May 22, 1956 G. HENSELEIT 2,746,610

DOOR-HANDLING MECHANISM FOR THE DOORS OF HORIZONTAL COKE OVENS

Filed Dec. 13, 1952 4 Sheets-Sheet 1

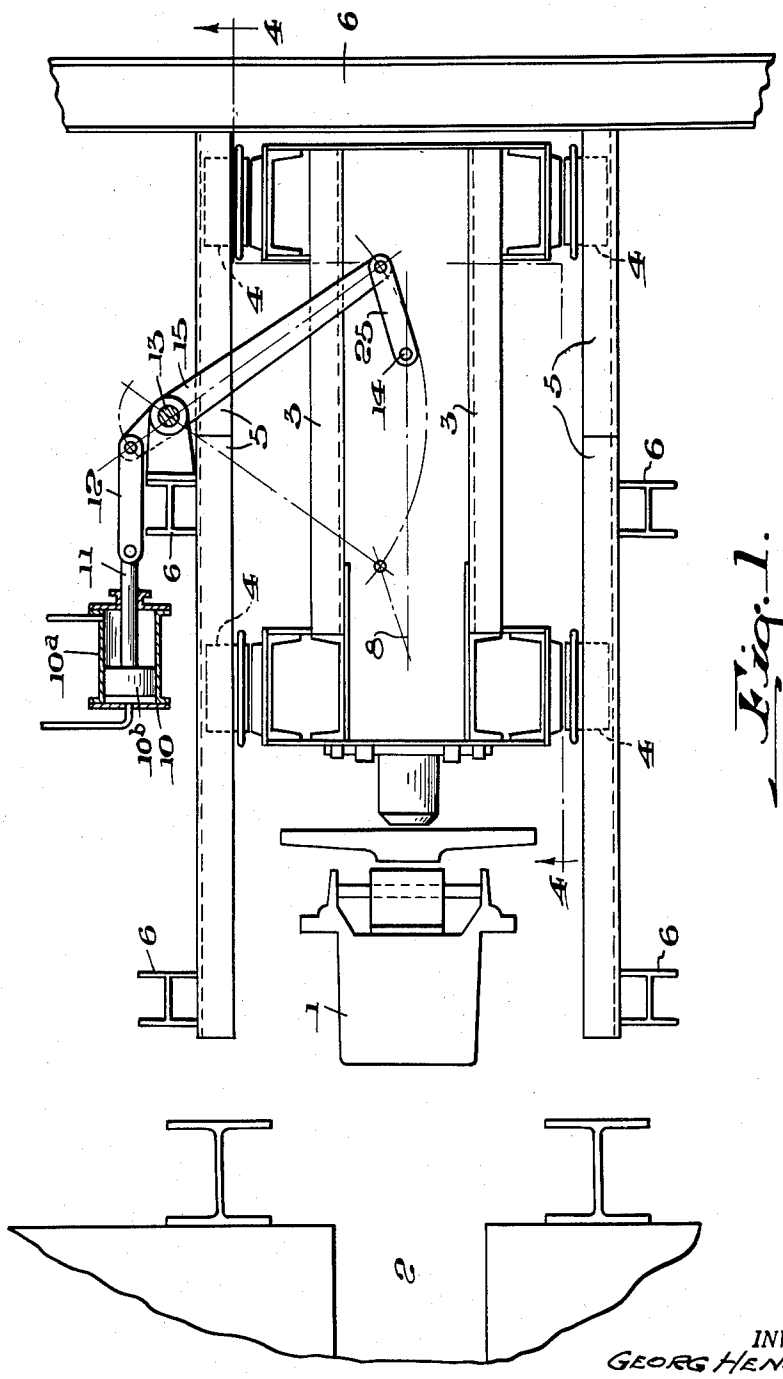


Fig. 1.

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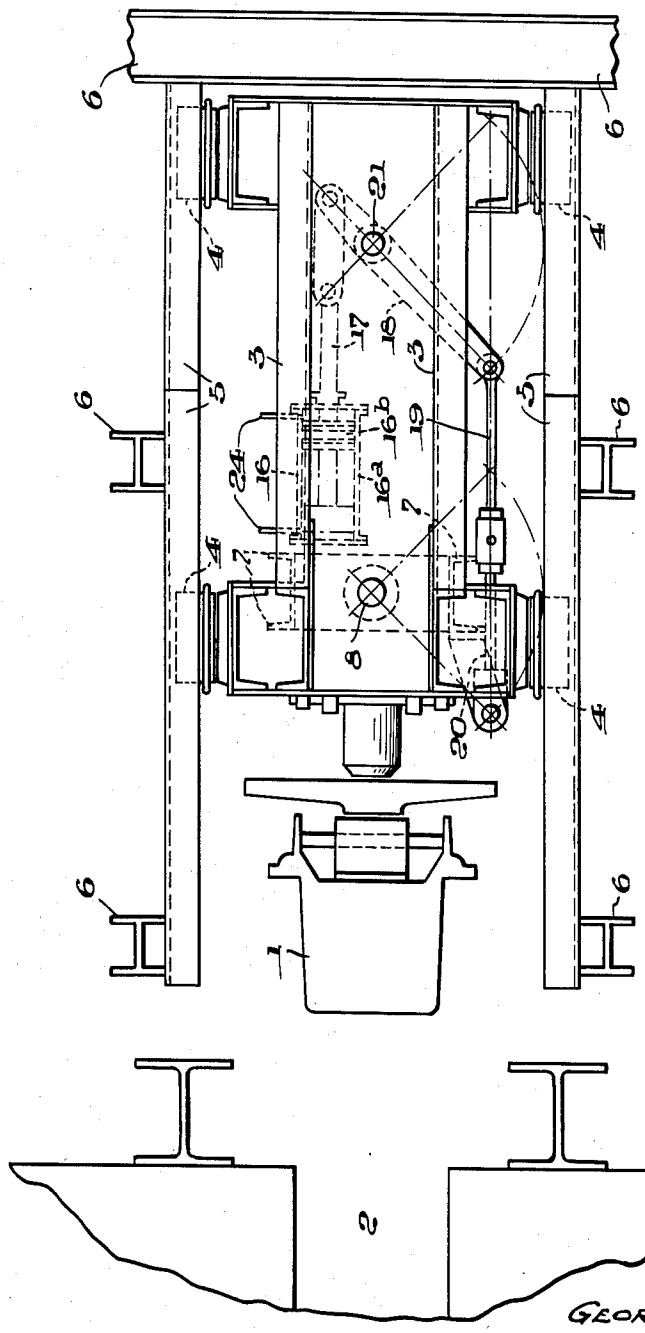


Fig. 2.

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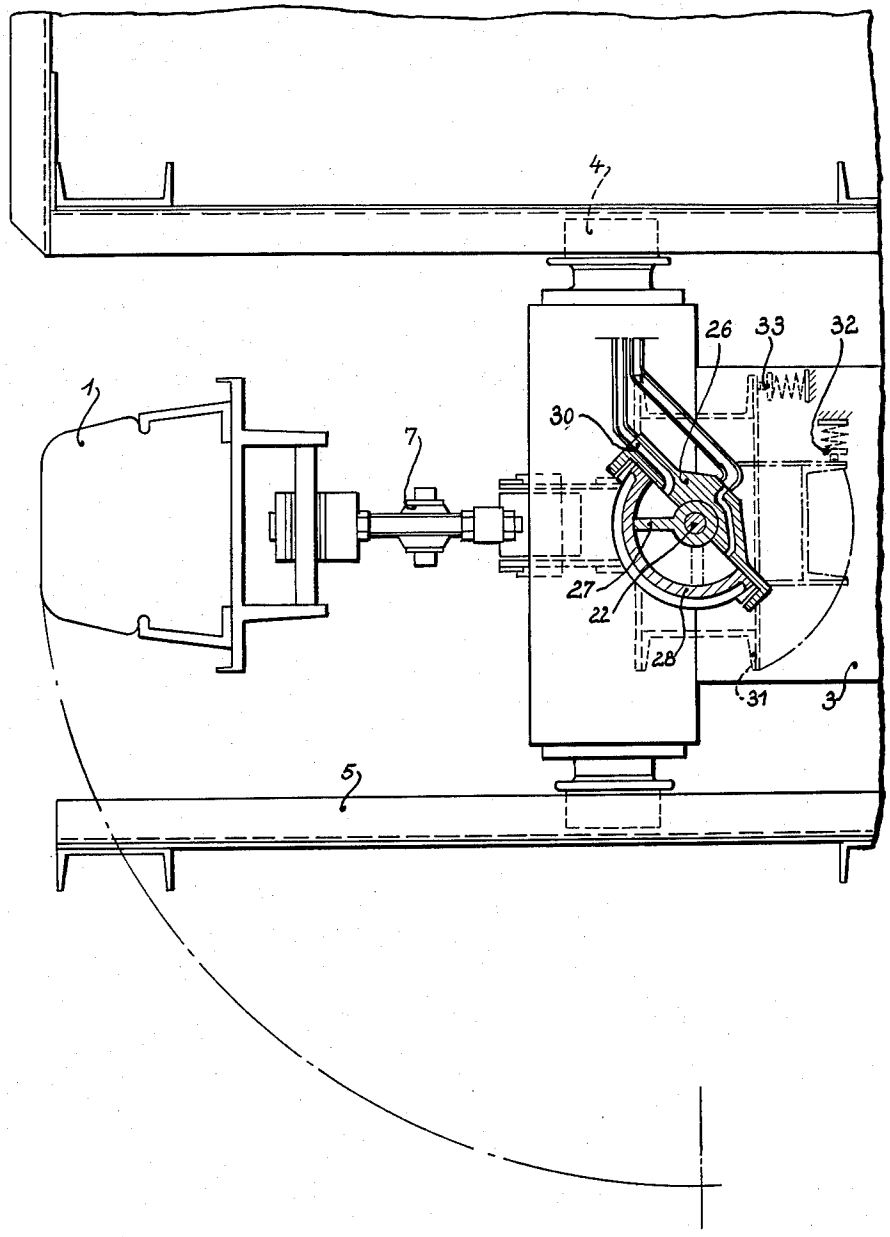
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DOOR-HANDLING MECHANISM FOR THE DOORS OF HORIZONTAL COKE OVENS

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Fig. 3



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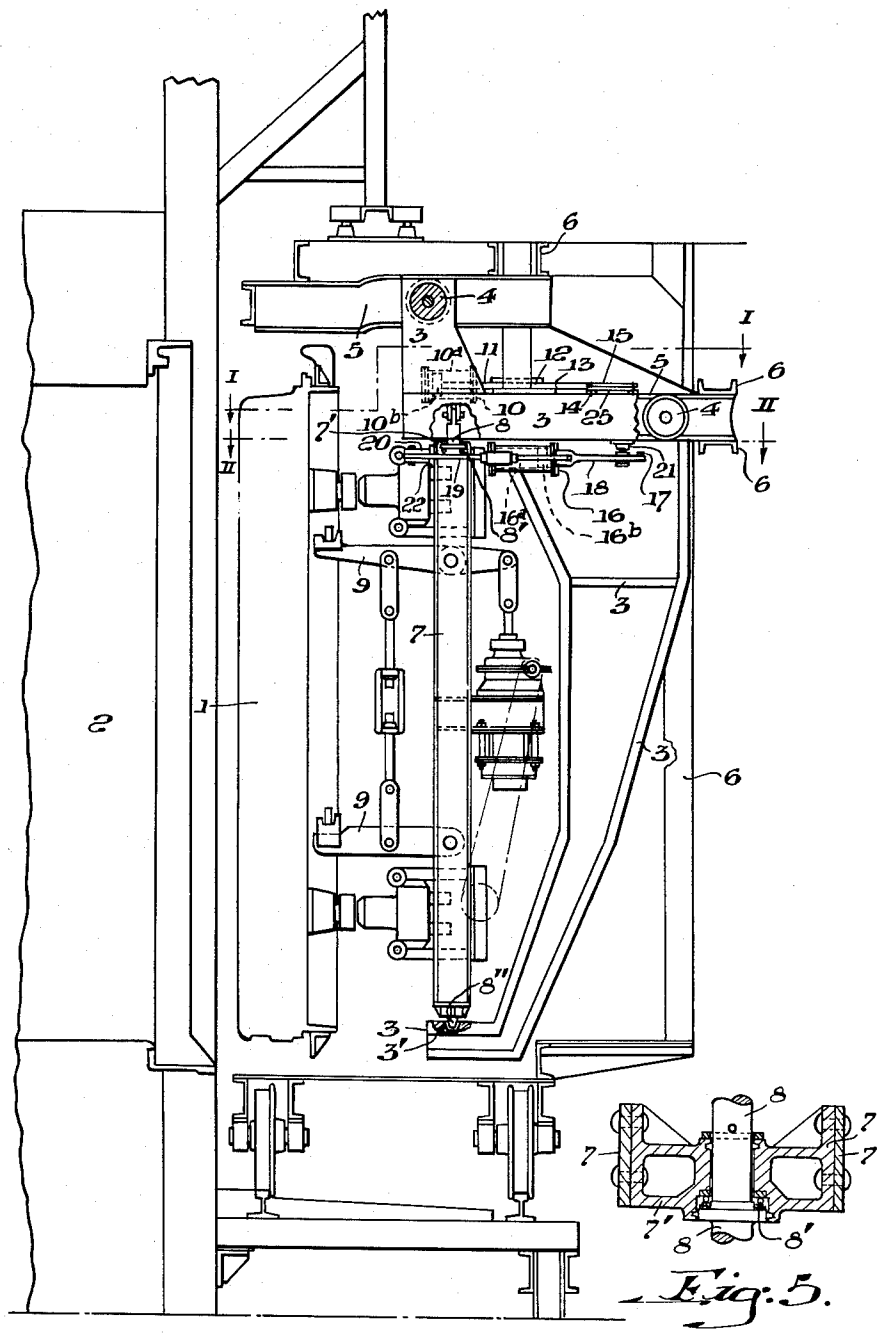


Fig. 5.

Fig. 4.

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2,746,610

DOOR-HANDLING MECHANISM FOR THE DOORS OF HORIZONTAL COKE OVENS

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Application December 13, 1952, Serial No. 325,754

3 Claims. (Cl. 212—4)

This invention concerns improvements in door-handling mechanism for the doors of horizontal coke ovens; in particular, but not exclusively, the invention concerns improvements or modifications in the door-handling mechanism described and claimed in my co-pending application Serial No. 257,233.

In the complete specification of my said co-pending application there is described and claimed a form of door-handling mechanism for the doors of horizontal coke ovens which comprises a cam track for controlling the path of movement of the door through an inclined or curved path to unseat it from its doorway, and means for pivoting the withdrawn door sideways, 90°, wherein a door carrier is suspended in rotatable fashion from an upper track of upwardly-inclined or upwardly-curved form, or having a section of its length of such form, and guide means for the door carrier, movable in the direction of the axis of the oven, are connected to said door carrier by coupling means which permit vertical movement of the door carrier relatively to the guide means for the carrier, but guide the carrier vertically during this movement.

The door carrier, which may be hingedly connected with the guide means therefor is moved mechanically in my aforesaid invention, for example, by means of a toothed wheel gearing driven by an electric motor, and the swinging movement after the withdrawal of the door from the oven chamber is effected in a similar manner or manually.

According to the persent invention, the axial displacement of the guide means which is connected with the door carrier is carried out in a simple, more economical, and facile way hydraulically or pneumatically.

A further feature of the invention provides an arrangement wherein the swinging movement of the door 90° after withdrawal from the oven chamber, may be completed hydraulically or pneumatically.

According to the invention, therefore, there is conveniently provided on the frame of the door-handling mechanism, a fluid-pressure motor by means of which the said axial displacement of the guide means relative to its doorway may be effected, whilst a second fluid-pressure motor connected with the guide means may be employed to effect the said swinging movement 90° of the door through the medium of a parallel link arrangement.

According to a further feature of the invention, the said swinging movement 90° of the door may be effected by a rotary fluid-pressure motor arranged with its axis in the pivotal axis of the door carrier.

The invention may also be applied to door-handling mechanism other than that described and claimed in my said co-pending application. According to a further aspect, therefore, this invention provides door-handling mechanism for withdrawing and swinging to one side of the doors of horizontal coke ovens, including door carrier means adapted to be engaged with a coke oven door to support the latter during handling thereof, wherein movement of said door carrier means axially of a coke oven and/or swinging to one side of said door carrier means is effected by fluid-pressure operated means.

Various embodiments of the invention are shown by way of example in the drawings, wherein:

Figure 1 is a plan view on line 1—1 of Fig. 4 of the guide means for the door carrier with the door carrier connected thereto, and of a part of the frame of the door-handling mechanism on which they are moved from oven 2 to oven 2 together with the drive means for the axial movement of the guide means relative to an oven;

Figure 2 is a view similar to Figure 1, on line 2—2 of Fig. 4, showing the driving arrangement for the 90° swinging movement of the door; and

Figure 3 shows in plan view, the arrangement of an alternative embodiment with a rotary fluid-pressure motor as the means for swinging the door.

Fig. 4 is a side elevational view of the device.

Fig. 5 is an enlargement of the suspension means for the door carrier.

In the drawings, guide means 3 serving for the withdrawal of a door 1 from an oven chamber 2 is arranged, by means of rollers 4, to be movable in the direction of the axis of oven 2 along a track 5 having an upwardly inclined cam portion therein on a frame 6 of the door-handling mechanism. A door carrier 7 is pivotally mounted at a pivot point comprising a suspension shaft 8 which is carried by the guide means 3 by bearing 7' fixed to the door carrier 7 and rotatable about shaft 8 on ball bearings 8' carried by pivot shaft 8 (Fig. 5) and grips the top and bottom parts of the door 1 by means of claws 9. At its lower end door carrier 7 has a shaft part 8'' rotatable in a groove 3' in the guide means 3, merely to center the lower end of the door carrier 7, by restricting its lateral movement without supporting any of the weight of the door carrier 7.

As shown in Figures 1 and 4, a pneumatic pressure motor 10, comprising a cylinder 10^a and a piston 10^b reciprocal in such cylinder, is mounted on the frame 6 of the door-handling mechanism which moves, as conventionally, from oven to oven 2; the piston rod 11 of the motor 10 is connected with a lever linkage 12, 15, 25, the levers 12 and 25 being parallel with each other the lever 15 being pivoted for movement about a pivot 13 on the frame 6. The end of the lever 25 is connected with the guide means 3 for free pivotal movement at a pivot point 14 so that on movement of the piston of the motor 10 to the left of Figs. 1 and 4 effects retraction to the right of the guide means 3 with the door carrier 7 from the oven chamber 2 to the position shown in Figures 1 and 4. The extent of this withdrawal movement, and also the forward movement in the reverse direction to the left, of the guide means 3, is accurately determined by the length of the stroke of the piston of the motor 10, so that when the door 1 is replaced in chamber 2, accurate positioning thereof is readily achieved without the necessity for resort to the application of additional pressure on the door for this purpose.

The above-described driving arrangement for moving the door 1 into and out of the oven chamber 2 is arranged at the top of the guide means 3. The driving arrangement for swinging the door 1 to one side 90° after it has been withdrawn from the oven chamber, is located at a level beneath the level of the motor 10 at the top of the guide means 3, this arrangement being shown in Figures 2 and 4.

This latter door swinging driving arrangement also comprises pneumatic-pressure motor 16, comprising a cylinder 16^a and a piston 16^b, mounted upon the guide means 3. The piston rod 17 of the motor 16 is connected with a link 18 which is coupled through a push rod 19 to a link 20 arranged parallel to the link 18. The link

18 is pivoted to the guide means 3 at 21. The link 20 is rigidly connected through part 22 of the door carrier 7 with the pivot shaft 8 of the door carrier 7 in such manner that swinging of the link 20 effects swinging of the door carrier through 90°. As will be readily appreciated, this swinging movement is effected by supplying compressed air through the pipes 24 to the motor 16, which operates the parallel links 18, 19, 20 to swing the door 1 through an arc 90°.

An alternative driving arrangement for swinging the door carrier is shown in Figure 3, wherein the driving vane 27 of a semi-rotary pneumatic-pressure motor 26 is coupled to the shaft 22 at pivot point 8 of the door carrier 7, the housing 28 of the motor 26 being mounted on the guide means 3. By means of passages 29 and 30, compressed air is supplied to the motor 26 in front of and behind the driving vane 27. When the compressed air is supplied through the passage 30, the driving vane 27 is swung into the position shown in broken lines, whereby the door carrier 7 together with the door 1 which is gripped thereby through claws 9 is also swung through substantially 90°; at the end of this swinging movement, a vertical U-section rail 31 of the door carrier 7 abuts (as shown in dotted lines) against a spring 32 mounted on the guide means 3, so that the shock of arresting the movement of the door carrier 7 is absorbed. In a similar manner, the shock of arresting the return of the door 1 to the axial position of the oven chamber 2 for introducing it into the oven chamber 2 is absorbed by a buffer spring 33.

Whilst the driving arrangements according to this invention for withdrawing and swinging the door 90° are primarily intended for door-handling mechanism as described and claimed in my said co-pending application Serial No. 257,233 they may also be employed in other types of door-handling mechanism.

What I claim is:

1. In door handling mechanism for withdrawing doors from horizontal coke ovens and swinging the withdrawn door to one side, the combination with a door handling mechanism framework, door carrier means thereon adapted to be engaged with a coke oven door to support the latter during handling thereof in insertion and withdrawal from its oven doorway; means mounted for movement on said framework for horizontal traversal movement of the door carrier means horizontally axially of a coke oven; and pivotal means for supporting the door carrier means for swinging of the same to one side of the axial line of movement of said door carrier means; of fluid pressure operated means comprising a fluid pressure chamber and a link arrangement connected therewith for effecting the movement of the means for horizontal traversal movement of the door carrier means horizontally axially of a coke oven door, said link arrangement comprising parallel links interconnected by a connecting link, one of the parallel links being mounted on said framework, and the other being mounted on the means for horizontal traversal movement of the door carrier.

2. Door handling mechanism as claimed in claim 1, and which includes separate means for effecting said swinging of the door carrier means, said separate means being mounted on the means for horizontal traversal movement of the door carrier means and comprising fluid pressure operated means in the form of a piston and cylinder assembly operating through a link arrangement interconnecting the piston and the door carrier means, said link arrangement comprising parallel links interconnected by a connecting link.

3. Door handling mechanism as claimed in claim 1, and which includes separate means for effecting said swinging movement of the door carrier means, said separate means being mounted on the means for horizontal traversal movement of the door carrier means and comprising a reversely rotatable rotary fluid pressure operated motor mounted in fixed relation with the door carrier means at the swinging axis thereof and provided with a vane coupled to the axis of the door carrier means, and with inlets and outlets for fluid pressure for reverse oscillation of the vane and the door carrier means.

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