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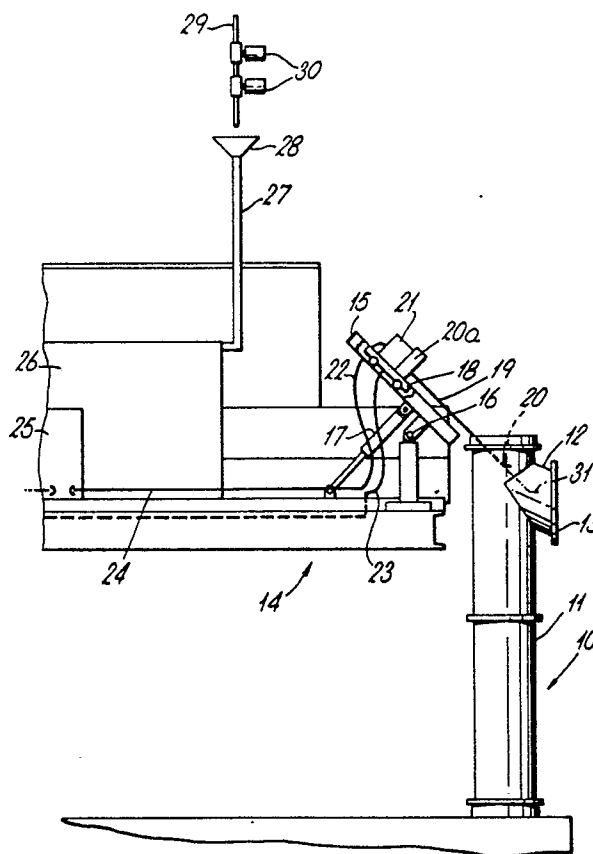
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(54) **Gooseneck cleaner.**

(57) A gooseneck cleaner for a coke-oven, said cleaner including a frame (15) mountable on the coke-oven Lehr car (14), and a carriage (18) movable on said frame and carrying an elongate lance (19) having a nozzle (20) at its free end. The nozzle projects water forwardly and upwardly in a vertical plane in a starting rotational position of the lance. When the nozzle is in the mouth of a side tube (12) of the gooseneck (10) high pressure water is forced through the nozzle which is reciprocated by no more than 90 degrees from this vertical plane. The lance (19) is advanced and when the nozzle is fully within the side tube (12) the nozzle is rotated through 360 degrees fully to clean the peripheral surface of the side tube without causing water to flow into the down tube (11) of the gooseneck (10).



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GOOSENECK CLEANER

The present invention relates to a gooseneck cleaner for a coke-oven.

Coke-ovens, particularly those used in the steel industry, include a vertical gooseneck pipe through which gas is emitted from the coke-oven pass. A side tube of the gooseneck pipe is connected to a common longitudinal connector pipe or manifold extending between the various coke-ovens. As time passes, said gooseneck becomes fouled with deposits such as carbon, tar and sulphur. This restricts the flow of gas from the oven and increases the pressure within the oven.

It has been conventional to clean the gooseneck pipe by a mechanical scraper device but this has generally proved unsatisfactory. It has recently been proposed to clean the pipe by a water jetting technique and one example of such a system is disclosed in British Patent 1516903 while this is generally satisfactory it does have certain disadvantages insofar as the high pressure jets of water, while being capable of satisfactorily cleaning the gooseneck, can cause a splashing in the vertical pipe and this makes it substantially impossible to operate the cleaning while the oven is heated because a very dangerous situation can occur if water passes down into the heated oven in which flash boiling would occur.

It is now proposed, according to the present invention, to provide a gooseneck cleaner for a coke-oven, said cleaner comprising a frame mountable on the coke-oven Lehr car, a carriage movable longitudinally with respect to said frame, an elongate lance mounted on said carriage for movement therewith, means to rotate said lance about its longitudinal axis, a swivel coupling at the rear end of said lance, for connecting the lance to a supply of very high pressure water, while enabling said lance to rotate about its axis, a single jetting nozzle on the forward end of said lance, said nozzle initially jetting water upwardly and forwardly in a vertical plane in a starting rotational position of said lance, means to move said carriage forwardly from a retracted position, via an intermediate position in which the nozzle is in the mouth of the side tube of the gooseneck to be cleaner, to an advanced position in which said nozzle is fully within said side tube, means to control rotation of said nozzle about its axis, to restrict said rotation to a reciprocating motion in which the nozzle sweeps an arc of no greater than 90 degrees to each side of said vertical plane, as said nozzle moves forwardly from said intermediate position to a further position, whereby water will not flow to the down pipe of said gooseneck, thereafter causing said lance to

rotate through 360 degrees as said nozzle is moved forwardly from said further position to said advanced position.

With such an arrangement, because there is only a limited oscillating motion initially, and because there is only a single jet emitting from the nozzle, this jet initially operating in a vertical plane, there is little or no chance of water being projected into the downpipe. The lance is advanced into the side tube once it is moved fully to a position within the side tube, the nozzle is then rotated through the full 360 degrees. It has been found that by using such a technique it is possible fully to clean the side tube around its full periphery without water flowing down the vertical pipe.

Preferably the frame is mounted for pivotal movement about a horizontal axis to enable the angle of said lance to be adjusted to suit a particular gooseneck configuration.

Advantageously, with such a construction, the frame is pivotal from an operating position in which said lance is inclined downwardly towards the forward, nozzle end, to a resting position in which said lance is inclined upwardly with the nozzle above the rear end of the lance.

In a preferred construction the Lehr car carries a water tank which feeds water to the high pressure jetting pump. Advantageously a device is used to prevent over filling as the cleaning operation is not used at the same rate as is the coal loading, but only when required. The level of water in the tank is sensed so that when it reaches a particular low level it can be topped up to the required level.

In order that the present invention may more readily be understood, the following description is given, merely by way of example, with reference being made to the accompanying drawing in which the sole figure is a schematic view of a portion of a coke-oven gooseneck and a Lehr car carrying a gooseneck cleaner one embodiment of gooseneck cleaner according to the present invention.

Referring to the drawing there is illustrated a coke-oven gooseneck 10 including a down pipe 11 and a side pipe 12 provided with a flange 13 for connecting to a manifold.

The drawing also illustrates a portion of a Lehr car indicated by the general reference numeral 14 which is movable in a direction perpendicular to the plane of the drawing and will be generally symmetrical passing between a similar gooseneck to the gooseneck 10 illustrated in the drawing.

The Lehr car 14 carries a frame 15 which is pivotally mounted at 16 the pivoting being controlled by a hydraulic reciprocating ram 17.

Axially movable in the frame 15 is a carriage

illustrated schematically at 18 and carrying a longitudinally extending lance 19 having a nozzle 20 at its forward end. This nozzle is provided with a single jet which projects water generally forwardly and upwardly at approximately 45 degrees and in a vertical plane in a starting rotational position of the lance 19. The lance is mounted for rotation about its own axis and this rotation is controlled via a reduction gearbox 20a and a hydraulic motor 21. A hydraulic ram (not shown) is provided to reciprocate the carriage 18 along the length of the inclined frame 15. A swivel joint (not shown) mounted at the rear end of the lance 18 enables the lance to be connected to a high pressure water hose 22. A further hose 23 is shown this being a hydraulic hose for driving the ram (not shown) and the motor 21.

High pressure water pipe work 24 is provided to feed water from a high pressure jetting pump 25 mounted adjacent a water tank 26 carried on the lehr car. Water can be fed to the tank 26 via a feed pipe 27 having a funnel 28 at its upper end and this can be moved, as the lehr car moves, to a particular position in a line of coke-ovens so that it passes under a water feed system 29 having automatic filling control valves 30.

In operation, the lehr car is moved to a particular gooseneck 10 which is opened and the carriage 18 is advanced by the hydraulic ram (not shown) until the nozzle 20 reaches an intermediate position indicated in dashed lines at 31, in which it is immediately in the mouth of the side tube 12. At this stage the nozzle jet is inclined upwardly and forwardly at approximately 45 degrees and the pump 25 is put into operation so that water is projected at high velocity against the upper part of the side tube 12. The lance 19 is reciprocated no more than 90 degrees from this vertical plane and the upper part of the side tube 12 is thus cleaned but there will be no direct jetting of the water into the down pipe 11 which can be very hot and any such direct jetting would be very dangerous. The lance 19 is then moved to a further position approximately at the location of the flange 13 and the lance can then be rotated through 360 degrees and water thereby can spray against the full periphery of the side pipe. The lance can simultaneously be advanced further to a fully advanced position to effect thorough cleaning of the side pipe whereafter it can be withdrawn to the position shown. When this is completed the ram 17 can be retracted so that the frame 15 will pivot about the axis 16 whereby the nozzle 20 is above the rear end of the lance. This prevents water dripping downwardly which again could be dangerous.

From time to time it will be necessary to top up the tank 26 and this is effected using the feed 29 together with its valves 30 at a particular position of

the lehr car in its movement.

A similar cleaning device will be provided on the lehr car on the opposite side, that is to the left as shown in the drawing, and this can be supplied by the same tank 26 and high pressure jetting pump 25.

Claims

1. A gooseneck cleaner for a coke-oven, said cleaner comprising a frame (15) mountable on the coke-oven lehr car (14), a carriage (18) movable longitudinally with respect to said frame, an elongate lance (19) mounted on said carriage for movement therewith, means (20a,21) to rotate said lance about its longitudinal axis, a swivel coupling at the rear end of said lance, for connecting the lance to a supply (22,25,26) of very high pressure water, while enabling said lance to rotate about its axis, a single jetting nozzle (20) on the forward end of said lance, said nozzle initially jetting water upwardly and forwardly in a vertical plane in a starting rotational position of said lance, means to move said carriage forwardly from a retracted position, via an intermediate position in which the nozzle is in the mouth of the side tube (13) of the gooseneck (10) to be cleaned, to an advanced position (31) in which said nozzle is fully within said side tube, means to control rotation of said nozzle about its axis, to restrict said rotation to a reciprocating motion in which the nozzle sweeps an arc of no greater than 90 degrees to each side of said vertical plane, as said nozzle moves forwardly from said intermediate position to a further position, whereby water will not be jetted directly into the down pipe (11) of said gooseneck, thereafter causing said lance to rotate through 360 degrees as said nozzle is moved forwardly from said further position to said advanced position.

2. A cleaner according to claim 1, wherein said frame (15) is mounted for pivotal movement about a horizontal axis (16) to enable the angle of said lance (19) to be adjusted to suit a particular gooseneck configuration.

3. A cleaner according to claim 2, wherein said frame (15) is pivotable from an operating position in which said lance is inclined downwardly towards the forward, nozzle end, to a resting position in which said lance is inclined upwardly with the nozzle above the rear end of the lance.

4. A cleaner according to claim 3, wherein said frame is pivotable about said axis by hydraulic ram means (7).

5. A cleaner according to any preceding claim, wherein said means to move said carriage forwardly include a hydraulic reciprocating ram.

6. A cleaner according to any preceding claim, wherein said means to rotate the lance comprise a hydraulic motor (21), a coupling and a reduction gearbox (20a).

7. A cleaner according to any preceding claim, wherein a water tank (26) which feeds water to the high pressure jetting pump (25) which feeds the lance (19), is mounted on the lehr car for movement therewith.

8. A cleaner according to claim 7, wherein means (27-30) are provided to fill said water tank as the tank moves with the lehr car, said means being operable only when the level within said water tank falls below a predetermined level.

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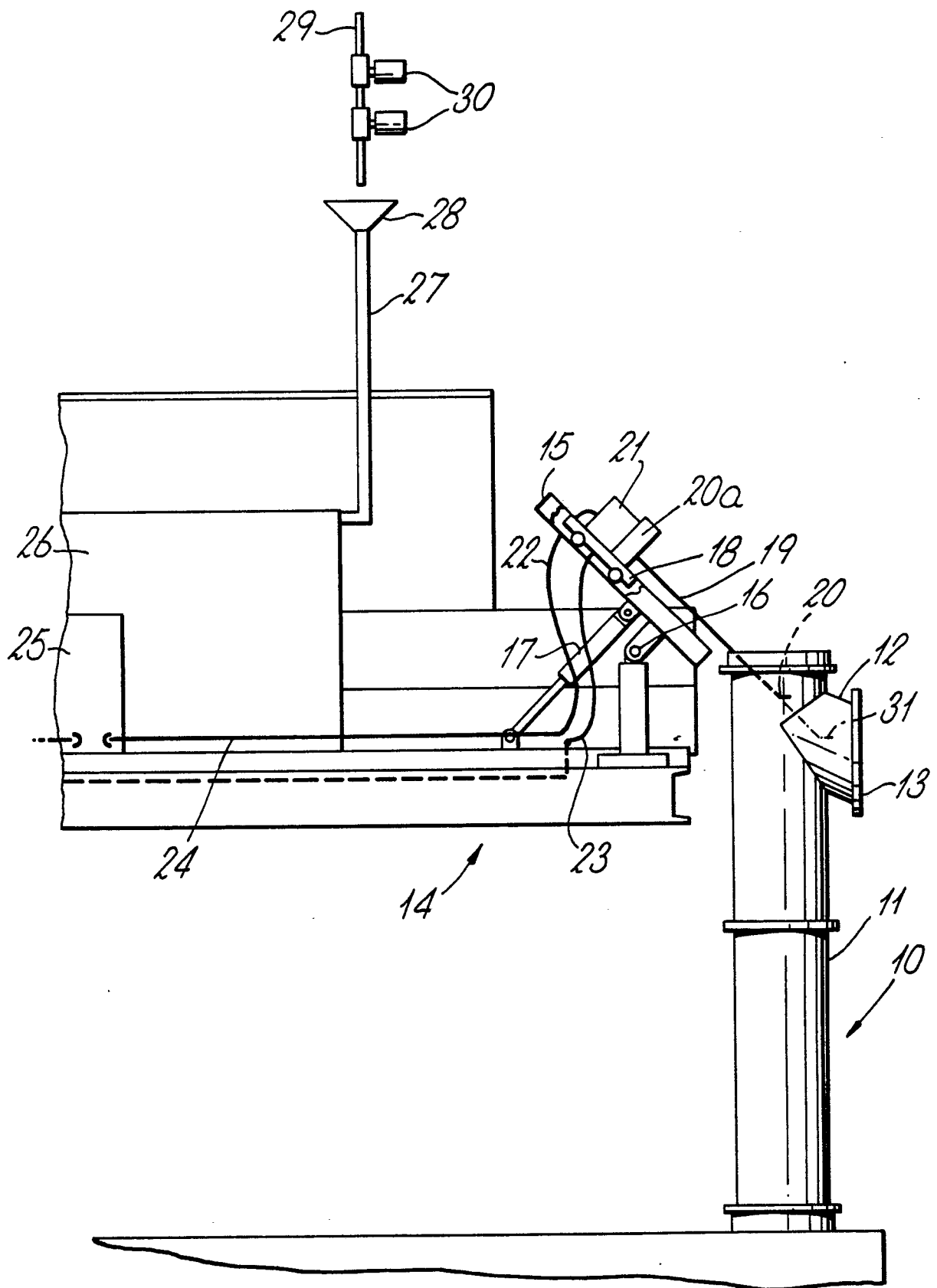
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X,D	GB-A-1 516 903 (INDUSTRIAL HIGH PRESSURE SYSTEMS) * Claims 1-7; page 2, line 126 - page 3, line 9; figures 1-6 *	1-8	C 10 B 43/08
E	EP-A-0 248 672 (JETIN INDUSTRIAL LTD) * Claims 1-8; figure *	1-8	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			C 10 B B 08 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06-06-1988	Examiner MEERTENS J.
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			