Dec. 22, 1931. G. P. WARDLEY ET AL 1,837,740

COKE QUENCHING APPARATUS

Filed May 31, 1927 3 Sheets-Sheet 1

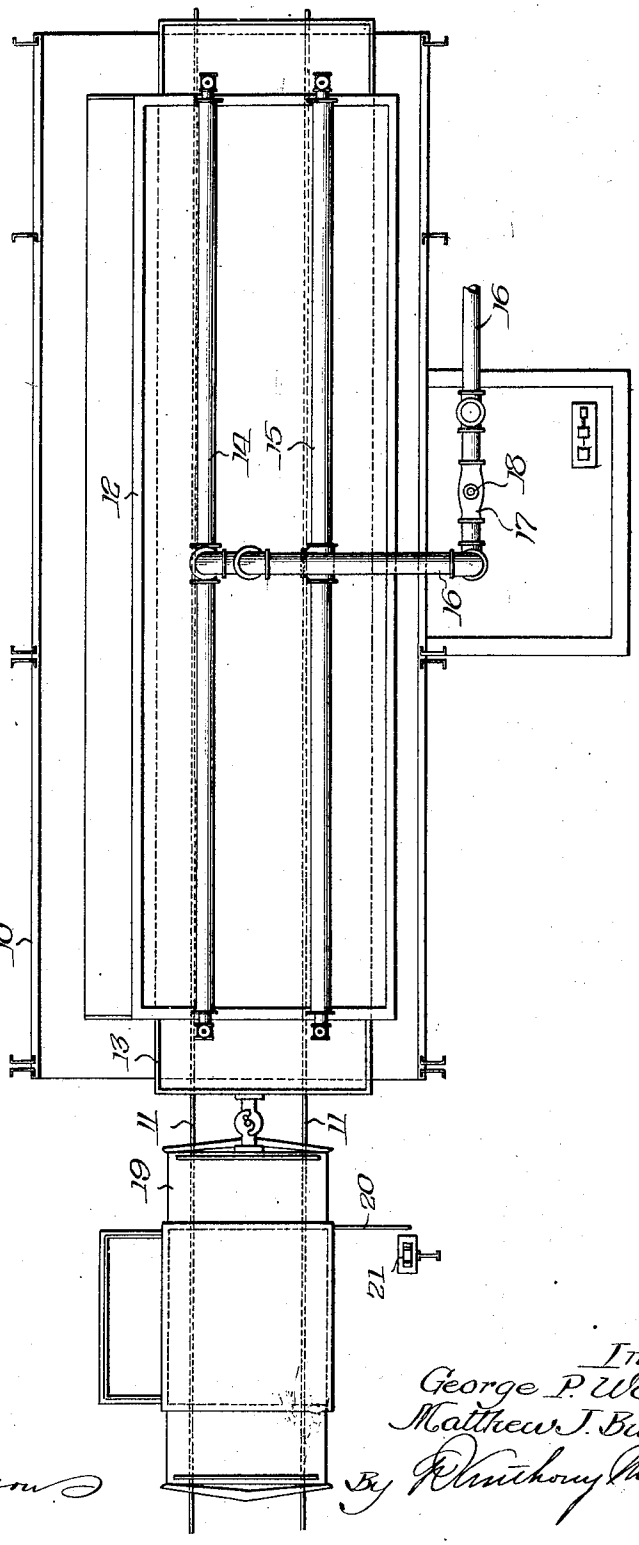


Fig. 1

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COKE QUENCHING APPARATUS

Filed May 31, 1927 3 Sheets-Sheet 2

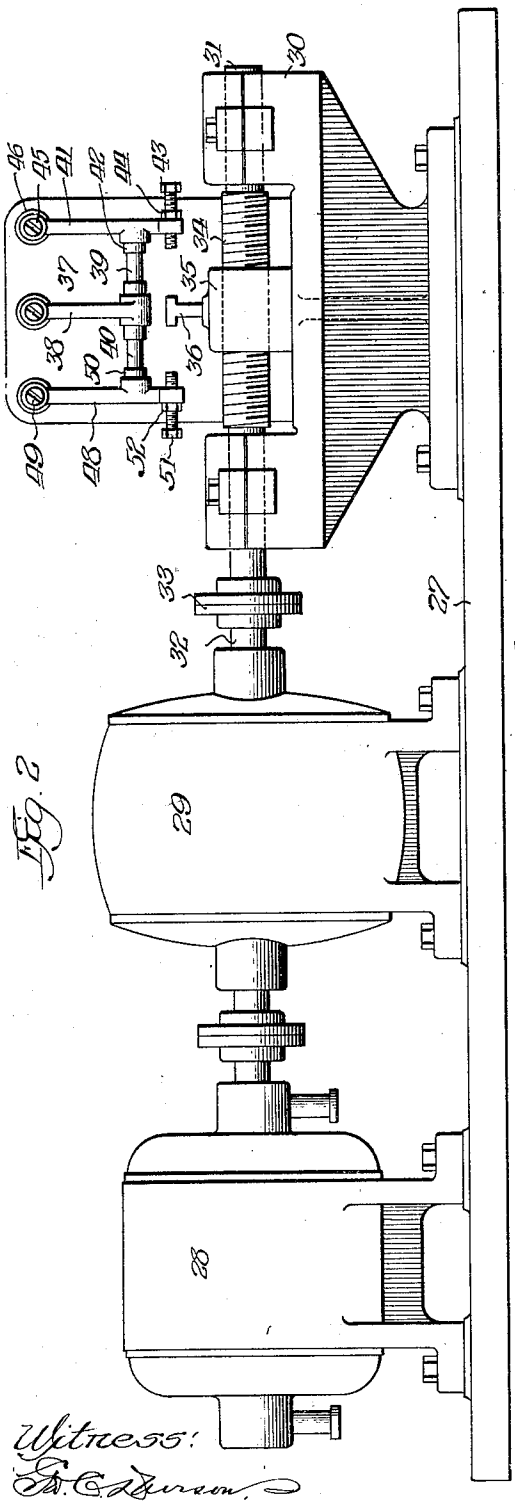


Fig. 2

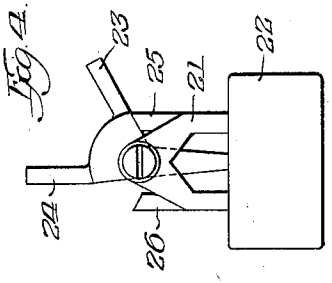


Fig. 4

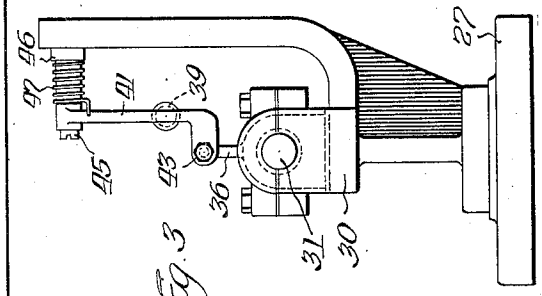


Fig. 3

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COKE QUENCHING APPARATUS

Filed May 31, 1927 3 Sheets-Sheet 3

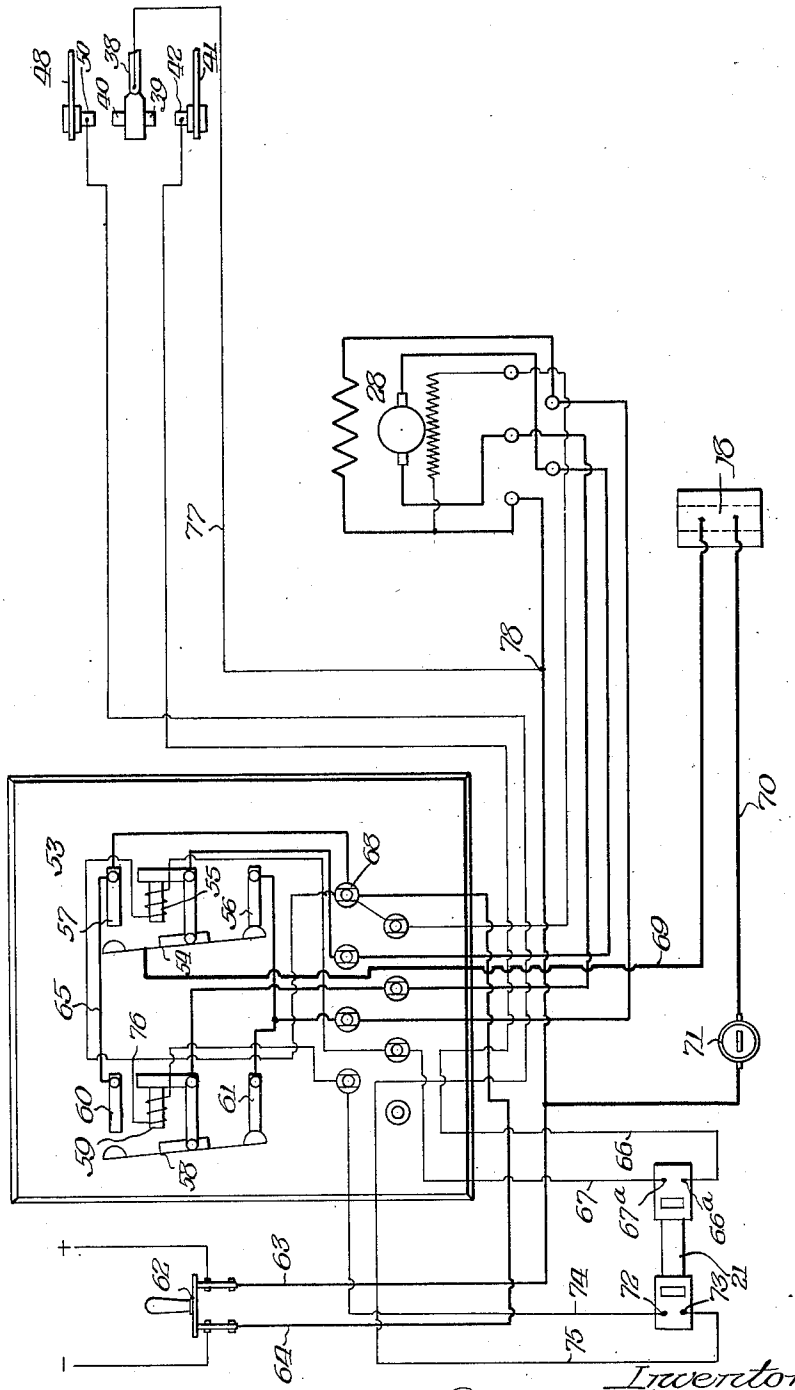


Fig. 5.

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Patented Dec. 22, 1931 1,837,740

UNITED STATES PATENT OFFICE

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COKE QUENCHING APPARATUS

Application filed May 31, 1927. Serial No. 195,288.

Our invention relates to coke quenching apparatus and has for its primary object the provision of apparatus which automatically controls the length of time the coke is subjected to the quenching operation.

In the quenching operation of coke it is very desirable to subject a pre-determined quantity of coke, after it is removed from the oven, to the quenching action of water, an exact amount of time so as to properly quench the coke and not have an undue amount of moisture in the coke after it has been quenched, which results from the use of too much water in the quenching operation. In the standard type of car into which the coke is discharged from the coke ovens and with the standard type of sprinkling apparatus in use for such car, it takes about twenty-eight seconds to properly quench the coke in using the water pressure which is common at most industrial plants. The timing of the quenching operation is an important task and has to be accomplished by means of stop watches or the like and very frequently the timing is not accurately performed, resulting in either an improper quenching of the coke through too short a time or in the use of too much water and causing an excessive amount of moisture in the coke. For these reasons it is highly important that the quenching operation be performed properly and as nearly automatic as possible, and the primary purpose of our invention is the provision of automatic quenching apparatus which is positive in operation and which is entirely automatic in its operation, requiring no attention on the part of the operator when the coke car is placed in position in the quenching station.

Another and further object of our invention is the provision of coke quenching apparatus which can be adjusted to meet varying conditions as to the size of car, the water pressure and the like, to meet various operative conditions, but when adjusted is automatic in its operation.

Another and further object of our invention is the provision of coke quenching apparatus which is simple and efficient in operation, which is easy to install and which can be installed at a minimum of trouble and expense. These and other objects of our invention will be more fully and better understood by reference to the accompanying sheets of drawings and in which:—

Figure 1 is a plan view of the coke quenching station;

Figure 2 is a side elevational view of the coke and timing device for use in our apparatus;

Figure 3 is an end elevational view of the switch which forms a part of the timing device;

Figure 4 is an elevational view of the trip switch; and

Figure 5 is a wiring diagram showing the wiring and various operating parts comprising the electrical equipment for the system.

Referring now specifically to the drawings and particularly to Figure 1 illustrating a coke quenching station, a drain platform 10 is shown having a track 11 positioned thereon and having a rectangular frame 12 which is positoned above the coke car 13 on the track 11 and which is supported over the platform 10 in any approved manner and which has on it a pair of longitudinally extending pipes 14 and 15, the said pipes having a plurality of holes therein through which water is sprayed onto the car 13 containing the coke below the pipes 14 and 15. A water supply pipe 16 is provided which is connected to the sprinkler pipes 14 and 15, the said water supply pipe having a valve 17 therein operated by a solenoid 18, by means of which the flow of water to the sprinkling pipes 14 and 15 is controlled. An electric locomotive 19 is shown having a trip rod 20 extending outward therefrom and which is adapted to engage a switch 21 which is mounted upon a base 22 and has a pair of outwardly projecting members 23 and 24 in the form of a Y, which are so positioned that the trip rod 20 on the locomotive 19 contacts with one or the other of these members as the trip rod passes the switch 21. A pair of stops 25 and 26 are provided which contact against the sides of the switch to limit its turning movement.

Referring now particularly to Figures 2 and 3, wherein a time switch and operating

apparatus therefor is shown, a base 27 is shown having a motor 28 mounted thereon with a speed reducer 29 connected to the motor 28 and which leads to a time switch comprising a frame member 30 secured to the base 27 in any approved manner and which has mounted therein a shaft 31 secured to a shaft 32 in the speed reducer 29 by means of a coupling 33, a portion of said shaft 31 being threaded at 34 and having a nut 35 mounted thereon from which a projecting head 36 extends, the said nut 35 being adapted to travel in sliding engagement with the member 30 on the threaded shaft 34. Integrally formed with said member 30 is an upstanding portion thereof 37 having a fixed contact arm 38 secured thereto and having a pair of outwardly extending contact members 39 and 40 mounted on the lower end of the arm 38. Also mounted on said member 37 is a movable switch member 41 having a contact member 42 mounted thereon at the lower end of which is positioned a screw 43 having a lock nut 44 thereon, the said member 41 being mounted upon a screw 45 with a spacer 46 positioned against the face of the member 37 and around which a coil spring 47 is positioned, one end of which engages the member 41 on its outer side so that the contact members 42 and 39 are normally held in engagement with each other. At the opposite side of the member 37 is mounted another movable switch member 48 upon a screw 49 having a contact member 50 secured thereto and a screw 51 at the lower end thereof upon which a lock nut 52 is positioned, these members forming a time-limit switch which is adapted to make and break an electrical operating circuit to the valve 17 as the nut 35 travels back and forth between the two points of the bolts 43 and 51 which are alternately engaged by the head 36 on the nut 35 as the device is operated.

Referring now particularly to Figure 5 and wherein is illustrated the circuits used for operating the device heretofore described, a clapper board 53 is illustrated having a clapper 54 mounted thereon adjacent and an solenoid 55 with contact members 56 and 57 mounted thereon. A second clapper 58 is provided adjacent an solenoid 59 on each side of which are a pair of contact members 60 and 61. A throw switch 62 is provided in the primary or operating circuit and from which a pair of wires 63 and 64 lead, the wire 63 going direct to the motor 28, the wire 64 leading to the contact member 57 which is connected in circuit by a lead wire 65 to the contact member 60, each of the members 57 and 60 being adjacent one end of the clappers 54 and 58 respectively. Attached to one side of the switch 21 is a lead wire 66 which leads to the contact member 42 carried by the member 41 with the wire 67 leading to the solenoid 55 and connected to the primary or operating circuit at 68, it being noted that this circuit is complete when the terminals of wires 66 and 67 in the switch 21 are connected through contact members 39 and 42. Leading from the clapper 54 is a lead wire 69 leading to the solenoid 18 on the valve 17 with a return wire 70 leading from the lead wire 63 through a hand switch 71 thus establishing a current through the solenoid 18 for operation of the valve 19 when one end of the clapper 54 is in contact with the contact member 57. At the opposite side of the switch 21 is a pair of terminals 72 and 73 having lead wires 74 and 75 connected thereto, the lead wire 75 being connected to the contact member 50 on the switch element 48 and the lead wire 74 leading to the solenoid 59 where it is connected at 76 to the wire 67 and serving when the terminals 72 and 73 are connected through the contact members 40 and 50 to energize the solenoid 59 pulling the clapper 58 out of its normal position as shown in the figure, so that one end thereof contacts with the contact member 60 and connecting the primary circuit so the motor is caused to travel in a reverse direction for the purpose of resetting the device after its operation is complete, as will be more fully described hereinafter. A lead wire 77 is provided which leads from the switch member 38 and is connected to the primary circuit wire 63 at 78 through which circuits are established to the contact members 42 and 50 with the members 39 and 40 respectively.

In operation the car 13 is backed into the quenching station underneath the spray pipes 14 and 15 and as the car is backed into the station the rod 20 engages the switch arm 23 which forms a contact between the points 66*a* and 67*a* and establishing a circuit to the solenoid 55, thus energizing this solenoid which pulls the clapper 54 down into contact with the contact member 57. This operation also establishes a circuit through the leads 69 and 70 through the solenoid 18, the switch 71 being normally placed in closed position so that the solenoid 18 becoming energized opens the valve 17 and allows the water to flow through pipe 16 into the spray pipes 14 and 15, causing a flow of water onto the coke contained in the car 13. The clapper 54 also closes the primary operating circuit to the motor 28 which thus starts to operate the gear reducing mechanism 29, rotates the screw member 34, causing the nut 35 to travel along the screw member 34 until it engages the bolt 43, pushes the member 43 mounted in the end of the switch member 41 and pushing this member outward separates the contact members 39 and 42 thus breaking the circuit leading to the solenoid 55 causing this solenoid to be de-energized and the clapper to return in the position shown in Figure 5, thus breaking the primary circuit to the motor and also the cir-

cuit to the solenoid 18, shutting off the flow of water to the sprinkling pipes 14 and 15.

As soon as the water stops flowing, the car 13 is pulled from under the quenching station by the locomotive 19, the rod 20 engages the arm 24 of the switch 21 and connects the contact members 72 and 73 and closing the circuit through the lead wires 74 and 75 by energizing the solenoid 59 and operating the clapper 58, bringing one end of the clapper into contact with the contact member 60 and which reverses the current through the motor 28 causing the motor to reverse itself and thus operating the screw 34 in the opposite direction causing the nut 35 to travel backwards on the screw 34 until it engages the bolt 51 and breaking the circuit to the solenoid 59 by separating the contact members 40 and 50 on the member 48 so that the motor is stopped and the nut is therefore brought into reset position so that when the next car of coke is backed into the quenching station the rod 20 engages the switch arm 23 and the cycle of operations such as heretofore described is again completed.

The limit of travel of the nut 35 is controlled by the distance between the points of the screws 43 and 51 and consequently the time of operation of the sprinkling apparatus is equal to the amount of time that it takes the motor 28 to drive the nut 35 between the points of these time-limit switches and this distance is varied by adjusting the screws 43 and 51 to the proper distance so the water is caused to flow upon the coke car for a predetermined length of time. This time will vary depending upon the pressure of the water and also the condition of flow, and whether muddy or clear and in general will amount to about twenty-eight to thirty seconds in order to quench a standard car into which the coke is received from the coke ovens before it is quenched. The adjustment of these screws can, of course, be determined by experimentation so that the time of flow of the water into the coke is controlled without the use of any timing apparatus and is made entirely automatic by merely pushing the car into proper position and allowing it to remain in the quenching station while the quenching apparatus causes the flow of water to flow onto the coke for the predetermined length of time. The rod 20 on the locomotive is so adjusted that when either of the members 23 or 24 on the switch is turned at an angle, the rod 20 will clear the points of these members so that it is immaterial whether the car of coke be spotted at exactly the proper place under the quenching station because pushing the car into the quenching station automatically starts the water to flow through the sprinkler pipes and pulling the car out causes the device to be reset for a new operation.

While we have described more or less precisely the details of construction, we do not wish to be understood as limiting ourselves thereto, as we contemplate changes in form and the proportion of parts and the substitution of equivalents as circumstances may suggest or render expedient without departing from the spirit or scope of our invention.

We claim:

1. Coke quenching apparatus comprising in combination, a sprinkling station, a water supply pipe leading to said sprinkling station, a valve in said water supply pipe, a solenoid controlling the operation of said valve, a reversible motor, a pair of primary electric circuits leading to said motor, secondary electrical circuits connected with said first mentioned circuits, circuit breaking mechanism in said secondary circuits, a shaft operated by said motor, an element movably mounted on said shaft and adapted to operate the said circuit breaker, a two-way switch adapted to close the secondary circuits, and means whereby the said two-way switch is operated by a coke car passing into and out of the said station, one of said main electric circuits being connected to the said solenoid.

2. Coke quenching apparatus comprising in combination a coke quenching statiton, a water supply pipe leading thereto, a valve in said water supply pipe, a solenoid connected to said valve, a reversible motor, a pair of primary electric circuits connected to said motor, one of said circuits having connection with said solenoid, primary circuit breaking means in each of said primary circuits, secondary circuits connected to each of said circuit breaking means, a shaft operated by the said motor, a movable member on said shaft, switches in said secondary circuits adapted to be opened by the member on the said shaft, and a switch operable by means passing into and out of the said quenching station whereby the said primary circuits are opened and closed.

3. A coke quenching apparatus, comprising, in combination, a coke quenching station, a water supply pipe leading thereto, a valve in said water supply pipe, a solenoid controlling the said valve, a reversible motor, contacts actuated by said motor, a main electric circuit leading to said solenoid and motor, a second main circuit leading to said motor, a circuit breaker mechanism in said main circuits, secondary circuits connected to said contacts and circuit breaker mechanism, and a switch connected to said secondary circuits whereby the said main circuits are opened and closed by actuation of said switch, said contacts being adapted to actuate the circuit breaker mechanism to open the main electric circuit leading to the solenoid and to the motor after a predetermined length of time.

4. A coke quenching apparatus, comprising, in combination, a coke quenching station, a water supply pipe leading thereto, a valve in said water supply pipe, a solenoid con-

trolling the said valve, a reversible motor, contacts actuated by said motor, a main electric circuit leading to said solenoid and motor, a second main circuit leading to said motor, secondary circuits connected to said contacts, circuit breakers connected in said main and secondary circuits, and a switch connected in said secondary circuits whereby the said main circuits are controlled by said switch in said secondary circuits to open said valve and start said motor and to close said valve after a predetermined length of time, said switch being adapted upon further actuation thereof to reverse said motor and restore said contacts to normal position.

Signed at Joliet, Illinois, this 9th day of April, 1927.

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MATTHEW J. BUTLER.