Dec. 25, 1962 E. M. NEELY 3,070,152

WATER COOLED GAS BURNER VALVES FOR HOT BLAST STOVES

Filed July 23, 1958 3 Sheets-Sheet 1

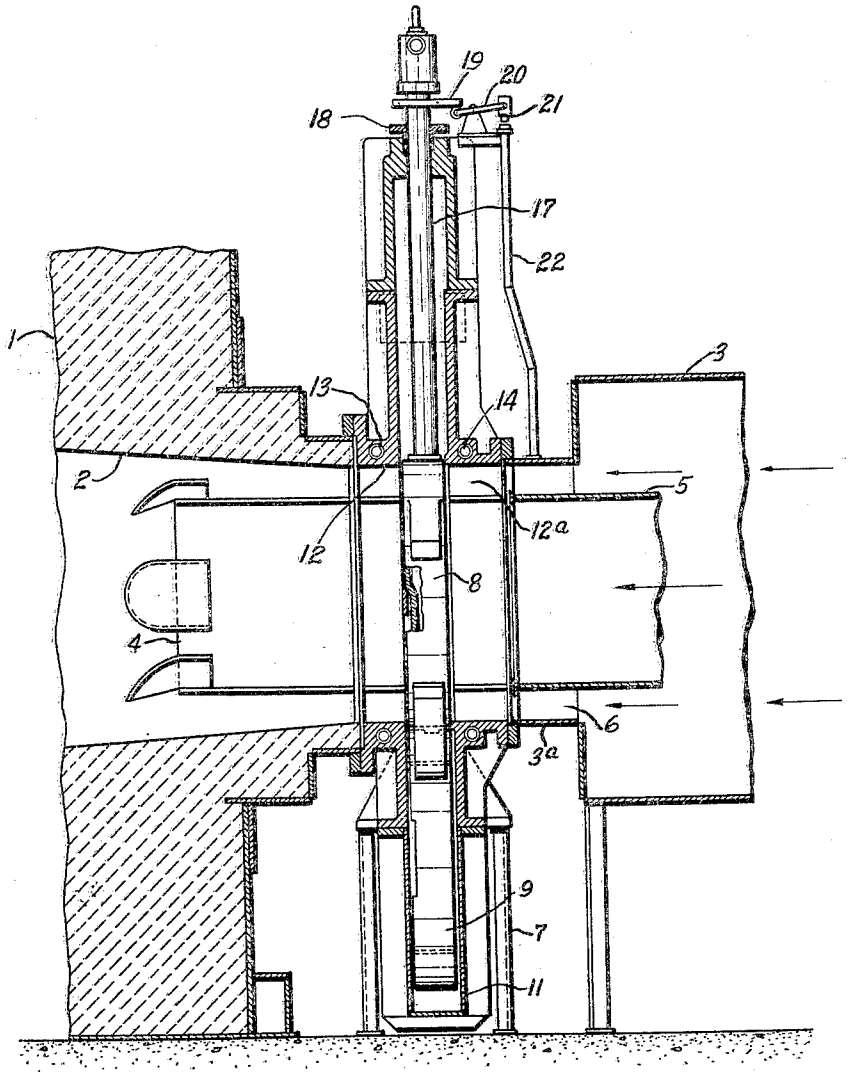


Fig. 1

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Filed July 23, 1958 3 Sheets-Sheet 2

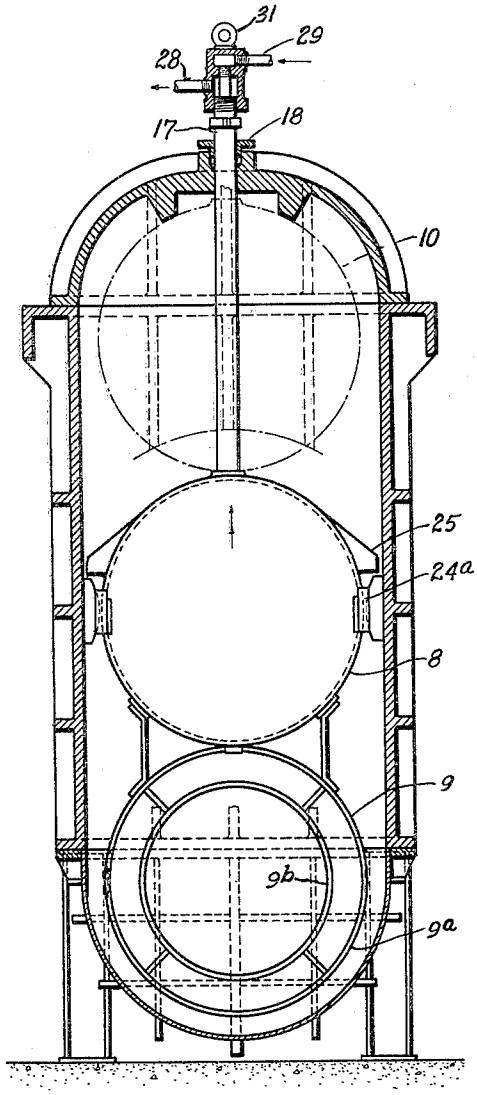


Fig. 2

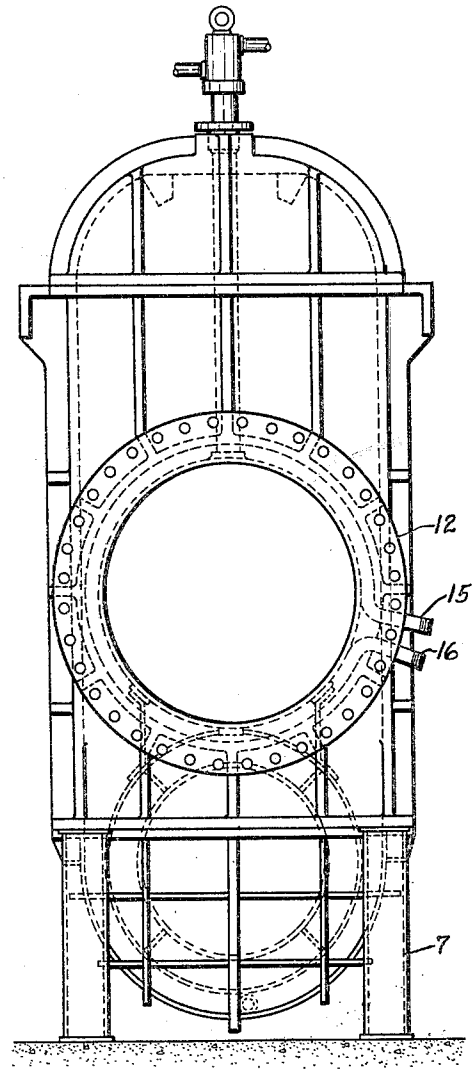


Fig. 3

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WATER COOLED GAS BURNER VALVES FOR HOT BLAST STOVES

Filed July 23, 1958 3 Sheets-Sheet 3

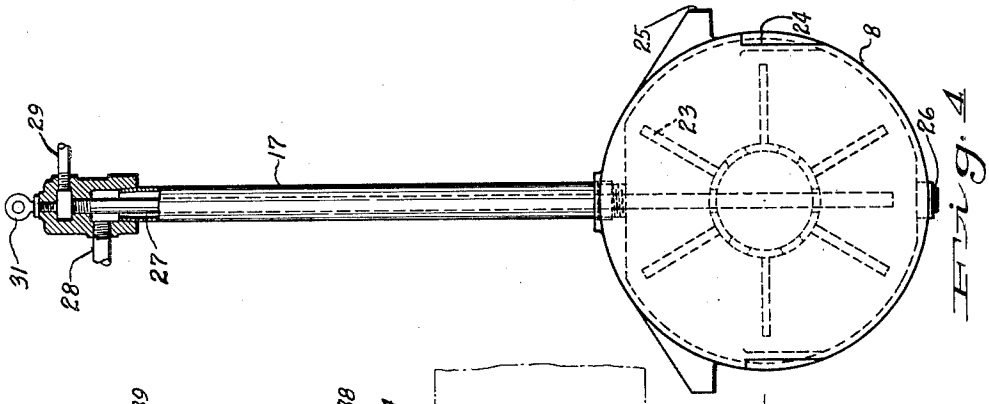


Fig. 4

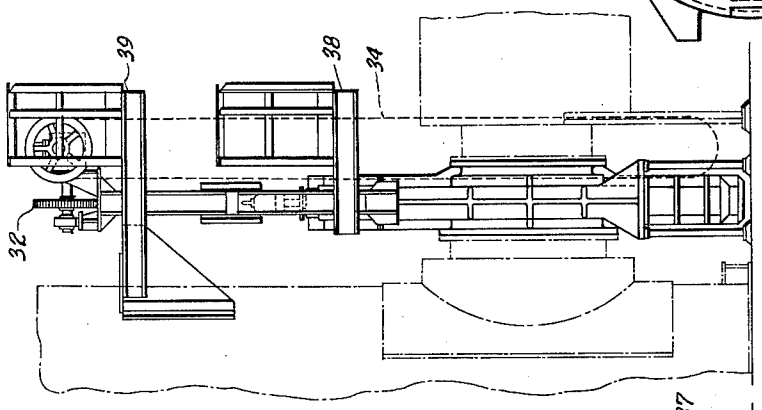


Fig. 5

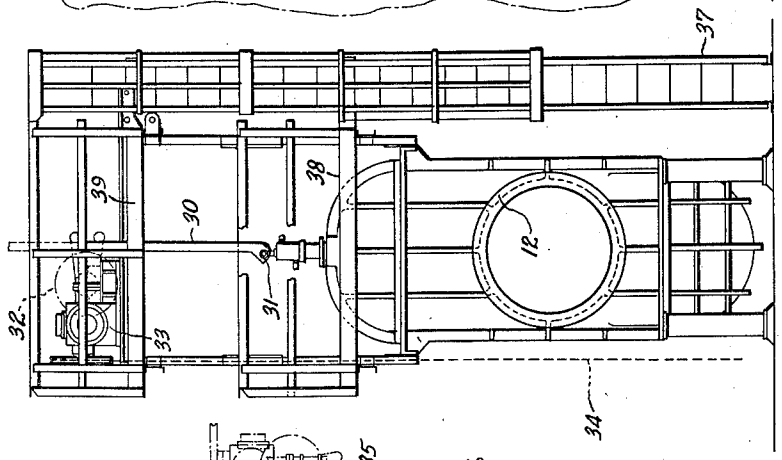


Fig. 6

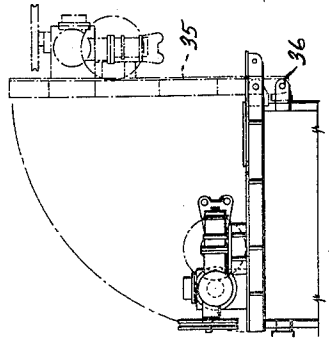


Fig. 7

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3,070,152

WATER COOLED GAS BURNER VALVES FOR HOT BLAST STOVES

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3 Claims. (Cl. 158—109)

This invention relates to new and useful improvements in water cooled valves, more particularly motor operated gas burner valves for hot blast stoves, and it is among the objects thereof to provide a burner valve capable of withstanding the high temperature conditions to which it is exposed.

It is a further object of the invention to provide a motor operated burner valve which is water cooled and which maintains its connections with the source of coolant during the opening and closing operations. It is still a further object of the invention to provide a valve of a construction to provide for the circulation of the coolant throughout the region of the valve sealing area while maintaining the shape of the valve against distortion that would render the sealing function thereof ineffective.

These and other objects of the invention will become more apparent from a consideration of the accompanying drawings constituting a part hereof in which like reference characters designate like parts and in which:

FIGURE 1 is a vertical cross-sectional view, partially in elevation, of a motor operated gas burner valve embodying the principles of this invention;

FIGURE 2, a vertical section taken transversely of the valve of FIGURE 1;

FIGURE 3, a front elevational view of the valve housing;

FIGURE 4, a front elevational view of the valve with the valve stem partially in section;

FIGURE 5, a side elevational view of the valve;

FIGURE 6, an end elevational view thereof; and

FIGURE 7, an end elevational view of a hinged drive base for the valve operating mechanism for changing valve if required.

With reference to the several figures of the drawing, the numeral **1** designates the wall of a hot blast stove having a burner opening **2** connected to an air duct **3** with a constricted portion **3***a* and having a burner nozzle **4** extending therein. The nozzle **4** is connected to a gas duct **5** which is concentric with the air duct **3** and of smaller diameter to provide a space **6** for the passage of air to the burner port or opening **2**. In some burners for hot blast stoves the gas duct and air ducts are reversed. That is to say, the air duct is in the center of the burner opening surrounded by an annular passage for the gaseous or other fuel leading from the fuel duct. A valve housing **7** having a base **7***a* extends vertically transversely of the axis of the air and gas ducts **3** and **5** is disposed against the wall **1** in alignment with the burner port or opening **2**. The valve housing, as is shown in FIGURES 2 and 3, is of a length to accommodate a valve disc **8**, a valve flow guide **9** and space for displacement of the valve disc at the top of the housing in the manner shown by dotted lines **10**, FIGURE 2, when the valve is operated to open and closed positions.

As shown in FIGURE 1, the valve flow guide portion **9** has ample clearance with the valve housing portion **11**. In FIGURES 1 and 3, the valve housing **7** is shown as provided with flange portions **12** and **12***a* having flow ducts **13** and **14** connected by pipes **15** and **16** to a source of coolant and a sump. These flange portions **12** and **12***a* constitute the seats for the valve **8** and also the connections for the gas and air ducts **3** and **5**, as shown. The valve disc **8** is connected by an operating rod or tube **17**

that extends through the top of the valve housing, which is provided with a packing gland **18** to seal the valve in the housing. Also, rod **17** is provided with a flange plate **19** that engages the end of a lever **20** that operates a vent plug **21** to open and close a vent tube **22** that extends to and communicates with the passage **6** of the air duct **3**. This vent functions to remove any air blast traveling back from the burner front when the valve **8** is closed. In other words, if the burner is employed on hot blast stoves, the pressure in the stove may be 25 pounds and the pressure in the air duct much lower, thus permitting a back flow of gases that would be vented automatically opening plug **21** when the valve **8** is in closed position.

As shown in FIGURE 2, the valve flow guide **9** consists of two rings **9***a* and **9***b* that are of the same dimension as the gas duct **5** and the restricted portion of the air duct **3** so that when the valve **8** is in open position and guide portion **9** in line with the gas and air ducts of the burner, rings **9***a* and **9***b* will register with the tubes or ducts **5** and the restricted portion **3***a* of the air duct **3**.

The valve **8** is more clearly shown in FIGURE 4 of the drawing. It is of annular shape with its outer periphery co-extensive with the seating flange **12**, FIGURE 6. It is of hollow construction for circulating a coolant such as water and is provided with a spider-like rib structure **23** to cause the coolant to flow through the entire area of the valve. The valve is provided with guide recesses **24** for receiving guide lugs **24***a*, FIGURE 2, and is also provided with seating lugs **25**. A pipe plug **26** is provided at the bottom end of the valve. The valve stem **17** having an inner tube **27**, the tube **17** being connected by a pipe line **28** to a drain and tube **27**, is connected by a pipe line **29** to a source of coolant such as water. The coolant is circulated down through pipe **27** which extends to the bottom of valve **8** as shown in FIGURE 4, and passes upward around the rib portion **23** and through the space between the inner tube **27** and the tube **17** to the effluent pipe **28**.

As shown in FIGURES 5, 6 and 7, the valve is moved to open and closed position by a link **30** connected to the operating rod or tube **17** by an eye bolt **31**, the link **30** being a gear rack driven by the wheel **32** through a transmission **33**. A chain **34** for operating the transmission **33** is provided for use in case of a power or motor failure. The operating drive base **35** is mounted on a hinge **36** and may be moved out of position, as shown by dotted lines in FIGURE 7, so that the valve can be removed from the valve housing. The view of FIGURE 7 shows the size of such burner valves by virtue of the foot ladder **37** and the operating platforms **38** and **39** to which the ladder extends.

It is evident from the above-described gas burner valve that the arrangement of the burner nozzle in line with the gas and air ducts and the bridging rings **9***a* and **9***b*, that combustion takes place at the tip of the nozzle and will not take place within the valve, per se, as would be possible without the bridging annuli **9***a* and **9***b*. Also, it is evident that by cooling the seating flanges **12** and **12***a* and the valve **8** in the manner described, the valve will last indefinitely and will not corrode because of oxidation which would result if it were exposed to high temperatures. Also, the cooling of the valve parts and particularly the valve disc maintains the shape of the valve against warpage and the like.

Although one embodiment of the invention has been illustrated and described, it will be evident to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

I claim:

1. In a furnace structure having an air duct and a gas

duct, a gas burner valve comprising a valve housing having juxtaposed valve seats and having radial flanges adapted to be connected to a burner port and a burner nozzle on one side and connected to the air and gas ducts on the other side, a valve member normally mounted in said housing having a hollow disc for engaging said valve seats in the closed position of the valve member and having a pair of concentric rings spaced below said disc adapted to bridge the gap between said burner port and nozzle and said ducts to maintain separate flow channels for the air and gas when the valve is in the open position, operating means for subjecting said valve to opening and closing movements, and a vent in the air duct on the inlet side of said valve to allow escape of gases from the outlet side of said valve when the latter is in its closed position.

2. A gas burner valve comprising a valve housing having juxtaposed valve seats and having radial flanges connected to a burner port and a burner nozzle on one side and an air and a gas duct on the other, a valve member normally mounted in said housing having a hollow disc for engaging said valve seats in the closed position of the valve member and having a pair of concentric rings spaced below said disc adapted to bridge the gap between said burner port and nozzle and said ducts to maintain separate flow channels for the air and gas when the valve is in the open position, operating means for subjecting said valve to opening and closing movements and means adapted to be positioned on the inlet side of the valve operative in response to closing movement of said valve to vent gases flowing back from the outlet side of the valve.

3. A gas burner valve as set forth in the next preceding claim 2 in which the hollow valve disc is suspended from the valve operating means by hollow tubing having a flow outlet at the top and an inner tube having a flow inlet connected with a source of coolant, said inner tube extending to the bottom of the valve and the outer tube being connected to the top of the valve, and said valve having radial arms to prevent stratification of the flow of coolant therein.

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