

No. 736,768.

PATENTED AUG. 18, 1903.

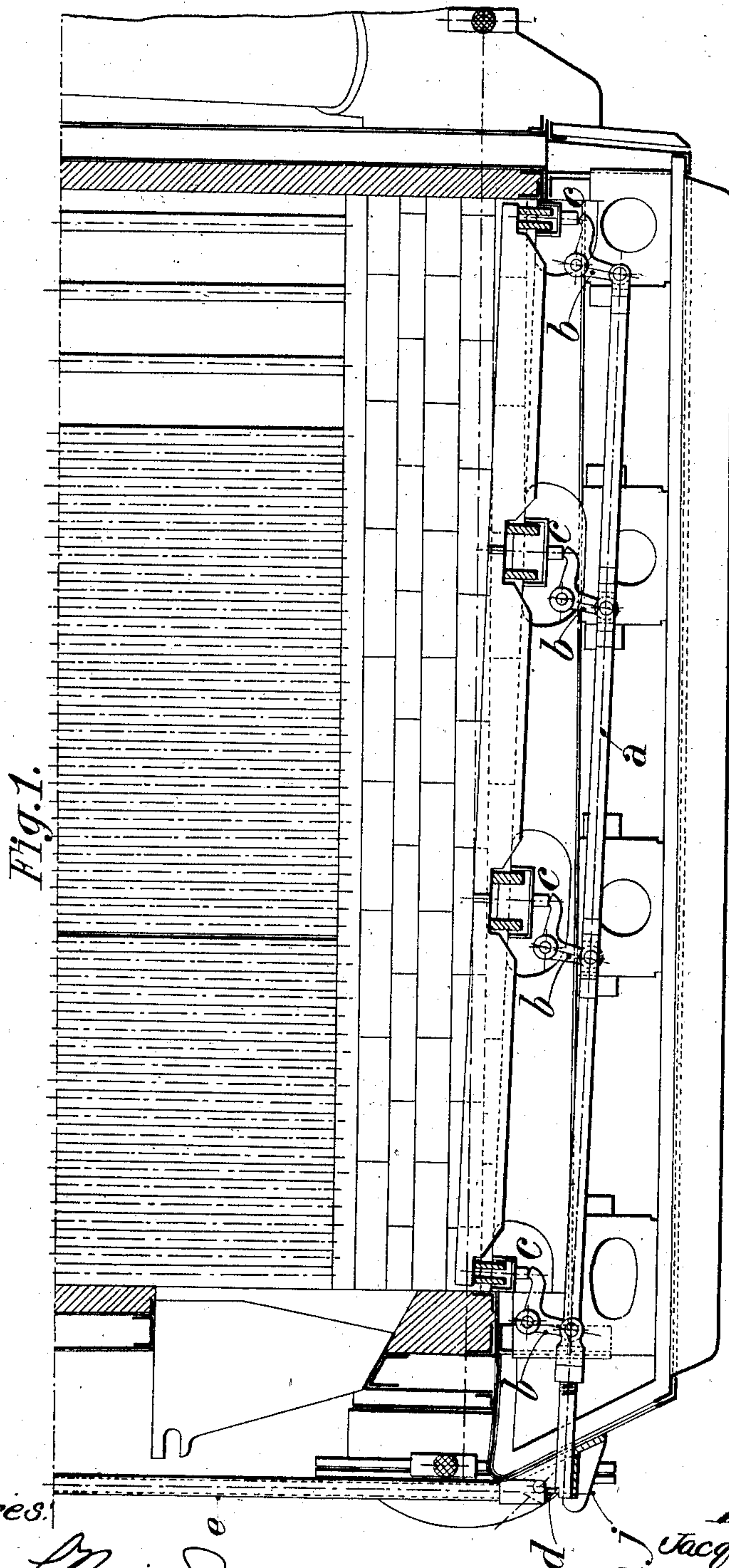
J. A., F. E. & M. E. NORMAND.

APPARATUS FOR SHAKING THE GRATE BARS OF FURNACES.

APPLICATION FILED FEB. 25, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.

James L. Morris, Jr.  
N. L. Bogan

Inventors

Jacques A. Normand  
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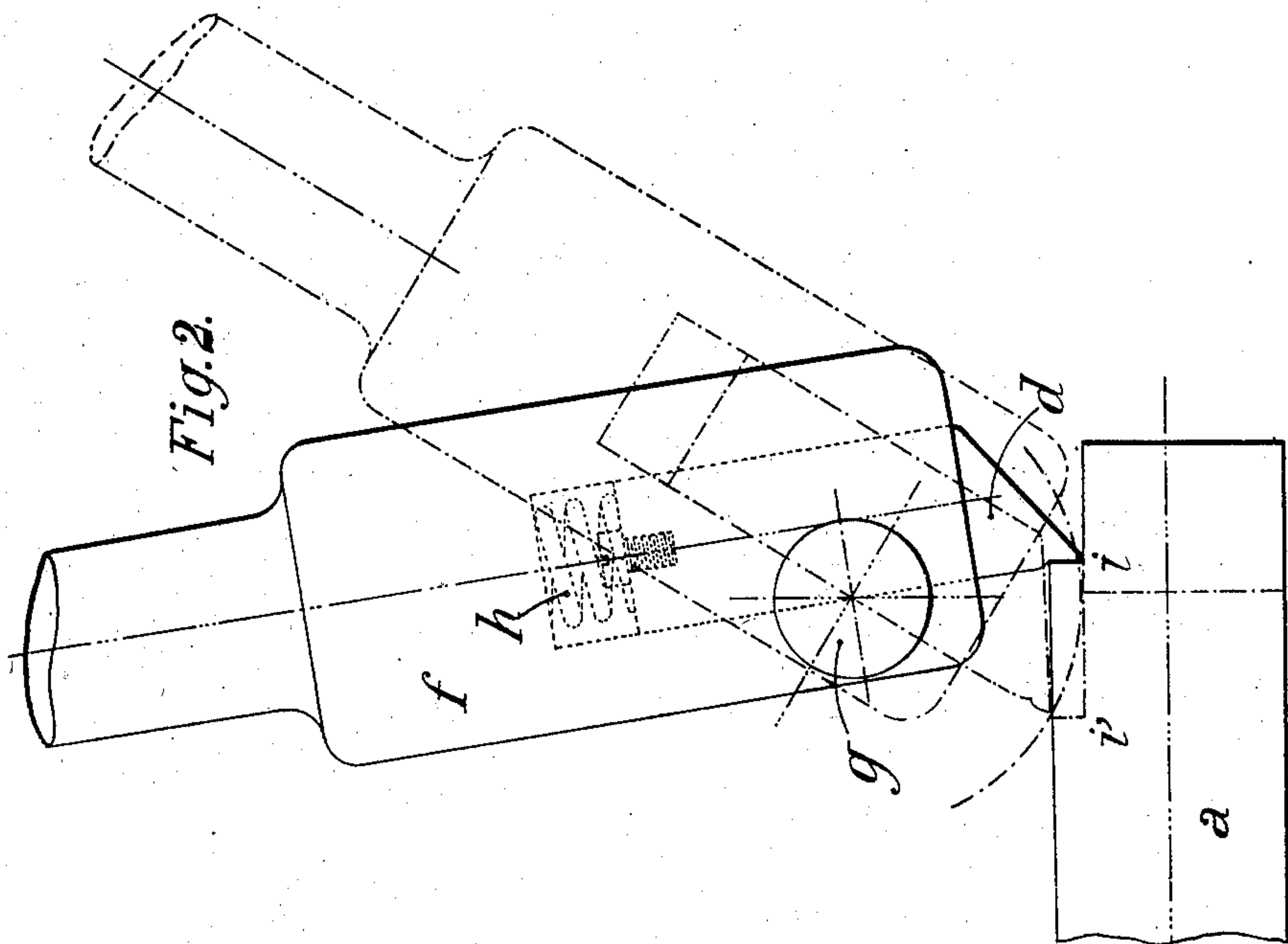
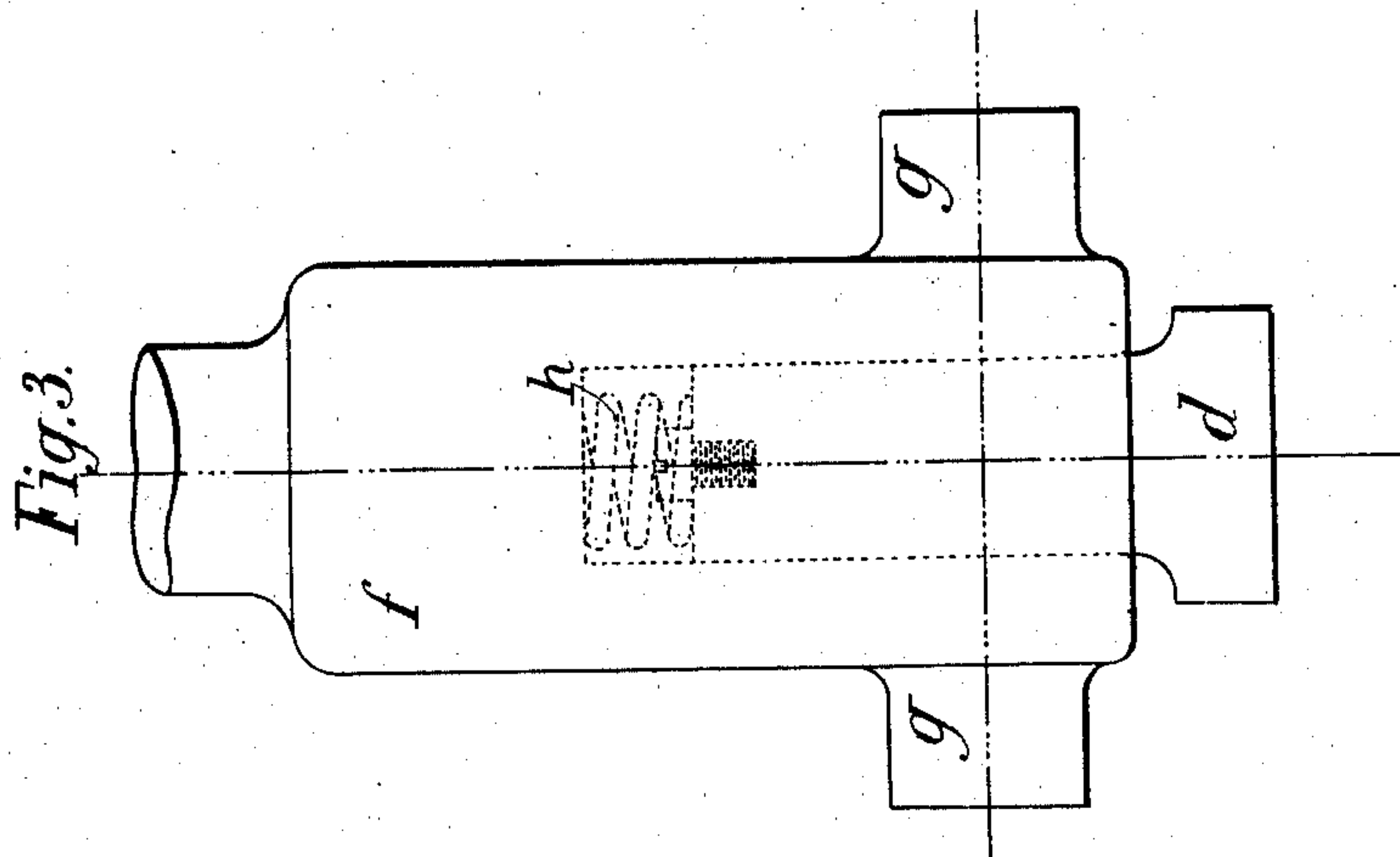
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# UNITED STATES PATENT OFFICE.

JACQUES AUGUSTIN NORMAND, FRANÇOISE ELISABETH NORMAND, AND  
MARIE EMILIE NORMAND, OF HAVRE, FRANCE.

## APPARATUS FOR SHAKING THE GRATE-BARS OF FURNACES.

SPECIFICATION forming part of Letters Patent No. 736,768, dated August 18, 1903.

Application filed February 25, 1903. Serial No. 145,090. (No model.)

*To all whom it may concern:*

Be it known that we, JACQUES AUGUSTIN NORMAND, FRANÇOISE ELISABETH NORMAND, and MARIE EMILIE NORMAND, engineers, citizens of the French Republic, residing at Havre, department of Seine - Inférieure, France, (whose post-office address is 67 Rue du Perrey, in the said city,) have invented certain new and useful Improvements in Apparatus for Shaking the Grate-Bars of Furnaces, of which the following is a specification.

This invention has for its object to provide efficient means for clearing the grates of steam-boiler or other furnaces from cinders and clinker, which when of a siliceous nature form slags at the expense of the iron of the grate and when simply fusible under the action of heat form caked masses, which prevent the air from passing through the grate, and hitherto have been removed only with difficulty while the boiler is working, especially if they be at the farther end of the grate, and their removal through the fire-doors renders it necessary to keep the doors open sufficiently long to lower the pressure in the boiler.

In order to cause the cinder and clinker to fall into the ash-pit there is according to this invention arranged on each side of the grate a shaking device which will raise the grate-bar bearers (and consequently the bars themselves) and then let them drop suddenly back onto their seats. If the grate be very wide, and especially if it be divided in two by a longitudinal bridge, shaking devices can be provided in the mid-part of the furnace in addition to the lateral shaking devices, so as to equalize the power and distribute the shaking action evenly over the grate.

In order that this invention and the way in which it can be operated may be readily understood, we will describe with reference to the accompanying drawings an arrangement according to this invention.

Figure 1 is a longitudinal section of part of the furnace of a water-tube boiler with shaking mechanism according to this invention applied thereto. Figs. 2 and 3 are details of the device for imparting the shaking action.

Each shaking arrangement consists of a longitudinal rod *a*, operating bell-cranks *b b*, centered to the sides of the ash-pit or other suitable support. When the rod *a* is moved longitudinally toward the rear end of the boiler, the bell-cranks are operated in one direction and in turn transmit movement to the bearers of the grate-bars, preferably through pieces *c c*, connecting together the grate-bar bearers at their ends.

Motion is imparted to the rod *a* by means of a lever situated outside the boiler. The lower part of this lever is shown about full size in Figs. 2 and 3. The upper part of the catch *d*, which is of rectangular or equivalent section, enters a socket in the end piece *f*, which turns on trunnions or centers *g*. A spring *h* presses on the catch *d* and keeps it constantly in contact with the end of the rod *a*, which end is provided with a shoulder *i*, against which the lower end of the catch *d* bears. Fig. 2 shows in full lines the position of the catch-lever *e* when the ends of the grate-bar bearers are resting on their seats, the dot and dash lines showing the catch-lever at the instant when the catch having shifted the rod *a* by the amount *i i'* is slipping past the shoulder *i*. The weight of the grate then causes the rod *a* to return to its original position, beyond which it is prevented from going by a stop *j*. The catch-lever *e* is moved forward until the catch, urged by the spring *h*, comes again into contact with the shoulder *i* ready for another operation. The upper part of the piece *f* may be a rod of circular section, on which is mounted a tube constituting the lever *e*. As the shoulder *i* at the end of the rod *a* and the catch *d* are both liable to wear out rapidly, it is advisable to make them of very hard steel and so that they are easily replaceable.

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

1. An apparatus for shaking grate-bars comprising a plurality of carriers for the bars, bell-crank levers contacting with and when operated adapted to elevate the carriers, an operating-rod connected to the said levers and provided at its outer end with a shoulder, said rod when operated adapted to operate the levers in one direction causing thereby the



elevation of the carriers, and means engaging the said shoulder and adapted when operated to impart a longitudinal movement in one direction to said rod, operating the levers in one direction and causing the elevation of the carriers and grate-bars.

2. An apparatus for shaking grate - bars comprising a plurality of carriers for the bars, bell-crank levers contacting with and when operated adapted to elevate the carriers, an operating-rod connected to the said levers and provided at its outer end with a shoulder, said rod when operated adapted to operate the levers in one direction causing thereby the elevation of the carriers, a spring - pressed

catch adapted to engage said shoulder, and an operating-lever carrying the said catch and adapted when operated to impart a longitudinal movement in one direction to said rod, operating the levers in one direction and causing the elevation of the carrier and grate-bars.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JACQUES AUGUSTIN NORMAND.  
FRANÇOISE ELISABETH NORMAND.  
MARIE EMILIE NORMAND.

Witnesses:

JOHN PRESTON BEECHER,  
LOUIS PALLARD.