W. R. PURNELL.

AIR CONTROL REGISTER.

APPLICATION FILED JULY 7, 1921.

1,436,823.

Patented Nov. 28, 1922.

3 SHEETS—SHEET 1.

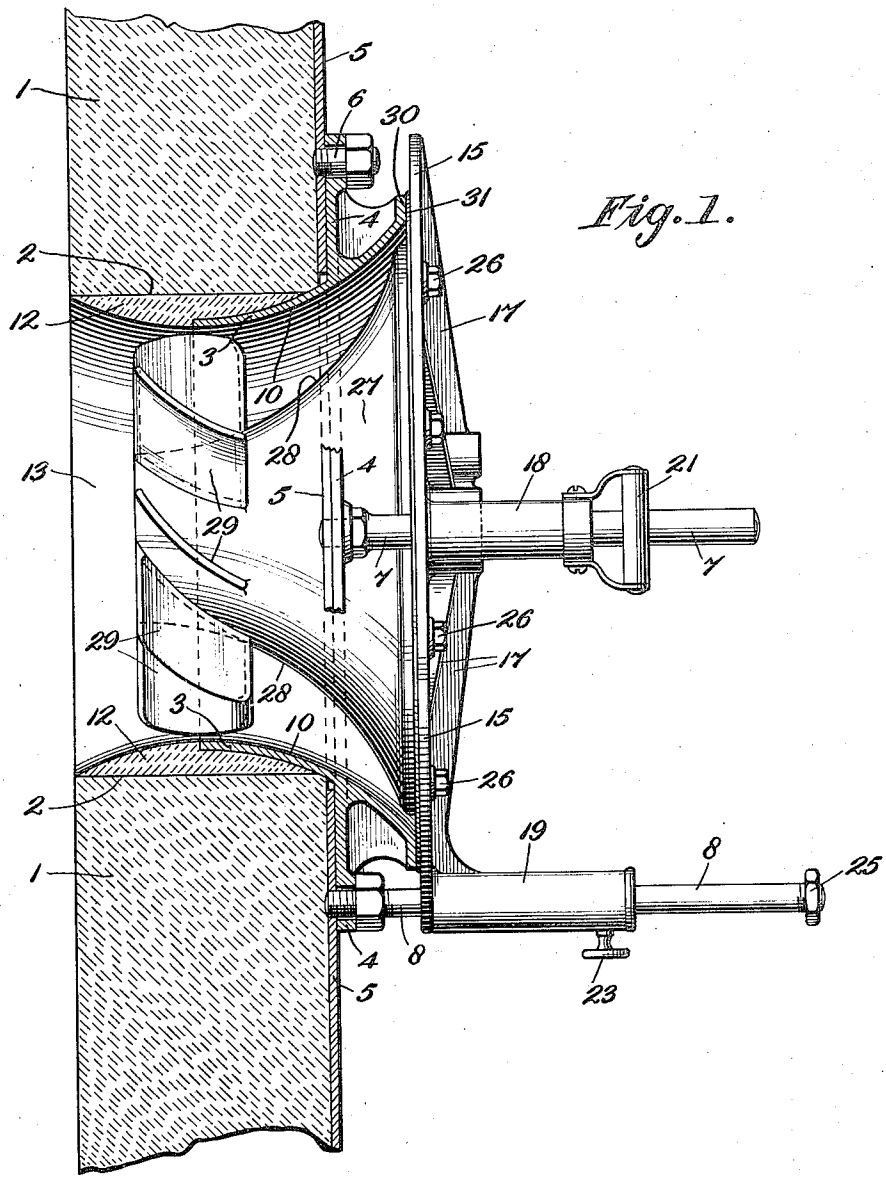


Fig. 1.

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3 SHEETS—SHEET 2.

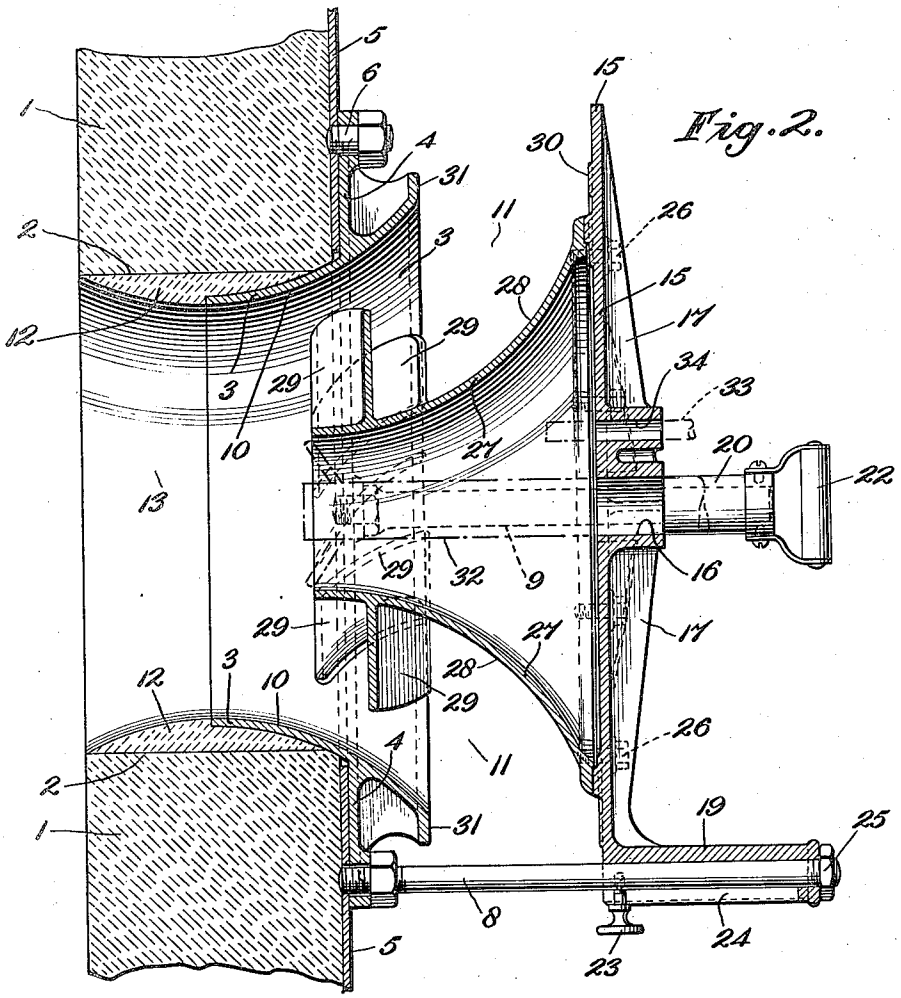


Fig. 2.

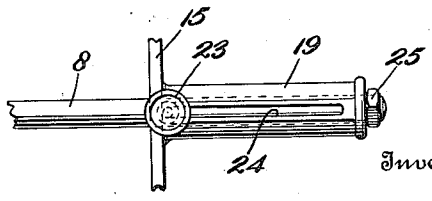


Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 4.

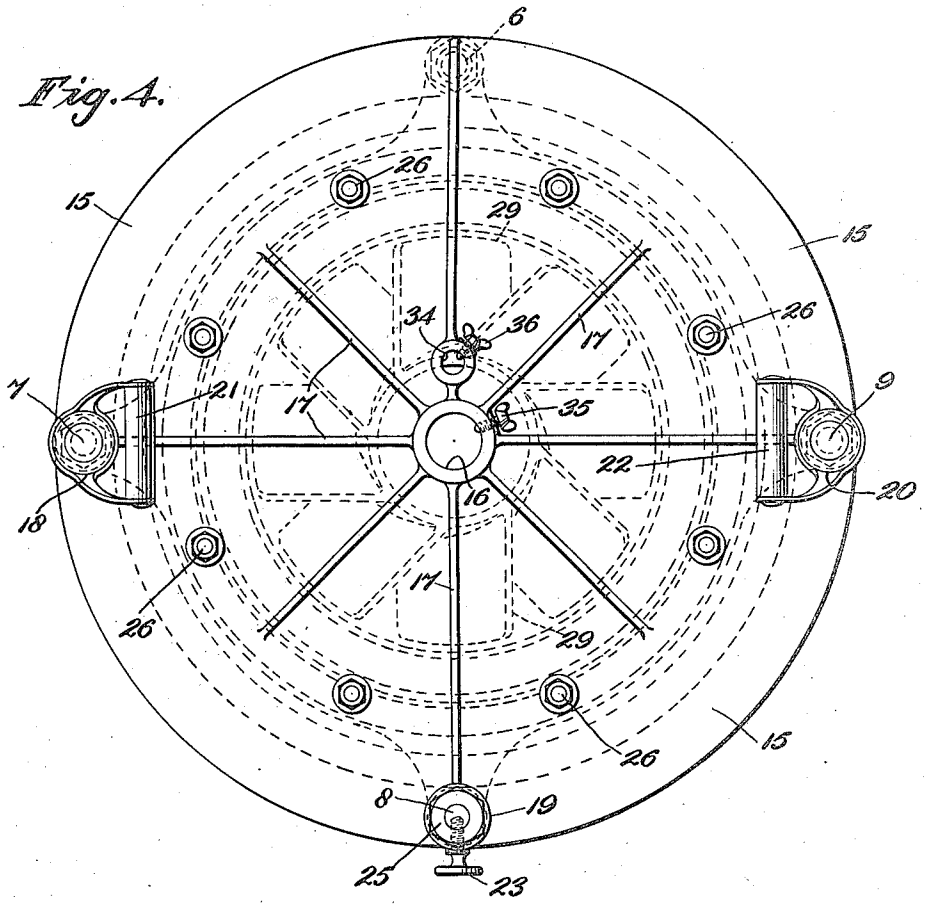
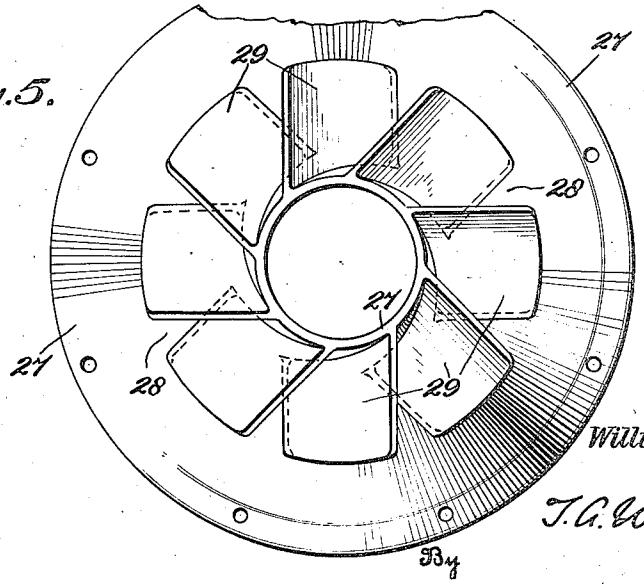


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM R. PURNELL, OF THE UNITED STATES NAVY.

AIR-CONTROL REGISTER.

Application filed July 7, 1921. Serial No. 483,056.

To all whom it may concern:

Be it known that I, WILLIAM R. PURNELL, a lieutenant-commander in the United States Navy, and a citizen of the United States, at present stationed at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Air-Control Registers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to air control registers and has for its object to provide a device of this character which will be simple in construction, comparatively inexpensive to manufacture, and more efficient in use than those which have been heretofore proposed.

With these and other objects in view, the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification, in which like numerals designate like parts in all the views:

Figure 1 is a diagrammatic sectional elevational view of an air control register made in accordance with the present invention, the parts being shown in their closed positions.

Figure 2 is a central vertical sectional view partly in elevation, of the parts shown in Figure 1, the register being shown in its open position;

Figure 3 is a fragmentary vertical plan view of the means employed for locking the parts in any desired position;

Figure 4 is a rear elevational view of the register as seen from the right of Figure 1; and

Figure 5 is a front elevational view partly broken away, of a portion of the movable rear element of the register.

1 indicates the wall of any suitable furnace or other combustion chamber provided with a furnace opening 2 into which is adapted to fit the furnace opening ring 3, which may be provided with an annular flange 4, whereby the said ring 3 may be secured to the front plate 5 as by the studs 6, 7, 8, and 9.

The furnace ring 3 is preferably annular and is provided with the curved surface 10 forming one side of the air passage 11, and the said ring 3 may be suitably supported and anchored within the furnace opening 2 by building up the said opening with suitable refractory material such as 12, which material is shaped so as to continue the curvature of the ring 3 and to present a substantially unbroken surface surrounding the mixing chamber 13, as will be clear from Figure 2.

Slidably mounted on the studs 7, 8 and 9 is the movable rear element 15 which preferably takes the form of a circular metallic plate provided with a central bore 16 and with a plurality of radial strengthening ribs 17. The said plate 15 is also provided at or near its outer circumference with the projections or bosses 18, 19 and 20 which are bored and adapted to receive the studs 7, 8 and 9 respectively. The said plate 15 is adapted to slide upon the said studs 7, 8 and 9, and the bosses 18 and 20 are provided at or near their outer ends with the handle members 21 and 22 by means of which the said plate may be moved to any desired position upon the said studs. The plate 15, when so adjusted, may be secured in such position by tightening up on the set screw 23 which is threaded into the stud 8 and which works in the slot 24 with which the sleeve or boss 19 is provided, as will be clear from Figures 2 and 3. The said stud 8 may be provided on its outer end with a nut 25 which acts as a stop to prevent the unintentional removal of the said rear plate 15.

Rigidly secured to the inner surface of the plate 15 as by the bolts 26 is the hollow conoidal member 27 provided with the curved surface 28 conforming substantially to the curved surface 10 of the furnace opening ring 3 and adapted to form the other side of the air passage 11, see Figure 2. The said member 27 may be provided at or near its reduced inner end with a plurality of angularly disposed vanes 29, here shown as integral with the said member, although these said vanes may, if desired, be made separate from and pivoted to the said member, so that their angularity may be adjusted to suit varying operating conditions.

The plate 15 is provided on its inner surface with an annular rib 30 which is preferably ground to coact with the ground sur-

face 31 of the furnace opening ring 3 to form a substantially air tight joint when the register is closed. Any suitable form of fluid fuel burner such as 32 may be employed with this register, the said burner passing through the bore 16 in the plate 15, and the said burner may be supported by the customary supporting rod 33 passing through the eccentric bore 34 with which the plate 15 is provided. The said burner 32 may be secured within its bore 16 by a thumb screw 35, while the said supporting rod 33 may be secured in its bore 34 by its thumb screw 36.

The operation of the present invention will be clear from the foregoing, but may be briefly summarized as follows:

The parts being assembled substantially as shown and fuel being supplied to the burner 32, it is ignited at the burner tip, and the air which is necessary to support and carry on the combustion is supplied thereto through the curved annular air passage 11 formed between the inner surface 10 and the furnace opening ring 3, and the outer surface 28 of the control member 27. Should the operating conditions require a large amount of air, the parts are adjusted to substantially the positions illustrated in Figure 2, the back member or plate 15 being moved to the right, as seen in said figure, as far as it will go, or until the right hand end of the projection 19 engages the stop nut 25. The greatest amount of air possible will then be sucked in through the air passage 11 and will strike the angularly disposed vanes 29 carried by the member 27, which vanes will deflect said air and impart a whirling motion thereto.

The air will then enter the mixing chamber 13, where it will be mixed with the fluid fuel as it leaves the tip of the burner 32, the whirling motion imparted by the vanes 29 insuring a thorough mixture of the air with the fuel. Should this adjustment of the parts admit too much air the back plate 15 may be moved to the left as seen in Figure 2 by loosening the set screw 23 and pushing it in by means of its handles 21 and 22, until the proper amount of air is being admitted, whereupon the set screw 23 may be again tightened, holding the parts in their new positions. Should it be desired to cut off the air entirely, the plate 15 is moved to its extreme left hand position, as seen in Figure 1, whereupon the ground surface of the annular rib 30 will engage the ground surface 31 of the furnace opening ring 3 forming a substantially air tight joint therewith, and preventing the entrance of any air into the mixing chamber 13.

The hollow space within the member 27 may be employed as a dead air space, or small holes may be drilled through the plate 15, leading to the interior of the said member 27, whereby cooling air may be admitted thereto.

By constructing a register in accordance with the above disclosure, there is provided a device without small or intricate working parts or adjustments, and in fact having a minimum number of parts, yet which will readily and accurately control the amount of air admitted to the mixing chamber. This results in increased efficiency and ease of operation, as well as in a relatively inexpensive structure. The surfaces 10 and 28 are substantially spherical in section, but are designed to approach as closely as possible the tractrix, or no friction curve for the flow of gases, with the result that the draft requirements of the register are relatively low.

Furthermore, owing to the peculiar construction of this register, the control of the air is obtained by means of a single movable rear element, which is so designed that it obstructs the furnace opening sufficiently to prevent radiant heat from coming back from the furnace directly upon the attendant, while at the same time permitting a free flow of air thereto, and should there be any flare back of the flame, the outwardly flaring air passage and the plate 15 will deflect it along the furnace front, instead of permitting it to go directly to the rear.

It is obvious that those skilled in the art may vary the details of construction as well as the arrangement of parts without departing from the spirit of the invention, and therefore, I do not wish to be limited to the above disclosure except as may be required by the claims.

What I claim is:

1. In an air control register the combination of a ring member adapted to be secured within an opening in a furnace wall; a support rigid with said ring member; a member slidably mounted upon said support, adapted to move axially of said ring member, and to co-act therewith to control the passage of air through said opening; means for locking said slidable member in any desired position relative to said ring member; and means comprising a plurality of angularly disposed vanes carried by said slidable member, adapted to impart a whirling motion to said air, substantially as described.

2. In an air control register the combination of a hollow conoidal member adapted to be secured within an opening in a furnace wall, constituting one wall of an air passage; and a companion conoidal member forming another wall of said air passage, and adapted to move relatively to said fixed member to control the flow of air through said passage, substantially as described.

3. In an air control register the combination of a hollow frusto-conoidal member

adapted to be secured within an opening in a furnace wall, forming one wall of an air passage; and a plate member having a frusto-conoidal extension forming another wall of said air passage, adapted to move axially of said fixed member to control the flow of air through said passage, substantially as described.

4. In an air control register the combination of a hollow frusto-conoidal member adapted to be secured within an opening in a furnace wall, forming one wall of an air passage; a plate member having a rigid frusto-conoidal extension forming another wall of said air passage, adapted to move axially of said fixed member to control the flow of air through said passage; and means within said passage for imparting a whirling motion to said air, substantially as described.

5. In an air control register the combination of a hollow frusto-conoidal member adapted to be secured within an opening in a furnace wall, forming one wall of an air passage; a plate member having a rigid frusto-conoidal extension forming another wall of said air passage, adapted to move axially of said fixed member to control the flow of air through said passage; and means within said passage comprising a plurality of vanes carried by said movable member for imparting a whirling motion to said air, substantially as described.

6. In an air control register the combination of a hollow frusto-conoidal member adapted to be secured within an opening in a furnace wall, forming one wall of an air passage; a plate member having a rigid frusto-conoidal extension forming another wall of said air passage, adapted to move axially of said fixed member to control the flow of air through said passage; and means within said passage comprising a plurality of angularly disposed vanes rigid with said extension for imparting a whirling motion to said air, substantially as described.

7. In an air control register the combination of a hollow frusto-conoidal member adapted to be secured within an opening in a furnace wall, forming one wall of an air passage; a plate member having a rigid frusto-conoidal extension forming another wall of said air passage, adapted to move axially of said fixed member to control the flow of air through said passage; means for moving said plate member; means for locking said plate member in any desired position relative to said fixed member; and means within said air passage comprising a plurality of vanes carried by said extension for imparting a whirling motion to said air, substantially as described.

8. In an air control register the combination of a hollow frusto-conoidal member adapted to be secured within an opening in a furnace wall, forming one wall of an air passage; a plurality of supports associated with said member; a plate member having a rigid frusto-conoidal extension forming another wall of said air passage slidably mounted upon said supports and adapted to move axially of said fixed member to control the flow of air through said passage; means for moving said plate member; means for locking said plate member in any desired position relative to said fixed member; and means within said air passage comprising a plurality of vanes carried by said extension for imparting a whirling motion to said air, substantially as described.

In testimony whereof I affix my signature.

WILLIAM R. PURNELL.