April 11, 1967 R. S. LOVELAND 3,313,490

YIELDABLE SHEET METAL BURNER SPUD CONTAINING A NON-DEFORMABLE ORIFICE MEMBER

Filed Jan. 6, 1965

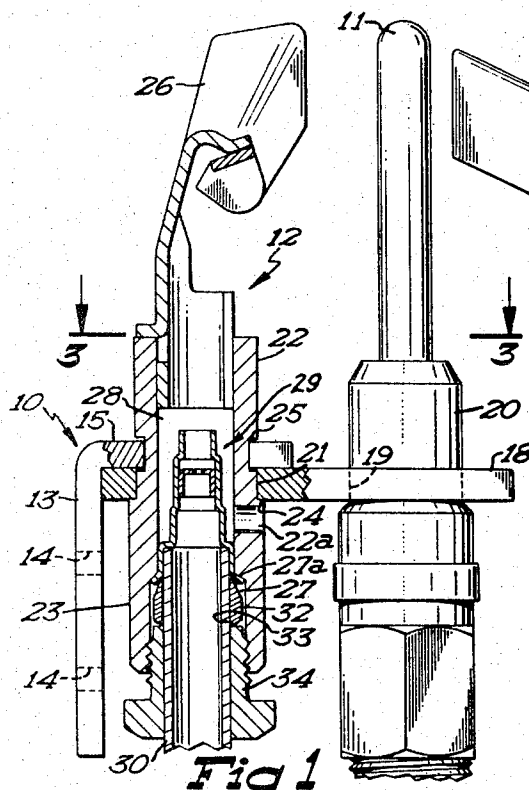

Fig 1

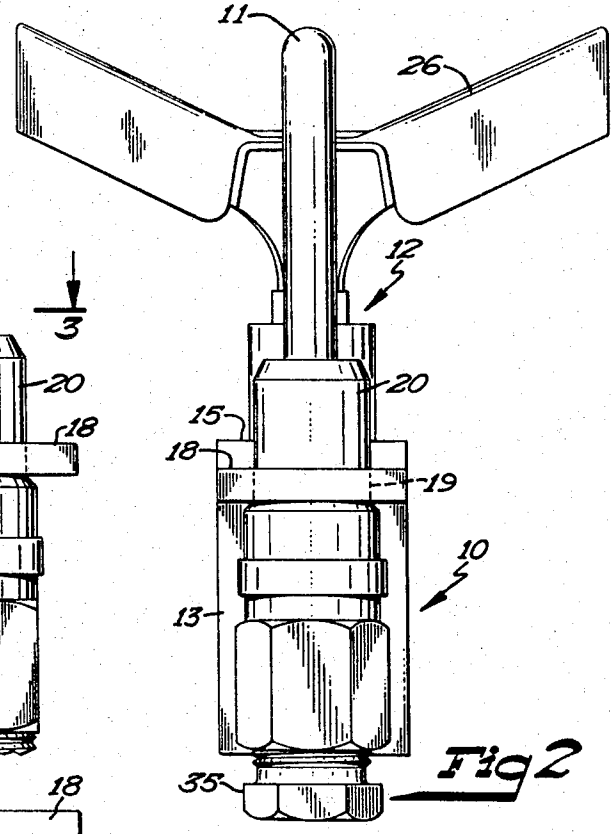

Fig 2

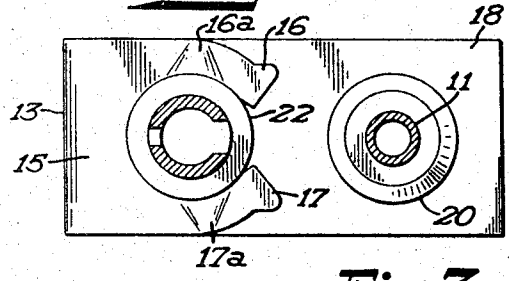

Fig 3

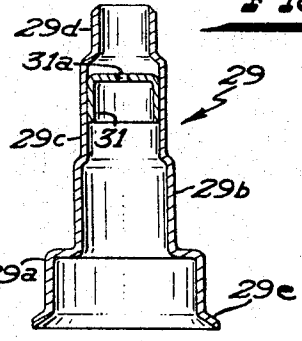

Fig 5

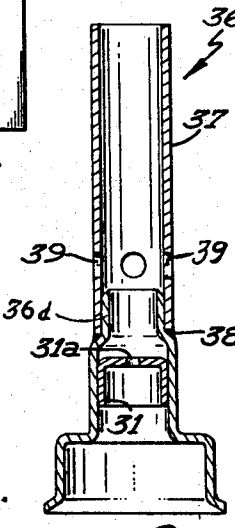

Fig 6

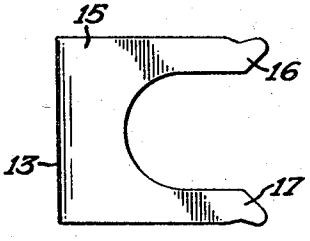

Fig 4

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United States Patent Office 3,313,490 Patented Apr. 11, 1967

3,313,490

YIELDABLE SHEET METAL BURNER SPUD CONTAINING A NON-DEFORMABLE ORIFICE MEMBER

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Filed Jan. 6, 1965, Ser. No. 423,786
4 Claims. (Cl. 239—596)

This invention relates to safety pilots and, more particularly to a pilot burner and flame sensing arrangement having a novel supporting bracket construction for assembling the parts thereof and a novel burner spud construction which produces an inexpensive safety pilot.

While safety pilots of the above-mentioned type are well known in the art, it has been the constant effort of the industry to produce more reliable and less expensive designs to meet competition in this highly developed art.

One of the objects of this invention is to provide a simple, sturdy and easy to manufacture assembly of a pilot burner and a flame sensing unit.

Another object is to provide a safety pilot which is of such simple construction and so readily assembled as to reduce the cost of manufacture thereof over prior art constructions.

A still further object of the invention is to provide an inexpensive burner spud construction which is less susceptible to the transfer of heat by conduction from the pilot burner head with which it is associated.

A still further object of the invention is to provide a pilot burner spud with an adjustably positioned and frictionally held orifice member therein.

Another object of the invention is to provide a burner spud wherein an orifice member thereof may be selectively positioned therein to adapt the orifice member to be used in a plurality of burners.

Still further objects of the invention will become apparent upon reading the following detailed description of the invention in conjunction with the accompanying drawing wherein:

FIGURE 1 is an elevational view of a preferred embodiment of the safety pilot with portions of the pilot burner and supporting bracket broken away;

FIGURE 2 is an elevational view of the safety pilot shown in FIGURE 1, viewed from the righthand side of FIGURE 1;

FIGURE 3 is a cross-sectional view of the invention taken along line 3—3 of FIGURE 1;

FIGURE 4 is a plan view of a portion of the bracket before it has been assembled with another portion of the bracket and the associated pilot burner;

FIGURE 5 is an enlarged cross-sectional view of the burner spud; and

FIGURE 6 is a cross-sectional view of a modification of the burner spud.

Referring to FIGURE 1 of the drawing, the safety pilot consists of a mounting bracket, generally designated by the reference numeral **10**, for supporting a flame sensing means **11** (thermocouple) and a pilot burner, generally designated by the reference numeral **12**. The bracket consists of a mounting plate or arm **13** having apertures **14** through the vertically extending arm thereof and a horizontally extending arm or supporting plate **15** terminating in fingers **16** and **17**. The supporting plate **18** has an aperture **19** therein, through which a support sleeve **20** for the flame sensing unit extends with an interference fit, and a second aperture **21**, through which a tubular burner body **22** extends.

The burner body **22** has an enlarged diameter portion **23** at the lower end thereof providing an abutment shoulder **24** which bears against the under surface of the plate **18**. An annular groove **25** in the body **22** is preferably

spaced from the abutment shoulder **24** a distance slightly less than the thickness of the plate **18** and is slightly greater than the thickness of the plate **15** so that when the fingers **16** and **17** are positioned in the annular groove and crimped toward each other, the metal intermediate the ends of the fingers will cold flow to press down against the top surface of the plate **18** and upwardly against the upper side wall of the annular groove to draw the laterally extending plate-like arm **15** and plate **18** tightly together and firmly hold the burner body **22** in assembled relationship therewith. Preferably, the end of the plate **18** bears against the adjacent surface of the mounting plate or arm **13** to help prevent relative rotation between the plate **18** and plate **15** around the burner body. A primary air opening **22***a* is provided in a wall of the burner body below the mounting plate **18** for introducing air into the burner. A target type of burner head **26** is mounted in the upper end of the burner body **22** while the lower end of the burner body has a threaded bore **27** of larger diameter than bore **28**, which is the inside diameter of the burner body.

A burner spud, generally designated by the reference numeral **29**, is made of thin sheet metal and has a lower cylindrical portion **29***a*, which has an inside diameter slightly larger than the outside diameter of a supply pipe **30**, an adjacent reduced diameter portion **29***b*, a second reduced diameter portion **29***c* and an upper and still further reduced portion **29***d*. Adjustably mounted in the reduced diameter portion **29***c*, is a cup-shaped or flanged flat plate or disc orifice member **31** having an axially extending supporting wall which is axially slideable in the portion **29***c* with a sufficient frictional fit as to cause it to remain in whatever position it is selectively placed and regardless of the gas pressure to which it is exposed. For the burner head illustrated in the drawing, the orifice member is positioned as shown in the drawing. For other types of burner heads, the orifice member **31** is possibly located at a different position in the portion **29***c* although there are some cases where one of these orifice positions will satisfy more than one type of burner. Also, there are burners wherein it is necessary to eliminate the portion **29***b* to place the portion **29***c* adjacent the portion **29***a*, depending upon how far it is desired to have the orifice **31***a* of the orifice member located with respect to a lower end of the burner spud and the burner head. The portion **29***d* serves the function of confining the gas issuing from the orifice **31***a* and to aid in directing the gas into the burner head positioned above the spud. The lower end of the portion **29***a* is outwardly flared at **29***e* to provide a shoulder which bears against the beveled shoulder **27***a* provided between the inner end of the bore **27** and the bore **28** of the burner body. A compression fitting including a compression sleeve **32** connected through a flangible collar **33** to a clamping nut **34** surrounds the tube **30** and seals against the flange portion **29***e* and forces the flange **29***e* into sealing engagement with the shoulder **27***a*.

The flame sensing member **11** may be a mercury filled bulb or a thermocouple or some other suitable means for receiving the flame of the pilot burner and is held in the supporting sleeve **20** by means of a clamping nut **35** in a conventional manner.

The modification of the burner spud down in FIGURE 6 is generally designated by the reference numeral **36** and consists of a sheet metal spud which is similar to the one in FIGURE 5 with the exception that the portion **29***b* has been eliminated and a portion in the form of a sleeve **37** has been placed over the portion **36***d* and soldered thereto at **38**. Primary air openings or apertures **39** are formed in the wall of the sleeve **37** at a point slightly above the upper end of the portion **36***d*. This spud **36** is for use in

a burner having a somewhat different construction from the burner disclosed in FIGURES 1 and 2.

While the burner spud could be constructed by various means, the preferred construction thereof is to draw and punch sheet metal in the forms illustrated with the result that the walls of the spud are quite thin. Therefore, the wall of the portion **29***c* will yield rather than cause buckling of the cup-shaped orifice member **31** if the pressure on the orifice member is too great as it is adjustably positioned in the spud. This will prevent deformation of the material surrounding orifice **31***a* and, therefore, prevent misalignment of the orifice **31***a* as to cause malfunction thereof.

By inserting the burner body through the aperture **21** in the plate **18** and sliding the fingers **16** and **17** in the annular grooves on opposite sides of the burner body and then crimping the ends of the fingers towards each other, the expansion of the metal at areas **16***a* and **17***a* locks the bracket plates and the burner together. However, it would be possible to position the burner body **22** in the opening **21** by an interference fit and merely rely on the fingers **16** and **17** to secure the burner body **22** to the arm or plate **15**.

Operation

With the safety pilot above described mounted adjacent a main burner by means of mounting bolts (not shown) extending through the openings **14** and into a suitable support on the main burner, and the burner **22** connected to a source of gas supply to conduit **30** and the flame sensor **11** connected to a safety device controlling the flow of fuel through the conduit **30**, the safety pilot is ready to be placed in operation. By turning on the gas supply, it will pass through the orifice **31***a* of the burner spud and be directed by the portion **29***d* into the burner head and inspirate primary air through the opening **22***a* for mixing on the surface of the target burner head **26**. Ignition of the gas at the target burner will cause flames to flow onto the flame sensor **11** and outwardly and upwardly through the inverted channel-shaped wings of the pilot burner **26** toward the associated main burner or burners. Due to the thinness of the walls of the burner spud and the distance that heat would have to be conducted from the burner head down through the burner body, and through the spud to the orifice member, the orifice member remains relatively cool and therefore does not candle, thus providing a satisfactory flame at all times. It is thus seen that the details of construction of the above described invention produce an inexpensive safety pilot that is easy to assemble yet provides one that is reliable in operation.

Furthermore, providing a spud construction wherein there is a low rejection rate due to the manner in which it is made, the reduction in cost as a result thereof is of benefit to the public, in addition to the invention being a definite improvement over the prior art. As modifications may be made in the invention without departing from the spirit thereof, the scope of the invention should be determined from the appended claims.

I claim:

1. The combination comprising: a pilot burner having a burner body with inner and outer walls and a burner head; a thin-wall, open-ended, sheet metal tubular spud having an inlet end and an outlet end and positioned in said burner body; and an orifice member having a supporting wall stronger than the wall of said spud which spud wall would yield during assembly before deformation of the supporting wall, and being selectively positionable and frictionally held in said tubular spud intermedite its ends, said tubular spud having a uniform diameter from the discharge end thereof to a point near said orifice member.

2. The combination defined in claim **1** wherein said tubular spud has two end and one central aligned and stepped diameter portions, with said orifice member adjustably positioned in said central portion, and said central portion being spaced from the inner wall of said burner body.

3. A pilot burner comprising a generally tubular body having first and second open ends, a thin-wall tubular spud positioned at the first end of said body for directing gas into said body, and a flat plate orifice member having a flange thereon positioned within said spud with the flange thereof supporting the orifice member so as to direct gas generally axially of said spud, the strength of the wall of said spud being such that it will yield during assembly, before said orifice member will be deformed, to prevent misalignment of the orifice therein.

4. A pilot burner as defined in claim **3** wherein said spud has at least three coaxially aligned and stepped open-ended portions and wherein said orifice member is adjustably positioned in the intermediate one of said stepped portions.

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