

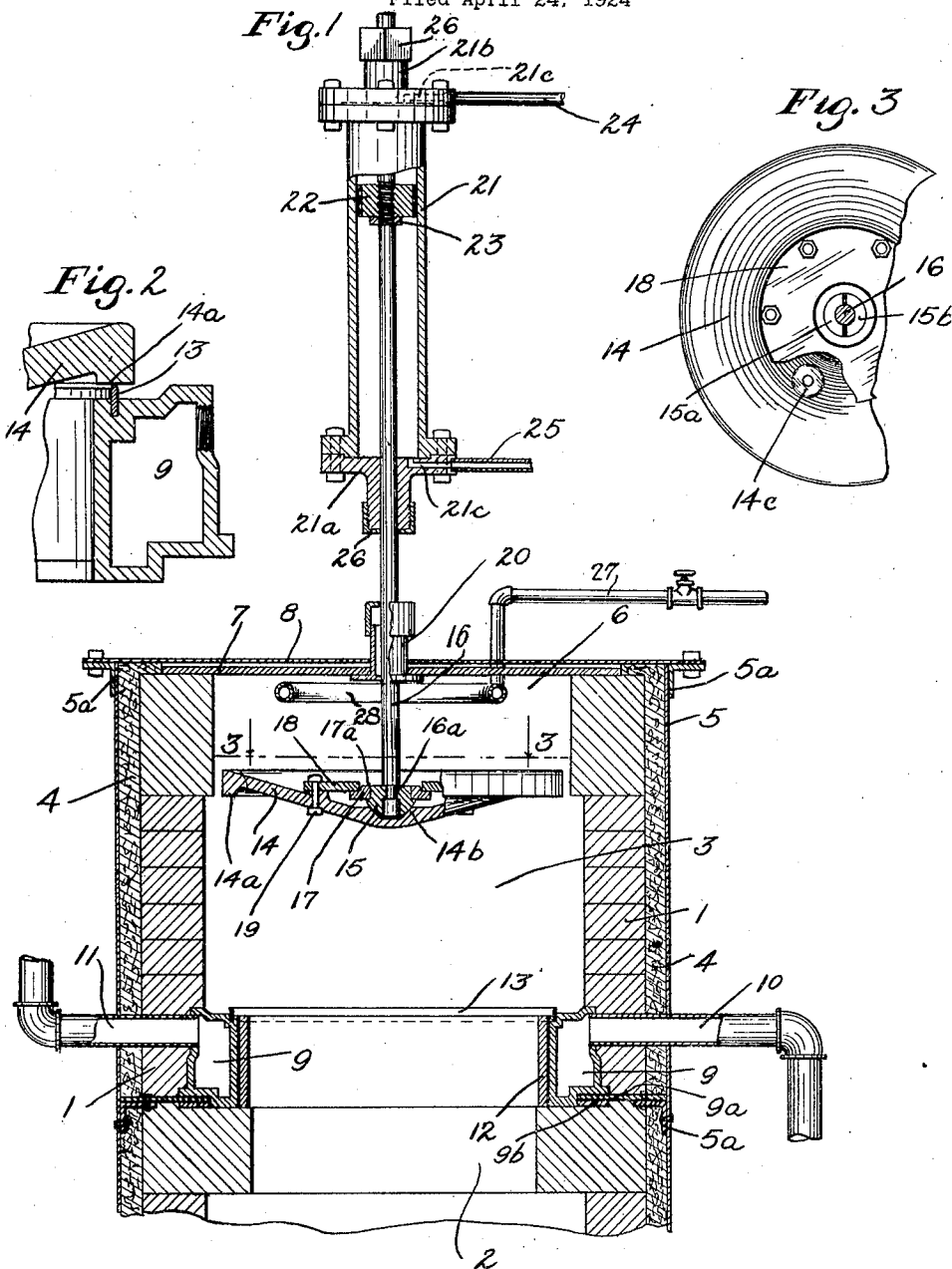
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C. I. TENNEY ET AL

HOT VALVE FOR GAS MAKING APPARATUS

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INVENTORS
 CHARLES I. TENNEY
 PAUL W. THAYER
 BY THEIR ATTORNEY

James F. Williamson

UNITED STATES PATENT OFFICE.

CHARLES I. TENNEY, OF NEWTON, IOWA, AND PAUL W. THAYER, OF MINNEAPOLIS, MINNESOTA, ASSIGNORS TO AMERICAN GAS CONSTRUCTION COMPANY, OF NEWTON, IOWA, A CORPORATION OF IOWA.

HOT VALVE FOR GAS-MAKING APPARATUS.

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This invention relates to a hot valve for gas making apparatus or similar apparatus. In gas making apparatus for making artificial illuminating or heating gas it is customary to employ a so-called generator which is a furnace chamber in which fuel is contained and through which a blast is blown to heat the same. The products of combustion from the generator are usually passed through a checker brick chamber called the carburetor, and usually through a second checker brick chamber called the superheater, from which the gas is passed to a stack or to a passage leading to a waste heat boiler. The hot valve in some gas making installations is installed between the generator and the carburetor, and in other cases is installed between the superheater and the stack where the hot products of combustion pass thereto. In such gas making apparatus there is always an accumulation of carbon or hydrocarbon deposited, such as carbon dust, incrustated carbon, tar, and the like. If it is attempted to use ordinary standard valves, such as sliding gate valves, this accumulation of tar, and the like, renders it extremely difficult to move the valves and to get a tight closure thereby. The more moving surfaces in contact on the valve, of course, the harder it is to move the valve.

It is an object of this invention to provide a simple and efficient valve particularly adapted for use as a hot valve and which can be placed between the generator and carburetor, between the carburetor and superheater, between the superheater and stack, or in the conduit leading from the superheater to the waste heat boiler.

It is a further object of the invention to provide such a valve structure comprising a ring of hard material having a comparatively sharp edge together with a plate having an annular flat surface adapted to contact said sharp edge of the ring, said plate being axially movable in alinement with said ring.

It is still another object of the invention to provide such a ring and plate, as above set forth, which plate is of concavo-convex form having its convex side disposed toward the ring.

It is also another object of the invention to provide such a ring and plate, which plate has a rod extending axially from one side

thereof and arranged for rectilinear movement, said rod being connected to said plate by a universal joint.

It is still another object of the invention to provide a valve structure comprising such a ring and plate as set forth, together with steam actuated rectilinearly movable means for moving said plate against said ring.

It is a still further object of the invention to mount said ring in the top of an annular casing through which a cooling liquid is circulated.

These and other objects and advantages will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to the same parts throughout the different views, and in which

Fig. 1 is a view for the most part in central vertical section through the valve and valve setting, a small part of the operating means for the valve being shown in side elevation;

Fig. 2 is a partial vertical section similar to that shown in Fig. 1, showing the valve in closed position and shown on an enlarged scale; and

Fig. 3 is a partial horizontal section taken on the line 3—3 of Fig. 1.

Referring to the drawings, a portion of a gas making apparatus is shown comprising a wall 1 of fire brick or suitable refractory material through which extends the passage 2 at the bottom, from which passage a laterally extended passage 3 leads. The wall 1 is shown as covered with a suitable asbestos or other insulating covering 4 surrounded by the metal casing 5 and the top of wall 1 is shown as having the cylindrical passage 6 therethrough over which extend the metal plates 7 and 8. The plate 8 is connected to the casing 5 by headed and nutted bolts passing through angle plates 5^a contacting the members 5 and 8 and disposed beneath the projecting edge of the latter. Mounted on the wall 1 above the opening 2 and surrounding the same is an annular casing 9 which is hollow and with which communicate the inlet and outlet pipes 10 and 11, respectively, which pipes will lead, respectively, to a water supply and discharge means. The casing 9 rests on a flat annular plate 9^a, bolted to angle brackets 5^a bolted to casing 5, and a ring 9^b underlies and supports the

inner edge of plate 9^a. A ring 12 is shown as disposed inside of the casing or casting 9 which also surrounds the passage 2 and which will be of hard metal adapted to resist heat. The casing 9 has set into its top side adjacent its inner corner, a hardened steel ring 13, the inner and outer sides of which converge towards each other at its top edge to form a comparatively sharp edge.

A plate 14 has a flat annular surface 14^a on its underside adjacent its outer edge, which surface is disposed in a plane substantially normal to the axis of said plate. While said surface may be formed on said plate in any manner, in the embodiment of the invention illustrated, it is shown as formed on the lower side of a short flange projecting downwardly at the edge of the plate. As clearly shown on Fig. 1, the plate 14 is of concavo-convex shape or depressed at its central portion, the convex side of said plate being disposed toward the ring 13. The top surface of said plate has a partly conical recess 14^b formed therein and a semi-spherical head 15 is disposed in said recess. Said head 15 is formed of two similar sections 15^a and 15^b divided along a diameter of said head and said sections are formed with an inwardly projecting flange adapted to seat in a groove 16^a formed adjacent the end of a rod or shaft 16, the sections 15^a and 15^b embracing said shaft and extending substantially to the end thereof. The sections 15^a and 15^b are held in engagement with the shaft by a ring 17 which fits over the top thereof and rests on an external shoulder formed about said sections, said ring being fitted tightly in place. The ring 17 has an upwardly projecting portion 17^a of reduced diameter forming a flange about its outer surface and a flat disk 18 has a central opening fitting over the portion 17^a, which disk is provided with a plurality of circumferentially spaced holes adjacent its outer edge through which pass the headed and nutted bolts 19 securing said ring to the plate 14. Said bolts pass through the plate 14 and bosses 14^c are formed on the concave side of said plate 14 on which the disk 18 rests. It will thus be seen that the shaft 16 is securely connected to the plate 14 by a universal joint. The rod or shaft 16 extends upwardly through a stuffing box 20 disposed in the plates 7 and 8 and extends through the cylinder heads 21^a and 21^b of a steam cylinder 21, a piston 22 being secured on said rod at an intermediate threaded portion thereon, said piston being held in place by a nut 23. The cylinder 21 is provided with suitable inlet and exhaust ports 21^c at each end thereof with which communicate the inlet and exhaust pipes 24 and 25, respectively. The cylinder heads 21^a and 21^b are provided with flanges secured by headed and nutted bolts to flanges formed

on the ends of cylinder 21, said cylinder heads being provided with the usual stuffing glands 26.

In operation, the pipes 24 and 25 will be connected with a suitable controlling valve so that said pipes will alternately be connected with a supply of live steam and to an exhaust passage. When steam is turned into cylinder 21 above the piston 22, the rod 16, together with the plate 14 is given a quick movement downward and said plate is slapped, as it were, against the ring 13, surface 14^a contacting the sharp edge of said ring. This quick slapping movement acts to cause the sharpened edge of ring 13 to cut through any deposit of tar or carbon on the plate 14 or on the ring so that a tight and close engagement is secured between the plate and ring. This tight closure between the plate and ring is further effected and rendered certain by the universal mounting of plate 14 on shaft 16. When it is desired to open the valve and passage 3, steam will be turned into cylinder 21 below the piston 22 and the valve plate 14 will be lifted from ring 13. It will be noted that the plate 14 lifts directly away from the ring and there is no sliding movement between parts. The sticking effect of any accumulation on the plate and ring is therefore reduced to a minimum or practically eliminated. With prior constructions of hot valves, considerable trouble has been experienced with the same cracking on account of expansion and contraction due to the intense heat encountered. In order to overcome this effect the plate 14 is made concavo-convex shape and the expansion of the plate will, therefore, more easily be taken care of by the plate tending to flatten. The strain on the perimeter of the plate is thus reduced so that the plate will not crack at its edge. The ring 13 will be kept comparatively cool by the circulation of cooling water or other liquid through the casing 9 and pipes 10 and 11. It will also be noted that the effective valve forming part of the plate 14 is at its outer edge where it is least in the path of the flame or hot products of combustion which will impinge mainly against the central portion of plate 14. The plate 14 is also cooled by supplying water to the upper surface thereof. The concavo-convex or bowl-shape of the plate also acts to effectively retain this water. Such water could be supplied by a perforated annular conduit 28 extending about shaft 16 above the plate 14 and connected with any suitable water supply pipe 27.

From the above description it is seen that applicant has provided a simple and efficient form of hot valve, together with an efficient operating means co-operating therewith. Such valves are of considerable size and of great weight and the provision of

such hot valves has heretofore been a serious problem. The present valve has eliminated a great difficulty in moving the valve, owing to the sticking thereof and at the same time
 5 secures a very effective closure. The use of steam is peculiarly adapted to such a valve, and the steam co-operates in the effective closing movement of the valve. This results from the expansive function of the
 10 steam so that when the same enters the cylinder the piston is given a very quick impetus and movement which results, as above stated, in a quick slapping effect of the valve against the ring. It is only by such
 15 a quick movement that the crust or accumulated deposit on the parts can be cut through and an effective closure obtained. The device has been amply demonstrated in actual practice and found to be very successful and
 20 efficient.

It will, of course, be understood, that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of
 25 applicant's invention, which, generally stated, consists in a device capable of carrying out the objects above set forth, such as shown and described and defined in the appended claims.

30 What is claimed is:—

1. A valve structure adapted for use in a gas making apparatus comprising a ring surrounding the valve opening and having a comparatively sharp edge directed parallel to its axis, a metal plate valve having
 35 an annular flat hard surface normal to the axis of said valve engaging with said sharp edge of said ring, and means for positively moving said valve axially and slapping the same against said ring.

2. A valve structure adapted for use in a gas making apparatus comprising a comparatively thin ring surrounding the valve opening and having a comparatively sharp
 45 vertically disposed edge, a metal plate valve having hard annular flat horizontal surface normal to the axis of said valve engaging with said sharp edge of said ring, and steam-actuated means for slapping said valve
 50 against said ring, whereby a quick action is produced against said ring and any deposits on said valve and ring are cut through and a tight engagement between said ring and valve effected, said valve being free for a
 55 gyrating motion about its axis so as properly to seat on said ring.

3. The structure set forth in claim 1, said ring being set into the top of an annular chambered casing, and means for circulating
 60 cooling liquid through said casing.

4. A hot valve structure for gas making apparatus comprising a comparatively thin ring surrounding the valve opening having a comparatively sharp upper edge directed
 65 parallel to its axis, a metal plate valve hav-

ing an annular flat hard surface normal to the axis of said valve and engageable with said sharp edge, a rod extending axially from one side of said plate valve and guided for rectilinear movement, and a universal
 70 joint connecting said plate valve and rod.

5. A hot valve structure for gas making apparatus comprising a ring surrounding the valve opening having a comparatively sharp upper edge, a metal plate valve having
 75 an annular flat hard surface normal to the axis of said valve and engageable with said sharp edge, a rod extending axially from one side of said plate valve positively connected thereto in a longitudinal direction
 80 but said valve being free for gyrating movement about its axis, said rod being guided for rectilinear movement, a piston connected to said rod, a steam cylinder in which said piston reciprocates, and means for admitting
 85 steam to said cylinder at each side of said piston to operate said valve to slap the same against said ring or withdraw the same therefrom.

6. A hot valve structure for gas making apparatus comprising a circular plate valve having a central recess in its upper side, a shaft having an annular groove adjacent
 90 its lower end extending axially from said plate, a pair of semi-cylindrical members having flanges fitting in said groove embracing and extending to the end of said shaft, said members having an external shoulder
 95 thereon, a ring embracing said members to contact said shoulder, and a disk apertured to surround said rod overlying said ring and secured to said first mentioned plate whereby said shaft is connected to said plate by
 100 a universal joint.

7. A hot valve structure for gas making apparatus comprising a plate having an annular flat undersurface disposed normal to the central axis of said plate, a ring with which said surface is adapted to contact,
 105 said plate being disposed above said ring and being of concavo-convex form and having its convex side directed toward said ring whereby its concave side forms a reservoir for cooling water.

8. A hot valve for use in the hot blast passage of the outlet portion of a gas making generator comprising a ring having a comparatively sharp edge surrounding said
 115 passage, a valve plate independently mounted above said ring having an annular flat surface adapted to contact said ring, an actuating rod centrally connected to said valve holding said valve against any axial movement relative thereto but permitting a gyrating
 120 movement about the axis of said valve and rod, and means reciprocating axially of said valve connected to said rod for slapping said valve against said ring.

9. A hot valve structure for gas machine apparatus comprising a plate convex on its
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lower side and concave on its upper side and having a plane annular horizontally disposed surface on its lower side adjacent its outer edge, a ring having a vertically disposed sharp edge with which said surface
5 is adapted to contact, and means connected centrally to the upper side of said plate for forcing the same against said ring and lifting the same therefrom.
In testimony whereof we affix our signatures. 10

CHARLES I. TENNEY.
PAUL W. THAYER.