Sept. 15, 1936. P. S. HARPER 2,054,250

LIGHTER

Filed Feb. 27, 1933

Fig. 1.

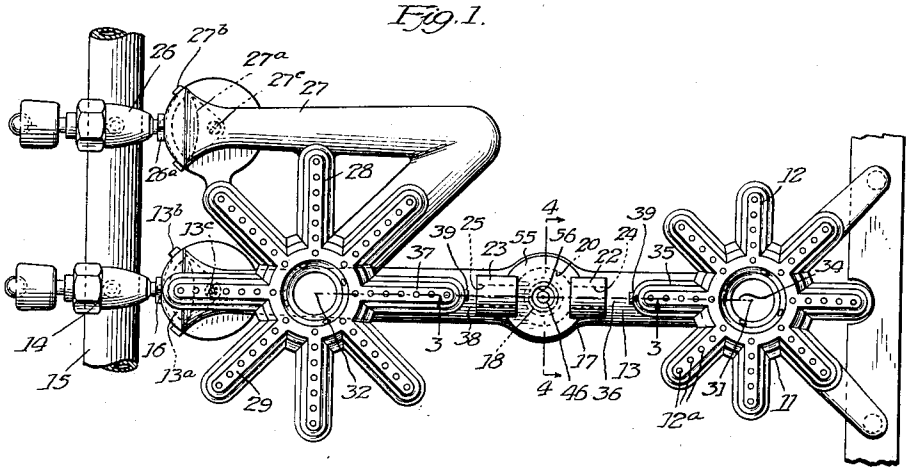


Fig. 2.

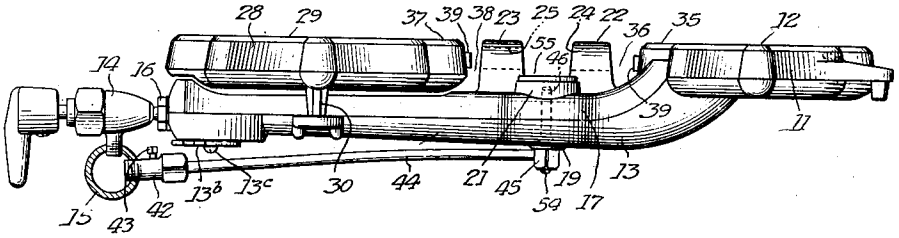


Fig. 3.

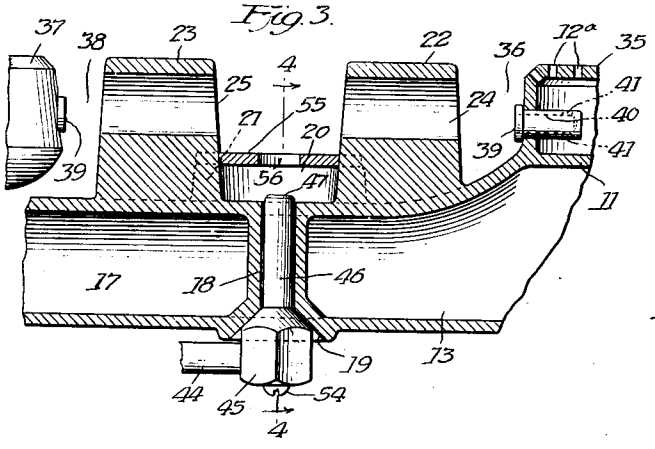


Fig. 4.

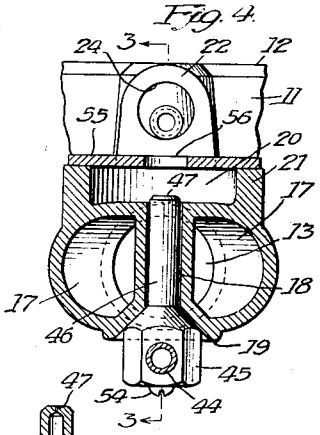


Fig. 5.

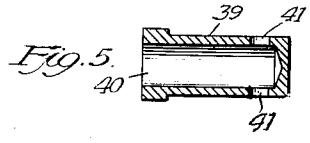
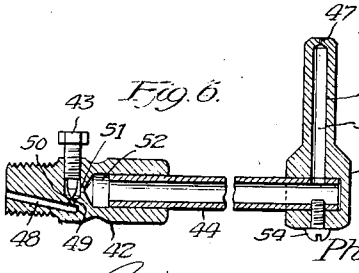


Fig. 6.



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UNITED STATES PATENT OFFICE

2,054,250

LIGHTER

Philip S. Harper, Chicago, Ill.

Application February 27, 1933, Serial No. 658,763

2 Claims. (Cl. 158—115)

This invention relates to lighters and particularly to the type of lighter used for automatically igniting the top burners of gas ranges and similar cooking appliances.

This lighter consists of an advantageous arrangement of the parts of an automatic lighter and also incorporates some new principles in the operation for the purpose of accomplishing the objects below set forth.

The first object of this invention is to provide a lighter in which there are no parts to become displaced when burners are removed from the stove for cleaning.

Another object of this invention is to provide an automatic lighter that has the maximum speed of operation.

A further object of this invention is to provide a lighter in which all the parts are fully below the top surface of the burners and entirely hidden from view in the modern stove constructions.

The further object of this invention is to provide a lighter more reliable in operation due to more positive locations of the gas outlets and gas conducting means.

The further object of this invention is a lighter which will operate over a wider range of gas qualities and gas adjustments.

These and other objects of this invention will be more apparent from the drawing in which like figures refer to like parts throughout.

This drawing consists of Figure 1 which is a plan view of the parts of the burners together with the lighter which is the subject of this invention;

Figure 2 is a side elevation of the burners and parts shown in Figure 1;

Figure 3 is a partial section on line 3—3 of Figures 1 and 4;

Figure 4 is a section on line 4—4 of Figures 1 and 3;

Figure 5 is an enlarged sectional view of the lighter jet incorporated in the other figures; and

Figure 6 is an enlarged sectional view of the lighter pilot used in this invention.

Referring now to Figure 1 of the drawing, a rear burner 11 is shown having star shaped burner head 12 and having a mixing tube 13 leading to said burner head. Said burner head 12 has a plurality of burner ports 12—*a* in its top surface after the manner of the usual construction of gas range burners. A gas valve 14 connected with a manifold 15 has a nozzle 16 projecting into the before mentioned mixing tube 13. Said mixing tube 13 is bifurcated at 17 whereby a hole 18 is placed centrally through the mixing tube without directly connecting with the passages 17. Said hole 18 has a cone shaped entrance 19 on the under side and for the purposes to be later described. At the upper end of the hole 18 is formed a cup 20 by the walls 21. Cast integral with said mixing tube 13 there are two upper projections 22 and 23 each having a horizontal passage 24 and 25 respectively, said passages extending in the same direction as the mixing tube 13 and being substantially parallel thereto said passages being termed lighter flash tubes.

A second valve 26 with a nozzle 26*a* is fastened in said manifold 15 and said second nozzle projects into a mixing tube 27 and a burner 28 having a burner head 29. Said burner head 29 is supported on the mixing tube 13 by means of a supporting bracket 30.

Each of said mixing tubes 13 and 27 in the burners 11 and 28 respectively, has an air opening 13—*a* and 27—*a* (shown in dotted lines), each opening being adjustably covered by a shutter 13—*b* and 27—*b*, in each case the shutter being fastened by a clamping screw 13—*c* and 27—*c* all in accordance with usual gas range burner practice. Said shutters 13—*b* and 27—*b* may be rotated and then clamped in any desired position by means of respective screws 13—*c* and 27—*c* in order to secure the gas and air mixture proper for combustion.

The burner head 11 has a center 31 and the burner head 29 has a corresponding center 32 and said burners are so placed that a line 34 drawn through their centers 31 and 32 is substantially perpendicular to the axis of the manifold 15.

Each of said burner heads has prongs after the manner of the usual gas range burners and the burner head 11 has a prong 35 projecting toward the passage 24 in the projection 22, said prong 35 extending to within a distance 36 of the aforesaid passage 24. In the same manner the burner head 29 has a prong 37 extending in the direction of the passage 25 in the projection 23 and extending within a distance 38 of the opening of the passage 25. Each of said prongs 35 and 37 has a lighter jet 39 inserted therein, and said lighter jet which is shown in detail in Figure 5 has a relatively large outlet opening 40 and two relatively small inlet openings 41. Said inlet openings 41 as shown are transverse to the direction of the main passage 40 and have a combined area less than the area of this outlet passage 40, and as a consequence of this construction the

jet 39 is in effect a velocity reducing means. Said jets 39 are so placed as to discharge into their respective passages 24 and 25 and as the gas burning from said jets has a rising tendency, said jets are placed slightly below the center of their respective passages 24 and 25 toward which they project. As can be seen, the object of so placing these jets is that the gas issuing therefrom passes through the passages 24 and 25.

Returning now to the manifold 15, a lighter having a lighter valve 42 is screwed therein at a suitable angle and said lighter valve has an adjusting screw 43. The construction of said valve is in accordance with standard practice and the adjusting screw 43 is for the purpose of restricting the flow of gas through said valve. A lighter tube 44 is fastened into said valve 42 in any suitable manner, the fastening method in the construction shown being to fasten the two parts together with a press fit. The lighter tube 44 extends below the mixing tube 13 and is connected to a lighter head 45 which lighter head has a reduced section 46 which extends through the beforementioned hole 18 in the mixing tube 13. Said lighter head 45 has an orifice 47 in its top end, said orifice 47 being of relatively small diameter.

The purpose of the lighter composed essentially of parts 42, 44, and 45, is to provide a small regulated flow of gas from the manifold 15, said flow of gas being burned from the orifice 47 and the flame from this orifice is adjusted in practice to extend to substantially the center of the passage 24. In order to show the construction in greater detail a cross sectional view Figure 6 is shown of the lighter and in this sectional view it is seen that the gas travels from the manifold into the slanting passage 48, through the connecting passage 49, past the adjusting screw 43 where the flow of gas is regulated by the distance of the screw 43 from its seat 50. After passing the seat 50 the gas flows around the screw 43 into the small passage 51 and through the passage 52 into the tube 44. This sectional view shows the connection into the lighter head 45 where the gas passes through the passage 53 and finally out of the small passage 47 previously mentioned. In order to drill the passage 53 in the part 45 it is necessary to have the opening for this drilling closed up and this is effectively done with the small plug 54.

In the above description it was mentioned that the lighter valve 42 was tapped into the manifold 15 at a suitable angle and this angle should be such that the lighter head 45 will bear in the cone opening 19 in the burner 11. The lighter tube 44 is made of a yielding material such as spring brass or half hard brass and consequently the lighter tube 44 should slope sufficiently so that with the burner 11 removed the lighter head 45 would be slightly above its normal position. When the burner 11 is replaced the cone shaped opening 19 tends to direct the upper portion of the lighter head 45 into its proper hole 18 and the spring of the tube 44 tends to maintain the lighter head 45 seated in the cone 19 whereby the jet of flame normally burning from the port 47 is at all times in the same proper relation to the beforementioned passage 24. As in the usual gas range construction the burner 11 has supports so that said burner when in supported position is at all times in proper relation to the other parts of the stove and is in a fixed relation to the lighter head 45.

A protecting plate 55 is placed on the walls 21, and there is a hole 56 centrally located in this plate 55. The flame from the pilot hole 47 burns through the said hole 56 with the lighter in operation. The level of the plate 55 must be less than ½ inch and is in the best practice only ¼ inch above the opening of the pilot hole 47 since the flame is burning in a closed chamber formed by the plate 55, the walls 21 and other parts of the structure shown, and so for the combustion of the flame access of air is only through the hole 55 in addition to whatever may be the slight leakage past the junction of parts such as plate 55 and walls 21. In practice the leakage should be held to a minimum and so it is desirable to have the plate 55 firmly fastened in position. This is done in the form of the invention shown by having the plate 55 of enameled steel, and then having same in place when the entire rear burner 11 is enameled. The enamel on the burner is then fused with the enamel on the steel plate, and in consequence the plate 55 is securely held in position and the joint between the plate 55 and walls 21 is substantially tight. Of course any other suitable means may be used for enclosing the pilot or securing the plate 55 in position, since the object of the construction shown is to prevent blowing out of the pilot flame, also to secure economy of gas consumption of the pilot flame since with the plate construction a lower gas flow gives a flame of equal length.

As to the operation of this invention the flow of gas from the pilot light 47 is ignited and the screw 43 is adjusted so as to regulate the height of the flame so that it reaches approximately the center of the passage 24. This pilot light burns a small constant amount of gas and it serves as a means of igniting the burners whenever they are desired for cooking service. In operating burner 11 the gas valve 14 is turned to a full on position which causes gas to flow from the nozzle 16 and mix with air in the mixing tube 13 in the usual manner of gas range burners. The gas mixture in the passage 13 travels into the burner head 12 and issues from the burner ports 12—*a*. At the same time this gas mixture enters the holes 41 in the lighter jet 39 and the combined flow into the two ports 41 issues from the discharge opening 40 of the jet 39. This discharging jet of gas enters the passage 24 and flows therein until it reaches the constant burning pilot flame of port 47. This gas mixture is then ignited and flashes back to the port opening 40 from which the continued flow of gas burns in the usual manner. At the same time that the flash of ignition ignites the gas from port 40 it also ignites the gas flowing from the adjacent burner ports 12—*a* and in this manner the entire burner is ignited.

A flash lighter is well known and in common use, and the advantages of this invention over the usual types of flash lighters is that it lights faster, has greater reliability in operation, and other advantages as set forth previously in reciting the objects of this invention in this specification. In order to explain the faster lighting of the arrangement in this invention it can be seen that the length of passage 24 is very short and consequently little time is taken for the flow of gas to reach from the lighter jet to the pilot light. Such short flow of gas has been before attempted but results have not been satisfactory due to a greater mixture of air at the entrance to the lighter passage corresponding to passage 24 in this specification. The form of velocity reducing jet disclosed in this invention eliminates such difficulty

since the gas is restricted in its flow into the jet by the small size of the holes **41** and consequently its velocity and jet action is reduced as it flows from the orifice **40**. Due to the reduced velocity of the gas issuing from the large orifice **40** there is decreased jet action and less objectionable air is induced into the tube **24** as in previous constructions, and consequently the gas mixture reaching the pilot approaches more nearly the same mixture as within the burner head. This gas mixture within the burner head is very nearly ideal in its air and gas proportion so that it will flash in a confined tube or space with the greatest rapidity. From the foregoing it is evident why the velocity reducing jet in the applicant's invention causes and affords faster operation since it provides a richer gas mixture for ignition by the pilot light.

A further reason for the rapidity of action of this invention is the fact that applicant can use a greater quantity of gas flow from the lighter jet in view of the reduced velocity. In practice substantially double the amount of gas flow is used from the lighter jet in the applicant's invention as is used in previous flash lighters. For instance some flash lighters use a number 38 M. T. D. hole drilled directly into the burner casting to serve as a lighter jet whereas the applicant in his invention employs an amount of gas flowing through the two size 38 M. T. D. holes since the holes **41** are frequently of this size in this invention and little resistance to flow is caused from travel through the appreciably larger opening **40**.

Another advantage of the applicant's invention is the reliability of location of the lighter jet with reference to the gas conducting passage as **24**. It can be seen that there can be no change in relative location of passage **40** and passage **24** throughout the life of the stove since both are fixed in the same unit. The pilot light comprising the flame burning from port **47** in the lighter head **45** is likewise definitely fixed with reference to the passages **24** and **25**, the reason for such definite location being shown in the drawing and being fully described previously in this specification. The location of the jet **39** in relation to its corresponding lighter passage **25** on the other hand may vary in alignment and may consequently interfere with the effectiveness of operation, but in practice suitable fitting points are provided in the burner so that operation difficulties are held to a minimum. It can be seen that in a lighter of this type there are four locations that should be held in proper relation, the first, being the relation of the jet **39** to the opening of the passage **24**; second, being the end of the passage **24** with relation to the pilot light **47**; third, being the relation of the pilot light to one of the openings of passage **25**; fourth, being the relation of the other opening of the passage **25** with reference to the jet **39'**. Of these four important locations it is seen that in the form of the invention shown and described no misalignment or displacement in the first three of the places can result, but in the fourth place the relation between the parts cannot be so held. In the form of my invention disclosed in my specification the place where this alignment can occur is between one of the jets and its corresponding passage, but it would be within the scope of this invention to cast or otherwise securely fasten each gas passage on its respective burner head. Such a modification would still involve three definite locations of parts and one location where relation of the parts cannot be so closely held, the latter in such modification being between the pilot light and the lighter passage in connection with the other burner than the one in which the lighter is secured.

While I have described more or less precisely the details of construction, I do not wish to be understood as limiting myself thereto, as I contemplate changes in form and the proportion of parts and the substitution of equivalents as circumstances may suggest or render expedient without departing from the spirit or scope of my invention.

I claim:

1. A burner having a burner port means, a lighter orifice in said burner discharging in proximity to at least a portion of said burner port means, a flash tube fixed to said burner whereby said burner and said flash tube comprise a single unit, said lighter orifice in said burner discharging into one end of said flash tube and said end of said flash tube being spaced an appreciable distance from said lighter orifice whereby gas issuing from said orifice is allowed free access of air before reaching said end of said flash tube, said burner having a hole below the other end of said flash tube, a pilot light head projecting upward through said hole, said pilot head having a smaller diameter in its part projecting through said hole than the diameter of said hole, whereby said burner with its flash tube permanently fixed thereto may be removed freely from said pilot light head.

2. In a burner and lighter assembly for a gas range consisting of two burners, a gas supplied pilot light head located between said burners, one of said burners having a means rigidly fixed thereto for locating said pilot light head, said means having a hole, said pilot light head projecting through said hole and adapted to have a flame burning therefrom, a flash tube extending from each of said burners toward said pilot light head, each flash tube having both ends open, each burner having a lighter orifice discharging into the respective flash tube toward the pilot light head, both of said flash tubes being fastened to at least one of said two burners and supported solely by means permanently fixed thereto so that the said burners, both flash tubes, and the said means for locating said pilot light head may be removed freely from said pilot light head as a single unit.

PHILIP S. HARPER.