

No. 890,175.

PATENTED JUNE 9, 1908.

H. RIES.
DOOR FOR FURNACES AND THE LIKE.

APPLICATION FILED JULY 9, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

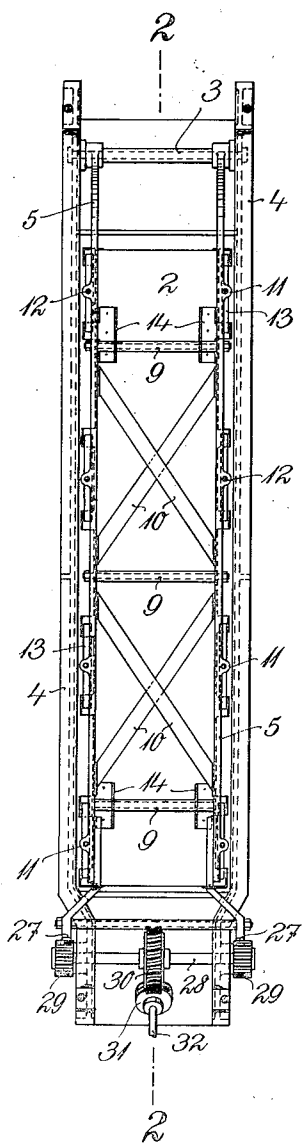
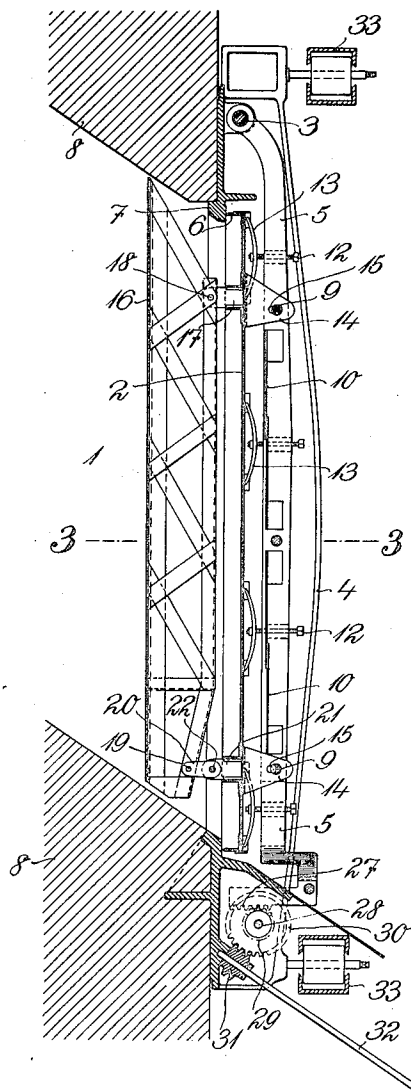


Fig. 2.



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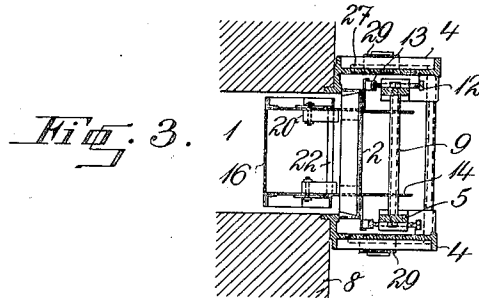
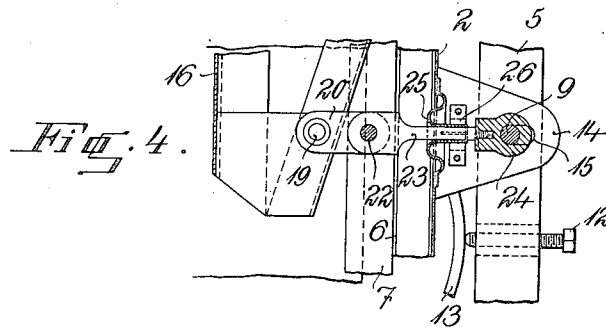
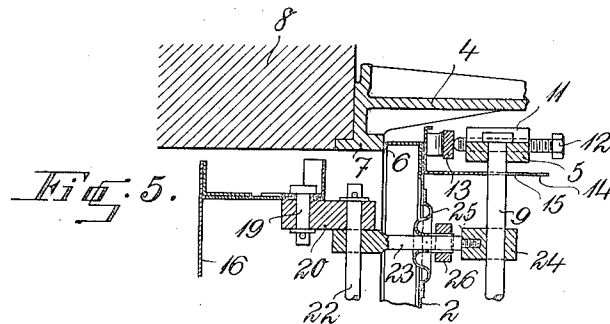
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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DOOR FOR FURNACES AND THE LIKE.

No. 890,175.

Specification of Letters Patent.

Patented June 9, 1908.

Application filed July 9, 1907. Serial No. 382,887.

To all whom it may concern:

Be it known that I, HANS RIES, a citizen of the Empire of Germany, residing at Munich, Germany, have invented certain
5 new and useful Improvements in a Door for Furnaces and the Like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which
10 it appertains to make and use the same.

In gas producing and coking furnaces and gas retorts the door of the furnace chamber must shut in a perfectly air tight manner. If the furnace door together with its closing
15 bar is made rigid and pressed by means of some suitable device against the door frame, then owing to the high temperature of the furnace, and the consequent changes in the shape of the door, and more particularly, of
20 the door frame, the tight joint between these two parts is easily destroyed.

According to this invention the above drawback is obviated by making the furnace door flexible and also by connecting it to the
25 closing device, by which it is pressed against the door frame by yielding pressure members. Owing to its flexibility the door under the action of the interposed pressure members, can compensate its own changes of
30 shape and follow the changes of shape of the door frame, so that the joint between the door and its frame always remains perfect.

If a protective cover or shield is used on a furnace door of the improved construction
35 with a view to protecting the door as much as possible against the heat, the cover or shield is connected to the door, according to this invention in such a manner that its changes of shape are not transmitted to the
40 door, but are compensated for by the connecting members between the two parts.

The injurious influence of the pressure of furnace charges which, when the furnace door is used for vertical or oblique furnace
45 tends to destroy the tight joint, is avoided by the protecting shield being connected direct to the door closing device, whereby the pressure exercised by the furnace charge on the shield is transmitted to the rigid closing
50 device.

Finally the furnace door according to this invention is constructed in such a manner that it can be closed at a distance, any pressure in the closing device being taken up by

the yielding pressure members between the 55 door and the door fastening device.

In the accompanying drawings which show a construction of the door for a chamber furnace having an oblique hearth, Figure 1 shows the furnace door in front elevation, 60 Fig. 2 is a vertical longitudinal section on line 2—2 of Fig. 1, and Fig. 3 a horizontal cross-section on line 3—3 of Fig. 2, and Figs. 4 and 5 show on an enlarged scale in longitudinal and cross-section through the furnace 65 door the connection between the protecting shield and door bolt.

The door plate 2 used for closing the chamber 1 is supported by carrying bars 5 which are pivoted about a pin 3 in the door frame 4 70 and formed into bolts, a tight joint being formed when the door is closed preferably by means of a knife-edged member 6 and a packing ledge 7 of the door frame 4 secured to the furnace masonry 8. 75

The bars 5 (Fig. 1) which extend through the whole length of the door, are rigidly connected together by means of transverse distance pieces or bars 9 and angle irons 10, and arranged at such distances apart that they 80 form a rigid closing member extending over the whole surface of the door. The bars 5 are provided with eyes 11 distributed uniformly over the door, through which pass screw bolts 12 preferably adjustable from the 85 outside, and carrying at the inner ends pressure springs 13. The door plate 2 is connected to the bars 5 by lugs or angle members 14 one arm of which is movable on the transverse members 9 for instance on the two 90 outer ones by means of longitudinal holes 15, while their outer arms are secured to the door plate 2. The iron door plate 2 is made so thin that it is easily distorted when unusual pressure is applied to it. The springs 95 13 are adjusted by means of the screws 12 in such a manner that the door plate 2 is uniformly forced away from the bars 5.

If the bars 5 are pressed by any unusual force against the door frame, the edges of the 100 door are forced against the door frame 4 by means of the springs 13, but when the shape of the door frame changes the door plate owing to its flexibility can easily adapt itself to the altered shape of the door frame and 105 also the flexibility of the door at once compensates for any change in its own shape due to the action of the springs, so that the joint

between the door and the door frame remains perfect.

When a protective shield is provided at the inner furnace door for keeping the incandescent furnace charge from the door plate 2, a transmission of the changes in the shape of the shield to the door plate is avoided by pivoting the shield at one end and connecting it at the other end to the door plate by means of links or like members.

In the vertical furnace door illustrated the upper end of the protective shield 16 is secured to the door plate 2 by means of angle irons 17 and a pivot 18 while the lower end engages with links 20 pivoted about pins 19, the links 20 being mounted on one and the same spindle 22 supported in angle members 21 secured to the door plate 2. If, owing to the action of the heat, the protective shield contracts, this results in a rotation of the links 20 about their spindle 22 without the door plate 2 being affected by the changes in the shape of the protective shield.

Figs. 4 and 5 show a device by means of which the pressure of the furnace charge on the furnace door constructed according to this invention is neutralized without affecting the door joint. To that end the protective shield 16 is connected direct to the bars 5 by means of bolts 23 which pass through the door plate 2 in a gas tight manner by means of stuffing boxes or the like. The connection of the bolts 23 to the bars 5 is preferably effected by means of sleeves 24 adjustable on the transverse bolts 9, to which the bolts 23 are secured in a suitable manner. For preventing the changes in the shape of the protective shield from exercising an injurious influence on the joint between the door plate 2 and the bolts 23, the latter are preferably connected to the shield in the manner shown in Fig. 2.

A tight joint between the bolts 23 and the door plate 2 is preferably made in such a manner that, in the event of any lateral movements or rotation of the bolts about the transverse bolts 9, the joint remains unaffected. To that end, a corrugated metal plate 25 is secured to the door plate 2 at the point through which the bolts 23 pass. The corrugated plate is drawn out in the center to form a tube having a slot formed in it and is tightly pressed by means of a clamp ring 26 against the bolt 23. In this way a joint which is flexible in every direction is obtained by means of the corrugated plate 25.

In coking and gas producing furnaces and gas retorts it is desirable to be able to manipulate the door from a distance for the purpose of protecting the attendants. If a rigid furnace door is fastened by hand from a distance the closing device is liable to be subjected to excessive strains in its individual members.

In the door according to this invention

this is avoided by the high pressures produced in the fastening device being taken up by the interposed springs 13 acting as buffers. As will be seen from Figs. 1-3, the free lower ends of the bars 5 are formed U-shaped and are provided with teeth 27 with which, when the door is closed, engage toothed wheels 29 mounted on a common spindle 28 supported in the frame 4. Between the toothed wheels 29 is mounted on spindle 28 the worm wheel 30 engaging with a worm 31 supported in the frame 4. In the furnace door illustrated the spindle 32 of the worm is directed obliquely downwards and made sufficiently long to enable the door to be operated at the desired distance from the furnace.

When the door is closed, the bars 5 can be pressed against the furnace by rotating the spindle 32, for instance by means of a hand wheel. The pressure exercised on the bars 5 is transmitted by the springs 13 to the door plate 2 in a gradual and uniform manner, so that the door is tightly pressed with its edge 6 against the frame 4. Owing to the gradual increase of pressure to which the door is subjected the teeth are not placed under severe strain whereby a reliable closing of the furnace door is insured.

The securing of the door frame 4 to the furnace masonry 8 is preferably effected by means of transverse anchors 33 secured to the top and bottom of the frame and anchored to the masonry by means of anchor bolts.

What I claim is:—

1. In a door for furnaces and the like, the combination with a flexible door plate of a closing member and yielding pressure members disposed between the door plate and the closing member.

2. In a door for furnaces and the like, the combination with a closing member of a flexible door plate connected to said member, and of brackets mounted on or near the flanged edges of the door plate, said brackets coöperating with yielding pressure members disposed between the door plate and the closing member.

3. In a door for furnaces and the like, the combination with a closing member of a flexible door plate carried by the said member and of an inner protective shield pivotally connected to said member.

4. In a door for furnaces and the like, the combination with a closing member and a flexible door plate carried thereby of an inner protective shield connected to said member by bolts passing tightly through the door plate.

5. In a door for furnaces and the like, the combination with a closing member and a flexible door plate carried thereby of an inner protective shield connected to said member by bolts passing tightly through spring corrugated plates carried by the door plate.

6. In a door for furnaces and the like, the combination with a flexible door plate carried by a closing member of teeth on said member and toothed wheels arranged on the door frame and adapted to engage the teeth on the closing member and to be operated from a distance.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

HANS RIES.

Witnesses:

ABRAHAM SCHLESINGER,
LOUIS F. MUELLER.