April 18, 1950 K. A. SCHARBAU ET AL 2,504,592

PILOT BURNER MOUNT

Original Filed May 30, 1945 2 Sheets-Sheet 1

FIG. 1

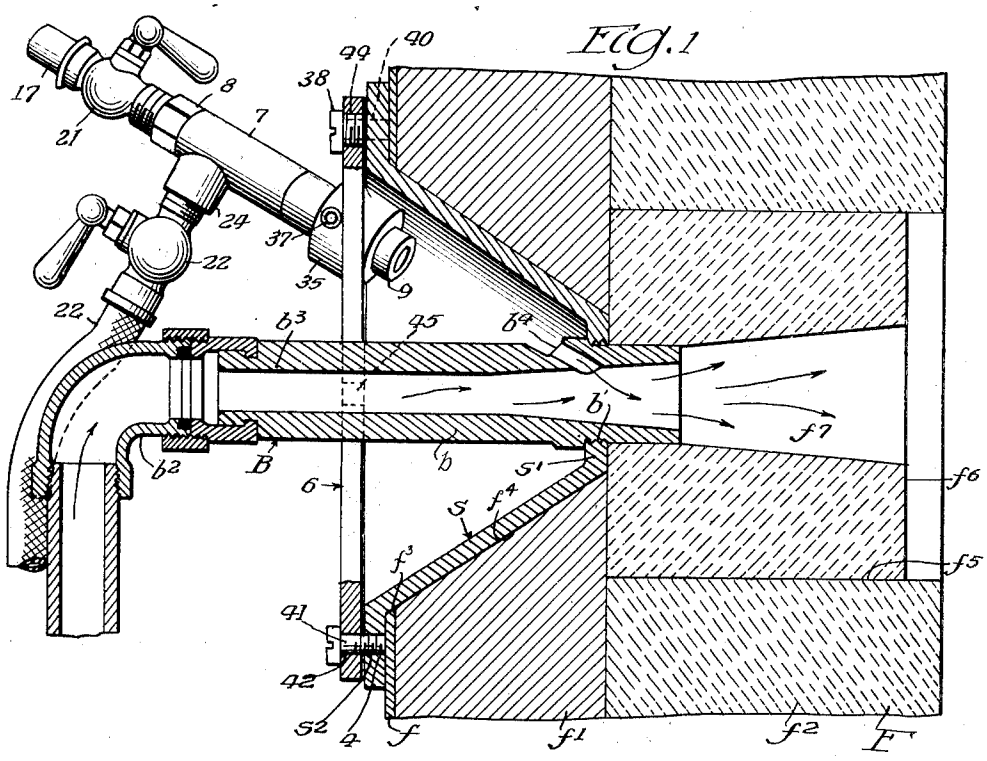
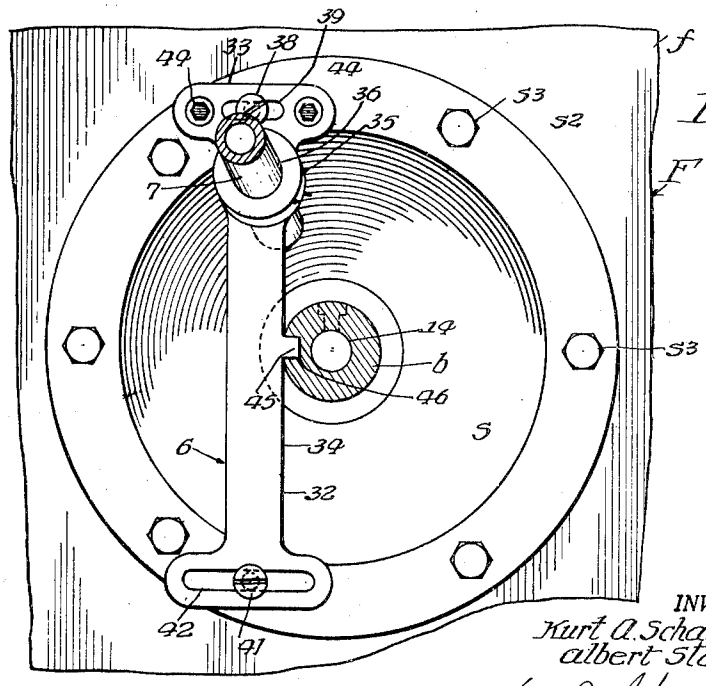


FIG. 2



INVENTOR.
Kurt A. Scharbau &
Albert Stadler
By Fred Gerlach
atty.

April 18, 1950 K. A. SCHARBAU ET AL 2,504,592

PILOT BURNER MOUNT

Original Filed May 30, 1945 2 Sheets-Sheet 2

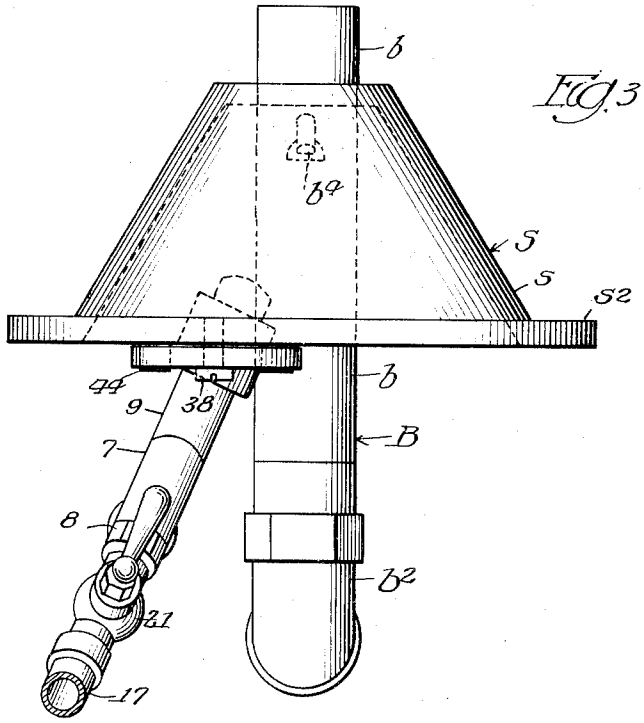


Fig. 3

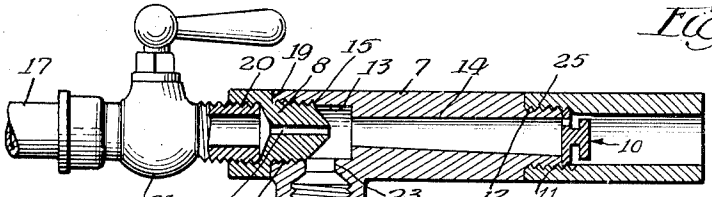


Fig. 4

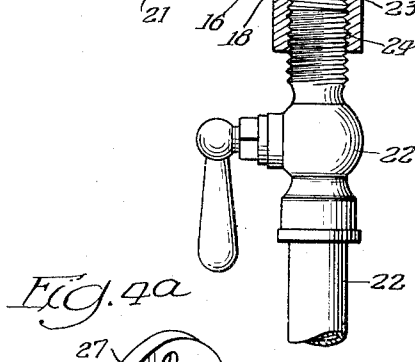
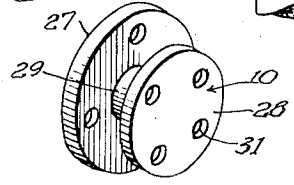


Fig. 4a



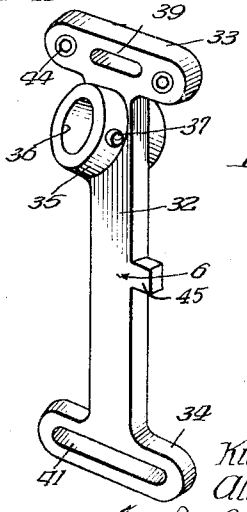


Fig. 5

INVENTOR.
Kurt A. Scharbau &
Albert Stadler
By Fred Gerlach Atty.

Patented Apr. 18, 1950

2,504,592

UNITED STATES PATENT OFFICE

2,504,592

PILOT BURNER MOUNT

Kurt A. Scharbau and Albert Stadler, Rockford, Ill., assignors to Eclipse Fuel Engineering Co., Rockford, Ill., a corporation of Illinois

Original application May 30, 1945, Serial No. 596,632. Divided and this application August 22, 1946, Serial No. 692,284

5 Claims. (Cl. 158—115)

1

The present invention relates generally to mounts for pilot burners. More particularly the invention relates to that type of mount which is designed and adapted to hold a gas variety pilot burner in operative relation with a main gas burner tube having its discharge end extending through an aperture in a support and provided with an exposed orifice for receiving the flame of the pilot burner.

One object of the invention is to provide a pilot burner mount of this type which is generally an improvement upon and has certain inherent advantages over previously designed mounts of the same general character and is characterized by high efficiency and simplicity of design or construction.

Another object of the invention is to provide a mount of the aforementioned type and character which comprises a bracket embodying certain adjustments whereby it is possible so to position the pilot burner that the flame emanating therefrom is properly directed toward the main burner.

A further object of the invention is to provide a pilot burner mount of the last mentioned character in which the bracket may be mounted in place with facility and has associated with it simple means for preventing rotation of the main gas burner tube relatively to the latter's support.

Other objects of the invention and the various advantages and characteristics of the present pilot burner mount will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like letters and numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a vertical longitudinal section of a main tube variety burner having applied thereto a pilot burner together with a pilot burner mount embodying the invention;

Figure 2 is a front view of the assembly of main burner, pilot burner and pilot burner mount;

Figure 3 is a top or plan view of said assembly;

Figure 4 is an enlarged vertical longitudinal section on the pilot burner;

Figure 4ª is a perspective view of the baffle unit at the discharge end of the tubular body of the pilot burner; and

Figure 5 is a perspective view of the mounting

2

bracket constituting the mount for supporting the pilot burner in operative position with respect to the main burner.

The mount which is shown in the drawings constitutes the preferred form or embodiment of the invention. It is illustrated in connection with a main tube variety gas burner B and a pilot burner, comprises a mounting bracket 6 and serves, as hereinafter described, to support the pilot burner in operative relation with the main burner B. The burner B is of conventional or standard construction. It is illustrated in connection with a furnace F and comprises an elongated horizontally extending tube *b*. The furnace F embodies a metallic outer shell *f*, an outer refractory lining f^1 and an inner refractory lining f^2. The side wall of the shell of the furnace is provided with a circular hole f^3 and this is in registry with a frusto-conical hole f^4 in the outer lining f^1 of the furnace F. The inner lining f^2 of the furnace is provided with a cylindrical hole f^5 which is in alignment and communication with the inner or small end of the frusto-conical hole f^4 in the outer lining f^1 and has mounted therein a combustion block f^6. The latter, as shown in Figure 1, has a central horizontally extending duct f^7 therethrough. The outer end of such duct is cylindrical and the inner end of the duct is inwardly flared. Said outer end of the duct is of less diameter than the small end of the frusto-conical hole f^4 and is in centered relation and communication with said inner or small end of the hole f^4. One end of the tube *b* of the main burner B extends through the frusto-conical hole f^4 into the outer end of the duct f^7 and is supported by a metallic cooling well support S. The latter comprises an annular frusto-conical side wall *s* and a centrally apertured inner end wall s^1. The side wall *s* fits in, and is shaped conformably to, the frusto-conical hole f^4 in the outer refractory lining f^1 of the furnace F and embodies at its outer end an integral outwardly extending flange s^2 which fits against the hole defining portion of the furnace shell *f* and is secured thereto by bolts s^3. The inner end wall s^1 of the cooling well support S is formed integrally with the inner end of the annular side wall *s* and abuts against the outer end face of the combustion block f^6. The inner end of the burner tube *b* extends through the central aperture in the inner end wall s^1 and is secured to said inner end wall by a screw thread b^1. The burner tube is of materially greater length than the cooling well support with the result that its outer end is disposed exteriorly of the support. Said outer end of the

tube is connected by a pipe connection b^2 to receive a combustible gas and air mixture under pressure from a source of supply. The inner periphery of the burner tube defines a throat b^3, the central and outer end portions of which are cylindrical. The inner end portion of the throat is flared in the direction of the inner end of the burner tube b. When the burner B is in operation the combustible gas and air mixture under pressure flows through the throat in the burner tube and burns as it emanates from the inner end of the tube and flows through the duct f^7 in the combustion block f^6 of the furnace. The upper portion of the inner or discharge end of the burner tube is provided with an angularly disposed orifice b^4. This orifice is located outwards of the inner end wall s^1 of the cooling well support S and leads into the central part of the flared inner end portion of the throat b^3 in the burner tube. It is inclined upwards and outwards with respect to the longitudinal axis of the throat b^3 and provides means whereby the combustible gas and air mixture in transit through the throat b^3 may be ignited from the outside of the burner tube.

The pilot burner is positioned above the central portion of the burner tube b and operates, as hereinafter described, to direct a flame into the angularly disposed orifice b^4 in order to maintain in an ignited condition the gas and air mixture flowing through the throat of the burner tube. It is carried or supported by the mounting bracket 6 and comprises an elongated tubular body 7, a nozzle 8, a tubular tip 9 and a baffle unit 10.

The body of the pilot burner is preferably formed of cast iron and has at one end thereof an integral, longitudinally extending, centrally disposed reduced stem 11. The latter, as best shown in Figure 4, is provided with an external or male screw thread 12. The interior of the tubular body 7 is shaped so as to define a cylindrical longitudinally extending open ended mixing chamber 13 at the other end of the body, and a longitudinally extending throat 14 which leads from the inner end of the chamber 13 to and through the outer end of the reduced stem 11. The mixing chamber 13 is of materially greater diameter than the throat 14 and has a female screw thread 15 at its outer end. The throat 14 flares gradually in the direction of the stem 11, as shown in Figure 4. The nozzle 8 of the pilot burner has an open ended, centrally disposed orifice 16 extending longitudinally therethrough and is connected by a pipe connection 17 to receive air under super atmospheric pressure from any suitable source, such, for example, as an air storage tank or compressor (not shown). One end of the nozzle extends into the outer end of the mixing chamber 13 in the tubular body 7 and embodies an external or male screw thread 18 which is in interfitting relation with the internal or female screw thread 15 and serves to secure the nozzle 8 in connected relation with the body 7. The other or outer end of the nozzle is of materially greater diameter than said one or inner end and embodies an annular shoulder 19 which abuts against the end of the tubular body 7 having the mixing chamber 13. The inner end of the orifice 16 is of reduced diameter, is in centered relation with, and is of materially less diameter than, the small end of the throat 14 and the outer end of the orifice is of increased diameter and has a female screw thread 20. The pipe connection 17 includes a shut-off cock 21, one end of the body of which extends into the outer end of the orifice 16 and has a male screw thread which interfits with the female screw thread 20 and serves to hold the cock in connected relation with the nozzle. When the cock 21 is open air under pressure flows through the nozzle 8 and then flows in jet form across the mixing chamber 13 and through the throat 14. A gas of high calorific value, such as propane, butane or natural gas, is supplied to the mixing chamber 13 for admixture with the air under pressure by way of a pipe connection 22 and a port 23. The pipe connection 22 receives gas under atmospheric or super atmospheric pressure from any suitable source (not shown) and is indirectly connected to the end of the tubular body 7 having the mixing chamber 13 by way of an internally threaded nipple 24 which is formed integrally with, and extends laterally from, the body 7. The port 23 communicates with the inner end of the nipple and leads to the inner end of the mixing chamber 13, as shown in Figure 4. A shut-off cock 22^a is included in the pipe connection 22 in order that the supply of gas to the body 7 may be cut off when the pilot burner is not in use and adjusted or regulated when the pilot burner is in use. One end of the body of the cock 22^a screws into the internally threaded nipple 24. When the cock 22^a is open while the shut-off cock 21 is open gas enters the mixing chamber 13 via the port 23 and there mixes with the jet of air under pressure emanating from the nozzle 8 to form a combustible gaseous mixture which flows from the mixing chamber through the flared throat 14. If the gas is not under super atmospheric pressure it is drawn into the mixing chamber 13 by aspiration. By reason of the fact that the throat 14 is flared in the direction of the stem 11 the velocity of the combustible mixture of gas and air under pressure progressively decreases as the mixture flows from the mixing chamber to and through the externally threaded stem 11.

The tubular tip 9 is preferably formed of steel and has substantially the same external diameter as the cast iron body 7. One end of the tip 9 surrounds the reduced stem 11 at the discharge end of the tubular body 7 and embodies an internal screw thread 25 which is in interfitting relation with the external or male screw thread 12 on the stem and serves to hold the tip of the pilot burner in connected relation. The portion of the inner periphery of the tip that is outwards of the screw thread 25 is cylindrical. It is of reduced diameter and has at the inner end thereof an annular outwardly extending shoulder 26 which faces in the direction and joins the inner end of the screw thread 25. When the pilot burner is in operation the combustible mixture of gas and air under pressure, after passing through the flared throat 14, flows into the tip 9. Combustion of the mixture takes place within the tip and the flame resulting from combustion projects from the tip as the result of the velocity of the mixture entering the tip.

The baffle unit 10 is located in the central portion of the tubular tip 9 and serves so to reduce the velocity of the combustible mixture entering the tip that the mixture burns in the tip. It is preferably of one-piece design or construction and comprises a pair of laterally spaced discs 27 and 28 and a stem 29 between the two discs. The disc 27 of the baffle unit has its marginal portion clamped between the shoulder 26 and the outer end of the reduced stem 11, and embodies inwards of its clamped margin an an-

nular series of holes 30. The disc 28 is of less diameter than the disc 27 and is disposed outwards of the latter. It is of slightly less diameter than the adjacent portion of the inner periphery of the tubular tip 9 and has an annular series of holes 31. Said holes are angularly offset with respect to the holes 30 in the disc 27 in order that they are not in registry with such holes. The stem 29 is formed integrally with, and extends between the central portions of, the two discs 27 and 28, and serves to hold the latter in offset or rigid laterally spaced relation. In connection with operation of the pilot burner the combustible mixture of gas and air under pressure, after travelling or flowing through the flared throat 14, passes first through the holes 30 in the disc 27 and then through the space between the two discs. After passing through such space a portion of the mixture flows through the holes 31 in the disc 28 and the balance flows around the said disc 28. During flow of the mixture past the baffle unit 10 the velocity of the mixture is reduced to such an extent that the mixture burns within the outer end of the tubular tip 9, as hereinbefore described. Preferably there are four holes in the disc 27 and four holes in the disc 28 and the holes in the disc 27 are arranged 90° apart and the holes in the disc 28 are arranged 90° apart and are positioned 45° from the holes 30 in the disc 27. The total area of the holes in each disc of the baffle unit is materially less than the area of the discharge end of the flared throat 14 in the tubular body 7. Because of the design and construction of the pilot burner the latter is capable of burning any gas of high calorific value without likelihood of the flame emanating from the tip being extinguished by a draft or unusual exterior air currents.

The mounting bracket 6 is preferably in the form of a one-piece metallic casting and is located at one side of the central portion of the tube *b* of the main gas burner B. It is I-shaped so far as general contour or configuration is concerned and comprises a vertically extending intermediate piece 32, an elongated horizontally extending upper crosspiece 33, and an elongated horizontally extending lower crosspiece 34. The upper end of the vertically extending intermediate piece 32 is provided with a cylindrical part 35 having a smooth centrally disposed longitudinally extending bore 36. The tip 9 of the pilot burner fits slidably within the bore 36 and is releasably secured in place by means of a set screw 37 which extends through a screw threaded hole in the outer side portion of the cylindrical part 35. The pilot burner is arranged so that the tubular tip 9 thereof is disposed within the cooling well support S. The bore 36 in the cylindrical part 35 on the upper end of the intermediate piece 32 of the mounting bracket is so canted or angularly arranged that when the pilot burner is in assembled relation with the mounting bracket the axis of the tubular tip 9 is substantially in alignment with the outer end of the angularly disposed orifice b^4 in the upper portion of the discharge end of the tube *b* of the main burner B and hence the flame emanating from the tip of the pilot burner is directed towards the orifice. The upper crosspiece 33 of the mounting bracket 6 is positioned adjacent the upper portion of the flange s^2 of the cooling well support S and is secured thereto by way of a bolt 38, the shank of which extends through a horizontal slot 39 in the upper crosspiece 33 and fits within a threaded hole 40 in said upper portion of the flange s^2. The lower crosspiece 34 of the mounting bracket is positioned adjacent the lower portion of the flange s^2 and is secured in place by means of a bolt 41, the shank of which extends through a horizontal slot 42 in the crosspiece 34 and fits in a threaded hole 43 in said lower portion of the flange s^2. The slots 39 and 42 permit the mounting bracket to be adjusted laterally with respect to the tube *b* of the main burner B and also permit the bracket to be tilted about its center in either a clockwise or counterclockwise direction. The ends of the upper crosspiece 33 of the mounting bracket are provided with transversely extending set screws 44 and these abut against the upper portion of the flange s^2 of the cooling well support S and make it possible angularly or rotatively to adjust the bracket about its longitudinal center or axis. When it is desired angularly or rotatively to adjust the bracket in one direction one of the set screws 44 is screwed forwards and the other set screw is screwed rearwards. Opposite or reverse angular or rotative adjustment of the bracket is effected by screwing the one set screw rearwards and the other set screw forwards. By adjusting the mounting bracket 6 laterally by way of the slots 39 and 42 and angularly or rotatively adjusting the bracket by way of the set screws 44 the bracket may be so positioned that the axis of the tubular tip 9 of the pilot burner is in coaxial alignment or relation with the angularly disposed orifice b^4 in the upper portion or discharge end of the tube *b* of the main gas burner B. The central portion of the vertically extending intermediate piece 32 of the mounting bracket is provided with an integral laterally extending lug 45 which fits within a notch 46 in the main burner tube *b* and serves to hold the main burner tube against rotation relatively to the bracket 6 and the cooling well support S while at the same time permitting the bracket to be shifted to a limited extent to and from the tube and also adjusted rotatively about its longitudinal center.

When it is desired to mount the pilot burner with respect to the main burner B the tip 9 is inserted through the bore 36 in the cylindrical part 35 at the upper end of the vertically extending intermediate piece 32 of the mounting bracket 6 and is secured in place by tightening the set screw 37. Thereafter the bracket with the pilot burner connected thereto is positioned alongside of the central portion of the main burner tube *b* and is shifted laterally in order to bring the laterally extending lug 45 into interfitting relation with the notch 46. After so positioning the bracket the bolts 38 and 41 are inserted through the slots 39 and 42 and are screwed part way into their respective threaded holes 40 and 43 in the flange s^2 of the cooling well support *s*. After such operation the bracket is adjusted laterally and tilted to the proper extent and then is angularly or rotatively adjusted about its center by adjustment of the set screws 44. When the bracket is so positioned that it serves to hold the pilot burner in such position that the axis of the tubular tip 9 is in coaxial alignment with the orifice b^4 the bolts 38 and 41 are tightened to the fullest extent.

When it is desired to operate the main gas burner B the pilot burner is lighted by first opening the shut-off cocks 21 and 22^a and then placing a lighted match adjacent the discharge end of the tubular tip 9. As soon as the pilot burner is ignited or lighted it produces a flame which

is directed into the angularly disposed orifice b^4 in the discharge end of the main burner tube b. Upon supply of a mixture of gas and air under pressure to the main burner tube the mixture is ignited in the flared discharge end of the throat b^3 of the main burner tube by the flame which enters the main burner tube via the orifice b^4.

The herein described pilot burner mount effectively and efficiently fulfills its intended purpose and, due to its design and construction, may be manufactured or produced at a low cost.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

This application is a division of our pending United States application Serial No. 596,632 filed May 30, 1945 and entitled Pilot burner.

Having thus described the invention what we claim as new and desire to secure by Letters Patent is:

1. In combination with an apertured support and an elongated main gas burner tube having one end thereof extending through the aperture in the support and provided with an exposed open ended orifice that extends through, and at an acute angle to the axis of, the tube, a mount and pilot burner assembly comprising an elongated one-piece bracket positioned adjacent the other end of, and extending transversely with respect to, the tube, having the ends thereof connected to the support, and embodying inwards of one of its ends a rigid integrally formed tubular member having a smooth bore, provided with a transversely extending set screw, and disposed at substantially the same angle as, and in substantially coaxial alignment with, said orifice, and a pilot burner positioned alongside of said other end of the tube and embodying a substantially straight tubular body provided at one end thereof with means for supplying it with a combustible gaseous mixture and having its other end fitting slidably within said tubular member and secured in place by said set screw.

2. In combination with an apertured support and an elongated main gas burner tube having one end thereof extending through the aperture in the support and provided with an exposed open ended orifice that extends through, and at an acute angle to the axis of, the tube, a mount and pilot burner assembly comprising a one-piece I-shaped bracket positioned adjacent the other end of, and extending transversely with respect to, the tube, having its end parts fitting against the support and provided in their intermediate portions with longitudinally extending slots, and embodying inwards of one of its end parts an integral tubular member having a smooth bore, provided with a transverse set screw, and disposed at substantially the same acute angle as, and in substantially coaxial alignment with, said orifice, attaching bolts extending through the slots and into the support and forming with said slots connections for permitting lateral adjustment of the bracket relatively to the tube, and a pilot burner positioned alongside of said other end of the tube and embodying a substantially straight tubular body provided at one end thereof with means for supplying it with a combustible gaseous mixture and having its other end fitting slidably within said tubular member and secured in place by said set screw.

3. In combination with an apertured support and an elongated main gas burner tube having one end thereof extending through the aperture in the support and provided with an exposed open ended orifice that extends through, and at an acute angle to the axis of, the tube, a mount and pilot burner assembly comprising a one-piece I-shaped bracket positioned adjacent the other end of, and extending transversely with respect to, the tube, having its end parts fitting against the support and provided in their intermediate portions with longitudinally extending slots, and embodying inwards of one of its end parts an integral tubular member disposed at substantially the same acute angle as, and in substantially coaxial alignment with, said orifice, attaching bolts extending through the slots and into the support and forming with said slots connections for permitting lateral adjustment of the bracket relatively to the tube, set screws extending transversely through the end portions of one of the end parts of the bracket and adapted when turned one relatively to the other after loosening of the bolts rotatably to adjust the bracket about its longitudinal center, and a pilot burner positioned alongside of said other end of the tube and embodying a substantially straight tubular body provided at one end thereof with means for supplying it with a combustible gaseous mixture and having its other end fitting and secured within said tubular member.

4. The combination with an apertured support, of an elongated main gas burner tube having one end thereof extending through the aperture in the support and provided with an exposed open ended orifice that extends through, and at an acute angle to the axis of, the tube, an elongated one-piece bracket positioned adjacent the other end of, and extending transversely with respect to, the tube, having the ends thereof connected to the support, and embodying inwards of one of its ends a rigid integral tubular member disposed at substantially the same acute angle as, and in substantially coaxial alignment with, said orifice, a pilot burner positioned alongside of said other end of the tube and embodying a substantially straight tubular body provided at one end thereof with means for supplying it with a combustible gaseous mixture and having its other end fitting and secured within said tubular member, and an interfitting lug and notch connection extending between the intermediate part of the bracket and the adjacent portion of the burner tube and operative to prevent rotation of the tube relatively to said bracket and support.

5. The combination with an apertured support, of an elongated main gas burner tube having one end thereof extending through the aperture in the support and provided with an exposed open ended orifice that extends through, and at an acute angle to the axis of, the tube, a one-piece I-shaped bracket positioned adjacent the other end of, and extending transversely with respect to, the tube, having its end parts fitting against the support and provided in their intermediate portions with longitudinally extending slots, and embodying inwards of one of its end parts an integral tubular member disposed at substantially the same acute angle as, and in substantially coaxial alignment with, said orifice, attaching bolts extending through the slots and into the support and forming with said slots connections for permitting lateral adjustment of the bracket relatively to the tube, set screws extending transversely through the end portions of one of the end parts of the bracket and adapted when

turned one relatively to the other after loosening of the bolts rotatably to adjust the bracket about its longitudinal center, and a pilot burner positioned alongside of said other end of the tube and embodying a substantially straight tubular body provided at one end thereof with means for supplying it with a combustible gaseous mixture and having its other end fitting and secured within said tubular member, and means operative to prevent rotation of the tube relatively to said bracket and support while at the same time permitting the bracket to be adjusted to a limited extent with respect to the tube and consisting of a laterally projecting lug on the intermediate

parts of the bracket and a lug-receiving notch in the adjacent portion of said tube.

KURT A. SCHARBAU.
ALBERT STADLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,659,404	Lipschutz	Feb. 14, 1928
2,241,583	Campbell	May 13, 1941
2,249,331	Sachs	July 15, 1941