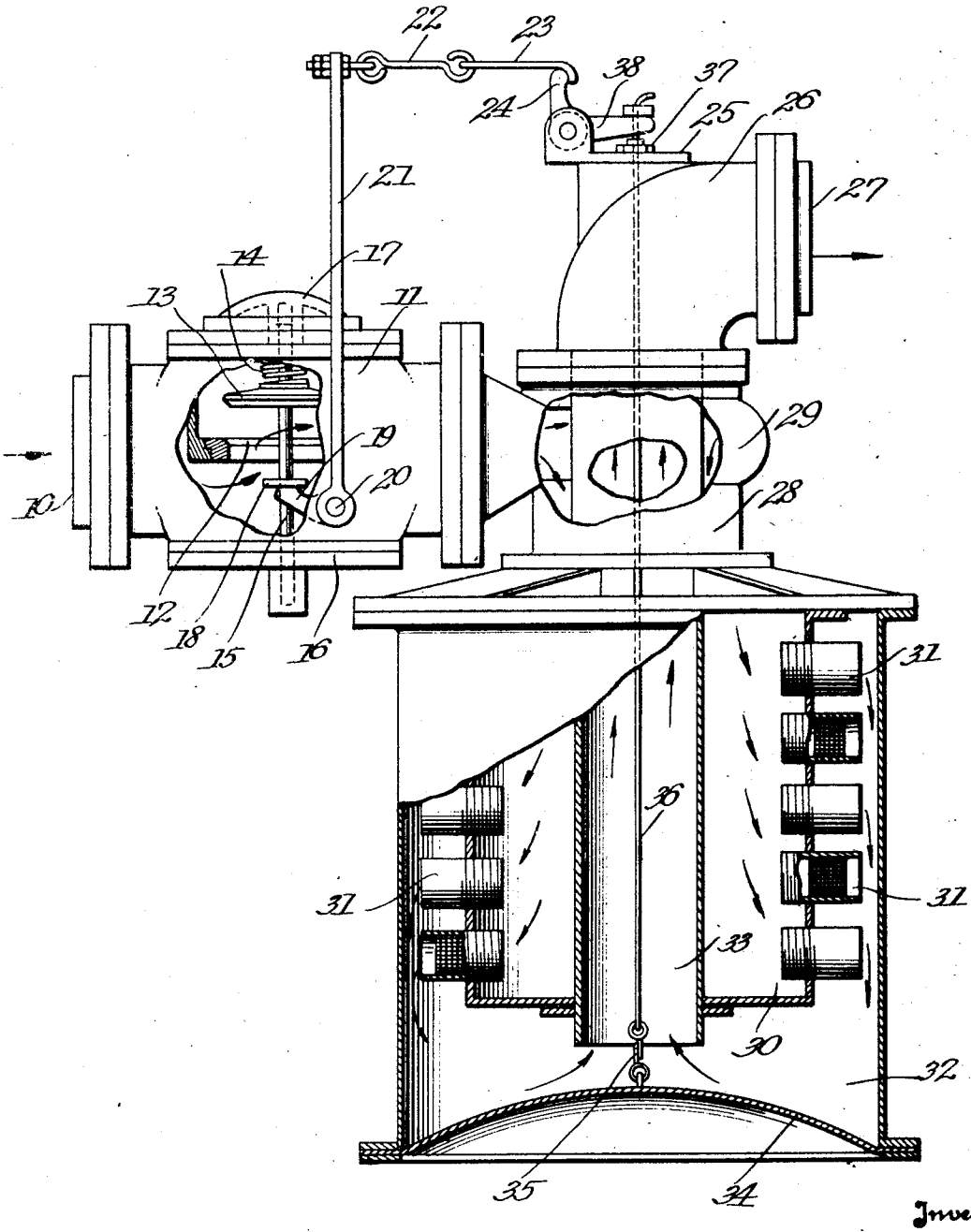
Aug. 16, 1932. W. H. VAN HORN 1,872,368

BACK FIRE PREVENTER

Filed Sept. 23, 1930




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Patented Aug. 16, 1932 1,872,368

# UNITED STATES PATENT OFFICE

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## BACK FIRE PREVENTER

Application filed September 23, 1930. Serial No. 483,954.

The present invention relates to back-fire preventers, and is designed particularly to take care of a pipe line or main which conveys gaseous fuel from the point of generation or mixing to the point of consumption or burning.

It has for its object to guard against the danger of accidental ignition of the gas on the burner side and the running back of the flame to the generating or mixing plant.

In the drawing herewith, I have illustrated one form of the invention, in order that the same may be clear to those skilled in the art, but it will be understood that this is illustrative, and that mechanical variations may be made which are within the purview of my invention.

Referring to the drawing, 10 indicates the inlet side of the device, designed to be coupled in any suitable manner with a pipe line leading from the gas generator or mixer. A valve casing 11 is provided, having a valve seat 12 for a valve 13 normally urged to its seat by a spring 14, the valve stem 15 at its lower end engaging a recess in the bottom plate 16 of the valve casing, while its upper end engages a recess in a cap plate 17 so as to guide and steady the movements of the valve toward and from its seat.

The valve stem is provided with a projection 18, here shown in the form of a disk, which is engaged by a tappet arm 19 mounted on a shaft 20 in suitable bearings within the casing, the end of the shaft 20 projecting through a wall of the valve casing and having fixed thereto the arm 21, the upper end of which is linked in any suitable manner by a loose linkage connection, here shown as made up of members 22 and 23, to a latch or trip member 24 pivotally mounted on a cap plate 25 carried by the elbow 26, to which elbow is connected the outlet 27, which, by any suitable piping arrangement, communicates with the burners or other point of consumption.

From the valve casing, the gas, the course of which is indicated by the arrows, flows to the section 28, which is preferably enlarged at the point 29, as shown, to give proper area for the flow of gas, and the gas then passes downwardly into a closed chamber 30, the walls of which are provided with any suitable number of nipples 31, threaded or otherwise secured in the walls of the casing 30, and provided with any suitable flame interrupting means, such as gauze, which will permit the flow of gas therethrough, but will effectively check the passage of flame.

The gas, coming through the nipples 31, passes to the casing 32, and enters the open lower end of the pipe 33 which passes through the bottom of the casing 30 to a point removed from the bottom 34 of the outer casing 32. The gas will then pass up the pipe 33, through the section 28, to the elbow 26, and thence to the outlet 27.

Bottom 34 is curved upwardly, as shown, and tends to direct gas from the nipples 31 centrally of the casing 32 and directly to the open lower end of the pipe 33. Secured to the bottom is a fusible and frangible connection 35, from which a wire 36 leads upwardly through the pipe 33, section 28, elbow 26, and cap 25, which cap is provided with a suitable stuffing box 37, and engages the arm 38 of the trip member 24, wire 36, at its upper end being suitably secured to the arm 38.

In operation of the device if a back-fire should occur, its course would be through the elbow 26, down the pipe 33, and directly against the thin metal bottom 34. The action of the flame or the pressure will destroy the coupling 35 and bulge the bottom 34 downwardly. That is, the effect of either heat or pressure will be to release the wire 36, freeing the trip 24 and permitting the spring 14 to at once close the valve 15 by reason of the release of arm 21 and tappet arm 19 which will rock upon shaft 20 and relieve the disk 18 of pressure tending to hold the valve open.

The closing of the valve 13 prevents, of course, further flow of gas from the inlet side, and the nipples, with their flame checking gauze fillers, would prevent flame coming through the pipe 33 from reaching the interior of the inner casing 30 or any of the passages communicating therewith in which fuel might remain.

The device constitutes a very effectual preventer of back-firing, ensuring not only a prompt closing of the valve, but so controlling and directing any back-fire as to prevent its reaching either the inlet side of the line or even the fuel which may be in the chambers and passages of the device itself. The back-fire effect is confined at the elbow 26, the pipe 33, and the outer casing 32. The action of the device is such that no damage can result to any part of the apparatus, except the thin metal bottom 34 and the breakable coupling 35.

The replacement of the device after back-fire explosion is, of course, simple, for by renewing the connection 35 and restoring the bottom 34, or replacing the bottom 34, the other parts, including the trip 24, the rocker arm 21, and the tappet 19, may be reset, putting the valve 13 in its normally open position, with the spring 14 under stress. This is of particular value, for the reason that in some instances efficient back-fire preventers are so injured or completely destroyed by back-firing that their repair, replacement, and resetting is not only expensive, but involves very considerable delay before the pipe line can be again put into use.

What is claimed is:

1. The combination with gaseous fuel supply and delivery pipes, and a valve controlling flow through the supply pipe, of two casings arranged one within the other, the inner casing having an inlet connected with the supply pipe and an outlet opening into the outer casing, means for interrupting the passage of flame through the outlet of the inner casing, the outer casing having a yielding wall and an outlet communicating with the delivery pipe, means acting to move the valve to closed position, and means for normally retaining the valve in open position and including a frangible connection with the yielding wall of the outer casing.

2. The combination with gaseous fuel supply and delivery pipes, and a valve controlling flow through the supply pipe, of two casings arranged one within the other, the inner casing having an inlet connected with the supply pipe and having a plurality of outlets opening into the outer casing, means for interrupting the passage of flame through each of the outlets of the inner casing, the outer casing having a yielding wall and an outlet communicating with the delivery pipe, means acting to move the valve to closed position, and means for normally retaining the valve in open position and including a frangible connection with the yielding wall of the outer casing.

3. The combination with gaseous fuel supply and delivery pipes, and a valve controlling flow through the supply pipe, of two casings arranged one within the other, the inner casing having at one end an inlet connected with the supply pipe and having formed in its side wall a plurality of outlets opening into the outer casing, means for interrupting the passage of flames through any of said outlets of the inner casing, a tube extending through the inner casing and connecting the outer casing with the delivery pipe, means acting to move the valve to closed position, and means for normally retaining the valve in open position extending through said tube and including a frangible connection with a wall of the outer casing.

4. The combination with gaseous fuel supply and delivery pipes, and a valve controlling flow through the supply pipe, of two casings arranged one within the other, the inner casing having an inlet connected with the supply pipe and an outlet opening into the outer casing and the outer casing having an outlet communicating with the delivery pipe, a spring acting to move the valve to closed position, a pivotally mounted detent normally restraining movement of the valve under the action of the spring, and means adapted to release the detent in event of explosion in the delivery pipe or the connection between said pipe and the outer casing.

5. The combination with gaseous fuel supply and delivery pipes, and a valve controlling flow through the supply pipe, of two casings arranged one within the other, the inner casing having an inlet connected with the supply pipe and an outlet opening into the outer casing and the outer casing having an outlet communicating with the delivery pipe, a spring acting to move the valve to closed position, a pivotally mounted detent normally restraining movement of the valve under the action of the spring, and means, including a frangible connection within the outer casing, adapted to release the detent in event of explosion in the delivery pipe or the connection between such pipe and the outer casing.

6. The combination with gaseous fuel supply and delivery pipes, of a connection between said pipes including a casing having an inlet, at its upper end, connected with the supply pipe, a second casing surrounding an outlet from and extending beneath the bottom of said casing, a tube extending through the bottom of the inner casing and connecting the interior of the outer casing with the delivery pipe, a valve in the supply pipe, a spring acting to close said valve, a detent adapted to restrain movement of the valve under the action of the spring, and a connection between the detent and the inner face of the bottom of the outer casing including a frangible section, whereby in event of an explosion in the delivery pipe or outer casing the detent will be released.

7. The combination with gaseous fuel supply and delivery pipes, of a connection between said pipes including a casing having at its upper end an inlet connected with the

supply pipe and having a series of tubular members extending through its side wall, a second casing surrounding all of said tubular members on and extending beneath the first said casing, means in each of said tubular members of the inner casing for preventing the passage of flame through said member, a tube extending through the bottom of the inner casing and connecting the interior of the outer casing with the delivery pipe, a valve in the supply pipe, a spring acting to close said valve, a detent adapted to restrain movement of the valve under the action of the spring, and a connection between the detent and the inner face of the bottom of the outer casing including a frangible section whereby in event of an explosion in the delivery pipe or outer casing the detent will be released.

8. The combination with gaseous fuel supply and delivery pipes, and a valve controlling flow through the supply pipe, of two casings arranged one within the other, the inner casing having an inlet connected with the supply pipe and an outlet opening into the outer casing, means for interrupting the passage of flame through the outlet of the inner casing, the outer casing having a yielding wall and an outlet communicating with the delivery pipe, means acting to move the valve to closed position, and means for normally retaining the valve in open position and including a frangible connection with the yielding wall of the outer casing adapted to be destroyed by abnormally high temperatures.

9. The combination with gaseous fuel supply and delivery pipes, and a valve controlling flow through the supply pipe, of two casings arranged one within the other, the inner casing having an inlet connected with the supply pipe and having a plurality of outlets opening into the outer casing, means for interrupting the passage of flame through each of the outlets of the inner casing, the outer casing having a yielding wall and an outlet communicating with the delivery pipe, means acting to move the valve to closed position, and means for normally retaining the valve in open position and including a frangible connection with the yielding wall of the outer casing adapted to be destroyed by abnormally high temperatures.

10. The combination with gaseous fuel supply and delivery pipes, and a valve controlling flow through the supply pipe, of two casings arranged one within the other, the inner casing having at one end an inlet connected with the supply pipe and having formed in its side wall a plurality of outlets opening into the outer casing, means for interrupting the passage of flames through any of said outlets of the inner casing, a tube extending through the inner casing and connecting the outer casing with the delivery pipe, means acting to move the valve to closed position, and means for normally retaining the valve in open position extending through said tube and including a frangible connection with a wall of the outer casing adapted to be destroyed by abnormally high temperatures.

In testimony whereof I have hereunto set my hand.

WILLIAM H. VAN HORN.