

[54] **QUENCHER CAR SPOTTING INTERLOCK**
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[52] **U.S. Cl.**..... **214/23; 202/262; 246/182 B**
[51] **Int. Cl.²**..... **C10B 33/10**
[58] **Field of Search**..... **246/122 R, 182 B; 214/23; 202/262**

[56] **References Cited**
UNITED STATES PATENTS
2,589,231 3/1952 Drake 214/23

3,520,425 7/1970 Stender..... 214/23

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[57] **ABSTRACT**

A sensing probe is mounted on a coke guide car and is movable toward a target mounted on a quencher car. When the probe contacts the target, subsequent to the closing of the door machine signal switch, an electrical circuit is completed and a signal is sent to the pusher machine that indicates the quencher car is properly spotted and is ready to receive hot coke when pushed from a coke oven chamber.

4 Claims, 4 Drawing Figures

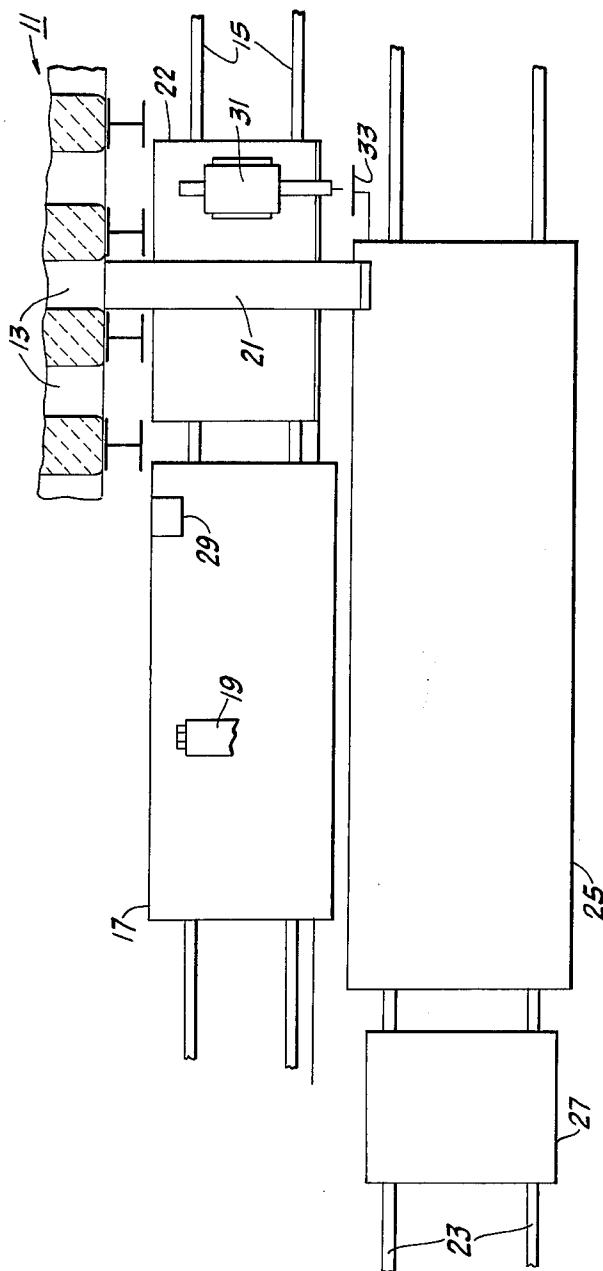


FIG. 1

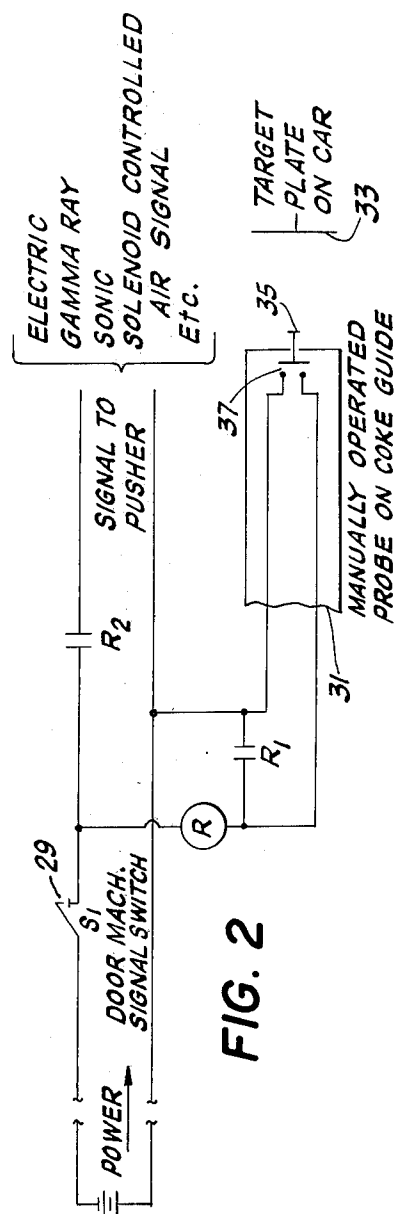


FIG. 2

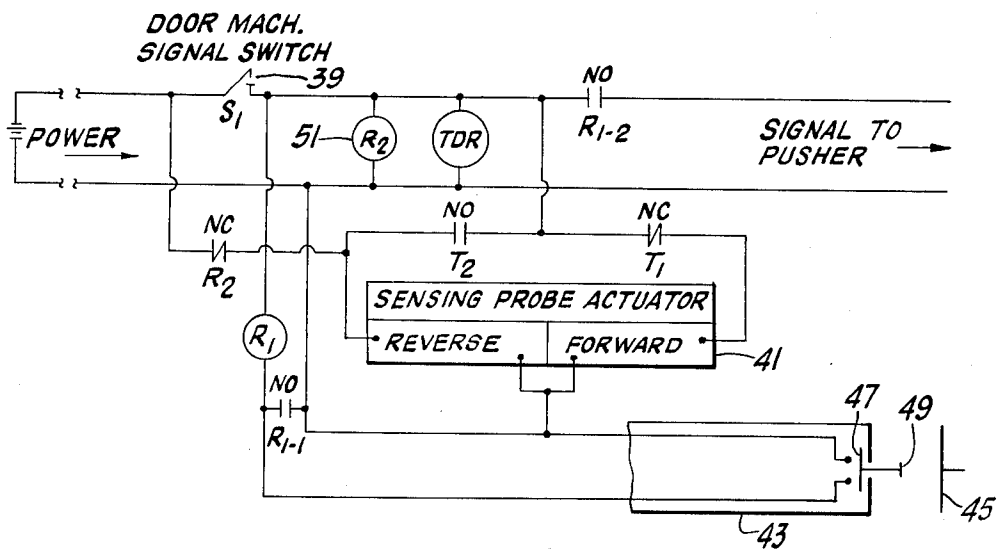


FIG. 3

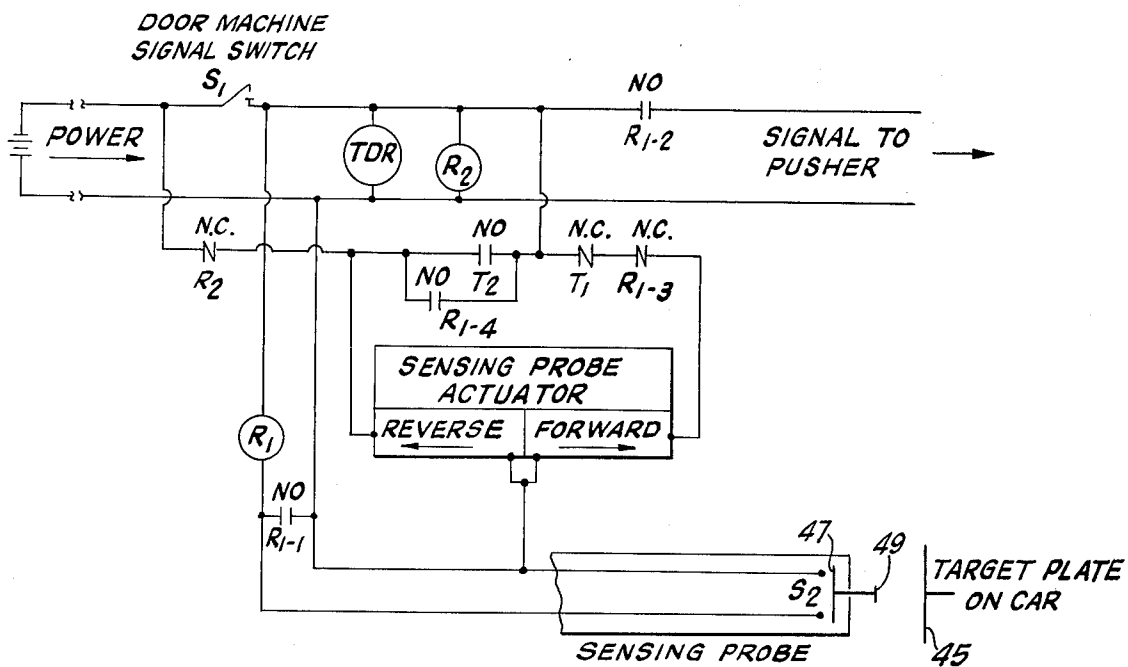


FIG. 4

QUENCHER CAR SPOTTING INTERLOCK

BACKGROUND OF THE INVENTION

Coke spillage, production losses, and damage to the facilities that result from the pushing on hot coke from a coke oven chamber, when the quenching car is not present or is not properly spotted at the oven to be pushed, has long been a significant problem for which there is as yet no completely satisfactory solution. With the advent of stringent pollution standards and the installation of various kinds of hoods and other apparatus to collect effluents during charging of coal and the pushing of coke, correct spotting of coke oven equipment becomes more important, in order to reduce spillage, production losses and damage to the facilities.

Most of the spotting devices known from the prior art, use mechanical limit devices, such as proximity switches to indicate the position of one piece of equipment relative to another. These kinds of spotting devices are not generally acceptable for several reasons. Wherefore, most coke plant machine operators continue to use visual line-up methods that still rely upon the ability of the operator to judge when the equipment is properly aligned.

The following disclosure describes a relatively simple, but effective electrical interlock system that assures correct spotting of the equipment without introducing a human error factor into the operation.

BRIEF SUMMARY OF THE INVENTION

A system for correctly spotting a coke oven quenching car relative to a coke guide and interlocks said car with respect to a pusher machine includes a target on the quenching car and a probe mounted on the coke guide. Means are provided for extending the probe toward the target. A switch in the probe closes when contact is made with the target, subsequent to the closing of the door machine signal switch, and a relay in an electrical circuit closes in response to the closing of the switch. A signal is then sent to the pusher machine indicating the proper spotting of the coke quenching car relative to the coke guide.

For a further understanding of the invention and for features and advantages thereof, reference may be made to the following description and the drawing which illustrates a preferred embodiment of equipment in accordance with the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a schematic view of a portion of a coke oven battery and a coke quenching car, with equipment in accordance with the invention shown in one operative position;

FIG. 2 is a schematic electrical wiring diagram of an interlock circuit for the equipment of FIG. 1;

FIG. 3 is a schematic electrical wiring diagram of a mechanized sensing probe forming a part of the equipment of FIG. 1; and

FIG. 4 is an alternate electrical wiring diagram to that of FIG. 3.

DETAILED DESCRIPTION

Referring to the drawings, FIG. 1 shows a portion of the coke side of a coke oven battery 11 that includes a plurality of coking chambers 13, a pair of rails 15 on which moves a car 17 carrying a conventional door

handling machine 19, and a conventional coke guide 21 on a coke guide car 22. A second pair of rails 23 is located in conventional relation to the rails 15, and on the rails 23 moves a quenching car 25 under the influence of a locomotive 27.

On the door machine 19 there is mounted a signal switch 29 (FIG. 2) and on the coke guide car 22 there is mounted a probe 31. On the end of the quenching car 25 there is a target 33 which is so constructed and arranged that, when the quenching car 25 is properly spotted initially with respect to the coke guide 21, the probe 31 and target 33 are perfectly aligned.

Referring to FIG. 2, the quenching car operator, at his normal station in the locomotive 27, spots the quenching car 25 visually as close as he can to the proper position to receive coke. The circuit shown in FIG. 2 cannot carry current from a source of power because a door machine signal switch S1 (29) is open and a normally open contact R2 is also open.

The door machine operator, from his usual station closes signal switch S1 (29), but still no current flows in the circuit to the pusher machine, because the normally open contact R2 is still open. The door machine operator then manually extends the probe 31, either by a cable system, by mechanical linkage, or in some other appropriate manner, toward the target plate 33.

In practice the target plate 33 on the quenching car would be a flat rectangular plate having dimensions of about $6 \times 8 \times 3/8$ "; the length, may be between 6 and 12 inches and, would be selected to suit a particular installation. The target plate 33, on the quenching car 25, should be so located that the end 35 of the probe 31, when it is extended, always contacts the target plate 33.

The end 35 of the probe 31 would, upon making contact with the target plate 33, actuate and close a normally open switch 37 in the end of the probe. Just as soon as the switch 37 closes, the probe 31 is retracted. Closing of the switch 37 energizes a relay R. Whereupon, contacts R1 and R2 close and a signal is sent to the pusher machine that the quenching car and the coke guide are in proper position to receive coke when pushed from the oven chamber.

If the quenching car is not properly spotted, the probe 31, when extended, will not contact the target 33. Then, switch 37 remains open; relay R is not energized, and contacts R1 and R2 remain open so that no signal is sent to the pusher machine. In such a situation, the quenching car must be spotted again.

Those skilled in the art will recognize that the quenching car need not be spotted as accurately as, say, the pusher machine or the larry car. Wherefore, the size of the target plate 33 may vary to suit local conditions at a particular coke plant installation.

When the push is completed, the door machine operator opens the signal switch S1, thereby deenergizing the relay R and opening contacts R1 and R2. Thereafter, the pushing cycle is carried out in a routine manner, and the quenching car is then ready to be spotted again at the next oven to be pushed.

FIG. 3 illustrates a wiring diagram of a mechanized sensing probe. As in the case of FIG. 2, the door machine operator manually closes door machine signal switch 39 (S1), whereupon relay 51 R2 is energized, and the normally closed contact R2 opens. A sensing probe actuator 41 is energized and moves a sensing probe 43 toward a target 45 on a quenching car; the contact T1 being normally closed. The target 45 is similar to the target 33 described previously. Likewise, the

3

probe 43 carries a switch 47 and an end 49 that are similar to the switch 37 and end 35 described previously herein.

At the same time, a time delay relay, TDR, is energized, and at the end of a preset time period, which is long enough for the probe end 49 to travel to and contact the target 45, the delay timer, TDR, opens contact T1 and closes contact T2. The probe actuator 41 then reverses and the probe 43 retracts to its original position.

If the quencher car is spotted in a proper position, the probe end 49 will contact the target 45 and momentarily close switch 47. Thereafter, the probe retracts. When switch 47 closes, the relay R1 is energized and normally open contacts R1-1 and R1-2 close; whereby, a signal is then sent to the pusher machine signifying proper spotting of the quencher car.

However, if the quencher car is not spotted properly when the probe 43 is extended, and no contact is made by the probe end 49 with the target 45, the switch 47 will not close and normally open contact R1-2 will remain open. Thus, with the contact R1-2 open, no current flows in the circuit to carry a signal to the pusher machine.

In such a situation, the door machine operator opens switch 39 (S1) and then respots the quencher car. It is assumed then that after extending the probe, the quencher car is properly spotted and it receives coke in the usual manner.

After the pushing of coke is completed, the door machine operator opens the switch 39 (S1), whereupon contacts R1, R2 and the time delay relay, TDR, are deenergized, resetting all contacts to their original condition.

Relay R2 (51) and normally closed contact R2 is in the electrical circuit in the event that the signal switch S1 (39) is reopened before the timer TDR has timed out and the probe is retracted.

When the switch S1 (39) is closed, the relay R2 (51) is energized and contact R2 opens, but the balance of the circuit is not affected. If, however, the switch S1 (39) is opened before the timer, TDR, has timed out and the probe is retracted, relay R2 (51) will be deenergized and the contact R2 will close, retracting the probe.

Referring to FIG. 4, which is the same electrical circuit as that shown in FIG. 3, but with the addition thereto of two additional contacts; R1-3 which is normally closed and R1-4 which is normally open. Both of these contacts are operated by a relay R1, so that the travel of the sensing probe is reversed as soon as contact is made with the target and switch 47 is closed. Then, if the quencher car is not spotted correctly, and if the probe end 49 does not contact the target 45, the time delay relay, TDR, would function, as described in connection with the circuit of FIG. 3, and retract the probe.

From the foregoing description of one embodiment of the invention, those skilled in the art should recognize many important features and advantages of it, among which the following are particularly significant:

That the quencher car spotting system of the present invention is simple and effective.

4

That the system is easy to maintain and is rugged enough for the service to be performed; and

That the system is pragmatic, as it combines both ordinary mechanical and ordinary electrical apparatus that are readily available and that do not have to be custom made.

Although the invention has been described herein with a certain degree of particularity, it is understood that the present disclosure has been made only as an example and that the scope of the invention is defined by what is hereinafter claimed.

What is claimed is:

1. A system whereby a coke oven quencher car is spotted relative to a coke guide and indicates to a pusher machine when said quencher car and a coke guide are properly spotted, wherein the improvement comprises:

- a. a target on said quencher car;
- b. a probe mounted to said coke guide;
- c. means for extending and retracting said probe with respect to said target;
- d. an electrical control circuit including a switch in said probe that closes when said probe contacts said target;
- e. a relay in said circuit that is energized when said switch closes;
- f. means in said circuit acting in response to said relay that completes said circuit; and
- g. means for sending a signal by said circuit to said pusher machine indicating the proper spotting of said quencher car relative to said coke guide.

2. The invention of claim 1 including:

- a. a signal switch in said circuit which when closed allows electrical current to energize said probe to advance it toward said target.

3. The invention of claim 1 including:

- a. a sensing probe actuator in said circuit that retracts said probe after it contacts said target.

4. A system whereby a coke quencher car is spotted relative to a coke guide and indicates to a pusher machine when said quencher car and said coke guide are properly spotted, wherein the improvement comprises:

- a. a target on said quencher car;
- b. a probe mounted to said coke guide;
- c. an electrical control circuit including a sensing probe actuator;
- d. a signal switch in said circuit which when closed allows electrical current to energize said probe to advance it toward said target;
- e. a switch in said probe that closes when said probe contacts said target;
- f. a time-delay relay in said circuit that is energized when said signal switch closes and that, after the passing of a preset time interval, reverses said probe actuator and retracts said probe;
- g. a relay in said circuit that closes when said switch in said probe closes thereby completing said electrical circuit; and
- h. means for sending a signal by said circuit to said pusher machine indicating the proper spotting of the quencher car relative to said coke guide.

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