(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 041 812**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **81302421.3**

(22) Date of filing: **02.06.81**

(51) Int. Cl.³: **C 10 B 43/08**

(30) Priority: **06.06.80 JP 75576/80**

(43) Date of publication of application:
16.12.81 Bulletin 81/50

(84) Designated Contracting States:
DE FR GB IT NL

(71) Applicant: **KORITSU MACHINE INDUSTRIES LIMITED**
4th Floor Wakoh 13 Building 16-1, Koami-cho
Nihombashi Chuo-ku Tokyo(JP)

(72) Inventor: **Kitano, Yoshiteru**
5-52, 3-chome, Mizue
Edogawa-ku Tokyo(JP)

(74) Representative: **Funge, Harry et al,**
M'CAW & CO. 41-51 Royal Exchange Cross Street
Manchester M2 7BD(GB)

(54) Coke oven door frame cleaning apparatus.

(57) A coke oven door frame cleaning apparatus of this invention provides complete cleaning of the door frame (6), more particularly, the sealing surface (7) and the inner surface (8) of the door frame (6). The cleaning apparatus completely washes away by means of high pressured fluid the tary deposits persistently stuck on the surfaces. Possible damage on these surfaces (7, 8) due to cutters and/or scrapers is avoided. The apparatus comprises an upstanding main frame (13) mounted on a carriage (10) and supporting two upstanding sub-frames (2, 3) each carrying nozzles (9) to which the pressure fluid is supplied. The nozzles (9) on a larger one (2) of the sub-frames direct the pressure fluid onto the sealing surface (7) whilst the nozzles on a smaller one (3) of the sub-frames direct fluid onto the inner surface (8) of the oven door frame (6), the sub-frames (2, 3) being positionally adjustable on the main frame (13).

EP 0 041 812 A2

COKE OVEN DOOR FRAME CLEANING APPARATUS

The present invention relates to a coke oven door frame cleaning apparatus for cleaning the door frame, more particularly to a cleaning apparatus for cleaning the sealing plate and the inner surface thereof.

As is well known, the coke oven door frame is contaminated and stuck on by tar and other persistent, viscous sometimes solid, material produced during coking operation.

With prior art cleaning apparatus using cutters and/or scrapers, the cleaning operation is carried out in such manner that these cutters and/or scrapers are pressure-contacted onto the door frame to be cleaned, more particularly to the sealing plate and inner surface of the door frame and then driven to move up and down or to rotate on the surface in order to scrape off the tar and other material stuck thereon. However, the prior art cleaning methods involve such drawbacks that uneven cleaning results when a solid adhesive material is used and there is left uncleaned portions, or otherwise the surface to be cleaned may be damaged. Further, the prior art cleaner using such cutters and/or scrapers must be accompanied by such mechanism that enables it to expand or contract when inserting or extracting into or from the door mouth of the coke oven chamber so that the cutters and/or scrapers may be pressure-contacted or detached onto or from the door frame surface to be cleaned.

The present invention has been made in the light of the above problems, and is directed to the provision of such door frame cleaning apparatus that is capable of complete cleaning of the door frame surface by washing away with high pressure fluid without leaving any deposits of the persistently stuck tary material and that without requiring any special mechanism for pressure-contacting or detaching the cutters/scrapers when inserting or extracting the apparatus. Further, since cutters and/or scrapers are not used, no damage to the door frame surface will result.

The present invention provides a coke oven door frame cleaning apparatus characterised by a main frame having a pair of sub-frames mounted thereon, a plurality of nozzles supported by each sub-frame and means for supplying fluid under pressure to each of said nozzles.

The present invention will become more fully understood from the detailed description given hereinafter and from the accompanying drawings of the preferred embodiment of the present invention which however should not be taken as limitative to the present invention but for elucidation and explanation only.

In the drawings:

Fig. 1 is a side view of a preferred embodiment of a coke oven door frame cleaning apparatus according to the present invention;

Fig. 2 is a front view of the same, with a heat-proof plate thereof taken away;

Fig. 3 is an enlarged sectional view of a main part of the apparatus, partly taken away, illustrated as inserted into the coke oven mouth; and

Fig. 4 is an enlarged explanatory view of one shape of a jet nozzle.

Referring now to the drawings, particularly to Figs. 1 and 2, there is illustrated a preferred embodiment of a coke oven door frame cleaning apparatus according to the present invention, which generally includes a plurality of fitting rods, a vertical stationary frame 13, a vertical heat-proof plate 18, a first jet nozzle supporting vertical frame 2 and a second jet nozzle supporting vertical frame 3, the latter two vertical frames having high pressure fluid supply pipes respectively on the entire periphery thereof. The cleaning apparatus is mounted on a carrier 10 which is per se mounted on a pusher machine on the pusher side or a coke guide car on the coke side of the coke oven battery (both not shown), by means of a hanger member 11 and a pair of spring-loaded fitting members 12.

On the vertical stationary frame 13 are mounted three guide members 21 each having a guide roller 21' and two pairs of stopper member 20. The first jet nozzle supporting vertical frame 2 has three guide rails 2' respectively receiving corresponding guide rollers 21'. On the entire periphery of the first jet nozzle supporting vertical frame 2 is mounted a supply pipe 4 with a plurality of branch pipes 4' for high pressure fluid, while on the entire periphery of the second jet nozzle supporting vertical frame 3 is mounted a supply pipe 5 with a plurality of branch pipes 5' for high pressure fluid.

Both the first jet nozzle supporting vertical frame 2 and the second jet nozzle supporting vertical frame 3 are mounted on the fitting rods 1 through respective

supporting members 1' as clearly shown in Fig. 3. The vertical heat-proof plate 18 is also mounted on the front end of the fitting rods 1 through respective mounting members 18', and further supported by respective stays 18" connected to the first jet nozzle supporting frame 2. As will be apparent from Figs. 1 and 3, the size of the first jet nozzle supporting vertical frame 2 is larger than that of the second jet nozzle supporting frame 3 so that it may face the sealing surface 7 of the door frame 6, while the second jet nozzle supporting vertical frame 3 may be inserted deeply into the door mouth 16. Both the supply pipes 4 and 5 are connected to respective main pipes 15 and 14 which are further connected to a high pressure fluid supply source (not shown), when the present cleaning apparatus is placed in the door mouth 16. Each branch pipe 4' has a jet nozzle 9 facing the sealing surface 7 of the door frame 6. Each branch pipe 5' of the supply pipe 5 has a plurality of jet nozzles 9 facing the inner surface 8 of the door frame 6. The jet nozzles 9 may be of such bifurcate or other forked form as illustrated in Fig. 4, if desired for a complete cleaning of wide range of coke oven door frame surfaces.

Further, the stationary vertical frame 13 is provided with a hydraulic cylinder 19 with its cylinder rod 19' connected to the first jet supporting vertical frame 2 so that the latter may be moved up and down with the guide rails 2' engaging with the guide rollers 21'.

In operation, when the door frame is to be cleaned, the cleaning apparatus is carried by the carrier 10 which is per se driven by the coke guide car or the pusher machine to the front of the door frame until the stopper members 20 have abutted against the contact faces 22 of the door

frame 6. At this time, the hydraulic cylinder 19 is driven to move the first jet nozzle supporting vertical frame 2, if necessary to adjust the vertical position when the cleaning apparatus is inserted into the door mouth 16, as shown in Fig, 3. At this position, the heat-proof vertical plate 18 and the second jet nozzle supporting vertical frame 3 have been deeply inserted into the door mouth 16 with the branch pipes 5 and thus the jet nozzles 9 facing the inner face 8 of the door frame 6, and the first jet nozzle supporting vertical frame 2 has been placed facing the sealing surface 7 of the door frame 6.

Now, high pressure fluid, such as high pressure water, is supplied through the main pipes 14 and 15 through the supply pipes 4 and 5 from the supply source to the branch pipes 4' and 5' and jetted through the jet nozzles 9 onto the sealing surface 7 and the inner surface 8 of the door frame 6 so as to wash away the tar and the like persistently stuck on these surfaces without leaving any deposits thereon. As the high pressure fluid, there may be preferably used high pressure water, however high pressure steam and other fluid may also be used.

Claims:

1. A coke oven door frame cleaning apparatus characterised by an upstanding main frame (13), a first jet nozzle supporting upstanding frame (2), a second jet nozzle supporting upstanding frame (3), a heat-proof upstanding plate (18), a plurality of fitting rods (1) for supporting by means of supporting members (1') said first and second jet nozzle supporting upstanding frames (2, 3) and said heat-proof upstanding plate (18), a high pressure fluid supply pipe (4) mounted on the periphery of said first jet nozzle supporting upstanding frame (2) and having a plurality of branch pipes (4') each with a jet nozzle (9), a high pressure fluid supply pipe (5) mounted on the periphery of second jet nozzle supporting upstanding frame (3) and having a plurality of branch pipes (5') each with a plurality of jet nozzles (9), a driving device (19) mounted on said main upstanding frame (13) for moving up and down said first and second jet nozzle supporting upstanding frames (2, 3) and said heat-proof upstanding plate (18), and main supply pipes (14, 15) each for said supply pipe (4, 5) and connecting to a high pressure fluid supply source; said first jet nozzle supporting upstanding frame (2) having a plurality of guide rails (2'), said upstanding stationary frame (13) having a plurality of guide members (21) each with a guide roller (21') engaging with said guide rail (2'), said main upstanding frame (13) having a plurality of stopper members (20) for abutting against a contact face (22) of a door frame (6), said main upstanding frame (13) having a hanger member (11) and one or more spring-loaded fitting members (12) for connecting the cleaning apparatus to a carriage (10).

2. A coke oven door frame cleaning apparatus characterised by
a main frame having a pair of sub-frames mounted thereon,
a plurality of nozzles supported by each sub-frame and
means for supplying fluid under pressure to each of said nozzles.

3. A cleaning apparatus according to claim 2, characterised in that
at least one of said sub-frames is positionally adjustable relative to said main frame.

4. A cleaning apparatus according to claim 2 or 3, characterised in that
said nozzles are disposed around the periphery of each sub-frame.

5. A cleaning apparatus according to any one of claims 2 to 4,
characterised in that
said main frame is mounted on a carriage.

6. A cleaning apparatus according to any one of claims 2 to 5,
characterised in that
the nozzles on one sub-frame are directed substantially transversely of the nozzles on the other of said sub-frames.

7. A cleaning apparatus according to claim 6, characterised in that
one sub-frame is of larger dimensions than the other of said sub-frames so as to extend outwardly therearound.

8. A cleaning apparatus according to claim 7,

characterised in that

said one sub-frame is disposed between said other of said sub-frames and said main frame.

FIG. 1

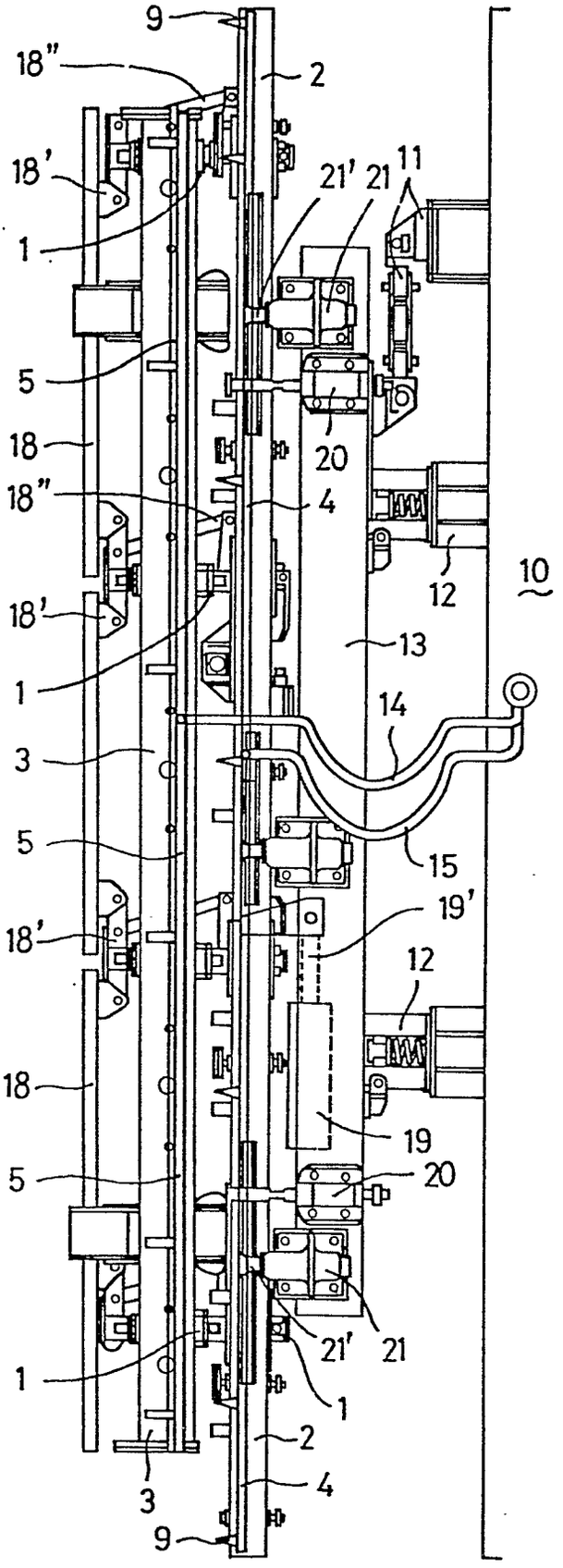
9
18"
2
18'
21'
21
11
1
5
18
20
18"
4
12
10
18'
13
1
14
3
5
15
19'
18'
12
18
19
5
20
21'
21
1
2
4
3
9

FIG. 2

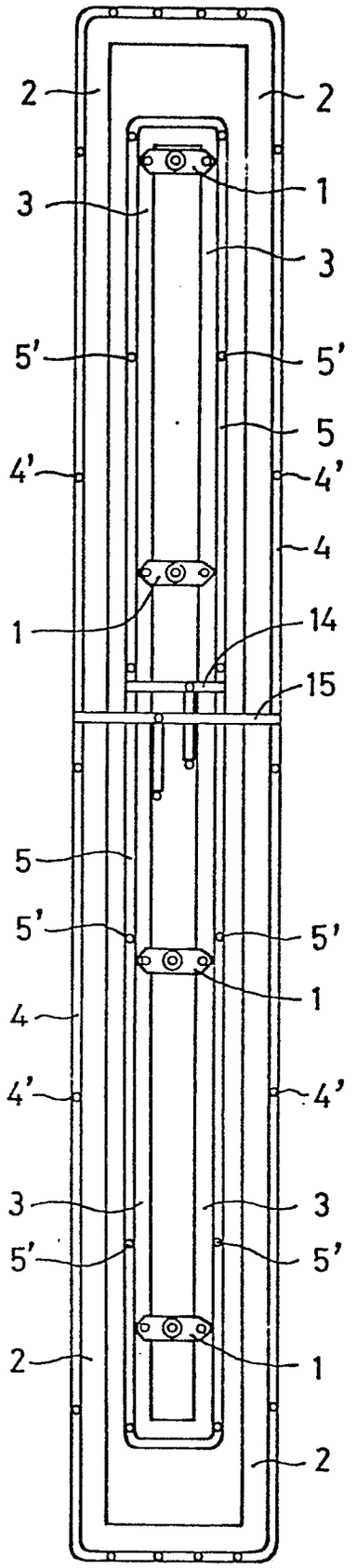
2
2
1
3
3
5'
5'
5
4'
4'
4
1
14
15
5
5'
5'
1
4
4'
4'
3
3
5'
5'
2
1
2

FIG. 4

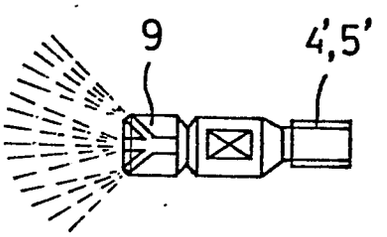

FIG. 3