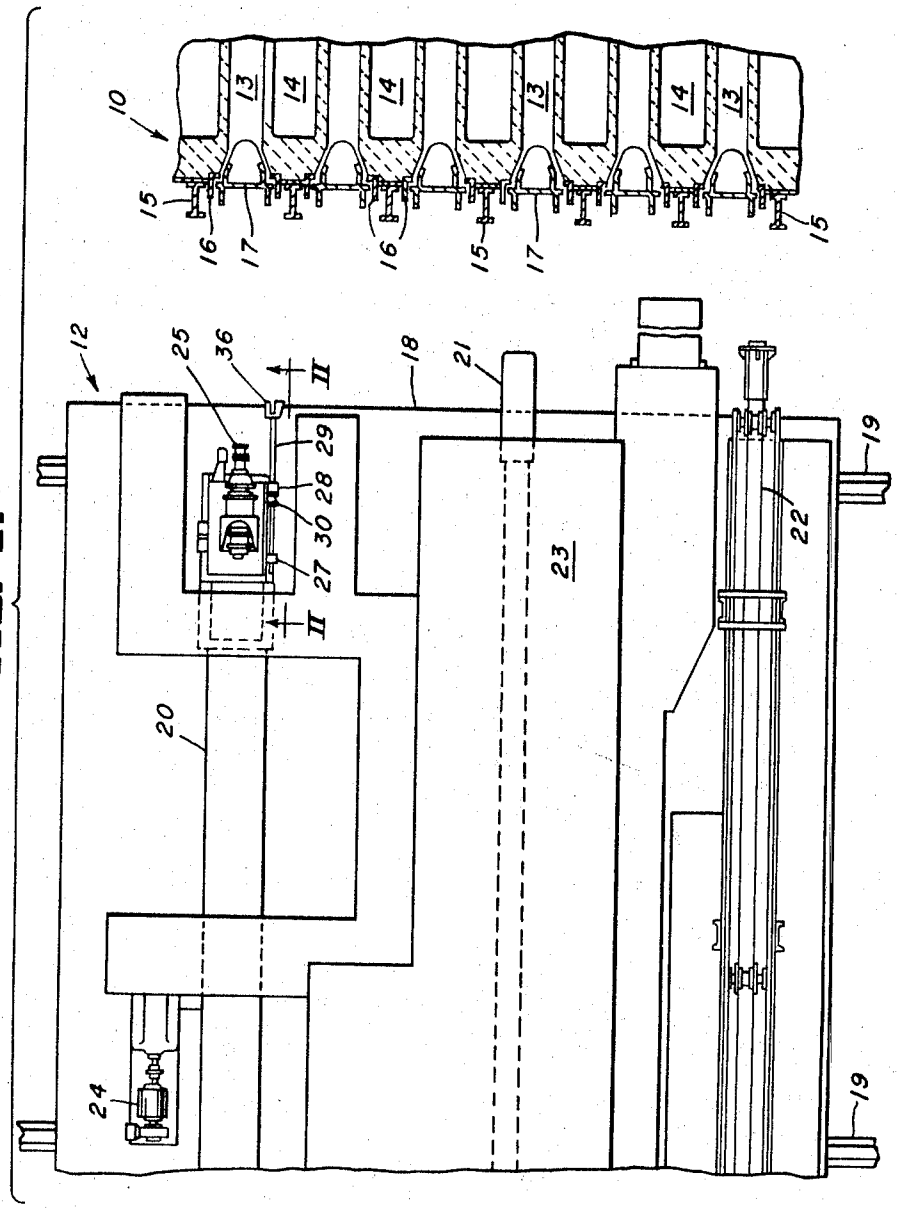
June 24, 1969 S. J. LO PRESTI ET AL 3,451,898

DEVICE FOR ALIGNING DOOR-HANDLING MECHANISM WITH A DOOR

Filed July 17, 1967 Sheet 1 of 2

FIG. 1.



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FIG. 3.

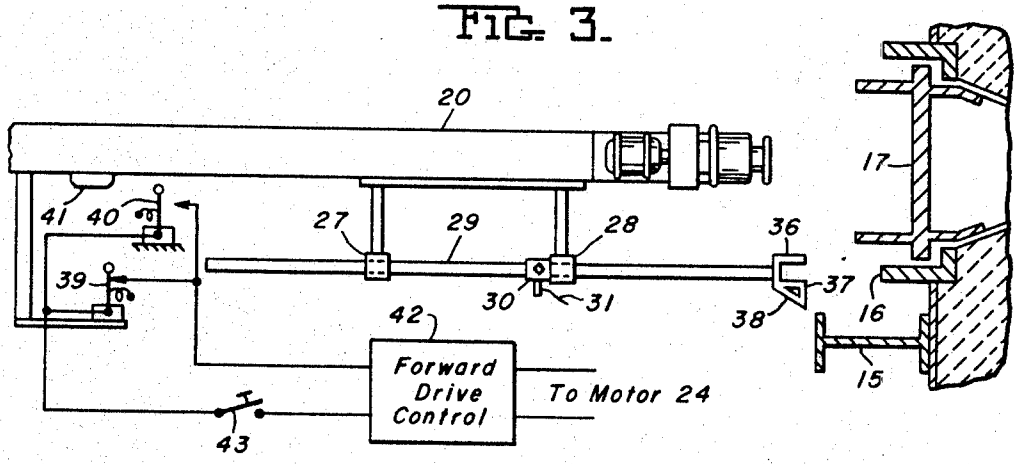
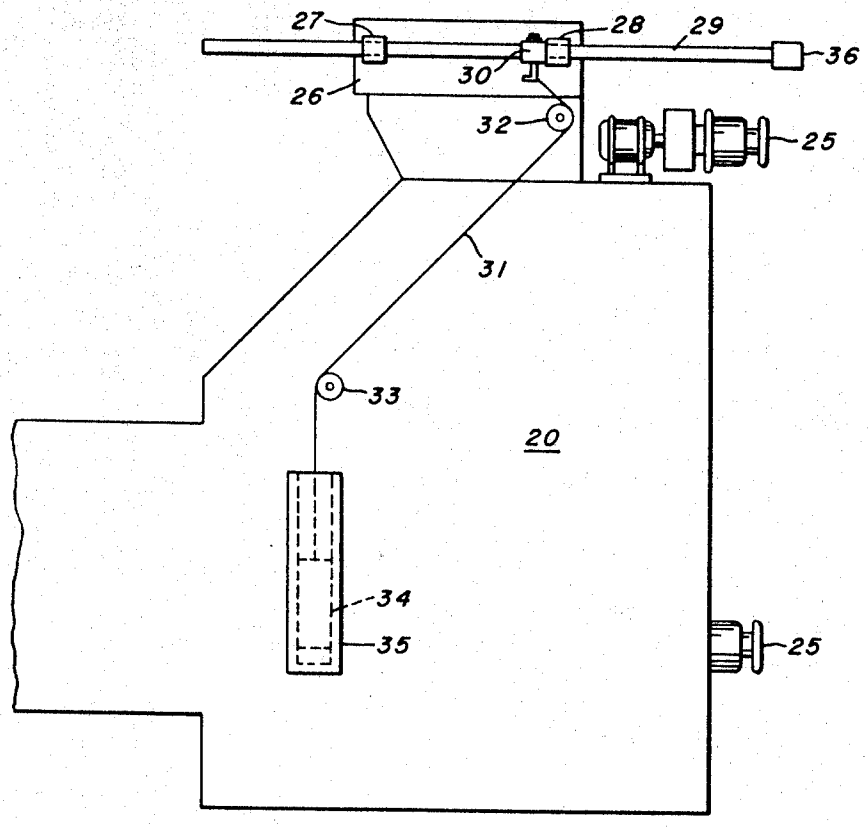


FIG. 2.



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DEVICE FOR ALIGNING DOOR-HANDLING MECHANISM WITH A DOOR

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U.S. Cl. 202—248 9 Claims

ABSTRACT OF THE DISCLOSURE

A device for aligning the door extractor of a coke pusher machine with a coke oven door. Includes a rod mounted on the extractor ram to engage parts around the door ahead of the ram. A system of limit switches stops operation of the ram if the rod does not engage properly because of misalignment.

This invention relates to an improved device for aligning a door-handling mechanism with a door.

Although the invention is not thus limited, the device is particularly useful as applied to a pusher machine for by-product coke ovens. A conventional coke oven battery includes a plurality of relatively high narrow ovens, which have a "pusher" side and a "coke" side. A pusher machine runs along a track parallel with the pusher side. The machine includes a ram for pushing coke from the ovens out the other side, a door extractor, and usually a leveler bar. As the coking process is completed in each oven in turn, the pusher machine is moved to a position in which the door extractor is aligned with the door of this oven. The extractor is used to remove the door, while another machine removes the corresponding door on the other side. The pusher machine is shifted to align the pusher ram with the open oven and used to push the coke therefrom. After the oven is recharged, the leveler bar is used to level the upper surface. Finally the doors are replaced.

Conventionally the operator's cab is aligned with the pusher ram offset from the door extractor. Consequently it is difficult for the operator to judge when the extractor is properly aligned with the door. Any misalignment is likely to cause damage when the parts come together. Various devices are known for aligning the extractor with the door, but those with which we are familiar either are not sufficiently accurate or unduly cumbersome. Commonly they use one of the buckstays as a reference, rather than the door itself. The position of a buckstay can vary as much as 3 or 4 inches either way because of thermal expansion or contraction.

An object of our invention is to provide an improved aligning device which is particularly suited for use on a coke oven door extractor and overcomes problems encountered with previous devices of this type.

A further object is to provide an aligning device which uses as a reference the frame of the door to be removed, thereby avoiding errors brought about by variations in the position of a buckstay.

A further object is to provide an aligning device which assures that a door extractor cannot engage or replace a door unless the alignment is proper, yet avoids need for extra drive means or the hazards of protruding members.

A more specific object is to provide an aligning device which includes quite simply a single feeler rod with a yoke to engage a coke oven door frame before the extractor engages the door, and a system of limit switches for preventing operation of the extractor unless the yoke makes proper engagement.

In the drawings:

FIGURE 1 is a top plan view of a portion of a coke oven battery and pusher machine equipped with our aligning device;

FIGURE 2 is a vertical sectional view on a larger scale on line II—II of FIGURE 1; and

FIGURE 3 is a partly diagrammatic top plan view on a larger scale than FIGURE 1 to show the operation more clearly.

FIGURE 1 shows a portion of a coke oven battery **10** and a pusher machine **12**. The battery **10** includes a plurality of ovens **13**, flue chambers **14** between ovens, and buckstays **15** supporting the structure. Each oven has its respective door frame **16** and removable door **17** at the pusher side. The pusher machine **12** includes a carriage **18** which travels on a track **19** parallel with the side of the battery. Mounted on the carriage are an extractor ram **20**, a pusher ram **21**, a leveler bar **22**, and an operator's cab **23** aligned with the pusher ram. The carriage is power driven, and carries drive motors for the rams and leveler bar. The motor for driving the extractor ram is indicated at **24**. The extractor ram has door hooks **25** for engaging and carrying any one of the doors **17**. Whenever the ram **20** or **21** or the leveler bar **22** is advanced from its retracted position, it trips a limit switch, not shown, which prevents the carriage from moving along the track. The battery and pusher machine are conventional apart from our aligning device, and hence are not shown in greater detail.

As also known in the art, the side face of the extractor ram **20** carries a plate **26** which projects above the ram (FIGURE 2). Plate **26** carries a apir of guides **27** and **28**, in which an axially movable elongated feeler rod **29** is mounted. The rod carries a clamp **30** to which is attached a wire rope or the like **31**. The rope runs over a pair of sheaves **32** and **33** journaled to the side of the extractor ram and at its lower end is attached to a counterweight **34**. A well **35** on the side wall of the extractor ram houses the counterweight. Thus the counterweight urges the rod toward the front of the extractor ram (the right as viewed in FIGURES 1 and 2) to the limit permitted by engagement of clamp **30** with guide **28**. In this position the front end of the rod projects beyond the door hooks **25**, but with the extractor ram retracted, the end of the rod does not protrude appreciably beyond the carriage **18** and does not constitute a hazard.

In accordance with our invention, the front end of rod **29** carries a bifurcated yoke **36**, which has a flat surface **37** at its front end and a rearwardly tapering cam surface **38** on the side remote from the extractor ram **20** (FIGURE 3). The ram carries a first limit switch **39** normally spaced from the back end of rod **29**, but positioned to be operated by the rod when the latter moves rearwardly relative to the ram. The carriage **18** carries a second limit switch **40**, and the ram carries a cooperating trip **41**. The second limit switch is positioned to be operated by the trip when the ram moves forwardly relative to the carriage. We connect the two limit switches in parallel to a conventional forward drive control **42** for motor **24**. We connect a manually operated switch **43** for the forward drive control in series with the two limit switches. The first limit switch **39** is normally closed, the second normally open. One of the two limit switches must be closed to enable the motor **24** to drive the ram forward.

In operation, we move carriage **18** along track **19** to align the extractor ram **20** approximately with a door **17**. We close switch **43**, which energizes motor **24** through the forward drive control **42**, since the first limit switch **39** is closed. The ram advances toward the door, and rod **29** moves with the ram. If the parts are properly aligned, the door frame **16** ultimately seats within the bifurcation of yoke **36** and stops further advance of the rod. The ram continues to advance, producing relative movement between the ram and rod. The trip **41** engages the second

limit switch **40** and closes it. A moment later the first limit switch **39** engages the back end of the rod and opens, but there is no interference with operation of the drive motor **24**. The ram picks up the door in the usual fashion to enable coke to be pushed from the oven **13**. If the parts are misaligned, the flat surface **37** of yoke **36** may hit the door frame **16**, or the yoke may hit the buckstay **15**, whereupon forward movement of the rod ceases. The rod does not advance as far as when frame **16** seats in the bifurcation. The first limit switch **39** engages the back end of the rod while the second limit switch **40** remains open. With both limit switches open, motor **24** stops before the extractor ram reaches the door. Motor **24** must be reversed and the ram realigned with the door before the operation can proceed. The cam surface **38** of the yoke prevents the yoke from becoming wedged betwen the buckstay and door frame.

From the foregoing description, it is seen that our invention affords a simple effective device for assuring that a door-handling mechanism is properly aligned with a door before the mechanism can engage the door. We do not require any additional motive means to operate our device, yet it positively stops the ram if the parts are misaligned.

While we have shown and described only a single embodiment of our invention, it is apparent that modifications may arise. Therefore, we do not wish to be limited to the disclosure set forth but only by the scope of the appended claims.

We claim:

1. In an installation which includes a fixed structure, a door removably mounted on said structure, and a handling mechanism for removing and replacing said door, said mechanism comprising a carrige movable alongside said structure, an extractor ram mounted on said carriage for relative movement toward and away from said structure, door-engaging means on said ram, and a motor on said carriage for driving said ram, the combination therewith of a device preventing said door-engaging means from engaging the door when it is misaligned therewith, said device comprising an elongated member mounted on said ram and being normally movable with the ram as the ram moves toward and away from said structure, said member also being axially movable with respect to said ram, means normally urging said member to a position on said ram toward said structure, a yoke on the end of said member to abut parts of said structure adjacent the door as said ram moves toward the door before said door-engaging means engages the door, said yoke having a bifurcation in wich one of the parts of said structure seats when said ram is properly aligned and fails to seat when there is misalignment, and a system of limit switches operated by said member and said ram and being connected with said motor, one of which switches is operated by said member to stop said motor when said yoke abuts a part of said structure without seating.

2. A combination as defined in claim **1** in which said yoke has a flat front face to abut parts when said ram is misaligned and a cam surface along one side to prevent its becoming wedged.

3. A combination as defined in claim **1** in which said system of limit switches includes a normally-closed first limit switch mounted on said ram for engagement with said member and a normally open second limit switch mounted on said carriage to be engaged by said ram, said switches being connected in parallel to control said motor.

4. A combination as defined in claim **3** in which said member opens said first limit switch while said second limit switch is open when there is misalignment, and said ram closes said second limit switch while said first limit switch is closed when alignment is proper.

5. A combination as defined in claim **1** in which said structure is a battery of coke ovens having a plurality of door frames and doors and said carriage forms part of a coke pusher machine.

6. A combination as defined in claim **5** in which the door frame seats in the yoke.

7. In a coke oven installation which includes:

a battery of ovens, each having fixed parts and a respective door removably mounted on said parts; and

a handling mechanism for selectively removing and replacing the doors, said mechanism comprising:

a carriage movable alongside said ovens;

an extractor ram mounted on said carriage for relative movement toward and away from said ovens;

door-engaging means on said ram; and

a motor on said carriage for driving said ram;

the combination therewith of a device preventing said door-engaging means from engaging a door with which it is misaligned, said device comprising:

a member mounted on said ram and being normally movable with the ram as the ram moves toward and away from the ovens, but also movable relatively to the ram;

said member normally projecting closer to the ovens than said door-engaging means and having a surface spaced from its end to seat on a part of an oven ahead of said door-engaging means as said ram moves toward said ovens when said ram is aligned properly with the door;

the end of said member providing a surface to abut a part of the oven when the ram is misaligned;

a first limit switch connected to said motor and operated by said member on abutting a part of an oven; and

a second limit switch connected to said motor and operated by said ram before said first limit switch is operated when the ram is aligned properly;

said member operating said first limit switch before said second limit switch is operated when there is misalignment to break automatically the circuit to said motor.

8. A combination as defined in claim **7** in which said fixed parts include respective door frames receiving said doors, and said first named surfaces seats on the frame of the door to be removed when said ram is aligned properly with this door.

9. A combination as defined in claim **8** in which said member carries a bifurcated yoke in which the frame seats when the ram is aligned properly and fails to seat when there is misalignment, said second limit switch operating before said first limit switch if said frame seats in said yoke, and operating thereafter if said frame fails to seat.

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