

No. 827,875.

PATENTED AUG. 7, 1906.

A. LOCHER.
FURNACE.

APPLICATION FILED MAR. 11, 1906.

Fig.1.

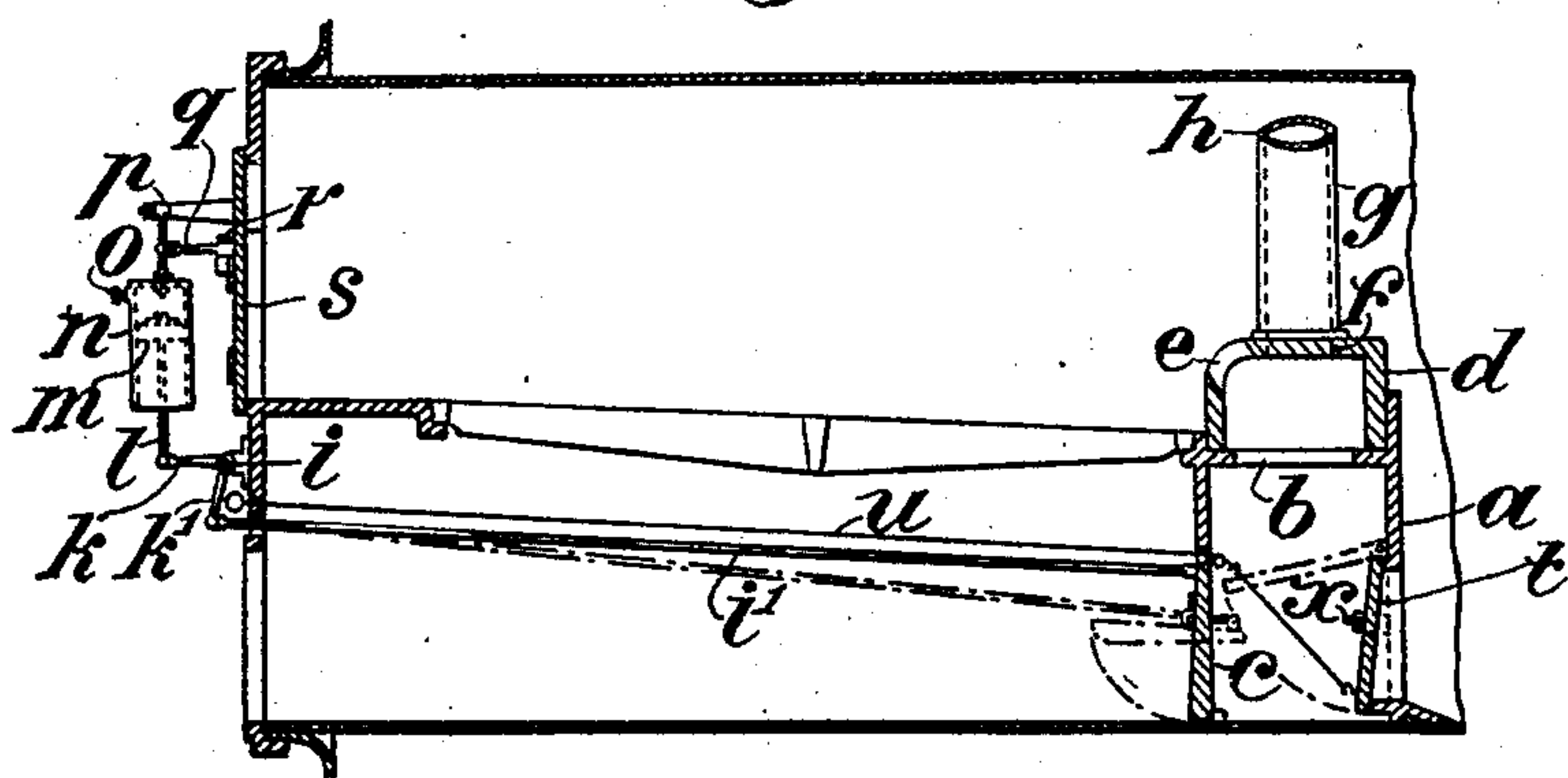


Fig.2.

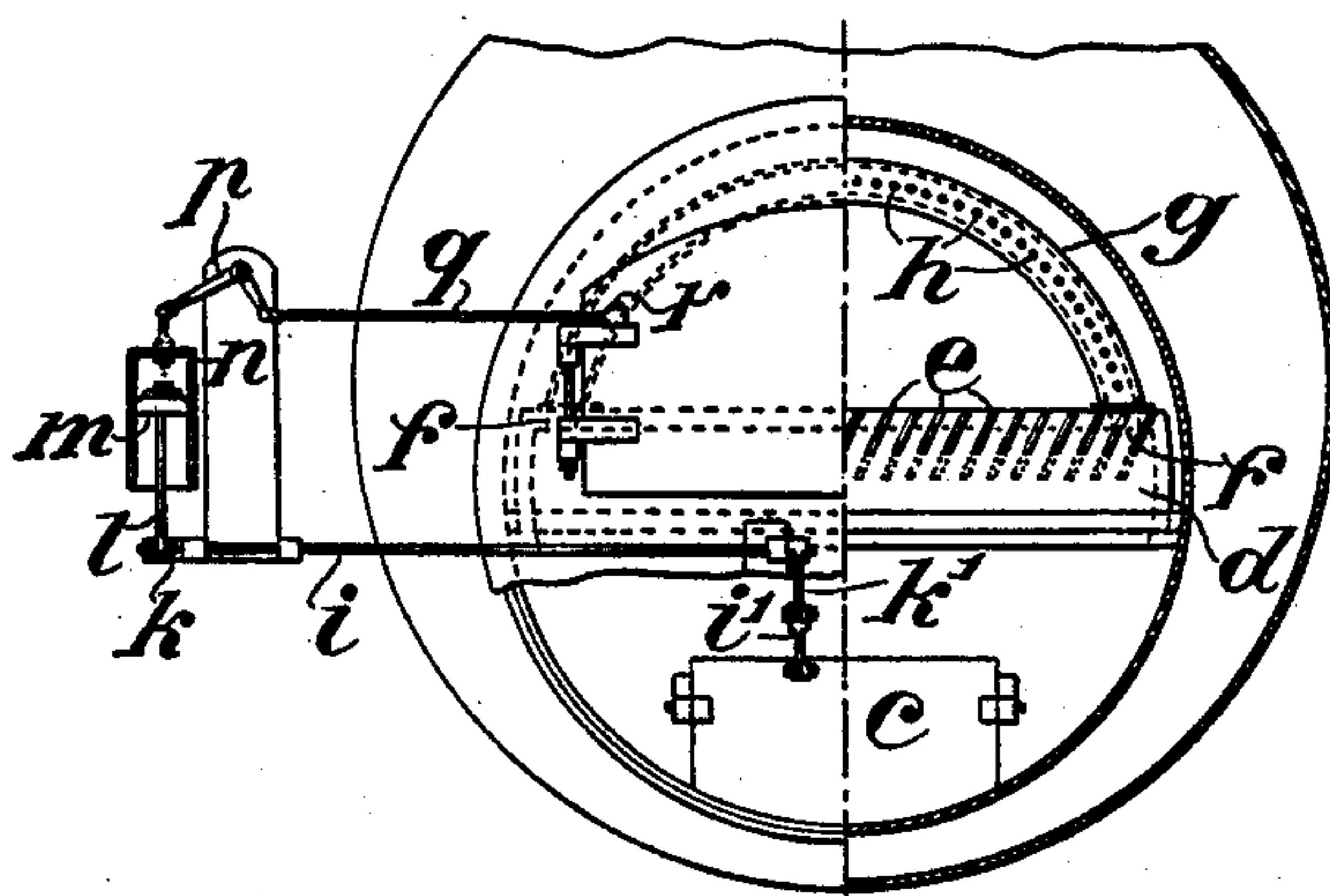
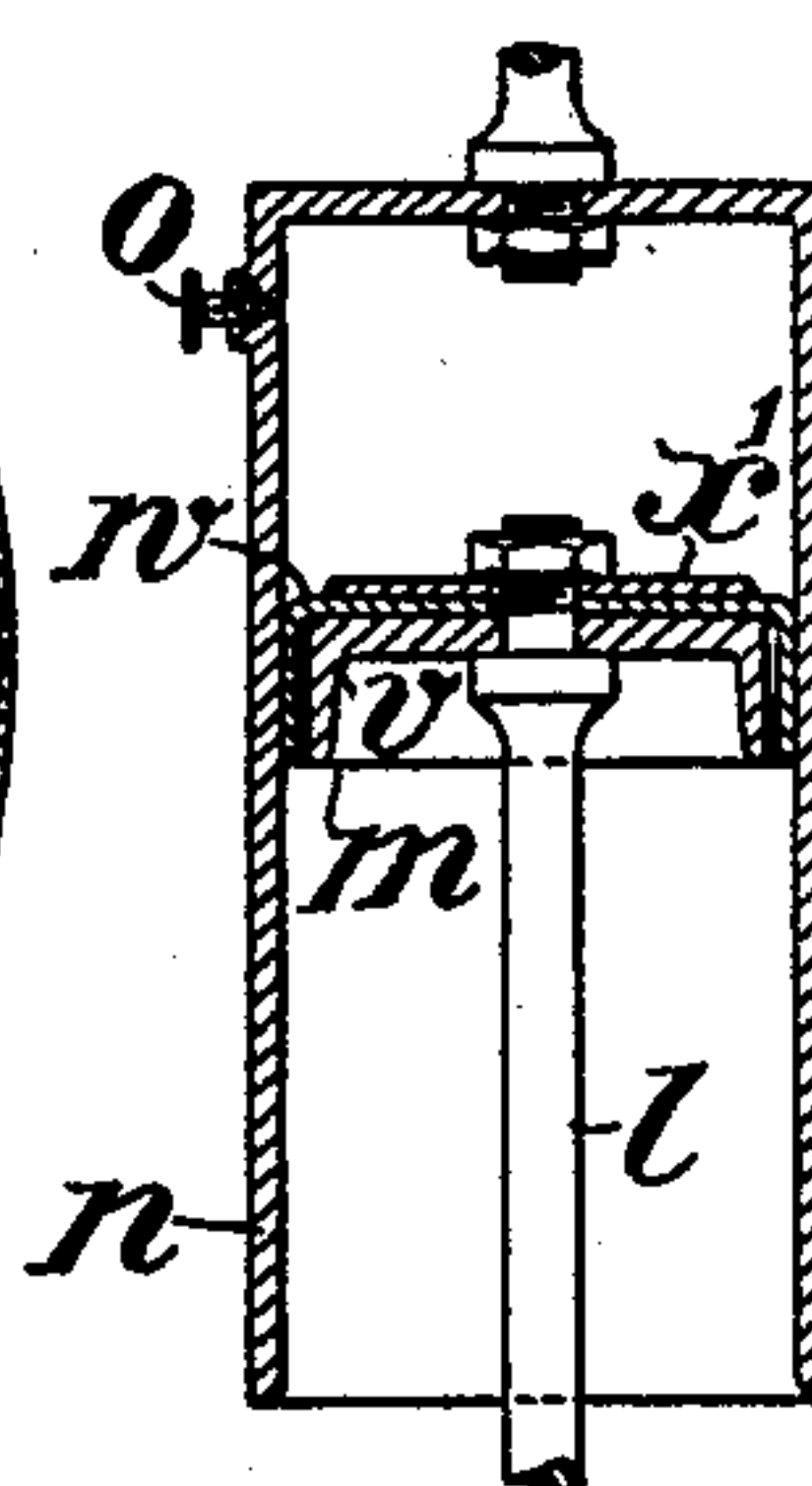


Fig.3.



Witnesses:
Alfred Bosshardt.
Stanley Braucall

Inventor.
Arthur Locher.
Per J. Bosshardt,
Attorney.

UNITED STATES PATENT OFFICE.

ARTHUR LOCHER, OF HERISAU, SWITZERLAND.

FURNACE.

No. 827,875.

Specification of Letters Patent.

Patented Aug. 7, 1906.

Application filed March 11, 1905. Serial No. 249,674.

To all whom it may concern:

Be it known that I, ARTHUR LOCHER, a citizen of Switzerland, residing at Herisau, canton of Appenzell, Switzerland, have invented new and useful Improvements in and
5 Connected with Furnaces, of which the following is a specification.

My invention relates to improvements in and connected with furnaces, and has for its
10 object to provide means for effectively consuming the smoke therein. The said means consist of a fire-bridge having slots inclining from the top, of a hollow arch-like top spanning the said bridge and furnished opposite the fire-grate with air-outlets, and of a
15 hollow-grate carrier supporting the said fire-bridge and forming an air-chamber, the interior of the said fire-bridge, top, and grate-carrier communicating with each other. The
20 said slots serve partly to slightly increase the grate-surface and partly to produce a Bunsen-burner-like effect. The said top is so constructed that the hot gases can pass freely between it and the heating-surface—that is to
25 to say, the flue-tube. The hollow fire-bridge with its slots and the said top, in connection with the natural draft of the chimney, serve to so convey heated air into the furnace-space that at the back of the grate a heat as in-
30 tense as possible is produced, and there will be sufficient oxygen around the fuel for the complete combustion of the furnace-gases without depriving a portion of the heating-surface of the direct action of the furnace-gases. The back of the hollow fire-bridge
35 support is furnished with a door closing air-tight, which serves to permit of removing the light ashes accumulating in the flue-tube behind the fire-bridge while the furnace is go-
40 ing. I attain these objects by the means illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of the said means in the furnace-flue; Fig. 2, a front
45 view thereof, partly in section; and Fig. 3, a detail in section, at an enlarged scale, of one form in which my invention may be carried out.

Similar letters refer to similar parts
50 throughout the several views.

Referring to the figures generally, in the furnace-flue of a steam-boiler is employed at the end of the fire-grate a fire-bar carrier *a*, which forms a chamber and on which the in-
55 ner end of the grate rests. The two vertical

walls of the grate-carrier or fire-bridge support have openings closable by means of doors. The door in the back wall of the said carrier or support serves to facilitate the re-
60 moval of the light ashes accumulating in the flue-tube behind the fire-bridge while the furnace is going. The air-tight door *t* can be opened by means of a pull-rope from where the fireman stands and when closed can be
65 locked by means of catches *x*, employed at the side thereof. The front wall of this carrier is furnished with a door *c* and the top with an opening *b*, corresponding in length with the width of the grate. When the door
70 *t* is closed, the grate-carrier cuts off the ash-space from the chimney, and by opening the door *c* its interior can be brought into communication with the air in the ash-space. Over the opening *b* is employed the hollow
75 fire-bridge *d*, open below and having in its wall adjacent to the grate inclined slots *e* for the outlet of the air, which slots also form partly an enlargement of the grate-surfaces and partly have the effect of a Bunsen burner.

The top of the fire-bridge has at each end
80 an opening *f*, which openings communicate with the hollow arch-like top *g* placed thereon, the wall of which adjacent to the furnace has also air-outlets. This hollow top is formed elliptical in section, and between the
85 same and the furnace-flue a space is provided through which the furnace-gases can pass. Owing to the elliptical section of the said top, it offers very little resistance to the passing
90 furnace-gases.

To regulate the admission of air automatically, a device is provided which has an air-cylinder *n*, open at the bottom, and a piston
95 *m* moving therein, (see more particularly Fig. 3,) consisting of the piston-head *v*, the leather packing *w*, and the clamping-plate *x'*. The cylinder *n* has at the top an air-inlet, which can be regulated by a set-screw *o*. By
100 a bell-crank lever *p*, rod *q*, and pivot *r* the said cylinder is connected with the furnace-door, while the piston *m*, by means of the piston-rod *l*, the levers *k* and *k'*, shaft *i*, and rod *i'*, is connected with the door *c*. The latter is heavier below than above its fulcrum,
105 so that its tendency is to self-close.

The air which passes from the ash-space through the grate-carrier *a* into the hollow
110 fire-bridge *d* also enters the hollow top *g*. The furnace-gases pass partly between the latter and the furnace-flue. The cold air

drawn naturally by the chimney from the ash-space becomes so intensely heated by the nearly red-hot furnace-bridge and its top that when leaving through the openings *h* and *e* and in entering the furnace-space it will not be detrimental. By this process the air and furnace-gases mix on the whole sectional surface in such a manner that the combustion of the fuel will be effected as nearly as possible free from smoke.

In order to insure an economical combustion of the fuel free from smoke, a door *c* is employed on the grate-carrier, which is connected with the device for automatically regulating the draft. The latter is employed in front of the boiler-setting and serves to open the air-door *c* when the fuel begins to develop smoke and to close the same gradually as it diminishes. As soon as the furnace-door *s* is opened the air-cylinder *n* is raised and the space between the piston *m* and the top of the cylinder *n* filled with air, which on closing the door *s* escapes only very slowly through the opening controlled by the set-screw *o*. The pressure upon the air takes place during the closing of the furnace-door quickly. The air confined cannot escape suddenly, and consequently the door *c*, connected by means of the said lever system with the piston *m*, opens when the furnace-door is closed, so that the air passing through the hollow fire-bridge and its top will enter the furnace-space. By means of the set-screw *o* the escape of air from the cylinder *n* can be so regulated that the door *c*, the weight of which pushes up the piston *m*, closing it gradually, will be left open as long as smoke develops. This operation is repeated automatically each time the furnace-door opens and closes.

The device for automatically regulating the admittance of air described can be readily applied, and no complicated intermediate

mechanism—such as chains, pulleys, eccentrics, and the like—is required to operate it.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a furnace, a flue-tube and means for consuming smoke comprising a hollow fire-bridge, a hollow arch-like top with ends communicating with the interior of the said bridge, the said arch and bridge each having air-passages through the wall opposite the fire-grate, a hollow grate-carrier supporting the said fire-bridge, a door in its back wall and a connection between the door in the said hollow support and the furnace-door for suddenly opening the door in the said hollow support when closing the furnace-door and afterward closing it gradually, substantially as and for the purpose set forth.

2. In a furnace, a flue-tube and means for consuming smoke, comprising a hollow fire-bridge, a hollow arch-like top spanning and providing a space between it and the adjacent part of the flue-tube and communicating with the interior of the said bridge, a hollow support carrying the latter, a door in the front of the said support to admit air to the said fire-bridge and top, an air-piston and cylinder therein in front of the furnace, the latter being suspended and suitably connected with the furnace-door and the former with the door in the said hollow support, so that when closing the furnace-door, the door in the said hollow support opens suddenly and as the smoke diminishes closes gradually, all substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR LOCHER.

Witnesses:

CARL MÜLLER,
A. LIEBERKNECHT.