No. 791,923. PATENTED JUNE 6, 1905.

G. MACHLET, JR.

GAS BURNER.

APPLICATION FILED MAR. 1, 1905.

2 SHEETS—SHEET 1.

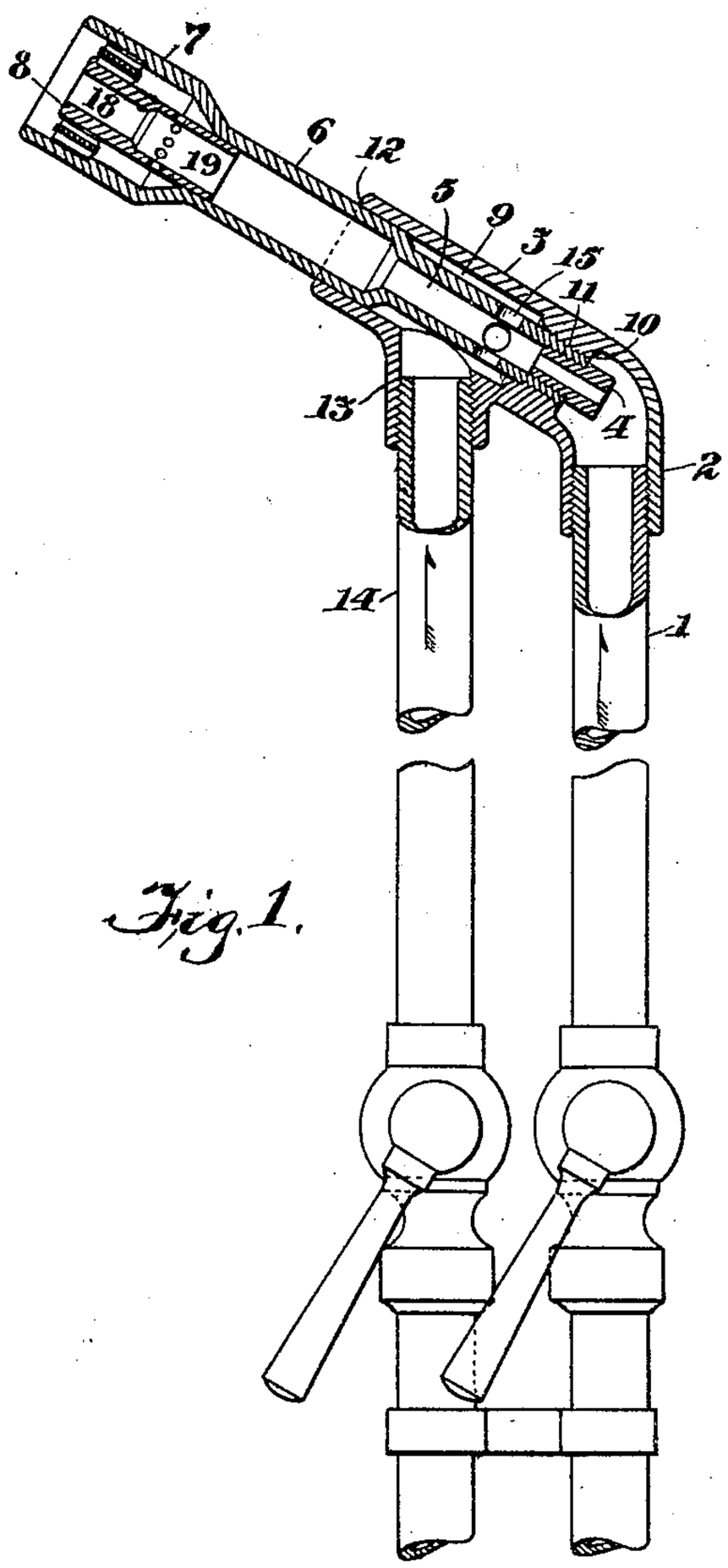

Fig. 1.

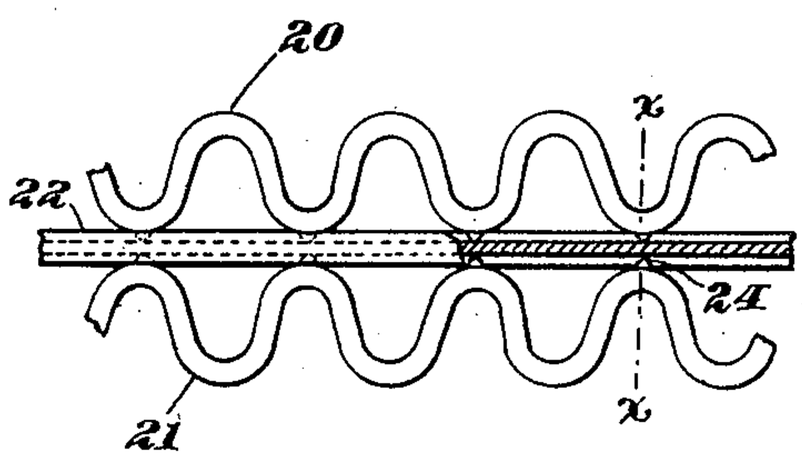

Fig. 2.

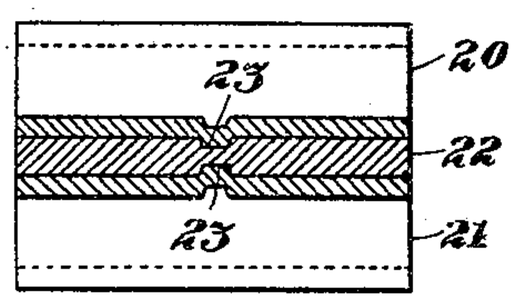

Fig. 3.

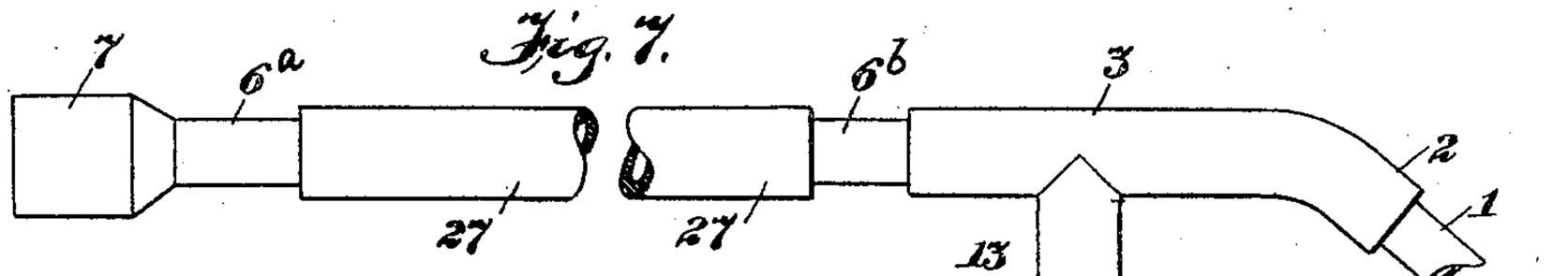

Fig. 4.

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2 SHEETS—SHEET 2.

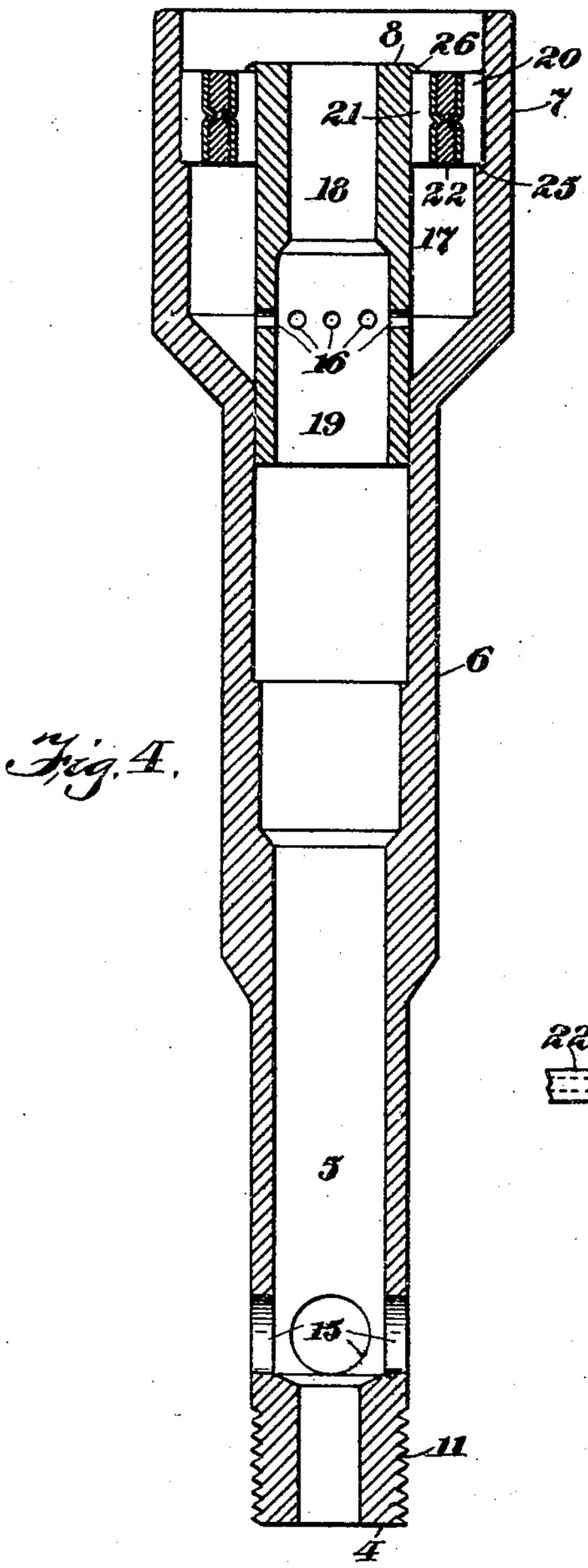

Fig. 4.

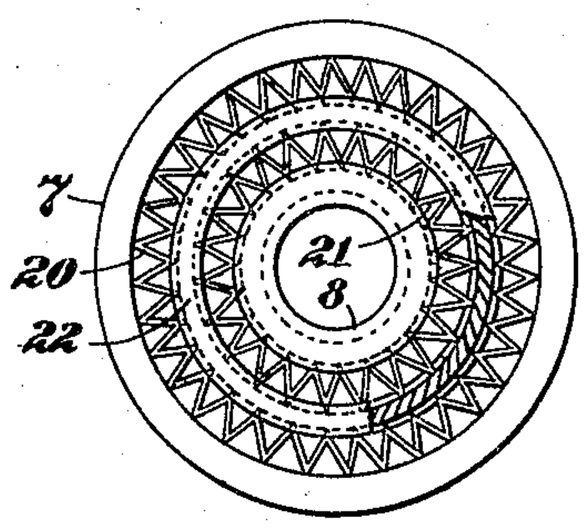

Fig. 5.

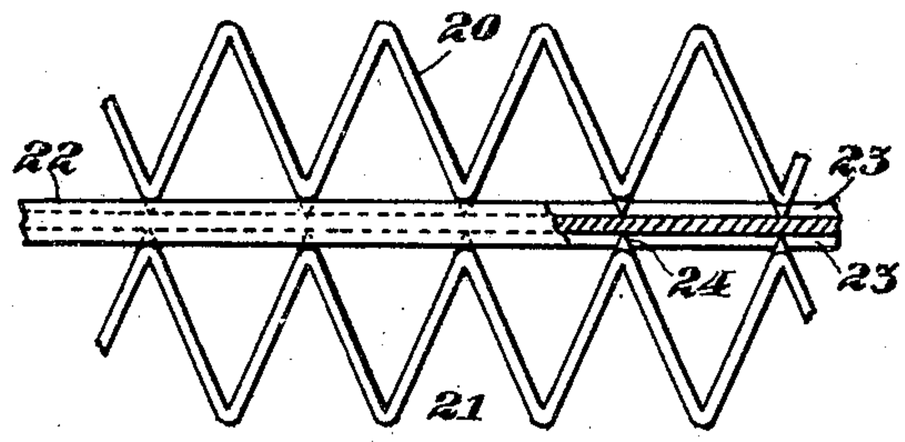

Fig. 6.

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UNITED STATES PATENT OFFICE.

GEORGE MACHLET, JR., OF ELIZABETH, NEW JERSEY.

GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 791,923, dated June 6, 1905.

Application filed March 1, 1905. Serial No. 247,922.

To all whom it may concern:

Be it known that I, GEORGE MACHLET, Jr., a citizen of the United States, residing in Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Gas-Burners, of which the following is a specification.

This invention relates to burners for burning mixed air and gas, and particularly to those in which a screen is employed for preventing the flame from entering the body of the burner, although portions of my improvements may be used upon other kinds of burners.

My invention also includes improvements in the variety of burners known as "blowpipes."

The main object of my invention is to provide a simple, inexpensive, reliable, and durable form of blowpipe so constructed as to secure thorough mixture of gas and air in the right proportions and to gain a maximum efficiency, while enabling parts to be taken out any time for inspection, cleaning, and renewal, and all of such proportions as to be convenient for handling.

The improvements are intended for use where air is supplied under pressure and the gas is drawn in by the air-current, and I insure that the proper quantity of gas shall be drawn in by the air-current. The invention, however, may be used in systems where gas is supplied under pressure and air is drawn in by the gas-current.

Upon a blowpipe I illustrate two tips, one inclosing the other, the inner one for delivering mixed air and gas under high pressure and the space between the tips delivering the mixture at lower pressure, and my improvements include novel means for insuring sufficient escape of gas into the space or expansion-chamber between the tips.

In burner-screens it has been the practice to employ two or more fluted strips with an intervening partition or partitions, these parts being mechanically held together or locked by means of projections upon one part inclosing the edges of another part; but these projections reduce the orifices through which the gas escapes, and hence interfere with the flow of gas. I have contrived to lock these screen members together so that no projection will interfere with the flow of gas, so that maximum efficiency is secured, while the parts are conveniently assembled and disassembled.

In gas-burners of the kind herein illustrated it has been the practice to supply both air and gas at one end of the mixing-tube, the usual construction comprising a nozzle that projected into the mixing-tube, air under pressure being supplied to said nozzle and gas being drawn in by the suction produced by the flow of air through the nozzle, the gas entering through a chamber which surrounded the nozzle. The latter was supported only at its base, and owing partly to this fact and partly to its thinness and weakness it was found that it would often get displaced somewhat from its true central position. This was particularly the case where the nozzle was attached at its base by a screw-thread, since in the course of taking the burner to pieces and reassembling them the nozzle would become thrown out of its true position. Consequently the proportion of gas and air was disturbed and the action of the device was rendered faulty. This difficulty I have overcome by contriving to have only one intake at the base of the mixing-tube and the other intake between the ends of the tube. At said end of the tube I form a relatively small opening, which serves as a nozzle, having sufficient length for that purpose. In tubes of large size the nozzle end of the tube is made solid or integral with the tube itself and completely closed except for the small central nozzle-opening, and just above the nozzle I form intake-openings for gas in the walls of the mixing-tube. Thus the nozzle cannot become accidentally bent or displaced from its true position nor the efficiency of the burner diminished. In small sizes the intake end of the tube is closed by a threaded bushing having a small central nozzle-opening, this bushing being removable to afford access to the interior of the tube, but not being liable to displacement from its true central position when in the tube.

Other advantages and improvements will hereinafter appear.

In the accompanying drawings, Figure 1 shows in longitudinal section a blowpipe or burner for burning mixed air and gas. Fig. 2 is a diagram illustrating the construction of a screen for a burner-tip. Fig. 3 is a section taken at the line *x x* of Fig. 2. Fig. 4 shows in longitudinal section the preferred form of burner-tip and screen. Fig. 5 is a plan of the burner-tip seen at Fig. 4. Fig. 6 is a view similar to Fig. 2, but showing different fluting of the screen members. Fig. 7 shows a length of flexible rubber tubing forming a connection between the mixing-head or mixing-tube and the tip portion of the burner.

Air under pressure is supplied to the burner through a pipe 1, which is threaded into the open end 2 of a tubular head 3. The air from the pipe 1 passes through a small nozzle 4 into the reduced end 5 of a mixing-tube 6, the latter being surmounted by an outer tip 7 and an internal tip or jet 8. The lower portion 5 of the mixing-tube is reduced so as to form a surrounding chamber 9 within the head 3, said chamber being separated from the lower end of the head by a partition 10, into which the lower end of the mixing-tube is threaded at 11, so that it may be removed for inspection, cleaning, &c. The chamber 9 is closed at its upper end by the main portion 6 of the mixing-tube, which fits tightly within the mouth of the head at 12. The nozzle 4 is in the form of a hollow screw, which is threaded into the lower end of the mixing-tube, as seen at Fig. 1, so that it may be withdrawn from the tube in order to permit inspection of the interior and also to permit introduction of tools for cleaning the same and for forcing out the inner tip 8, this removable nozzle being particularly valuable in the case of small burners in which the bore of the nozzle is too small to permit the introduction of any suitable tool.

Into the chamber 9 opens a nipple or inlet 13, into which is screwed a gas-supply pipe 14. It will be understood, however, that the supply 1 may be used for gas under pressure, and the pipe 14 may be omitted under some circumstances. The reduced portion 5 of the mixing-tube is formed with perforations 15 near the partition 10, and the gas from the pipe 14 is drawn through these perforations into the mixing-tube by the action of the jet of air entering through the nozzle 4. The bore of said nozzle is much smaller than the bore of the portion 5 of the mixing-tube, and the perforations are formed on all sides of the latter, so that the gas is drawn in from all sides, and hence becomes thoroughly mixed with air. The main portion 6 of the mixing-tube between the portion 5 and the tips is of larger diameter, so as to fit into the head at 12, and also so as to form an enlarged chamber in which the air and gas may become even more thoroughly mixed. At the same time the bore of the main portion or neck 6 is large enough to receive the lower end of the inner tip 8, which may be forced into the top of said neck and there held by friction or binding alone. The bore of said tip 8 at its lower end is substantially greater than the diameter of the bore in the reduced portion 5 of the mixing-tube, Fig. 1. In the base of the inner tip 8 perforations 16 are formed, through which the mixture escapes into the larger expansion-chamber 17 between the two tips. The pressure of the gas in this expansion-chamber is much less than the pressure of that emitted by the inner tip 8, and owing to such lower pressure the gas emitted from the chamber 17 remains constantly lighted, as it does not escape fast enough to tend to blow the flame away. By means of the constant flame of the low-pressure gas the high-pressure gas escaping from tip 8 is kept constantly ignited, and owing to the rapid flow a great heat is produced.

It will be seen that the passage 18 above the perforations 16 in the inner tip 8 is constricted. The purpose of this constriction is to insure that sufficient gas shall escape through the perforations 16, the constriction being intended to choke the flow of gas to some extent, so that more shall escape into the expansion-chamber 17. The aggregate area of the perforations 16 may be about equal to the difference between the area or cross-section of the constricted bore 18 and that of the larger bore 19, formed in the lower part of the tip 8, so that the rate or speed of the flow through the burner at 18 may be about equal to the rate of outflow through the passages 16. Much more of the mixture escapes through 18 than through 16; but the rate of movement is preferably about the same.

An annular screen between the inner and outer tips 8 and 7 prevents flame from entering between said tips. In this instance the screen comprises an outer fluted annulus 20, an inner fluted annulus 21, and an intermediate annular partition 22. Each of said members 21 and 20 may consist of a strip of suitable metal bent into zigzag shape, as seen at Figs. 5 and 6, or into undulating shape, as at Fig. 2. The partition 22 serves to divide the openings formed by the undulations, such reduction in the size of the openings serving to prevent the passage of flame into the expansion-chamber 17. The partition 22 is formed upon its opposite sides with grooves or continuous recesses 23, into which fit projections or keys 24, formed upon the ridges of the members 20 and 21 about midway between the top and bottom edges of the latter, whereby the fluted members and the partition are locked together. The grooves and projections may, however, be formed at different heights than illustrated. The outer annulus 20 rests upon a shoulder 25, formed within the outer tip 7, while the inner tip 8 is provided with a brim 26, that catches over the inner annulus 21.

Before putting the tip 8 into the burner the three members 20, 21, and 22 are slipped upon it, and then the lower end of the tip 8 is forced into the top of the mixing-tube 6 until the annulus 20 of the screen rests upon the shoulder 25. In order to take these members out, it is only necessary to introduce a tool and force the tip 8 up out of the mixing-tube. A great advantage in the freer flow of gas is gained by getting rid of all the projections upon the members 21 and 20.

It will be seen that the members 20, 21, and 22 are flush at top and bottom and that they are interlocked between their ends. The interlocking means are preferably midway between the top and bottom of the members, so that either member may be used either side up. The partition is contiguous to both of the members 20 21, so as to form numerous individual or separate passages for the gas.

At Fig. 7 it will be seen that the exterior portion 6 of the mixing-tube may be divided into two parts 6^a and 6^b, these parts connected by a flexible rubber tube 27 of any desired length. The head 3, which in some cases it is not desired to handle on account of its weight, may thus be left at rest, while the hose 27 permits such movements of the burner-tip as may be required.

Other variations may be resorted to within the scope of my invention and portions of my improvements may be used without others. The screen may be used in other kinds of burners and need not always be of annular form.

Having thus described my invention, I claim—

1. A gas-burner having a screen comprising a pair of fluted members and an intervening partition: the partition having grooves upon its opposite sides, and the ridges of the fluted members having projections within said grooves; said projections being between the top and bottom edges of the fluted members.

2. A gas-burner having a screen comprising a pair of fluted members and an intervening partition whose top and bottom edges are flush with those of said fluted members; said partition formed upon its opposite sides with grooves, and the ridges of said fluted members provided between their top and bottom edges with projections to fit in said grooves.

3. A gas-burner having a screen comprising a pair of fluted members and an interposed contiguous partition; said fluted members and partitions formed between their top and bottom edges with means whereby they are interlocked.

4. A gas-burner comprising cylindrical tips, one within the other and an intervening annular screen comprising a pair of fluted members and an intervening partition; said fluted members and partition formed between their top and bottom edges with means whereby they are interlocked; said outer top formed with an internal shoulder whereon said screen rests; and said inner tip secured at its lower end within the burner and having a brim which retains said screen.

5. As a new article of manufacture, a screen-strip for use in gas-burners, said strip formed in a succession of transverse flutes or corrugations, and projections formed in line upon succeeding ridges between the edges of the strip.

6. A gas-burner comprising a neck surmounted by a pair of tips one within the other, and a screen between said tips; the inner tip having perforations below said screen, and constricted above said perforations, and said screen consisting of members interlocked between their top and bottom edges.

7. A gas-burner comprising a neck surmounted by a pair of tips one within the other, and a screen between said tips; the inner tip having perforations below said screen and constricted above said perforations to such an extent as to cause the rate of upward flow from the inner tip to be about equal to the rate of lateral flow through said perforations, and said screen consisting of members interlocked between their top and bottom edges.

8. A gas-burner comprising a neck surmounted by a pair of tips one within the other; the space between said tips forming an expansion-chamber, and constricted passages provided between said neck and said expansion-chamber; said inner tip substantially constricted above said passages, and a screen between said tips consisting of members interlocked between their top and bottom edges.

9. A gas-burner comprising a neck surmounted by a pair of tips one within the other; a space between said tips forming an expansion-chamber; perforations formed in said inner tip; the inner tip constricted above said perforations; the difference between the flowing capacity of said tip at said constriction and the flowing capacity at said perforations being about equal to the aggregate flowing capacity of said perforations, and a screen between said tips consisting of members interlocked between their top and bottom edges.

10. A gas-burner comprising a neck surmounted by a pair of tips one within the other, with an intervening expansion-chamber; the inner tip being joined at its lower end to the neck and formed with a larger bore at its bottom than at its top; the wall of the inner tip having perforations at the part thereof provided with the larger bore; and the difference between the areas of said bores being about equal to the aggregate areas of said perforations, and a screen between said tips consisting of members interlocked between their top and bottom edges.

11. A gas-burner comprising a tubular head and a mixing-tube, said mixing-tube provided at one end with a pair of tips and at the other end with a nozzle, and being secured within

said head, the latter having at one end an inlet into which said nozzle opens and having between its ends a chamber separated from said inlet; said mixing-tube having perforations within said chamber; said head provided with a second inlet opening into said chamber; one of said tips within the other, and a screen between said tips; the inner tip having perforations below said screen and constricted above its perforations.

12. A gas-burner comprising a tubular head and a mixing-tube, said mixing-tube provided at one end with a tip and at the other end with an integral nozzle of less diameter than the tube, and being inserted within said head, said head having at one end a single inlet into which said nozzle opens, and having between its ends a chamber separated by a partition from said inlet, said mixing-tube having perforations within said chamber, said head being provided with a second inlet opening into said chamber, and the nozzle end of said mixing-tube threaded into said partition.

13. A gas-burner comprising a tubular head having at one end an inlet and at the other end a mixing-tube, said mixing-tube provided at one end with a tip and at the other end with a nozzle, and inserted within said head, the latter having between its ends a partition through which the nozzle end extends, a portion of the mixing-tube within said head perforated and also reduced in diameter to form a surrounding chamber, and the head having a second inlet opening into said chamber.

14. A gas-burner comprising a tubular head having at one end an inlet and at the other end a mixing-tube, said mixing-tube provided at one end with tips and at the other end with a nozzle, and inserted within said head, the latter having between its ends a partition into which the nozzle end is threaded, a portion of the mixing-tube within said head perforated and also reduced in diameter to form a surrounding chamber, the head having a second inlet opening into said chamber, one of said tips of larger diameter than said mixing-tube and the other tip of smaller diameter and inserted into the upper end of said mixing-tube.

15. A gas-burner comprising a tubular head having at one end an inlet and at the other end a mixing-tube, said mixing-tube provided at one end with tips and at the other end with a nozzle, and inserted within said head, the latter having between its ends a partition into which the nozzle end is threaded, a portion of the mixing-tube within said head perforated and also reduced in diameter to form a surrounding chamber, the head having a second inlet opening into said chamber, one of said tips of larger diameter than said mixing-tube and the other tip of smaller diameter and inserted into the upper end of said mixing-tube; said outer tip and mixing-tube being integral.

16. A gas-burner comprising a tubular head having at one end an inlet and at the other end a mixing-tube, said mixing-tube provided at one end with tips and at the other end with a nozzle, and inserted within said head, the latter having between its ends a partition into which the nozzle end is threaded, a portion of the mixing-tube within said head being perforated upon all sides and reduced in diameter to form a surrounding chamber, the head having a second inlet opening into said chamber, one of said tips of larger diameter than said mixing-tube and the other tip perforated and of smaller diameter, and a screen between said tips.

17. A gas-burner comprising a tubular head having at one end an inlet and at the other end a mixing-tube, said mixing-tube provided at one end with tips and at the other end with a nozzle, and inserted within said head, the latter having between its ends a partition into which the nozzle end is threaded, a portion of the mixing-tube and the other tip perforated and of smaller diameter, and a screen between said tips; said inner tip constricted above the perforations therein.

18. A gas-burner comprising a tubular head having at one end an inlet and at the other end a mixing-tube, said mixing-tube provided at one end with tips and at the other end with a nozzle and inserted tightly within said head, the latter having between its ends a partition through which the nozzle end of the tube extends, a portion of the mixing-tube within said head being reduced in diameter to form a surrounding chamber, and the head having an opening or inlet into said chamber, said nozzle in the form of a bushing threaded into the end of said reduced portion, and the latter threaded into said partition.

19. A gas-burner comprising a tubular head and a mixing-tube, the latter provided at one end with an integral nozzle of reduced diameter, and inserted within said head, the head having between its ends a partition into which the nozzle end of said mixing-tube is threaded, said head also having at one end a single inlet into which said nozzle opens and having between its ends a chamber provided with a second inlet, said mixing-tube having perforations within said chamber close to said nozzle.

20. A gas-burner comprising a head provided with separate inlets for gas and air, a mixing-tube detachably fixed within said head and having in its inner end a relatively small opening which serves as a nozzle and is in communication with one of said inlets, said tube having above said nozzle a perforation whereby it communicates with the other of said inlets, a tip upon the outer end of said tube and integral therewith, a second tip provided within said tip, and a screen between said tips.

21. A gas-burner comprising a mixing-tube having at its lower or intake end a relatively small opening which serves as a nozzle, and having intake perforations above said nozzle,

a tip in communication with the delivery end of said tube, a second tubular tip within said tip, and a screen between said tips; the internal diameter of said tubular tip being substantially greater than the internal diameter of said mixing-tube near said intake perforations.

22. A gas-burner comprising a head, a mixing-tube detachably fixed therein and having at its lower or intake end a relatively small opening which serves as a nozzle, and having intake perforations above said nozzle, said head having one inlet in communication with said nozzle and another inlet in communication with said perforations, an outer tip in communication with the delivery end of said tube, a smaller tubular tip within said outer tip, and a screen between said tips; the space between said tips forming an expansion-chamber, relatively small openings being provided into said chamber, the internal diameter of said tubular tip being substantially greater than the internal diameter of said mixing-tube near said intake perforations, and said smaller tip constricted above said chamber-openings.

23. A gas-burner having a screen comprising a pair of annular fluted members one surrounding the other, and an interposed contiguous partition; the partition having recesses upon its opposite sides, and the contiguous ridges of the fluted members having between their edges projections within said recesses.

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Witnesses:
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