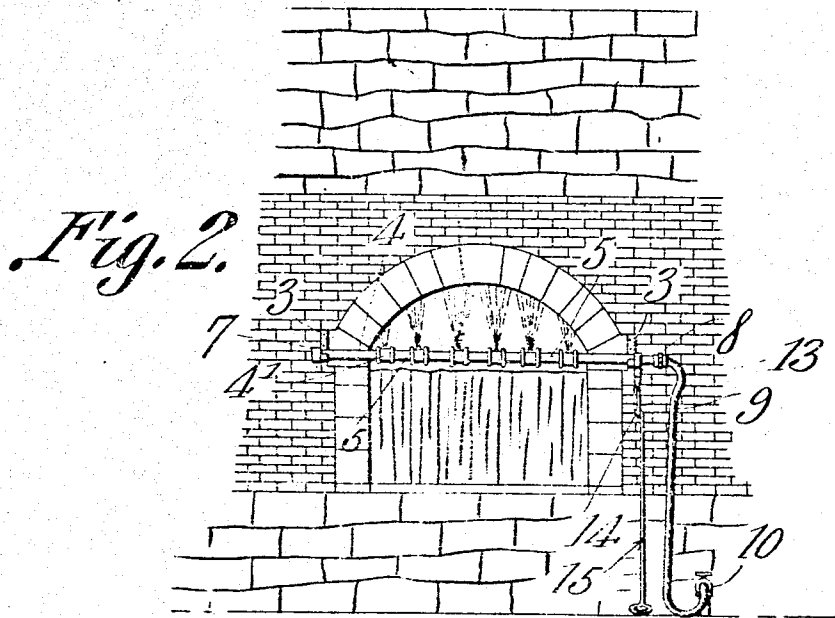
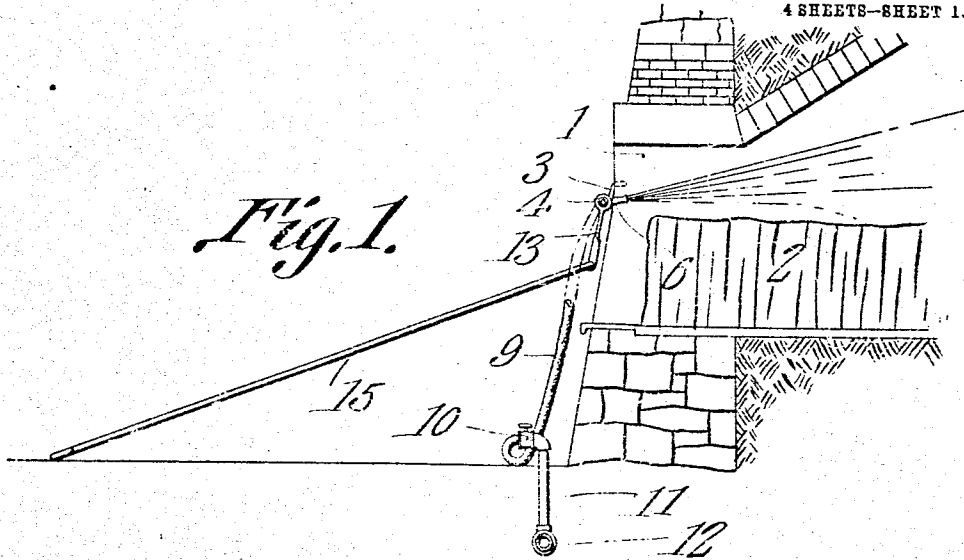


T. J. MITCHELL & J. A. McCREARY.  
MACHINE FOR QUENCHING COKE.  
APPLICATION FILED FEB. 3, 1910.

956,397.

Patented Apr. 26, 1910.

4 SHEETS—SHEET 1.



Witnesses

*E. P. Hunt*  
A. Easterdun

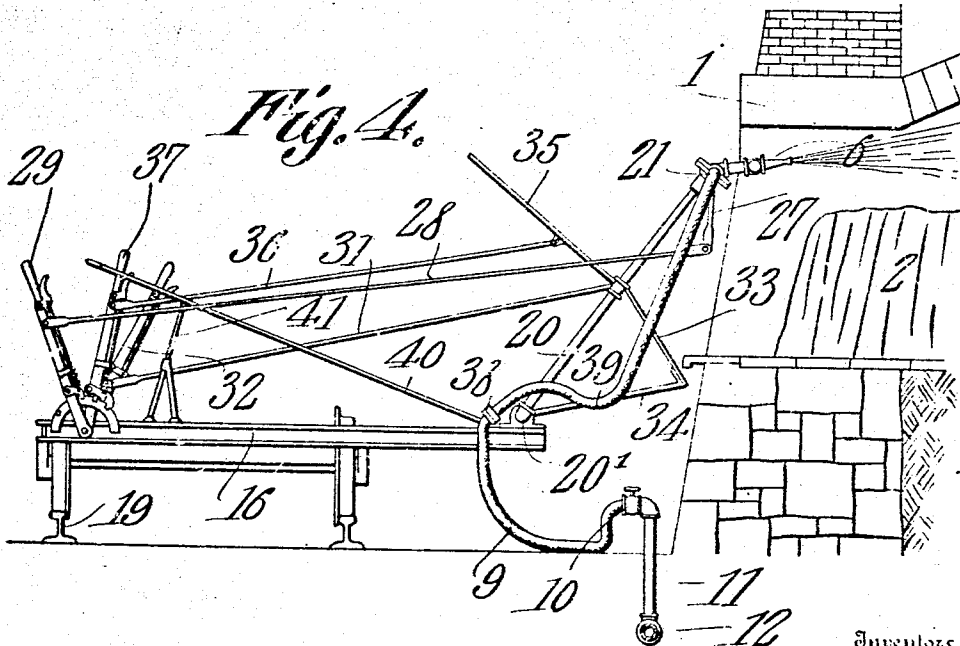
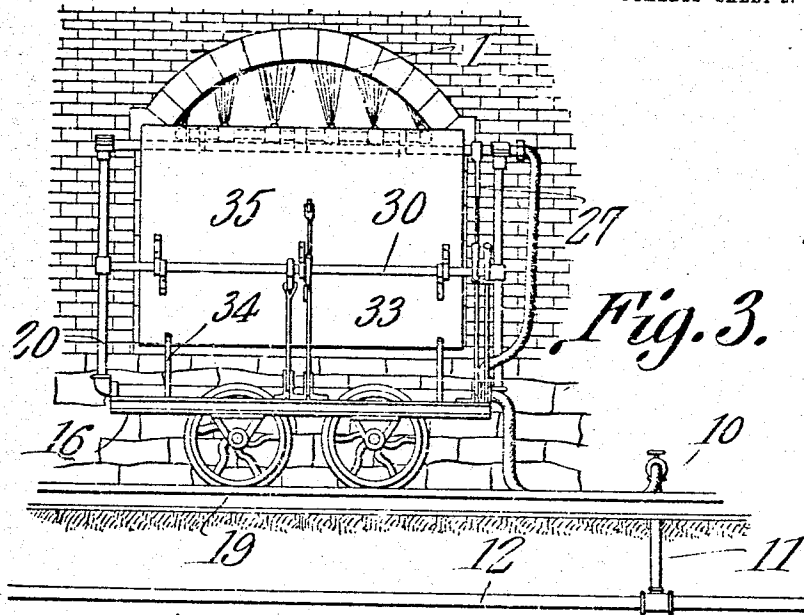
Thomas J. Mitchell <sup>Inventors</sup>  
James A. McCreary  
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4 SHEETS—SHEET 2.



Witnesses  
*E. J. McCreary*  
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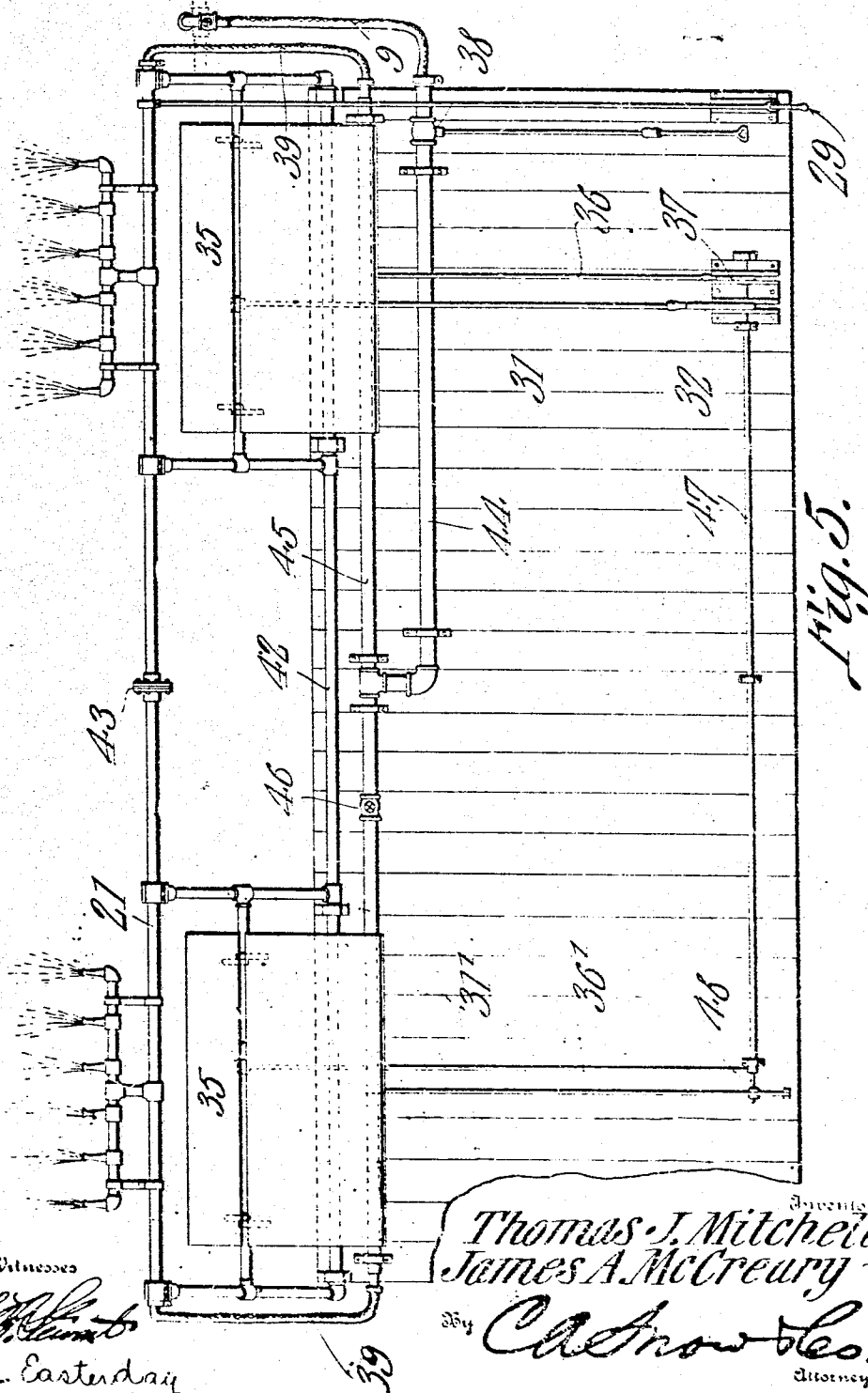
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

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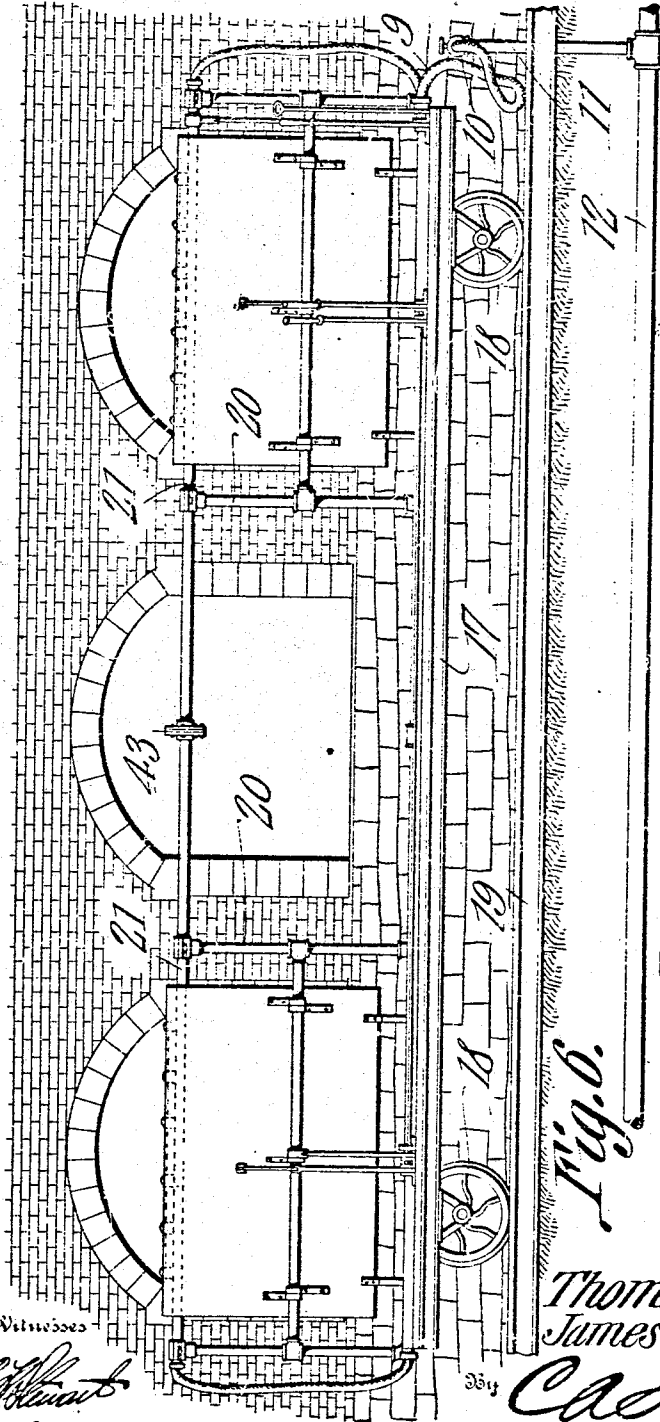


Fig. 6.

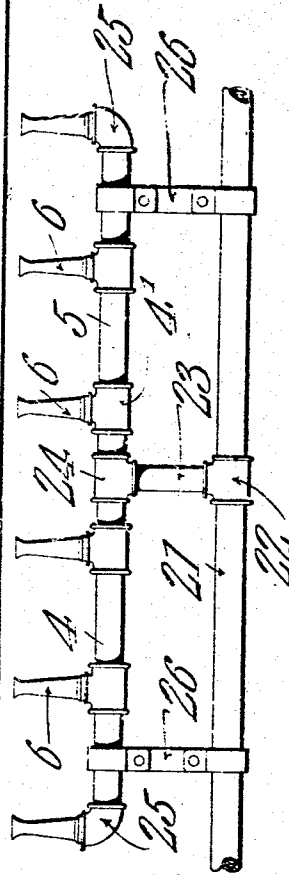


Fig. 7.

Witnesses  
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# UNITED STATES PATENT OFFICE.

THOMAS J. MITCHELL AND JAMES A. McCREARY, OF UNIONTOWN, PENNSYLVANIA.

MACHINE FOR QUENCHING COKE.

956,397.

Specification of Letters Patent.

Patented Apr. 26, 1910.

Application filed February 3, 1910. Serial No. 541,749.

*To all whom it may concern:*

Be it known that we, THOMAS J. MITCHELL and JAMES A. McCREARY, citizens of the United States, residing at Uniontown, in the county of Fayette and State of Pennsylvania, have invented a new and useful Machine for Quenching Coke, of which the following is a specification.

This invention has reference to improvements in machines for quenching coke in the oven and its object is to provide a readily manipulated machine by means of which the coke may be very rapidly reduced in temperature until cool enough for handling.

The present invention is designed particularly for use in connection with the Mitchell type of coke oven shown in Letters Patent No. 899,886, granted September 29, 1908, in which oven, when in operation, there is formed a coke block of substantially the same width throughout its length and which may be pushed bodily through one end of the oven by means of a suitable pushing mechanism acting on the block through the other end of the oven. Numerous advantages resulting from the use of this type of oven among which may be noted the rapidity with which the oven may be discharged, the whole time necessary for ejecting the coke block from the oven not exceeding about two minutes after the coke has been reduced to a workable temperature.

In order to take advantage of the rapidity with which the oven may be discharged of the coke, the quenching of the burning coke to a workable temperature must be as expeditiously performed. The item of expense also enters into the problem.

It has heretofore been customary to quench the burning coke by means of a stream of water delivered from a hose, the coke of course being still in the oven. This requires from twenty-five to thirty minutes and all the advantage due to the facility with which the oven may be discharged of its contents is lost. It has been proposed to quench the coke by means of a machine having a sprinkling head which may be introduced into the oven and caused to travel back and forth over the surface of the coke at the same time sprinkling water thereon. Such machines are of expensive construction and require the services of numerous helpers, and furthermore are slow and tedious in operation approaching the time consumed in the more generally em-

ployed method of quenching coke by means of water sprayed into the oven from a hose in the hands of an operator at the mouth of the oven.

The present invention is designed to throw a large quantity of water onto the surface of the burning coke within the oven and contemplates an apparatus which may be very easily handled by a minimum number of helpers and will cause the quenching of the coke to a temperature at which the coke may be handled in a period not exceeding about four minutes, thus not materially interfering with the expeditious handling of the coke permitted by the type of oven referred to.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification, in which drawings:—

Figure 1 is a central longitudinal section through one end of a coke oven with one form of the invention applied thereto. Fig. 2 is an elevation of the structure of Fig. 1. Fig. 3 is an elevation of a truck supported quenching mechanism adapted for operating on but one oven at a time. Fig. 4 is an end elevation of the structure of Fig. 3 with the corresponding end of the coke oven shown in vertical section longitudinally of the oven. Fig. 5 is a plan view of a quenching machine and supporting truck adapted for quenching one or more ovens simultaneously. Fig. 6 is a front elevation of the structure of Fig. 5. Fig. 7 is a detail view of a battery of stream forming and directing nozzles used in connection with the quenching structures.

The simplest form of the quenching mechanism is illustrated in Figs. 1 and 2 and reference will first be had to these figures.

A coke oven of the Mitchell type is indicated at 1, this type of oven consisting of a long and comparatively narrow chamber of equal diameter throughout with the doors or openings at the ends of the same diameter as the body of the chamber while the interior of the chamber rises from the ends toward the center at which latter point the charge is introduced to be afterward leveled and burned until there is produced a long block 2 of coke which may be readily ejected through one end of the oven by a suitable pusher engaging the other end of the coke and causing it to be ejected through the first named end of the oven, the coke block being

of a width and height permitting such manipulation, the whole operation taking but about two minutes as already stated. When the coking operation has been completed the whole interior of the oven and the entire mass of the coke block are very hot. Before however the coke block can be handled it is necessary to quench it and reduce its temperature sufficiently to permit handling. This may be done to best advantage by spraying the coke block with water.

In the structure shown in Figs. 1 and 2 hook shaped supports 3 are provided on each side of the mouth of the coke oven and these supports are designed to receive the end of a pipe 4 which may be made up of a suitable number of tees 4' joined by nipples 5 and terminating at the ends in longer pipe sections sufficiently extensive to rest in the hooks 3. To each tee there is secured a nozzle 6 and the structure is such that the pipe carries a series of nozzles extending across the opening to the coke oven and directed toward the interior of said oven. One end of the pipe beyond the corresponding hook 3 is provided with a cap 7. At the other end of the pipe beyond the corresponding hook 3 there is provided a union 8 receiving one end of a hose 9 the other end of which may be connected to a valve 10 on the upper end of a branch pipe 11 rising from a main 12 buried a suitable distance in the ground and extending along the front of the bank of ovens.

Fast to the pipe 4 near one end thereof is an arm 13. The free end of the arm 13 may be provided with an eye for the reception of the hooked end 14 of an operating rod 15 of sufficient length so that the handle end may be so distant from the mouth of the oven that an operator is out of the danger zone caused by the outrush of steam or hot gases from the mouth of the oven.

When it is desirable to quench the coke after the burning of the charge in the oven has been completed, the closure for the mouth of the oven is removed and the pipe 4 is hung on the hooks 3 with the nozzles 6 directed into the mouth of the oven and the hose 9 is attached to the valve 10 which latter may then be opened so that there is produced a flow of water through the hose 9 into the pipe 4 and from thence in the form of jets from the nozzles 6 into the oven above the coke block 2, and assuming a proper elevation of the discharge end of the nozzles 6 and a sufficient pressure of water, the jets may reach to the farther end of the coke block. By changing the elevation of the discharge ends of the nozzles by rocking the pipe 4 about its longitudinal axis on the hooks 3 as bearings, which rocking may be performed by a proper manipulation of the rod 15, the battery of jets or streams may be directed from one end of the coke block to

the other as the operator may desire, the large quantity of water available quickly quenching the coke to a suitable temperature for subsequent handling, the steam generated escaping through the open end or ends of the oven. It will be understood of course that the battery of nozzles 6 and the pipe 4 may be provided at each end of the oven, the arrangement then being a duplicate of the arrangement shown in Figs. 1 and 2. As soon as a coke block in an oven has been suitably quenched the hose 9 may be disconnected from the valve 10 after the latter has been closed and the pipe 4 may then be carried to the next oven to be treated and the process of quenching may then be repeated, the structure being light enough to be handled by one operator so that much time is saved without any increase in the number of operators needed.

Where tracks along the line of ovens are available, then the battery of nozzles 6 may be mounted on a suitable truck 16 as shown in Figs. 3 and 4 or 17 as shown in Figs. 5 and 6.

Referring first to the structure shown in Figs. 3 and 4 the truck 16 is a small easily handled structure but little longer than the width of the mouth of an oven and this truck is mounted upon wheels 18 adapted to the track indicated at 19, such tracks being commonly provided for apparatus used in connection with the handling of the coke.

The platform of the truck may overhang toward the oven to bring the structures carried thereby into operative relation to the oven, the truck being adapted to the tracks already available. At the side of the truck adjacent to the oven there is mounted a frame 20 which may for convenience of construction be made up of pipes and pipe fittings, but of course any other suitable frame structure may be employed. One long side of the frame 20, the side adjacent to the body of the truck, and therefore in operation the lower side is secured to the truck by bearing blocks 20' in which the said lower side of the frame may turn so that the upper long side of the frame may be swung in an arc about the longitudinal axis of the lower side of the frame thus permitting the movement of the upper long side of the frame to and from the mouth of an oven. The upper long side of the frame is in the form of a pipe 21 so supported in the side members of the frame as to be capable of independent rotative movement about its longitudinal axis. The pipe 21 includes a tee 22 best shown in Fig. 7 and this tee is coupled by a nipple 23 to another tee 24 introduced into the pipe 4 made up of the nipples 5 and tees 4' with the latter carrying nozzles 6 similar to the battery of nozzles shown in the structure of Figs. 1 and 2 except that the terminal nozzles of the battery

of nozzles are connected to the pipe 4 by elbows 25 beyond which the pipe 4 does not extend.

In the structure shown in Fig. 7 the pipe 23 is connected to the pipe 4 midway the length of the latter while the ends of the pipe 4 are supported and braced by straps 26 having eye ends embracing the corresponding portions of the pipe 4 and of the pipe 21 so that the battery of nozzles will participate in any rotative movement of the pipe 21 in the frame 20, the nozzles moving in an arc about the longitudinal axis of the pipe 21 as a center.

Fast to the pipe 21 is one end of an arm 27 and to the other end of this arm there is connected a link 28 extending and connected to a hand lever 29 mounted on the truck 16 near the side thereof remote from the ovens, the lever 29 being of an ordinary type capable of being locked in adjusted position.

The frame 20 is shown as provided with a central cross bar 30 which may also be made of pipe and this bar is connected by a link or rod 31 to a manipulating lever 32 by means of which the frame 20 may be rocked about its supports 20' to any desired position and there locked, thus permitting the movement of the pipe 21 toward or from the mouth of the oven as the operator may desire, the rocking of the frame 20 toward the oven being sufficiently extensive to permit the introduction of the nozzles 6 to a considerable distance into the mouth of the oven if such be desired.

Fast to the cross bar or pipe 30 is a shield 33 having the edge remote from the bar 30 secured to the lower member of the frame 20 by brace bars 34 so that when the frame 20 is in operative relation to the mouth of the oven with the nozzles 6 introduced thereinto the shield 33 will extend across the lower portion of the mouth of the oven with the lower edge of the shield below the lower edge of the mouth of the oven and the body of the shield sloping in an upward direction away from the mouth of the oven toward the cross bar 30.

Pivoted at the lower edge to the cross bar 30 is another shield 35 constituting a continuation of the shield 33 and this shield 35 is connected by a rod or link 36 to a manipulating lever 37 by means of which the shield 35 may be locked in adjusted positions.

Mounted on the truck 16 is a valve 38 having a hose 9 attached thereto for coupling the valve 38 to any one of the valves 10 exposed along the line of ovens at the upper ends of the branch pipe 11 coming from the main 12. The valve 38 is connected by a flexible pipe or hose 39 to one end of the pipe 21, the other end thereof being closed. The valve 38 is under the control of a manipulating rod 40 having its accessible end sup-

ported by a standard 41 adjacent to the manipulating levers for the rest of the structure so as to be within ready reach of an operator.

When the coke block within an oven is ready for quenching the truck 16 is moved into proper position in front of the mouth of the oven, the whole structure being sufficiently light to be readily pushed into position by hand. The hose 9 is coupled between the valves 10 and 38 and the valve 10 may then be opened, the valve 38 being at the time closed. By the proper manipulation of the lever 32 the frame 20 is moved toward the mouth of the oven until the nozzles 6 are introduced thereinto and the lever 37 is manipulated to cause the shield 25 to cover the mouth of the oven to a sufficient extent to prevent escaping gases and steam reaching an operator standing at the side of the truck remote from the oven. Now by a proper manipulation of the rod 40 and lever 29, streams of water are caused to flow from the nozzles 6 into the oven, the force of the stream being controlled by a suitable manipulation of the valve 38 and the elevation of the streams being controlled by a suitable manipulation of the lever 29 acting through the rod or link 28 and arm 27 on the pipe 21 with which latter the nozzles move.

An operator standing on the truck with the lever 29 and rod 40 within reach may direct streams of water upon the coke block as required while protected from the outrush of steam and gases by the shields 33 and 35, but the shield 35 may be so adjusted as to permit the operator observing the interior of the coke oven over the top of the shield 35 while still protected by the said shield from the direct rush of the steam and gases. The structure of Figs. 3 and 4 permits the quenching of the coke block as expeditiously as the structure of Figs. 1 and 2 and with a minimum of labor. Where it is desirable to quench more than one oven at a time the structure of Figs. 5 and 6 may be employed, this structure differing from the structure of Figs. 3 and 4 in providing a truck sufficiently long to include more than one oven and preferably three ovens where the ovens are built in long rows or closely adjacent ovens. The truck 17 of Figs. 5 and 6 is provided at each end with a frame 20 with the adjacent ends of the lower member of the two frames connected together by a reach pipe or bar 42 so that the two frames will move together. The pipes 21 constituting the upper members of the frames 20 are continued beyond the adjacent ends of the frames and where they meet they are coupled together by suitable flanges 43 with an interposed web cutting off communication from one pipe 21 to the other. The two frames 20 therefore become in effect one frame as long as the elongated truck 17.

The battery of nozzles 6 of each frame 20 is so located as to be introducible into the end or mouth of a corresponding oven, but these ovens will be separated by an intervening oven to which the structure is inactive when operating upon the separated ovens. The rest of the structure is similar to that of Figs. 3 and 4 except that the valve 38 to which the hose 9 connects is included in a pipe 44 on the floor of the truck and this pipe 44 is in turn connected to an intermediate point of another pipe 45 extending from one end to the other of the truck and at the end connected by respective flexible pipes 39 to the outer ends of the pipes 21.

In the pipe 45 between the point of connection therewith to the pipe 44 and the end of the pipe 45 connected by a flexible pipe 39 to the pipe 21 at one end of the truck, there is introduced a valve 46. Also the lever 32 for controlling the position of the frame 20 is connected to a rock shaft 47 which in turn is connected at one end by a rod or link 31' to the corresponding frame 20 so that the two frames may be moved simultaneously by means of the one controlling lever 32. The shaft 47 may be made hollow and another rock shaft 48 extends therethrough and beyond the ends thereof, this last named shaft being connected at one end to the lever 37 for operating the shield 35 while the other end of the shaft 48 is connected by a link or rod 36' to the corresponding shield at the other end of the truck. By this means a single operator may spray two ovens simultaneously, thus correspondingly facilitating the operation. If at any time it be advisable to spray but one oven at a time with the structure of Figs. 5 and 6, then the valve 46 may be closed and water admitted to the pipe 44 through the valve 38 will pass to but one battery of nozzles 6.

During the first part of the operation of quenching the coke, it is not necessary that the operator should watch the process and therefore the screen 35 may be in its most elevated position to protect the operator from the outrushing hot gases or steam. As the operation progresses the screen or shield 35 may be lowered sufficiently to permit the operator to observe the progress of the operation and shut off the flow of water when the quenching has reached the proper point and so that the frame or frames 20 may be rocked away from the ovens to withdraw the nozzles and the water be shut off at the valve 10 being utilized, after which the structure may be moved to the next oven or ovens to be treated and the operation may be repeated.

Since the Mitchell type of coke oven admits of the rapid expulsion of the coke, many ovens may be discharged one after the other by a single pushing apparatus, in a comparatively brief period of time, but

unless the quenching of the coke to a temperature at which the coke may be handled, keeps pace with the possible rapidity of operation of the pusher, the advantage of the oven for facilitating rapidity of operation is lost. But the present invention provides a means for quenching the coke with such rapidity that a series of ovens may be prepared for the action of the pushing apparatus as rapidly as the latter can operate to expel the coke, and this preparation not only requires a minimum of time but a minimum of labor since a single operator may cause the quenching of the ovens as or more rapidly than the mechanism used for discharging the coke from the oven can be made to operate.

What is claimed is:—

1. A quenching apparatus for coke ovens, comprising means for directing water into the oven over the coke block therein, a support for the water directing means on which the latter is movable about an axis transverse to the oven, and means under the control of an operator for moving the water directing means on its axis.

2. A quenching apparatus for coke ovens, comprising means for directing a plurality of streams of water simultaneously in the oven over the coke block therein, a support for the water directing means on which the latter is movable about an axis transverse to the oven, and means under the control of an operator for moving the water directing means on its axis.

3. A quenching apparatus for coke ovens, comprising a suitable carrier movable into operative relation to the mouth of an oven, a support on the carrier movable with reference to the carrier into and out of operative relation to the mouth of the oven, a battery of water directing nozzles on said support extending in a direction across the mouth of the oven, and means on said carrier for elevating and depressing the discharge ends of the nozzles at will.

4. A quenching apparatus for coke ovens, comprising a suitable carrier movable into operative relation to the mouth of an oven, a support on the carrier movable with reference to the carrier into and out of operative relation to the mouth of the oven, a battery of water directing nozzles on said carrier extending in a direction across the mouth of the oven, means on said carrier for elevating and depressing the discharge ends of the nozzles at will, and a shield on the carrier movable at will into operative relation to the mouth of the oven.

5. A quenching apparatus for coke ovens, comprising a suitable carrier movable into operative relation to the mouth of an oven, a support on the carrier movable with reference to the carrier into and out of operative relation to the mouth of the oven, a battery

of water directing nozzles on said carrier extending in a direction across the mouth of the oven, means on said carrier for elevating and depressing the discharge ends of the nozzles at will, a shield on the carrier movable at will into operative relation to the mouth of the oven, and another shield on the carrier coacting with the first named shield.

6. A quenching apparatus for coke ovens, comprising a suitable carrier movable into operative relation to the mouth of an oven, a support on the carrier movable with reference to the carrier into and out of operative relation to the mouth of the oven, a battery of water directing nozzles on said carrier extending in a direction across the mouth of the carrier, means on said carrier for elevating and depressing the discharge ends of the nozzles at will, a relatively fixed shield on the carrier movable with the latter into operative relation with the lower part of the mouth of the oven, and an adjustable shield on the carrier movable with relation to the upper part of the mouth of the oven at will.

7. In a quenching apparatus for coke ovens, a linear battery of nozzles, means for supporting said battery of nozzles in substantially transverse relation to the mouth of the oven, and means for the elevation and depression of the discharge ends of the nozzles at will.

8. In a quenching apparatus for coke ovens, means for directing water onto the coke within the oven, and a shield movable

into operative relation to the mouth of the oven to protect an operator from the out-rush of steam, said shield having a member movable at will while the apparatus is in operation to expose the upper portion of the mouth of the oven to view.

9. In a quenching apparatus for coke ovens, a suitable carrier movable into operative relation to the mouth of an oven, a support thereon movable to and from the mouth of the oven, a linear battery of nozzles carried by the support, a shield carried by the support, and operating means for elevating and depressing the discharge ends of the nozzles and for adjusting the shield at will.

10. In a quenching apparatus for coke ovens, a suitable carrier movable into operative relation to a plurality of ovens at once, separated supports on the carrier, water directing means on each support, means common to both supports for moving them simultaneously to and from the mouths of separated ovens, and means common to the water directing means on both supports for elevating and depressing them simultaneously.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

THOMAS J. MITCHELL.  
JAMES A. MCCREARY.

Witnesses:

JAMES M. SMITH,  
JOHN L. HYATT.