottom of the shell F, whereby the combustion of the fuel is promoted, substantially as described. 15
8. In a stove, the combination, with the magazine and the outer shell, of a cylinder, R, forming with the said shell a chamber, *i*, outside the cylinder, communicating with the space above the magazine and with the exit flue. 20
9. The combination of the exit-flue, the perforated rings, the gas-chamber *l*, the chamber *i*, and the gas-escape passage *i'*, as described.
10. The combination of the shells B and F with an air-feeding chamber, *o*, between them, the ring C, a fire-bed, and conduits adapted to take air from outside the ring C to the air-feeding chamber, substantially as described. 30
11. The combination, with the magazine, of the cylinder R, arranged around the upper part of the magazine and inclosing a dead-air space between the two, and the chamber M<sup>3</sup> around the lower part of the magazine, having communication with the external air, whereby said magazine is protected throughout its entire length from extreme heat, substantially as shown and described. 35
12. The combination of the doors *d'*, adjacent to the upper members of a divided fire-pot, the frusto-conical lower member of such fire-pot, a fixed fire-bed and fingers *s*, constructed and arranged to operate, substantially as described, for the removal of ashes from the grate without opening the door, whereby the 45
13. The combination, with the rear wall of the fire-pot, of chambers *z*, communicating by inlets *z'* with the external air, substantially as and for the purpose described. 50
14. A safety-valve, between the combustion chamber and exit-flue adapted to be opened by gaseous pressure while the main damper or dampers of the stove are closed, combined with an independent gas-flue extending from the combustion-chamber to a point in the exit-flue beyond the damper, substantially as described. 55
15. The combination of a direct draft damper and a hinged safety-valve therein with the combustion-chamber, the exit flue or pipe, and a gas-flue extending from said chamber to a point in the exit-pipe beyond the damper, substantially as and for the purpose described. 60
16. The direct and indirect dampers *u v*, respectively, draft-flues K' K<sup>3</sup>, and the combustion-chamber, in combination with safety-valve *u'*, substantially as described. 65
17. The combination of a grated fire-bed, vibratory fingers *s*, for moving the ashes on the same, and a frusto-conical ring, C, extending from the plane of the grate upward to the stove wall and window, whereby the accumulation of ashes near the window is avoided. 70
18. The combination of the magazine made in telescoping sections, movable to positively carry down the fuel, the grate upon which the fuel rests, and the fingers or cutters *s*, adapted to be vibrated over the grate in the ignited fuel, to clear away the clinkers and agitate the fuel, substantially as described, whereby the fuel is positively fed and the fire kept bright. 75
19. The combination, substantially as set forth, of the flue K', provided with a hood, *j*, next the outlet J, a return-flue, K<sup>3</sup>, provided with the damper *v*, the combustion-chamber, and an automatic safety-valve arranged between said combustion chamber and the outlet, as and for the purpose described. 80
20. In a stove, the combination, with the fire-pot and grate of a fuel-magazine made in sections, the lowermost of which is fixed or stationary with relation to the combustion-chamber and the upper movable, so as to telescope within the lower, whereby the fuel is fed without disturbing the bed of ignited fuel. 85

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