June 26, 1934. J. A. PERRY ET AL 1,964,300

GAS PILOT BURNER CONTROL

Filed April 24, 1933 3 Sheets-Sheet 1

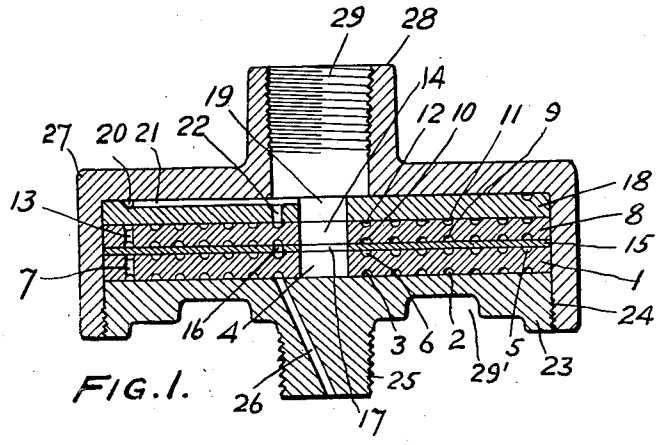

FIG. 1.

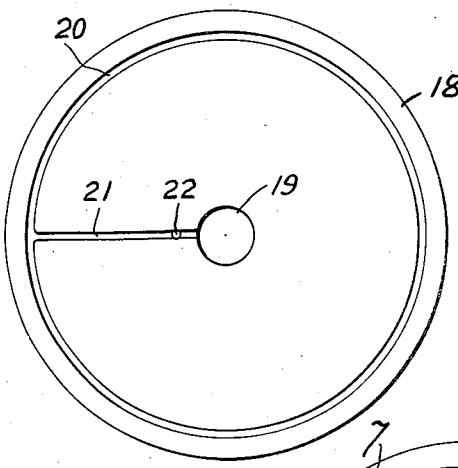

FIG. 2.

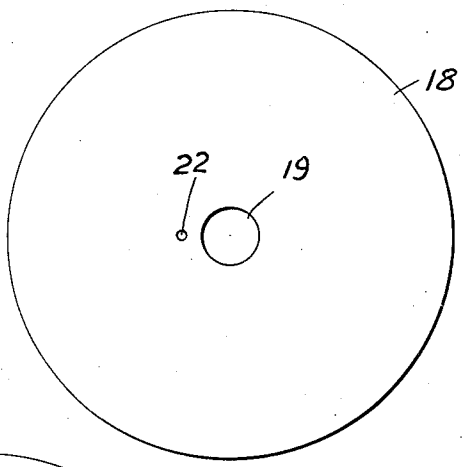

FIG. 3.

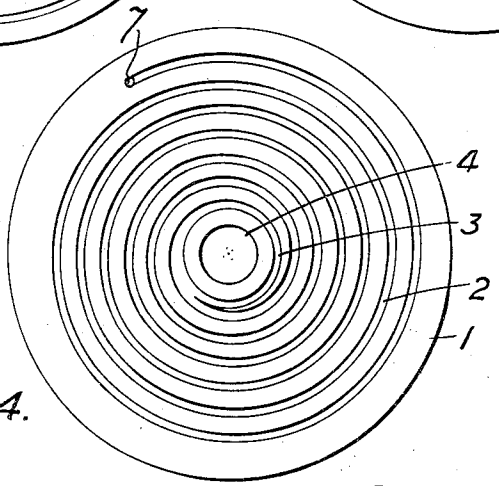

FIG. 4.

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GAS PILOT BURNER CONTROL

Filed April 24, 1933 3 Sheets-Sheet 2

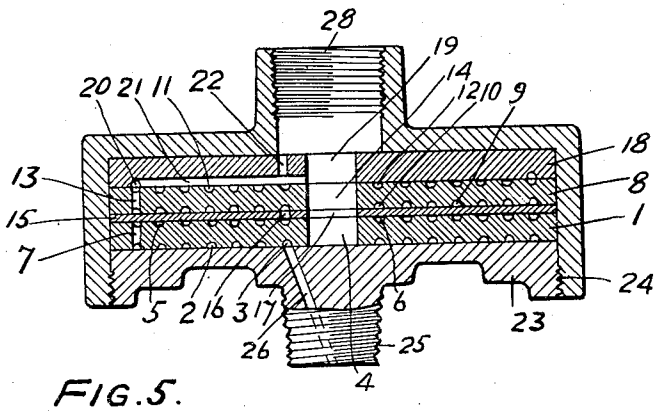

FIG. 5.

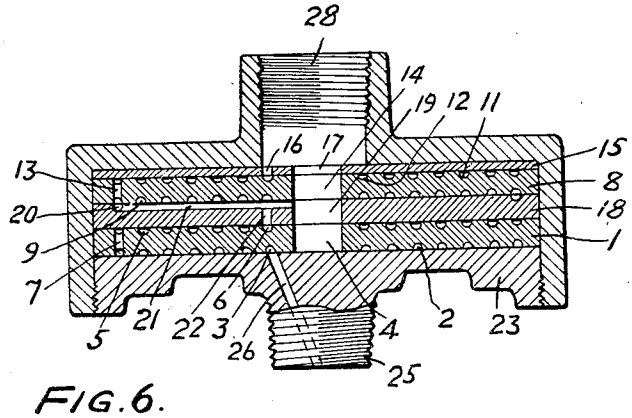

FIG. 6.

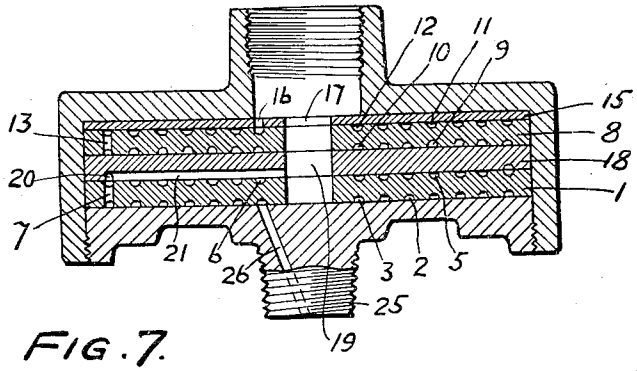

FIG. 7.

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GAS PILOT BURNER CONTROL

Filed April 24, 1933 3 Sheets-Sheet 3

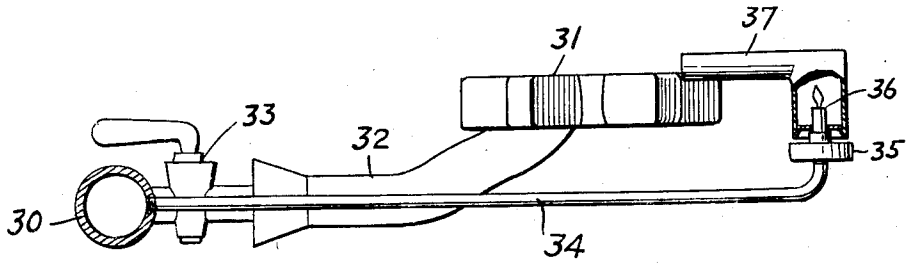

FIG. 8.

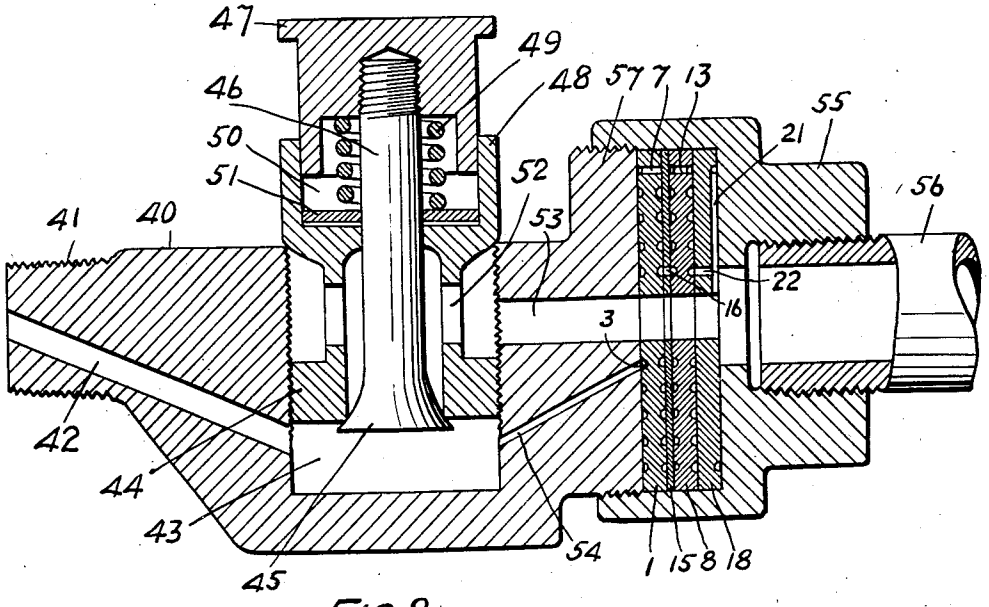

FIG. 9.

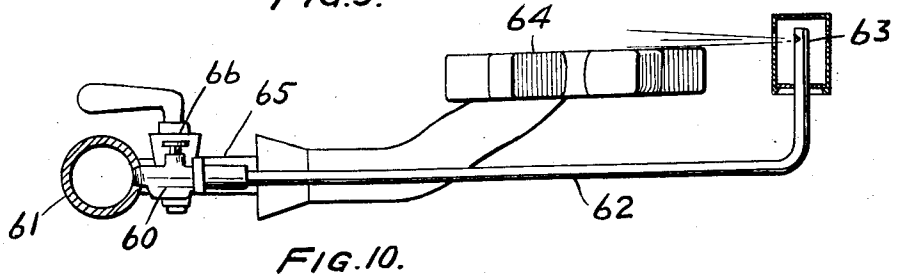

FIG. 10.

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UNITED STATES PATENT OFFICE

1,964,300

GAS PILOT BURNER CONTROL

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Application April 24, 1933, Serial No. 667,650

4 Claims. (Cl. 158—115)

The present invention relates to pilot lights for gas burning appliances.

Pilot lights are usually provided on intermittently operated gas burning appliances. These pilots burn continuously with a small flame to serve for the ignition of the larger flow of gas to the burners. The outage of these pilot lights is a constant source of trouble and expense to the gas distributing companies, and, in the case of appliances intermittently turned on by automatic means, the outage of a pilot may cause asphyxiation or an explosion with destruction of life and property.

The principal cause of the pilot outage is the stoppage of the needle valves employed to secure the small flow to the pilot which is necessary for purposes of economy.

The orifices of these needle valves when adjusted for a small flow are very narrow, for instance on a gas range pilot burning 0.2 to 0.3 cubic foot per hour the needle valve orifice may be an annulus only .00028 inch wide.

These orifices readily clog with dust particles due to their narrow width, and in some situations this is the chief cause of stoppage. In other situations, particularly those in which coke oven gas is distributed, the stoppage is principally due to minute particles of gummy material formed in the gas and not prevented by ordinary purification methods.

These particles are very small but the larger ones are of an order of magnitude approaching the width of the needle valve orifices. It requires only a small quantity of dust and a still more minute quantity of gum or gum and dust to clog the needle valve orifice and cause an outage of the pilot.

We have found that if orifice control is abandoned and the flow of gas to the pilot is controlled by passing the gas through a long capillary passage formed by a spiral groove in a flat disc held tightly against a bounding surface, the desired small flow may be secured with a very great reduction in the danger of stoppage. Due to the length of the passage formed by the groove, its cross sectional dimensions may be many times greater than the needle valve orifice width. In actual test on coal gas containing considerable quantities of gum particles the disc controlled pilot, burning simultaneously in parallel with several very widely used needle valve pilots adjusted for the same flow (namely 0.2 to 0.3 cubic foot per hour under a gas pressure of 3½ inches) burned continuously for twenty-five days and was still burning without apparent diminution of flow at the end of that time, while the best needle valve controlled pilot had gone out twenty-three times through stoppage of the needle valve orifice. Considering the time required to clean and put back the needle valve pilot in service and the fact that the needle valve pilot at times was out for a considerable period before the fact was noticed, as when outage occurred at night, the comparison is even more favorable to the disc type control than appears from the above.

The principal object of the present invention is to provide a pilot control employing such grooved discs, which can be economically manufactured, which is readily adjustable for different conditions of gas pressure and required flow; which may be readily assembled and taken apart for adjustment or cleaning if necessary; and which is adapted for use with a variety of appliances and ignition devices.

The invention will be described and its advantages pointed out in connection with the accompanying drawings which form a part of this specification and show forms of the invention chosen for illustration and in which—

Fig. 1 shows a cross section of one form of the control unit and discs adjusted for full length passage of the gas through the groove channels.

Fig. 2 shows a plan view of one side of the adjustment disc.

Fig. 3 shows a plan view of the reverse side of the adjustment disc.

Fig. 4 shows a plan view of one of the two identical sides of a spirally grooved disc.

Fig. 5 shows a cross section of the control unit of Fig. 1 adjusted for three-quarter length passage of the gas through the groove channels.

Fig. 6 shows a cross section of the control unit of Fig. 1 adjusted for one-half length passage of the gas through the groove channels.

Fig. 7 shows a cross section of the control unit of Fig. 1 adjusted for one-quarter length passage of the gas through the groove channels.

Fig. 8 shows a view chiefly in elevation of the unit of Fig. 1 connected to a pilot light burner of a gas range employing a "flash back" ignition tube.

Fig. 9 shows a cross section of a torch type igniter in combination with a control unit having the same discs as in Fig. 1 and adjusted as in Fig. 1.

Fig. 10 shows chiefly in elevation the apparatus of Fig. 9 connected to the burner bar of a gas range.

Referring to the Figures 1, 2, 3, 4—1 is a flat disc shown in cross section in Fig. 1 and in plan

in Fig. 4, provided with a spiral groove 2 in one flat surface, extending outward from an annular groove 3, which encircles but is separated from the channel 4 which passes through the disc. On its other flat surface the disc is provided with a similar spiral groove 5 extending outward from the annular groove 6. The spiral grooves on either side of the disc are connected by the channel 7 extending through the disc. 8 is a second disc identical to disc 1 also provided with spiral groove and annular grooves on one face indicated as 9 and 10, respectively, and spiral and annular grooves on the other face indicated as 11 and 12, respectively. The two spiral grooves are connected by the channel 13. 14 indicates the central channel through disc 8.

The two discs 2 and 8 are separated by a thin washer disc 15 provided with the channel 16 passing through the washer and registering with the annular grooves 6 and 10. The washer is provided with a central channel 17 registering with channels 4 and 14 of discs 2 and 8, respectively.

18 indicates a disc provided with the central channel 19, registering with channel 14 in disc 8, and provided with the annular groove 20 in one of its flat surfaces. It is also provided with the radial groove 21 extending from groove 20 to the channel 19 and with the channel 22, extending through the disc and communicating with the radial groove 21 and registering with the annular groove 12 of disc 8.

The discs are held together tightly in a housing comprised of two members termed for convenience a cover plate and a cover; the cover plate 23 is shown provided with the threaded lug 25 adapted to be connected to a source of gas, for instance the burner bar of a gas range, and provided with the inlet channel 26 leading to its surface in contact with disc 1 and registering at that end with the annular groove 3 of disc 1. The cover plate is threaded at 24 to screw into the threaded flange of the cover 27, which is provided with the outlet passage 28 which communicates with the opening formed by the registered central channels of the discs. The cover is shown threaded at 29 for connection to the pipe (not shown) leading to the pilot burner. Externally the cover plate may be in the form of a hexagonal nut for convenience in assembly and disassembly, and the cover plate may be provided with the recesses 29' to receive a wrench for the same purpose.

When the discs are arranged as in Fig. 1, the gas passes from the source of supply, through the channel 26 to the annular groove 3 in disc 1 and thence through the spiral groove 2, and through the channel 7, to the spiral groove 5 of disc 1, through the spiral groove 5 to the annular groove 16, from thence through the channel 16 in disc washer 15 to the annular groove 10 in disc 8 and thence through the spiral groove 9, channel 13, spiral groove 11 and annular groove 12 in disc 8 to the channel 22 in disc 18 and thence into the radial groove 21 in that disc and thence in to the outlet passage 28 and thence to the pilot burner. The gas flows in series through the length of the four spiral grooves provided by the two discs 1 and 8.

Referring to Fig. 5—The same parts are employed as in Fig. 1 and are indicated by identical numbers. The disc 18 however is reversed so that the annular groove 20 registers with an outer portion of the spiral groove 11 of disc 8, and the radial groove 21 forms a bypass gas passage from the outer portion of the spiral groove 11 to the central channel 19.

The gas travels the same path described in connection with Fig. 1, until it reaches the annular groove 20, from thence it flows straight through the radial groove 21 to the outlet channel, bypassing the spiral groove 11. The travel of the gas through the control unit is substantially three-fourths the travel in the arrangement of Fig. 1.

Referring to Fig. 6—The parts are the same as in Figs. 1 and 5, but the washer disc 15 is moved to the position shown and disc 18 is arranged between discs 1 and 8 with the channel 22 registering with the annular groove 6 of disc 1 and the face of the disc 18 carrying the radial groove 21, in contact with disc 8 and not disc 1.

The travel of the gas is the same as described in connection with Fig. 1, until the gas reaches the annular groove 6 in disc 1, when instead of passing through the grooves of disc 2 it passes through the channel 22 and the inner portion of the radial groove 21 to the central channel 14 and thence to the outlet 28, bypassing the two spiral grooves of disc 8. The travel of the gas is substantially one half of that in Fig. 1.

Referring to Fig. 7—The parts are the same as in Figs. 1, 5 and 6, but the disc 18 is arranged between the discs 1 and 8 in a position reversed from the position shown in Fig. 6, so that the annular groove 20 of disc 18 registers with the outer portion of the spiral groove 5 of disc 1 and the radial groove 21 forms a bypass connection across the spiral groove 5 to the central channel 19.

The travel of the gas is through the spiral groove 2 of disc 1 and through the channel 7 to the outer portion of the spiral groove 5 and thence by the annular groove 20 and the radial groove 21 to the central channel 19 and thence to the outlet 28.

The entire disc 8 is bypassed and one spiral groove of disc 1 also. The travel of the gas is substantially one-fourth the length of that in Fig. 1.

It will be seen from the above description that by employing the same discs but varying their relative positions the travel of the gas through the spiral grooves can be varied in steps of ¼, ½, ¾ and full travel. This permits of adjustment to secure a desired flow under different gas pressure conditions or to secure various flows under the same gas pressure.

Employing discs of approximately 1¼ inches in diameter and having a spiral groove on each face approximately 17 inches long and .035 inch wide with a cross sectional area equivalent to a circle .035 inch in diameter, the arrangement shown in the above described figures permits the supplying of a pilot flow between 0.2 and 0.3 cubic foot per hour under gas pressure conditions varying from 2½ to 10 inches of water. Likewise for a given pressure the flow can be varied by shortening or lengthening the gas path.

The above dimensions are given for illustration as they are adapted for convenient use for gas range pilots, as the assembled unit is small and compact and grooves of such dimensions have proven in actual test to be very satisfactory.

Grooves of larger cross section may be employed, however. The flow varies with the pressure, and inversely as the length of the groove, among other factors, and in grooves having cross sections approximating the circular, substan-

tially with the 4th power of the diameter of a circle having an area equivalent to the cross sectional area of the groove. Normally the unit would be designed for the average condition, permitting upward and downward variation in both pressure and flow.

The employment of two discs with spiral grooves is illustrated,—more of such discs may be employed to lengthen the gas channel and permit the use of a larger diameter groove if required or to increase the degree of adjustability with the same length channel.

Also by employing additional discs such as 18 but with their annular grooves arranged to register with the spiral grooves at points intermediate the ends of the spiral grooves instead of at their outer ends, the adjustability may be multiplied.

Referring to Fig. 8—This figure shows the assembled control unit connected to the pilot of a gas range.

30 indicates the range burner bar; 31 is a cooking burner supplied by gas through the supply pipe 32 as controlled by cock 33. 34 is the pilot supply tube leading from the burner bar 30 through the control unit 35 to the pilot burner 36 which burns continuously.

When the gas is turned on to the burner by opening cock 33, gas issuing from burner ports travels through the ignition tube to the pilot burner, ignites and flashes back igniting the gas issuing from the rest of the burner ports.

Referring to Fig. 9—The invention has the added advantage that the discs illustrated in the previous figures may be employed without change to control the flow of gas to the pilot of the torch type igniter. The central channel through the discs becomes the duct for the larger flow of gas providing the torch. Thus it is necessary to manufacture only one set of discs for the two commonly employed methods of range burner ignition. Fig. 9 shows the discs of the previous figures in combination with a very widely used type of range lighter modified for the purpose.

40 generally indicates the lighter, which is provided with the threaded lug 41, adapted to be screwed into a tapped hole in a range burner bar, and provided with the passage 42 for leading the gas to the valve chamber 43. The chamber is threaded to receive the threaded valve seat 44. The valve 45 has the stem 46 which is screwed into the push button 47 which slides within the bore of the member 48 which carries the valve seat. Spring 49 arranged in the stuffing box chamber 50 serves to hold the valve on its seat, 51 indicates packing. Ports 52 in the member 48 are in communication with the outlet passage 53. 54 is a bypass passage for the pilot flow around the valve 45.

In the present lighters this bypass is controlled by a needle valve arranged to provide a very narrow orifice for the flow of the gas the stoppage of which is a serious source of trouble. In the present invention the employment of this needle valve control is replaced by control by passage through the long grooves of the discs.

The bypass passage is arranged to register with the annular groove 3 of disc 1. The discs 1, 8, 15 and 18 are identical with those of previous figures and their relative arrangement in Fig. 9 is the same as that shown in Fig. 1, and it is not thought necessary to redescribe them. They may be arranged as in the relative positions shown in Figs. 5, 6 and 7 for adjusting the flow of the pilot gas.

The central channels formed in the discs register with the outlet passage 53, to provide a passage from the valve chamber 43 to the pipe 56 leading to the pilot burner (not shown). The cover 55 is essentially the same as cover 27 in previous figures and is threaded to receive the pipe 56 and to screw onto a threaded boss 57 on the lighter body 40.

Referring to Fig. 10—The pilot control unit and lighter together are designated as 60; attached to burner bar 61 of a gas range is the pipe leading to the pilot burner 63; 64 indicates a cooking burner supplied with gas from the burner bar by pipe 65 as controlled by the burner cock 66.

Referring to Figs. 9 and 10—In operation, the pilot light burns continuously supplied with a small flow of gas flowing through passage 42, chamber 43, the bypass passage 54 and the grooves and passages of the disc unit and the pipe 56 to the burner 63.

When the burner is to be ignited the cock 66 is turned on and gas issues from the burner ports, at the same time the push button 47 is pushed down opening the valve 45 and permitting a larger flow of gas to pass between the valve and seat 44 and through the ports 52 to the passage 53 and thence through the registered central channels of the discs to the pipe 56 and the pilot burner producing a torch flame directed to the burner 64 and igniting the gas issuing from its ports. The push button is then released and the valve 45 is closed against the seat 44 cutting off the larger flow of gas. The pilot flow continues through the bypass passage 54 and the pilot burner continues to burn with a small flame.

The apparatus described and illustrated above has the following advantages among others. It provides a pilot control in which the danger of stoppage is very greatly minimized. The control may be small and compact. It is entirely enclosed and not easy for the householder to tamper with. It may be readily assembled and taken apart by the fitter for adjustment or cleaning. The same discs may be employed with a variety of appliances and ignition devices. The discs may be cheaply made and the grooves accurately formed by die casting or stamping so that they will not require calibration.

The invention has been described particularly as to its use with gas ranges. It is obvious that it may be employed in a wide variety of gas burning appliances having pilots, such as water heaters, etc., or with gas appliances having burners other than pilots which are supplied with gas at a low rate of flow, as for instance gas refrigerators.

It will be obvious to those skilled in the art to which the invention relates that modifications may be made in details of construction and arrangement and matters of mere form without departing from the spirit of the invention which is not limited to such matters, or otherwise than the prior art and the appended claims may require.

We claim:

1. A gas pilot control comprising disc cover plates having means for detachably connecting them at their rims and of which one has a central gas connection and the other has an inclined gas connection, in combination with a centrally perforated washer having on one face an annular groove and a radial groove connecting with the annular groove and with the central perforation

and said washer having a hole through it from the radial groove, a second flat face centrally perforated washer having a hole through it, and centrally perforated discs having on their opposite faces spiral grooves springing from circular grooves surrounding and spaced from their central perforations and communicating at their ends through the discs, the washers and discs by arrangement between the cover plates in different sequences and relations with their grooves and holes in communication with each other and with the gas connections, providing spiral gas passages of different lengths.

2. In a gas pilot control an element having a facial circuitous groove, a connection supplying gas to the groove, and a reversible element having on one face a groove by passing all or a part of said circuitous groove and having its other face constructed to pass gas through the circuitous groove according to the relative position of the parts.

3. A gas pilot control comprising cover plates each having a gas connection in combination with a perforated washer having on one face a groove connecting with the perforation, a second flat faced washer having a hole through it, and perforated discs having on their opposite faces spiral grooves communicating at their ends through the discs, the washers and discs by arrangement between the cover plates in different sequence and relations with their grooves and holes in communication with each other and with the gas connections providing spiral gas passages of different lengths.

4. A gas pilot control comprising, in combination, cover elements, gas inlet and outlet connections, elements having circuitous grooves arranged on each face thereof and intercommunicating at one of their ends through the elements, and perforated washer elements of which one is provided with a facial groove, the washer and circuitously grooved elements by arrangement between the cover elements in different sequence and relations with their grooves and holes in communication with each other and with the gas connections providing circuitous gas passages of different lengths.

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