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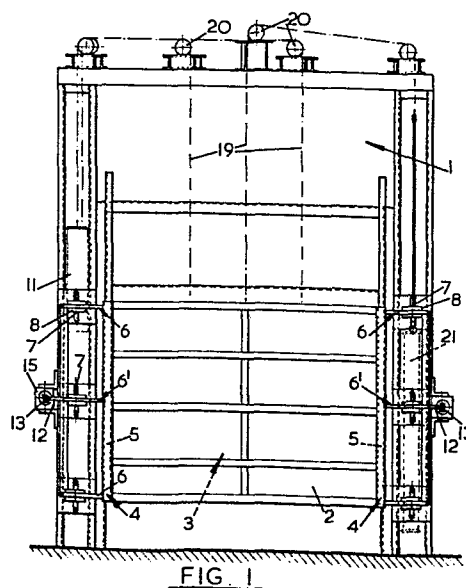
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54 **Furnace door seal.**

57 This invention relates to a furnace door 2 for use in closing a furnace opening 3 having a predetermined size and shape, which furnace door 2 has a substantially heat resistant surface having an extent corresponding to at least the extent of said opening 3, wherein the door 2 is provided with a flexible heat resistant ceramic fibre sealing means 17 arranged for sealing engagement with the furnace around said opening 3.



FURNACE DOOR SEAL

This invention relates to furnace doors and in particular to the close sealing of the furnace opening thereby.

In general where it is desired to provide close
5 sealing between doors and door frames it is usual to
employ more or less flexible gaskets and the like. A
particular problem arises though in the case of furnace
doors due to the very high temperature to which any seal
is subjected. Whilst there are available high temperature
10 resistant materials such as asbestos, existing known
arrangements using these tend to produce imperfect sealing
expecially where either or both of the door jambs and the
door lintel have any irregularities and imperfections
and particularly in the case of the vertical sliding
15 type of door. Conventionally this type of door is faced
with a refractory brick lining and the sliding door guide
is formed and arranged to have a camming action which
wedges the door tightly against the furnace around the
opening as the door reaches the end of its travel. On
20 the one hand though the sealing efficiency between the
door and furnace is limited due to the rigid nature of
the refractory brick lining and on the other hand the
lining is subjected to considerable friction and abrasive
forces as the door wedges against the furnace during
25 the end part of its travel.

It is an object of the present invention to avoid
or minimise one or more of the abovementioned disadvantages
and to provide a furnace door with improved door seal
means.

In its broadest aspect the present invention
30 provides a furnace door for use in closing a furnace
opening having a predetermined size and shape, which
furnace door has a substantially heat resistant surface
having an extent corresponding to at least the extent of

said opening,
characterized in that
said door is provided with a flexible heat resistant
ceramic fibre sealing means arranged for sealing engagement,
5 in use, with the furnace around said opening.

In a further aspect the present invention provides
a said furnace provided with a furnace door of the
invention.

In a particularly preferred aspect the present
10 invention provides a furnace having a door opening and
a furnace door slidable between an open position in which
it is laterally displaced from said opening and a closing
position opposite said door opening characterized in that
said furnace is provided with elongate guide means extending
15 substantially parallel to the plane of said door opening,
said door having guide engagement means arranged for
cooperation with said guide means to guide said door
during sliding movement thereof between its open and
closing positions, said elongate guide means being mounted
20 so as to be transversely displaceable by a guide drive
means between a guiding position in which said door is
spaced from said opening and is substantially freely
movable across said opening with a door seal means
provided on said door substantially clear of the furnace
25 and a clamping position in which said door is clamped
by said guide means against said furnace in a closed
position with said door seal means in sealing engagement
with the furnace around said opening so as to seal said
opening.

30 Preferably said sealing means is of a flexible
ceramic fibre material. Advantageously the whole of
that part of the door face opposite the opening is
covered with ceramic fibre material though other heat
resistant surface protecting materials may also be used
35 here.

By means of the present invention it is possible

to obtain a good sealing of a furnace opening in a simple and effective and reliable manner through the clamping action of the guide means whilst providing an effective guiding for the opening and closing movement of the door
5 which minimises the possibility of damage to the sealing means or other parts of the door due to interference with the furnace.

Further preferred features and advantages of the invention will appear from the following description given
10 by way of example of a preferred embodiment illustrated with reference to the accompanying drawings in which:

Fig. 1 is a front elevation of a furnace with a furnace door of the invention; and

Fig. 2 is a detail plan view of the door and part
15 of the furnace thereadjacent, of Fig. 1.

Fig. 1 shows a furnace 1 with a generally rectangular furnace door 2 in its closed position directly in front of a furnace opening 3. At the outside edges on the front face of the door (remote from the furnace opening) are
20 provided guide engagement means in the form of laterally outwardly facing generally U- or C-shaped channel sections 4 which extend for substantially the full height of the door 2.

Inside the channel sections 4 are nestingly engaged
25 respective guide means which are in the form of rods 5 which project upwardly of the door 2 to a position corresponding to a raised open position of the door 2.

Each of the guide rods 5 is supported by three spaced apart outwardly extending vertically aligned
30 levers 6 which are pivotally mounted 7 on lugs 8 which project forwardly from the furnace 1 to either side of the opening 3. Each of the guide rods 5 is secured to first, innermost, ends 9 of each of the respective levers 6.

35 The second, outermost, ends 10 of the respective

levers 6 are also interconnected by respective link members 11 which extend parallel to the guide rods 5 and pivotal axes of the levers 6 so that the latter move in unison.

5 The central lever 6' on each side extends 12 at its outermost end 10 beyond the outer ends of the other levers 6 and the axis of the link member 11 and is pivotally connected 13 to the piston rod 14 of a pneumatically operated piston and cylinder door closing means 15.

10 In Fig. 2 it may be seen that the door 2 is in its closed position, the piston rods 14 being in forwardly extending positions so that the guide rods push against the rearwardmost sides 16 of the guide engaging channels 4 thereby clamping the door 2 securely against the furnace 1 across the opening 3 with a peripherally extending
15 ceramic fibre door seal 17 in sealing engagement with the furnace 1 around the opening 2. Upon retraction of the piston rods 14 the guide rods 5 engage the forwardmost sides 18 of the guide engaging channel 4 to pull the door forwardly away from the furnace opening 3 into a
20 closing position opposite the opening but clear of the front of the main furnace body.

The door 2 may now be freely raised into an open position clear of the opening 3 with the aid of pulley wires 19 from which it is suspended and which extend
25 around respective pulleys 20 to counterbalance weights 21 by lowering the counterbalance weights 21. This can be done either manually or with the aid of suitable drive means such as an electric motor.

The ceramic fibre door seal means used in accordance
30 with the invention is a known material used at present for lining the interior of furnaces. In general it is in the form of a more or less densely packed arrangement of upstanding ceramic fibres on a flexicle backing of for example a heat resistant cloth which may be cemented to
35 the furnace door or directly or indirectly on a more or

less rigid heat resistant substrate which may be conveniently bolted to the furnace door. This type of material is commercially available from Messrs. Clinotherm Ltd. of Dewsbury, Yorkshire, England and is made in
5 various thicknesses e.g. from 40 to 125mm and various temperature grades e.g. heat resistant up to 1100°C and heat resistant up to 1500°C.

CLAIMS

1. A furnace door (2) for use in closing a furnace opening (3) having a predetermined size and shape, which furnace door (2) has a substantially heat resistant surface having an extent corresponding to at least the
5 extent of said opening (3), characterized in that said door (2) is provided with a flexible heat resistant ceramic fibre sealing means (17) arranged for sealing engagement, in use, with the furnace around said opening (3).
2. A furnace door as claimed in claim 1 wherein said
10 sealing means is of a flexible ceramic fibre material (17).
3. A furnace door as claimed in claim 2 wherein the sealing means (17) is supported in a channel (27) so as to project out of said channel (27).
4. A furnace door as claimed in claim 2 or claim 3
15 wherein the sealing means (17) is in the form of a more or less densely packed arrangement of upstanding ceramic fibres on a flexible backing.
5. A furnace having a door opening and a furnace door as claimed in any one of claims 1 to 4 wherein said
20 furnace door (2) is slidable between an open position in which it is laterally displaced from said opening (3) and a closing position opposite said door opening (3) and said furnace is provided with elongate guide means (5) extending substantially parallel to the plane of said
25 door opening (3), said door⁽²⁾ having guide engagement means (4) arranged for cooperation with said guide means (5) to guide said door (2) during sliding movement thereof between its open and closing positions, said elongate guide means (5) being mounted so as to be transversely displaceable
30 by a guide drive means (15,12,6) between a guiding position in which said door (2) is spaced from said opening (3) and is substantially freely movable across said opening with a door seal means (17) provided on said door (2)

substantially clear of the furnace (1) and a clamping position in which said door (2) is clamped by said guide means (5) against said furnace (1) in a closed position with said door seal means (17) in sealing engagement with
5 the furnace (1) around said opening (3) so as to seal said opening (3).

6. A furnace as claimed in claim 5 wherein said guide means is in the form of a rod (5) and said guide engagement means is in the form of a channel (4).

10 7. A furnace as claimed in claim 6 wherein the guide drive means comprises a pressurised fluid operated piston and cylinder means (15) connected to the guide rod (5) by a mechanical linkage (12).

8. A furnace as claimed in claim 6 or claim 7 wherein
15 the weight of said door (2) is counterbalanced (21) to facilitate raising and lowering of the door (2).

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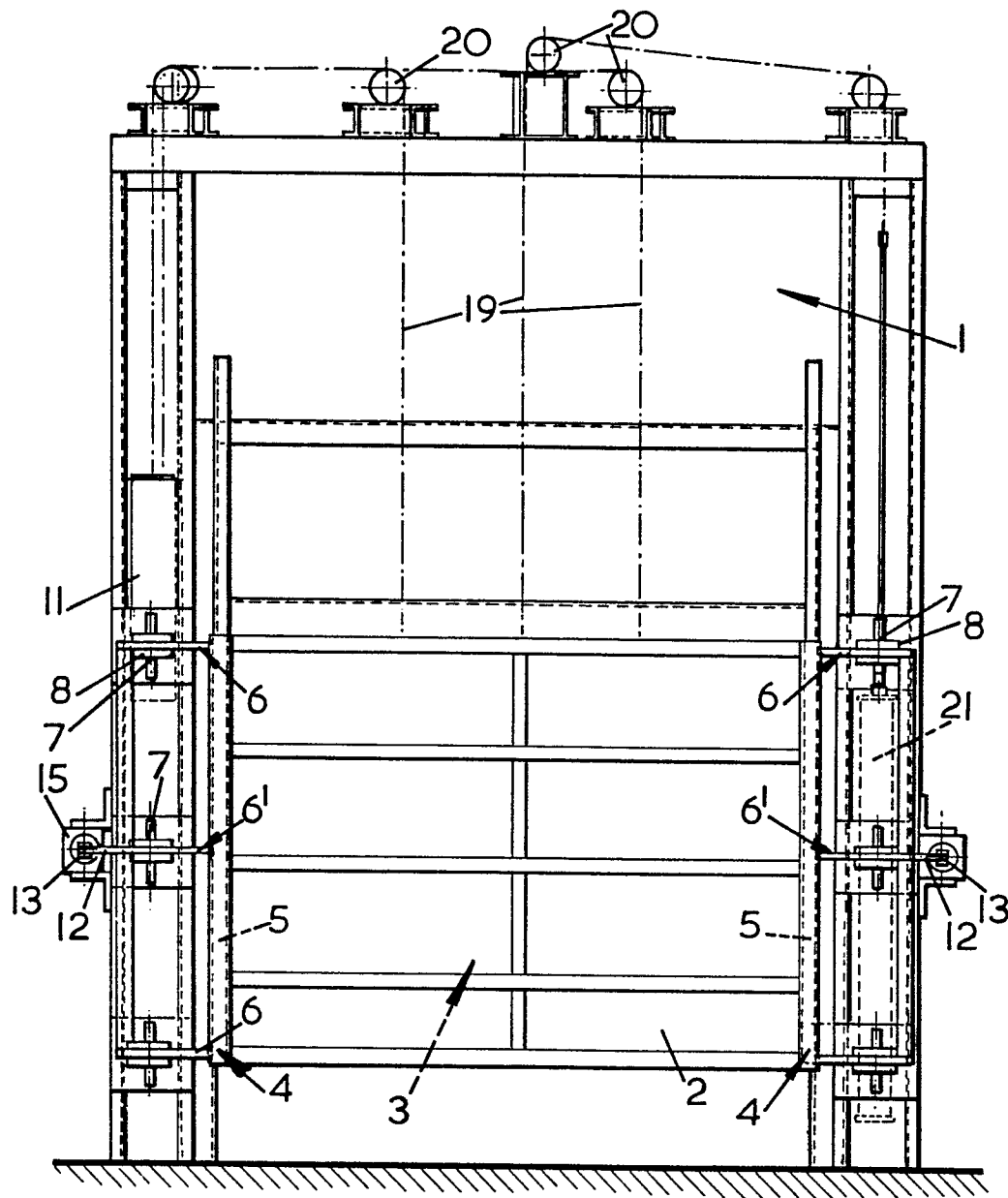


FIG. 1

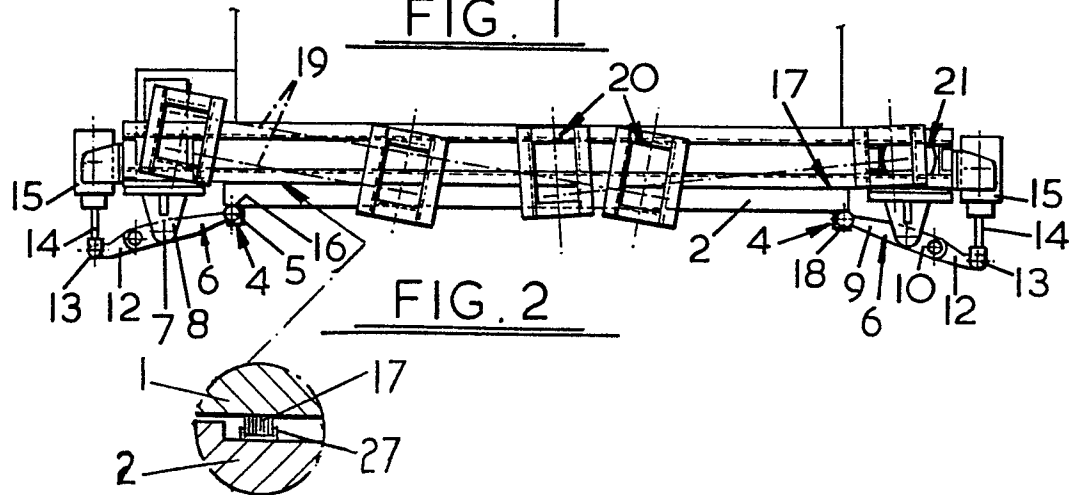


FIG. 2



European Patent
Office

EUROPEAN SEARCH REPORT

0079804
Application number

EP 82 30 6118

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
X	--- US-A-2 862 263 (GRIEVE) *Figures; column 2, lines 3-55*	1-4	F 27 D 1/18 F 23 M 7/00
Y	--- US-A-4 160 421 (HEINEN) *Claims; abstract; figures*	1-4	
Y	--- CH-A- 372 781 (YGNIS) *The whole document*	1-4	
Y	--- DE-C- 759 983 (W.WALLICZEK) *The whole document*	1,5,6	
Y	--- DE-B-1 015 464 (BROCKMANN, BUNDT) *Figures; claims*	1,5,8	
A	--- DE-A-2 306 080 (BROWN, BOVERI)		TECHNICAL FIELDS SEARCHED (Int Cl 3)
A	--- DE-A-1 583 327 (ALCO) -----		F 27 D F 27 B F 23 M
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18-02-1983	Examiner OBERWALLENEY R.P.L.I
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			