J. & A. NICLAUSSE.

FURNACE GRATE.

APPLICATION FILED JAN. 2, 1907.

990,766.

Patented Apr. 25, 1911.

2 SHEETS—SHEET 1.

Fig.1.

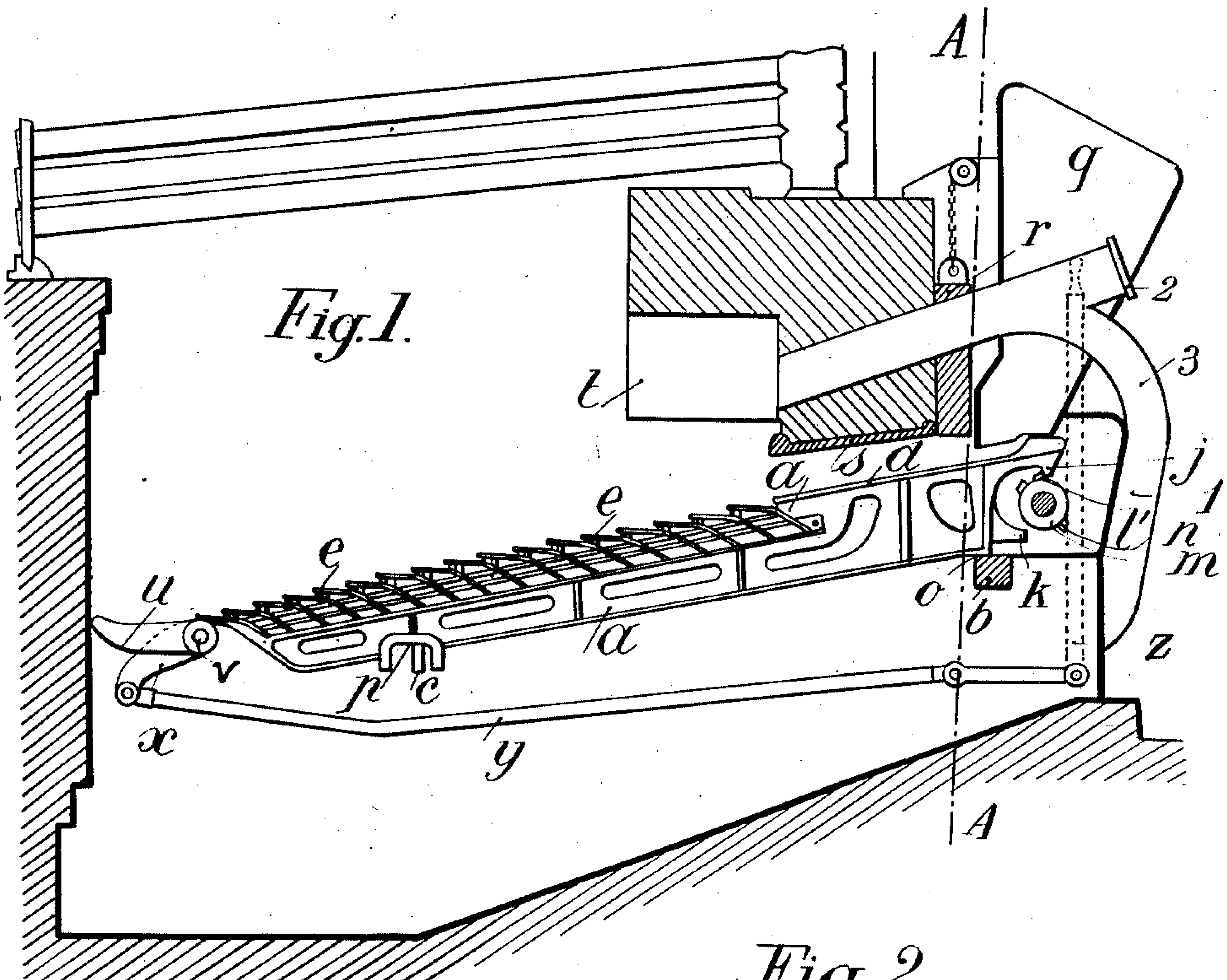
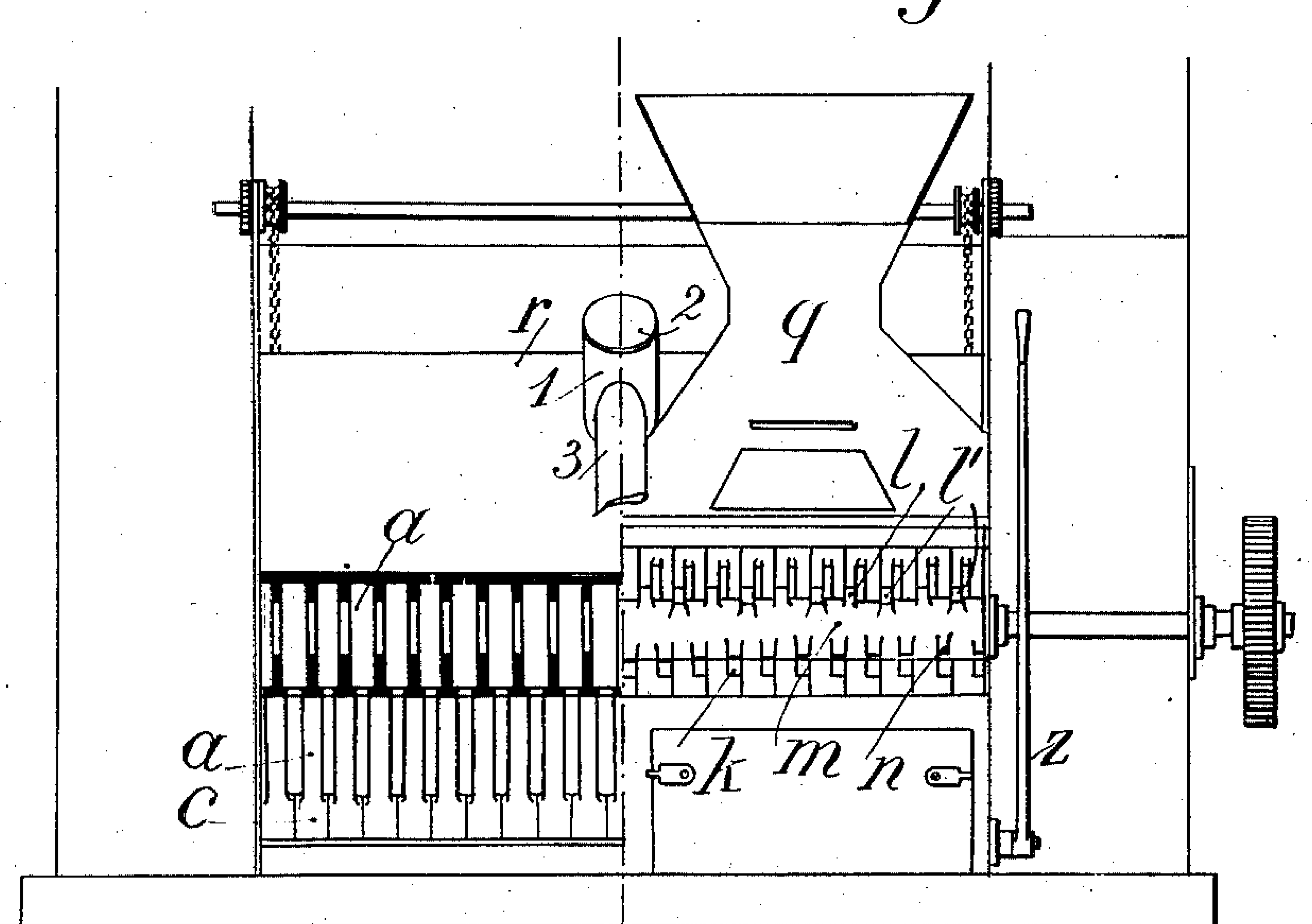


Fig. 2.



Witnesses:
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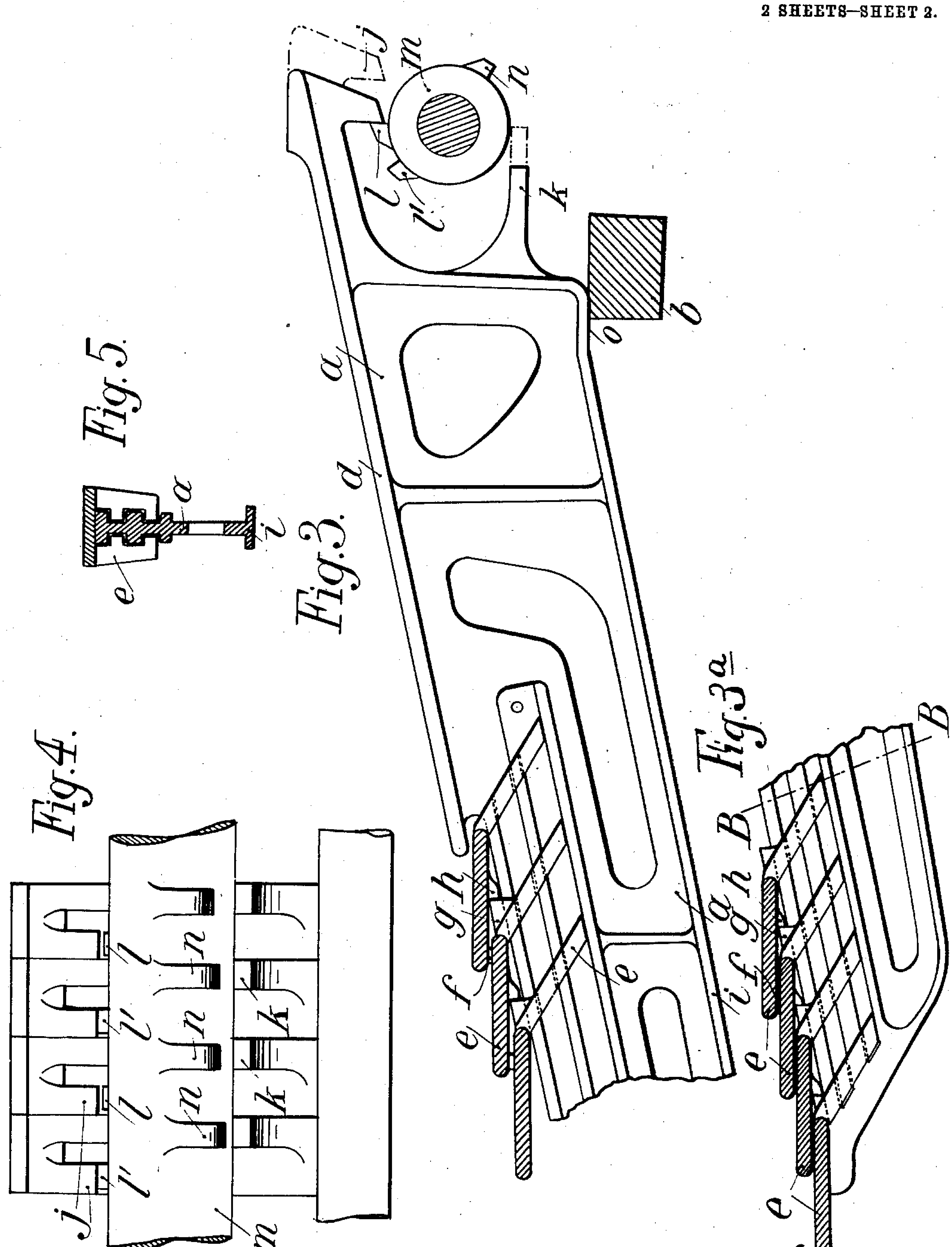

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UNITED STATES PATENT OFFICE.

JULES NICLAUSSE AND ALBERT NICLAUSSE, OF PARIS, FRANCE.

FURNACE-GRATE.

990,766. Specification of Letters Patent. Patented Apr. 25, 1911.

Application filed January 2, 1907. Serial No. 350,429.

To all whom it may concern:

Be it known that we, JULES NICLAUSSE and ALBERT NICLAUSSE, of 24 rue des Ardennes, Paris, France, engineers, have invented a new and useful Improvement in Furnace-Grates, which improvement is fully set forth in the following specification.

This invention has for its object an improved fire grate for boiler and other furnaces by the aid of which even very small fuel may be used.

The grate consists of a series of bars placed side by side and fed from a hopper at the front; the bars are given a longitudinal movement, which causes them to move forward a little by means of a transversely rotating cylinder provided with teeth or cams which act alternately or simultaneously upon the heads of the bars. These bars are in contact at their forward end and extend beneath a regulator regulating the thickness of the layer of fuel and beneath an arch which prevents combustion until the fuel has arrived at a point at which the bars become carrier bars and carry each a series of fixed or removable plates arranged in tiers, spaces being left between them for the passage of air. The rear portion of the grate extends to a cinder remover actuated by hand or mechanically.

The accompanying drawings illustrate one method of carrying out the invention.

In these drawings Figure 1 is a longitudinal section showing a grate applied to a boiler furnace. The right hand portion of Fig. 2 is a front view and the left hand portion a section on the line A A of Fig. 1. Fig. 3 is a partial elevation to a larger scale of a complete bar and of the mechanism by which it receives motion. Fig. 3ᵃ is a similar view of the rear portion of the grate. Fig. 4 is an end view of Fig. 3 showing several bars. Fig. 5 is a transverse section on the line B B of Fig. 3ᵃ.

In the drawings the grate consists of a series of bars *a* resting upon two supports, a forward support *b* and a rear support *c*. Each bar consists at its forward end of a flat imperforate portion *d* and then takes the form of a bar carrier. The carrier portion carries (Fig. 3) a series of independent removable plates *e* mounted upon *a* as shown in Fig. 5. These plates *e* take the form shown resting upon each other with distance pieces *f* and tail pieces *g* and *h*. These distance and tail pieces are narrower than the plates *e*. As the lower webs *i* of the carrier bars are narrower than the plates *e*, a space is left between two neighboring bars *a* when in position which will allow air to pass from beneath the bars up between the plates.

Each bar *a* is provided at its forward portion with two fixed lugs, an upper lug *j* and a lower lug *k* turned in the reverse direction and placed in different vertical planes for example *j* to the left and *k* to the right (Figs. 2 and 4). A tooth *l* carried by a cylinder *m* which can be turned upon its axis, acts upon the upper lug *j* in such a manner as to move bar *a* into the position shown in dotted lines in Fig. 3. A second tooth *n* also carried by the cylinder *m* is arranged in such a manner as to push the lug *k* and consequently the bar *a* back into its original position. For this purpose each bar is formed with flat portions *o* and *p* which slide upon the supports *b* and *c* respectively.

A grate is composed of a series of bars *a* laid side by side. There is thus obtained by reason of the imperforate portions *d* a continuous surface through which air cannot pass. Below it extends a portion like the tiles of a roof formed of the plates *e* and with air passages formed between the plates. The overlapping plates, as shown, are approximately parallel to the general direction of the grate bar. All the bars forming this covering are submitted to the action of the teeth *l*, *l'* and *n*. These teeth are arranged in three series, *l*, *l'* and *n*, arranged at an angle to each other. The first series *l* operates the even numbered bars, the second series *l'* the odd numbered bars. The teeth *n* arranged in a single series which act upon all the bars simultaneously and are so positioned as to push all the bars directly after the second series have been drawn forward. In order to avoid too great a strain upon the axis of the cylinder each series of teeth may be arranged helically as shown in Figs. 2 and 4.

The fuel is distributed upon the forward portion of the grate by means of one or more hoppers *q* and the thickness of the layer thus distributed is regulated by a regulator *r* which can be raised or lowered.

The whole of the imperforate portion of the grate is located beneath a flat arch *s* situated a small distance from the grate. The arch *s* is continued as a higher arch *t*.

At the end of the grate is a cinder remover formed of a series of bars *u* fixed to the shaft *v* which can be oscillated by the levers *x* and *z* combined with *y*, as shown in Fig. 1.

The fuel delivered by the hopper *q* spreads itself in a uniform layer regulated by the height of the regulator *r* situated at the forward portion of the grate. The cylinder *m* on being rotated causes the even numbered bars *a* to be moved forward by means of the teeth *l*. The fuel however upon these bars cannot follow this movement by reason of the fuel located above it; likewise the odd numbered bars are drawn by their teeth *l'* the fuel upon them being unable to move. So soon as the second series of bars has been moved forward the teeth *n* push all the bars rearward. The fuel distributed then moves downward. When the bars are again drawn toward the front, the fuel finds a natural support in the fuel recently delivered by the hopper. So long as it is under the arch *s* the fuel can not burn for it receives no air for this purpose. When after having been subjected to a slight distillation near to the outlet from the arch *s* the fuel arrives upon the portion of the bars provided with air passages, it kindles, combustion being aided by the presence of the arch *t*. The speed of movement of the grate is regulated according to the desired speed of combustion in such a manner that the combustion may be complete at the lower end of the grate and that the cinder remover may receive only the residues of combustion. The space left between the different plates may vary as shown in the drawing in order to proportion the inlet of air at every point to the needs of combustion. The fuel on the grate is raked automatically, the ashes and unburned residues being carried toward the cinder remover, *u*, *v*, at the rear of the furnace chamber, said cinder remover being oscillated at suitable intervals as needed. Although the grate may work with natural draft or forced draft, it is advantageous to completely close the ashpit and to employ a blower delivering air into the space formed by the grate, by the lower portions of the ashpit forming walls by the ashpit itself and its door. There is therefore the advantage of a blast at all parts of the grate, resulting in a continuous cooling of all these parts as well as a regularly controlled combustion. When there is an accidental excess of pressure in the furnace this arrangement avoids all chances of blowing outward.

In order to render the rear of the grate visible from the furnace, by looking through the front of the boiler, a tube 1 is provided through this front having at its forward end a transparent plate 2 formed of mica for example. As the flames formed in the front of the grate are generally opaque, air is injected through the tube 1 when it is desired to see the back of the grate. The air may be led through the pipe 3 forming a branch of that which is contained in the chamber formed between the grate and the ashpit and the lower sides of the boiler. When air is injected the flames become clear and the grate thus visible.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:

1. A grate formed of a series of bars laid side by side, each consisting of a forward fuel supporting part through which air cannot pass, and a rear part carrying overlapping plates arranged in tiers between which air can pass, in combination with means for longitudinally moving all the bars simultaneously in one direction and for simultaneously moving alternate bars in the opposite direction.

2. A grate consisting of a series of bars laid side by side and inclining from the front to the rear of the furnace, each bar consisting of an imperforate forward fuel supporting part through which the air cannot pass, and a rear part carrying overlapping plates arranged in tiers between which the air can pass, in combination with means for successively imparting movement to alternate bars simultaneously in one direction, and means for imparting a simultaneous longitudinal movement to all the bars in the opposite direction.

3. A grate formed of a series of bars laid side by side, each consisting of a broad imperforate forward fuel supporting part and a narrow rear part carrying overlapping vertically spaced plates, the spacing between the said plates being varied to suit the needs of combustion at each point, the said bars arranged at an inclination side by side to form with the forward parts a broad continuous imperforate table-like structure, and with the rear parts a series of transversely extending plates overlapping downwardly toward the rear.

4. A grate formed of a series of bars laid side by side, each consisting of a broad imperforate forward fuel supporting part and a narrow rear part carrying overlapping vertically spaced plates, the spacing between the said plates being varied to suit the needs of combustion at each point, the said bars arranged at an inclination side by side to form with the forward parts a broad continuous imperforate table-like structure, and with the rear parts a series of transversely extending plates overlapping downwardly toward the rear, means to periodically propel the bars forwardly alternately, and means to simultaneously propel them rearwardly.

5. In a grate comprising a series of similarly disposed inclined grate bars, each having its upper forward end formed with an

imperforate fuel-supporting portion, said portions together forming an imperforate table structure, the lower rear portion of each bar formed with a series of overlapping vertically spaced plates, means to simultaneously propel alternate bars forward, and means to simultaneously propel all of the bars rearwardly.

6. In a grate comprising a series of similarly disposed inclined grate bars, each having its upper forward end formed with an imperforate fuel-supporting portion, said portions together forming an imperforate table-structure, the lower rear portion of each bar formed with a series of overlapping vertically spaced plates, a drive cylinder carrying one set of teeth corresponding in number to the grate bars and arranged in two longitudinal series, the members of each series alternating with those of the other series, and a second set arranged in a single continuous series, the teeth of the first set arranged to simultaneously engage alternate grate bars to draw them forward and the teeth of the second set to engage all the bars simultaneously to push them back as the cylinder is rotated.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

JULES NICLAUSSE.
ALBERT NICLAUSSE.

Witnesses:
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HANSON C. COXE.