July 12, 1932. R. ROOSEN 1,867,101

CLEANING DEVICE FOR PULVERIZED FUEL FURNACES

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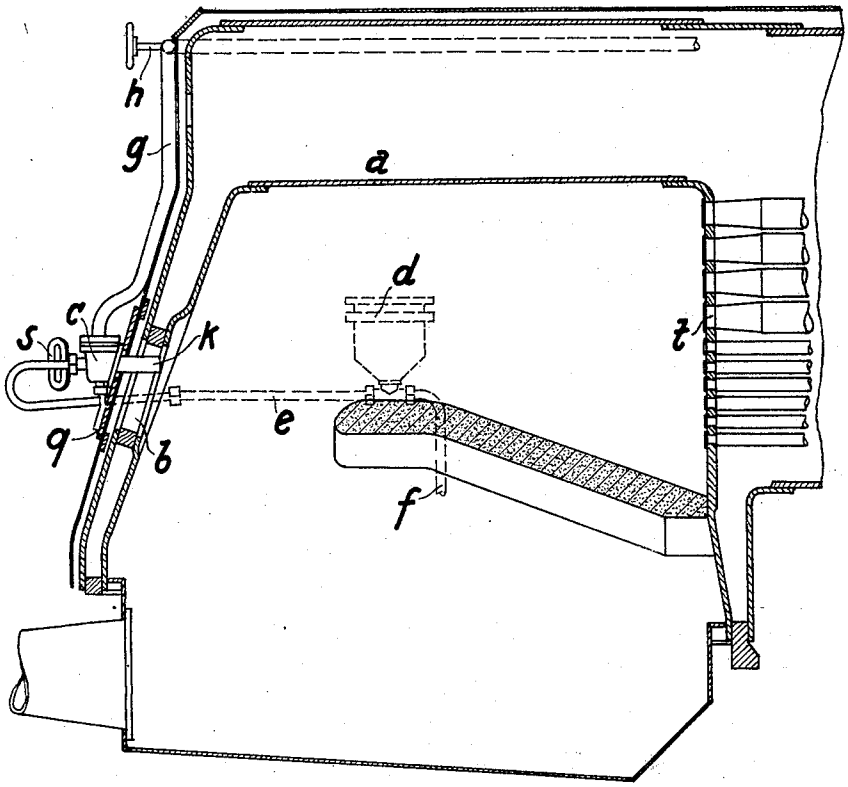
Fig. 1.



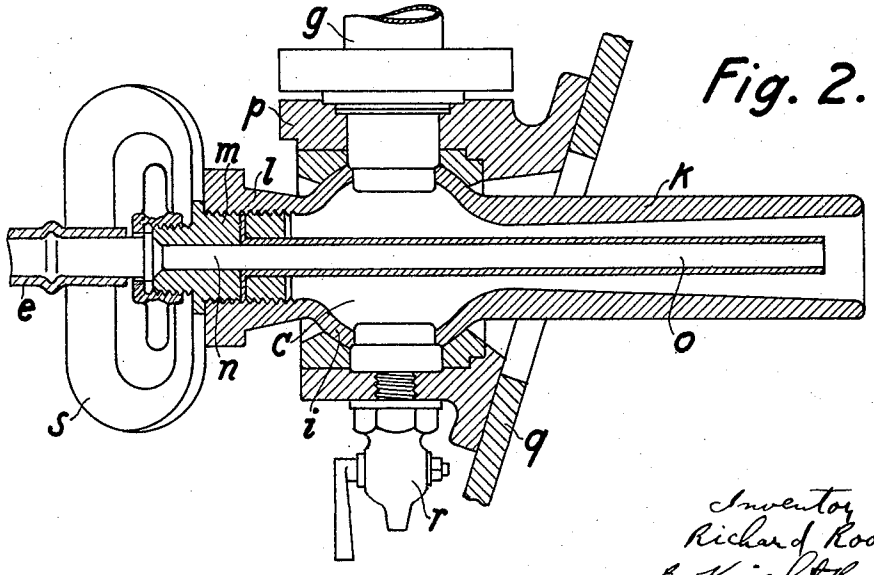




Fig. 2.

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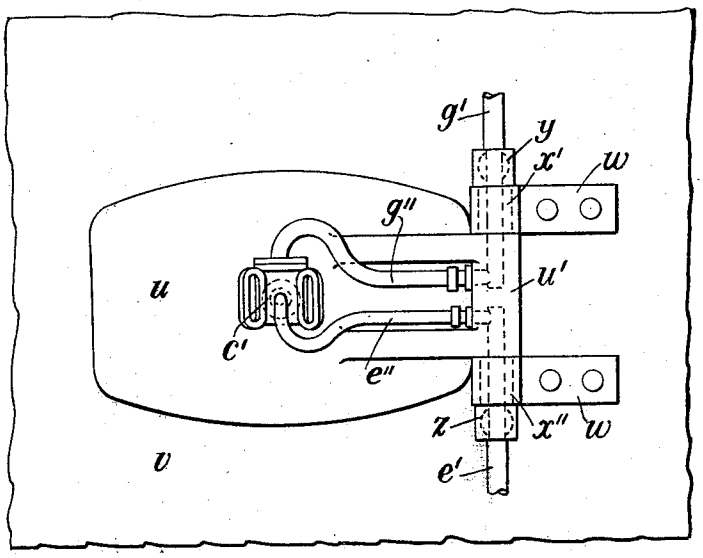
*Fig. 3.*

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# UNITED STATES PATENT OFFICE

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## CLEANING DEVICE FOR PULVERIZED FUEL FURNACES

Application filed August 13, 1930, Serial No. 475,069, and in Germany November 13, 1929.

The invention has for its object a particularly suitable cleaning device for pulverized fuel furnaces particularly intended for removing the dangerous honey combs deposited on the walls of the combustion chamber. The new device comprises a movable combined blast pipe mounted in a ball head on the wall of the combustion chamber which blast pipe is composed of an inner pipe and a concentrically arranged outer pipe, the former serving to project sand at high speed against the walls of the combustion chamber by means of compressed air, while high pressure steam is projected by the latter pipe.

The use of steam-sand blasts for cleaning purposes of this kind is known in itself; the older designs, however, suffer from several fundamental drawbacks. In the first place these known devices are applied in a very primitive manner by simply inserting the device in or mounting it on, a corresponding aperture in the wall of the combustion chamber. This mode of application is not satisfactory if steam of high pressure is used. In contradistinction thereto, the provision of a ball head in which the device is mounted according to the invention, enables perfect tightening of the members that feed the steam. Furthermore, in these older designs the steam is supplied through the inner pipe while sand is fed through the outer one. As thus the steam jet is within the sand jet, spreading of the sand takes place, so that the whole jet enlarges to an inadmissible extent on its way up to the impact place on the wall, whereby the cleaning effect is seriously derogated. By the inverse arrangement, however, as practiced by the invention, that is by the steam jet enveloping the sand jet, the advantage is obtained that the latter arrives at the wall in a uniformly closed condition, whereby a much better cleaning effect is obtained, more particularly in removing the very hard honey combs. Finally, by the steam jacket surrounding the sand jet both the drying of the sand that happens to have become moist and which would easily adhere to the walls of the combustion chamber is obtained, as well as the heating of the cold sand-conveying air between the sand box and the blast pipe, whereby injuries of the boiler, caused by its being struck by cold air, are avoided.

In order that the invention can be more readily understood, an embodiment of the same is illustrated by way of example in the accompanying drawings in which

Figure 1 is a longitudinal section through the rear part of a locomotive boiler with the blast device,

Figure 2 is a longitudinal section through the blast device and the means by which it is fixed to the wall of the combustion chamber, on an enlarged scale, and

Fig. 3 is a plan view of a modified constructional embodiment of my invention.

Referring to Figs. 1 and 2, *a* denotes the combustion chamber in front of an aperture *b* of which is mounted the blast device *c*. Sand is fed to this device from the box *d* by means of a pipe *e* which is flexible in part. The air under pressure required to convey the sand through pipe *e* is supplied through a pipe *f* from the main air tank (not shown). Steam is supplied through a pipe *g* from the dome, no throttling member being interposed but a valve *h* serving to shut off pipe G. The latter opens into a tubular casing *k*, Figure 2, which at the point of entrance of pipe *g* externally forms a ball head *i* and is closed on its rear end *l* by a screw plug *m* that has a bore *n*. Into this bore opens from outside the sand supply pipe *e* while on the side turned to the ball head *i* the bore *n* is prolonged by a pipe *o* which extends about up to the end of the tubular casing *k*. The ball head *i* rests in a correspondingly shaped outer casing *p* which is mounted on the seating *q* of the hole. The outer casing *p* is fitted with a drain cock *r* and the tubular casing *k* is fitted on its outer end with a handle *s* so that the blast device can be turned to all sides, in order to sweep the entire tube wall *t* of the boiler.

When the described appliance is in operation, the steam escaping from the tubular casing *k* envelopes the sand thrown out by the pipe *o*. The sand thus arrives in a closed jet at the place to be cleaned of the wall and at the same time is preheated by the sur-

rounding steam and, if moist, dried. The sand-conveying air is likewise dried so that it cannot meet the wall in cold state and injure it.

The constructional details of the device forming the subject-matter of the invention may be modified in many respects. So, for instance, the device can be mounted on a hinged fire door by making the socket for the ball head *i* integral with the door itself which in its turn includes a steam channel that opens into another ball head situated in the pivot axis of the door and embracing the hinge bolt thereof, the steam pipe that comes from the dome opening into this ball head. Furthermore, the sand duct which is described as flexible in part, may be replaced by a rigid duct including ball joints on the places where turning motion is required. The above construction is best illustrated by reference to Fig. 3, wherein the modified blowing device *c'* is movably arranged in the middle of fire door *u*. The door *u* is rotatably mounted by its hinge *u'* in hinge elements *w* fixed upon the rear boiler wall *v*. The taps *x'*, *x''*, set in hinge *u'*, are hollow. The tap *x'* is connected upon one end thereof through a ball or similarly rotatable joint *y* to a pipe *g'* which leads to the steam dome for the supply of steam (not shown). The other end of the tap communicates through pipe *g''* with that portion of *c'* which corresponds to the steam nozzle *k* in Fig. 2. The other tap *x''* is likewise connected at one end thereof through rotatable joint *z* to pipe *e'* which leads to supply container for the sand (not shown). The other end of the tap is connected through pipe *e''* with that portion of *c'* which communicates with tube *o*, in Fig. 2. By this construction it is possible to close and open the firedoor without affecting the conducting tubes *g'*, *g''*, *e'*, *e''* and the cleaning device *c'*.

I claim:

1. A cleaning device for pulverized fuel furnaces comprising a steam nozzle mounted by means of a ball joint in front of and projecting into a hole in the fire door of the furnace, another nozzle concentrically arranged within said steam nozzle, means for supplying sand under pressure to said other nozzle, a duct for feeding steam to said steam nozzle through said ball joint and comprising another ball joint situated in the pivot axis of said fire door, and pipe connections from the source of steam to said last-named ball joint and from the latter to said first-named ball joint.

2. A cleaning device for pulverized fuel furnaces comprising a steam nozzle mounted by means of a ball joint in front of and projecting into a hole in the fire door of the furnace, another nozzle concentrically arranged within said steam nozzle, ducts for feeding, respectively, steam and sand under pressure through said ball joint and comprising further ball joints situated in the pivot axis of said fire door, and pipe connections from the source of steam and sand supply to the respective last-named ball joints and from the latter to said first-named ball joint.

The foregoing specification signed at Berlin this 22nd day of July, 1930.

RICHARD ROOSEN.