March 3, 1959 G. W. ALLEN 2,875,821

SHEET METAL BURNER AND CROSS LIGHTER

Filed Nov. 9, 1954 2 Sheets-Sheet 1

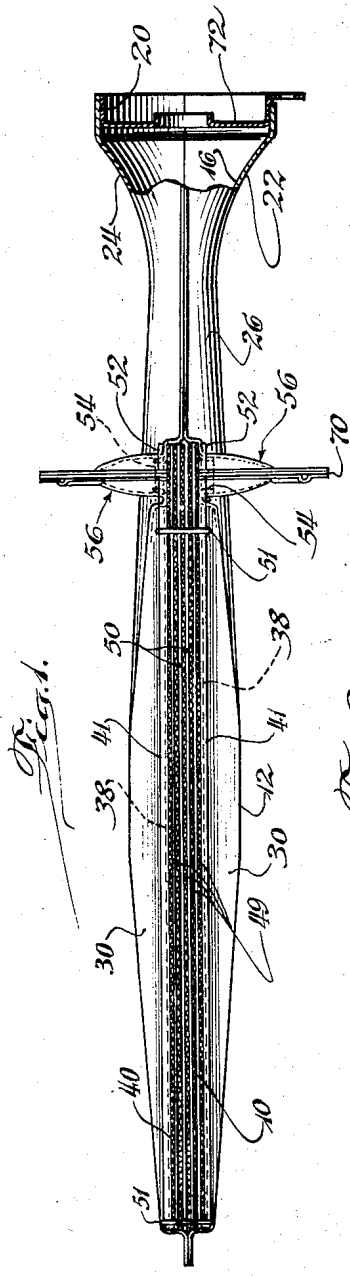

Fig. 1.

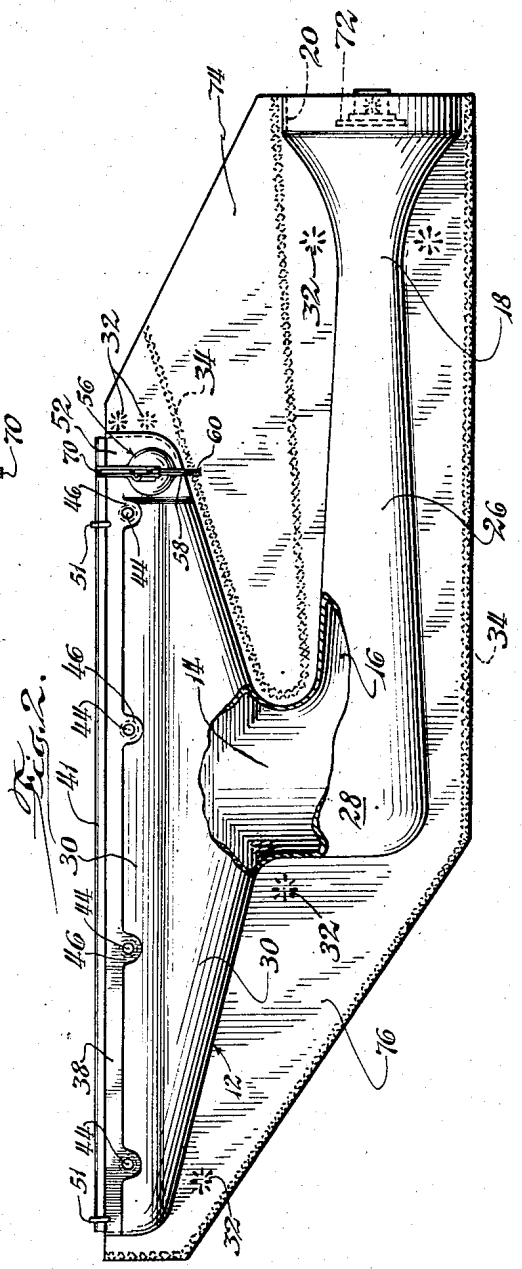

Fig. 2.

Inventor:
George W. Allen
By Ahlberg, Kupsper & Gradolph
Attorneys

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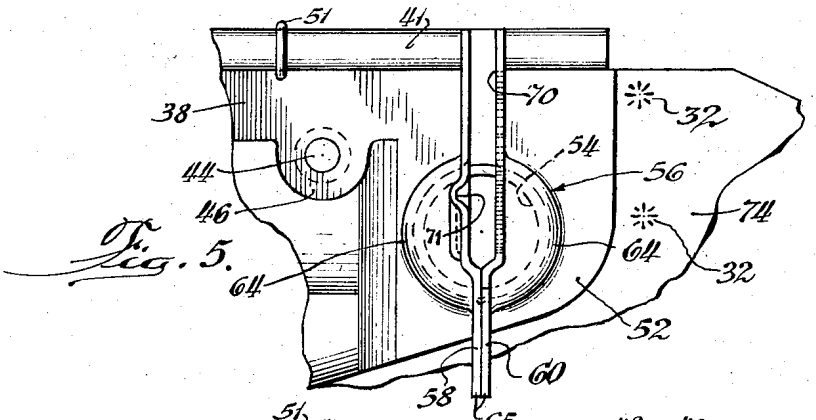

Fig. 5.

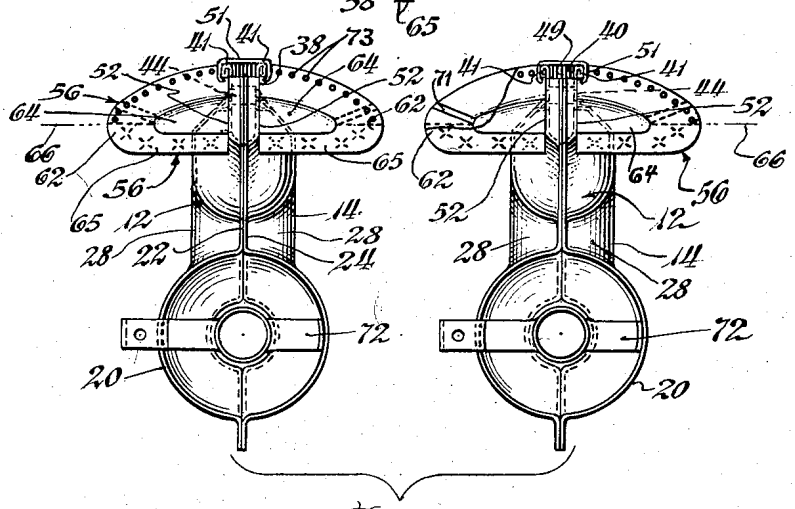

Fig. 3.

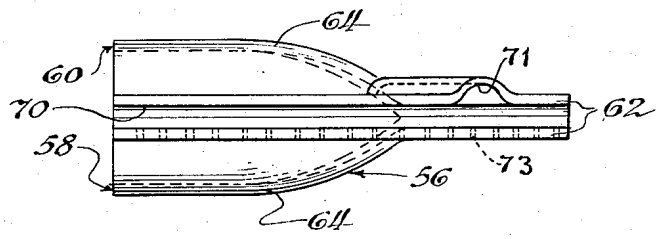

Fig. 4.

Inventor:
George W. Allen
By Ahlberg, Wuppper & Gradolph
Attorneys.

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SHEET METAL BURNER AND CROSS LIGHTER

George W. Allen, Indianapolis, Ind., assignor to Stewart-Warner Corporation, Chicago, Ill., a corporation of Virginia

Application November 9, 1954, Serial No. 467,731

3 Claims. (Cl. 158—115)

The present invention relates to gas burners adapted to be mounted alongside each other.

One object of the invention is to provide an improved gas burner adapted to be used alongside similar burners and having highly efficient means for cross lighting between burners.

A further and more specific object is to provide an improved gas burner of the above character which is well suited for economical fabrication from sheet metal.

Other objects and advantages will become apparent from the following description of the form of the invention illustrated in the drawings, in which:

Figure 1 is a plan view of a burner embodying the invention;

Fig. 2 is a side view of the burner of Fig. 1;

Fig. 3 is a right end view of two burners mounted side by side;

Fig. 4 is a fragmentary plan view on an enlarged scale of one cross-lighting runner; and

Fig. 5 is a fragmentary vertical view on an enlarged scale of a cross-lighting runner as viewed from the outer end.

The gas burner incorporating the invention is adapted to be mounted side by side with similar burners, Fig. 3, in a heater or furnace (not shown) to provide the heating capacity desired. Each burner is symmetrical about a vertical longitudinal plane and is relatively narrow in relation to its length.

A long narrow series of burner openings **10** extending along the top of the burner, Figs. 1 and 2, are fed with a mixture of gas and air from a horizontally elongated plenum chamber **12** underlying the openings. The plenum chamber **12** is widened generally from top to bottom and deepened from its outer ends toward the center. The lower central portion of the chamber merges with the upper end of a short vertical passageway **14** connected with the inner end of a horizontal fuel mixing tube **16**.

Shaped and dimensioned in accordance with conventional burner design practice, the mixing tube **16** has a circular transverse configuration which sharply decreases in diameter from the outer end **20** of the tube to a venturi throat **18** and then progressively increases in diameter to the inner end of the tube which merges with the passageway **14**.

The mixing tube **16**, the plenum chamber **12** and the connecting passageway **14** are fashioned in a very economical manner from two generally vertical sheet metal plates **22, 24** formed substantially as mirror images of each other. Both plates are blanked to have a generally rectangular shape, the upper right and the lower left corners of each plate being cut away, as shown in Fig. 2.

Each plate **22, 24** is shaped by suitable dies or the like to form an elongated bulge **26** therein extending horizontally inward from the lower right corner of the plate, Fig. 2, in spaced relation to the lower marginal edge of the plate. Each bulge **26** is displaced away from the opposed plate and shaped to form a one-half section of the mixing tube **16**. The inner end of the bulge **26** in each

plate merges with an upwardly extending bulge **28** shaped to form a half section of the passageway **14**. The upper end of the bulge **28** merges with a much larger bulge **30**, which fans out horizontally in both directions and extends to the upper edge of the plate to form a half section of the plenum chamber **12**. The upper edge of each plate **22, 24** extends horizontally a short distance beyond the opposite extremes of the plenum chamber bulge **30** in the plate.

The two plates **22, 24** are fastened in face to face engagement by suitable spot and seam welds **32** and **34** forming gastight seals between the plates running along opposite sides of the mixing tube **16**, the passageway **14**, and the plenum chamber **12**.

As shown in Figs. 1 and 2, the upper marginal edge of each plate **22, 24** above the plenum chamber bulge **30** in the plate is offset horizontally outward from the opposite plate to form one straight vertical side **38** of a long narrow burner opening channel **40**. The extreme upper edges of the flat channel sides **38** are curled outwardly and downwardly to form reinforcing beads **41**.

The flat channel sides **38** are positively held in spaced relation to each other by four transverse members **44** spaced horizontally along the channel **40** just below the channel sides and attached at opposite ends to four downwardly extending flats **46** on each plate **22, 24**.

The members **44** also support a plurality of vertically corrugated ribbons **49** fitted into the channel **40** with flat spacer ribbons **50** between each corrugated ribbon to form the burner openings **10**. The ribbons **49** and **50** are secured in place by two transverse clips **51** snapped over the beads **41** at opposite ends of the channel **40**.

Short opposed end sections **52** of the plenum chamber bulges **30** at the mixing tube end of the channel **40** are flattened to extend straight down from the flat channel sides **38**. A central aperture **54** is formed in each end flat **52**.

The apertured flats **52** form support bases for horizontally elongated cantilever lighters or runners **56** brazed to the flats and projecting laterally toward adjacent burners, Fig. 3. Each runner **56** is formed from two vertically disposed sheet metal stampings **58, 60** shaped as mirror images of each other, except for certain structural features to be presently described. Each stamping has a generally flat marginal edge **62** of U-shape configuration extending around the stamping from points on the adjacent flat **52** above and below the aperture **54** in the flat. A central, horizontally elongated bulge **64** in each stamping **58, 60** is offset outwardly from the opposed stamping and extends from the adjacent support flat **52** to the U-shaped marginal edge **62** of the stamping. The bulges **64** in the two stampings of each runner **56** form a passageway within the runner which communicates with the interior of the plenum chamber **12** through the adjacent aperture **54**, which is almost entirely encircled by the runner.

The upper edges of the runners **56** adjacent the plenum chamber **12** are substantially flush with the upper edges of the burner ribbons **49, 50**. Outwardly from the plenum chamber **12**, the upper edge of each runner **56** curves downwardly with a progressively increasing curvature to the extreme end of the runner.

The lower portions **65** of the opposed marginal edges **62** of the two stampings **58, 60** of each runner **56** are seam welded together up to a horizontal offset line **66** (see Figs. 3 to 5) extending through the extreme outer end of the runner. Above the line **66**, the marginal edge **62** of each stamping is offset horizontally from the opposed stamping to form with the latter a thin cross-lighting burner gap **70** in the upper edge of the runner.

In operation, each runner **56** projects outwardly a thin

stream of fuel mixture extending from the burner openings **10** to the outer end of the runner from which the fuel mixture is directed horizontally (just above the offset line **66**) toward a similar runner on the adjacent burner (see Fig. 3). In this manner the runners **56** of adjacent burners provide a substantially continuous stream of fuel mixture extending from burner to burner for efficient, dependable cross-lighting between burners.

To provide further assurance of unfailing cross lighting between burners when the gas pressure is extremely low, an auxiliary channel **71** is swaged rearwardly in the upper marginal edge **62** of the rear stamping **60** of each cross lighter **56** to extend outwardly at a somewhat upwardly inclined angle from the outer end of the central bulge **64** in the stamping to the extreme outer edge of the lighter gap **70**. The cross lighter channels **71** increase the flow of gas horizontally from the lighters of adjacent burners as a further aid to the progress of flame from lighter to lighter.

In the event that the gas outlet gap **70** of one or more of the burner cross lighters **56** should become blocked by falling scale or otherwise (a most unlikely condition) effective cross lighting between burners is effected by gas supplied through a row of auxiliary lighting ports **73** drilled in the front stamping **58** of each lighter **56** and extending generally from the outer end of the lighter to the plenum chamber **12**.

Fuel gas is supplied to each burner through a conventional nozzle (not shown) fitted into a support **72** extending across the outer end of the mixing tube **16**.

Formed almost entirely of sheet metal, the improved burner is extremely economical to manufacture. The sheet metal construction is inherently resistant to breakage. Moreover, the two plates **22, 24** form strong reinforcing webs **74, 76** between opposite ends of the plenum chamber **12** and the mixing tube **16** (Fig. 2). These webs can be used in mounting the burner.

While I have shown and described a preferred embodiment of my invention, it will be apparent that variations and modifications thereof may be made without departing from the principles and scope of the invention as set out in the following claims.

I claim:

1. A sheet metal gas burner adapted to be used alongside another burner and comprising, in combination, two opposed generally vertical plates of sheet metal formed substantially as mirror images of each other, each plate having an elongated bulge therein displaced outwardly from the opposed plate and shaped to form a half section of a fuel mixing tube, said mixing tube bulge of each plate merging with an enlarged bulge reaching to the upper edge of the plate and shaped to form a half section of a plenum chamber, a large section of the upper marginal edge of each plate being offset from the opposed marginal edge of the opposite plate, said plates being welded in face to face engagement with each other, means coacting with said offset marginal edges of the two plates to define burner outlets from the space between said plenum chamber bulges of the two plates, the plenum chamber bulge of at least one of said plates defining an aperture therein, a cantilever lighter of sheet metal attached at one end to said one plate in embracing relation to said aperture therein, said lighter comprising two sheet metal stampings attached respectively at one end to said one plate on opposite sides of said aperture therein, each stamping having a U-shaped marginal edge bounding the stamping generally in a substantially vertical plane as the stamping projects away from the adjoining plate, the central portion of at least one stamping extending from the end thereof adjacent said aperture to said U-shaped marginal edge of the stamping being bent outwardly from the opposed portion of the other stamping to form therewith an internal lighter cavity communicating through said aperture with the plenum chamber, that part of the one

stamping central portion which delimits the upper extremity of the cavity turning outwardly from the plenum chamber and downwardly at a progressively increasing slope, the opposed portions of the U-shaped marginal edges of the two stampings extending from the adjoined plate along the underside of the lighter to the projecting end thereof and up to a generally horizontal line running through the projecting end of the lighter being sealed together, the upper portions of said marginal edges of the two stampings above said line curving outwardly from said adjoined plate and downwardly to the projecting end of the lighter with a progressively increasing slope, said upper portions of said marginal edges of the two stampings above the line being offset horizontally from each other down to the line to define a thin cross-lighting fuel gap communicating with said internal lighter cavity and opening upwardly and horizontally outwardly therefrom to issue fuel from said cavity upwardly from the lighter and horizontally outward from the projecting end thereof, a portion of said marginal edge of at least one of said lighter stampings disposed at the projecting end of the lighter above said line being swaged away from the opposing portion of the marginal edge of the other stamping to have a spacing therefrom greater than the width of said cross-lighting gap to provide for an increased flow of fuel from said internal lighter cavity horizontally outward from the projecting end of said lighter, and one of said stampings defining a plurality of auxiliary gas outlet apertures therein communicating with said internal lighter cavity and disposed adjacent its upper marginal edge in a series extending substantially from said plenum chamber means to the projecting end of said lighter.

2. In a combination heater construction of the type in which a plurality of gas burners are disposed adjacent each other and in which a mixing tube integral with each of the burners causes air and gas to be mixed in proper proportions and to be directed to a plenum chamber means from which the gas is emitted through burner ports for ignition, the combination with each of the burners of a cross lighter construction which permits limited variable spacing and misalignment between the burners comprising a pair of sheet metal stampings in engagement with each other, fixed at one end of the respective plenum chamber means, and extending toward an adjacent burner, the central portion of at least one stamping being bent outwardly from the opposed portion of the other stamping to form therewith an internal cavity in the lighter, that part of said central portion which delimits the upper extremity of the cavity extending outwardly from the plenum chamber means and downwardly at a progressively increasing slope, passageway means connecting the cavity with the plenum chamber, the lower edges of the two stampings being sealed together from the plenum chamber means to a central generally horizontal line in their outer ends, the upper marginal edges of the two stampings turning outwardly from said plenum chamber and downwardly toward the projecting end of the lighter to said line at a progressively increasing slope, said upper edges being narrowly spaced from each other to define a thin cross lighting fuel gap communicating with the lighter cavity and opening upwardly and horizontally outwardly therefrom to issue fuel from said cavity upwardly from the lighter and horizontally outwardly from the projecting end thereof, and one of said stampings defining adjacent its upper edge a plurality of auxiliary gas outlet apertures arranged in a series extending substantially from said plenum chamber means to the horizontal line.

3. In a combustion heater construction of the type in which a plurality of gas burners are disposed adjacent each other and in which a mixing tube integral with each of the burners causes air and gas to be mixed in proper proportions and to be directed to a plenum chamber means from which the gas is emitted through

burner ports for ignition, the combination with each of the burners of a cross lighter construction which permits limited variable spacing and misalignment between the burners comprising a pair of sheet metal stampings in engagement with each other, fixed at one end of the respective plenum chamber means, and extending toward an adjacent burner, the central portion of at least one stamping being bent outwardly from the opposed portion of the other stamping to form therewith an internal cavity in the lighter, that part of said central portion which delimits the upper extremity of the cavity extending outwardly from the plenum chamber means and downwardly at a progressively increasing slope, passageway means connecting the cavity with the plenum chamber, the lower edges of the two stampings being sealed together from the plenum chamber means to a central generally horizontal line in their outer ends, the upper marginal edges of the two stampings turning outwardly from said plenum chamber and downwardly toward the projecting end of the lighter to said line at a progressively increasing slope, said upper edges being narrowly spaced from each other to define a thin cross

lighting fuel gap communicating with the lighter cavity and opening upwardly and horizontally outwardly therefrom to issue fuel from said cavity upwardly from the lighter and horizontally outwardly from the projecting end thereof, and the edge of at least one of the stampings being bent outwardly from the opposed portion of the other stamping adjacent the horizontal line to define an auxiliary gas outlet channel communicating with the cavity and inclined upwardly and outwardly toward an adjacent burner.

References Cited in the file of this patent

UNITED STATES PATENTS

709,356	Piper	Sept. 16, 1902
1,161,438	Bell	Nov. 23, 1915
1,289,555	Schall et al.	Dec. 31, 1918
2,470,880	Zimbelman et al.	May 24, 1949
2,541,428	Leo et al.	Feb. 13, 1951
2,560,777	Reeves	July 17, 1951
2,658,504	Jaye et al.	Nov. 10, 1953
2,658,569	Hughes et al.	Nov. 10, 1953