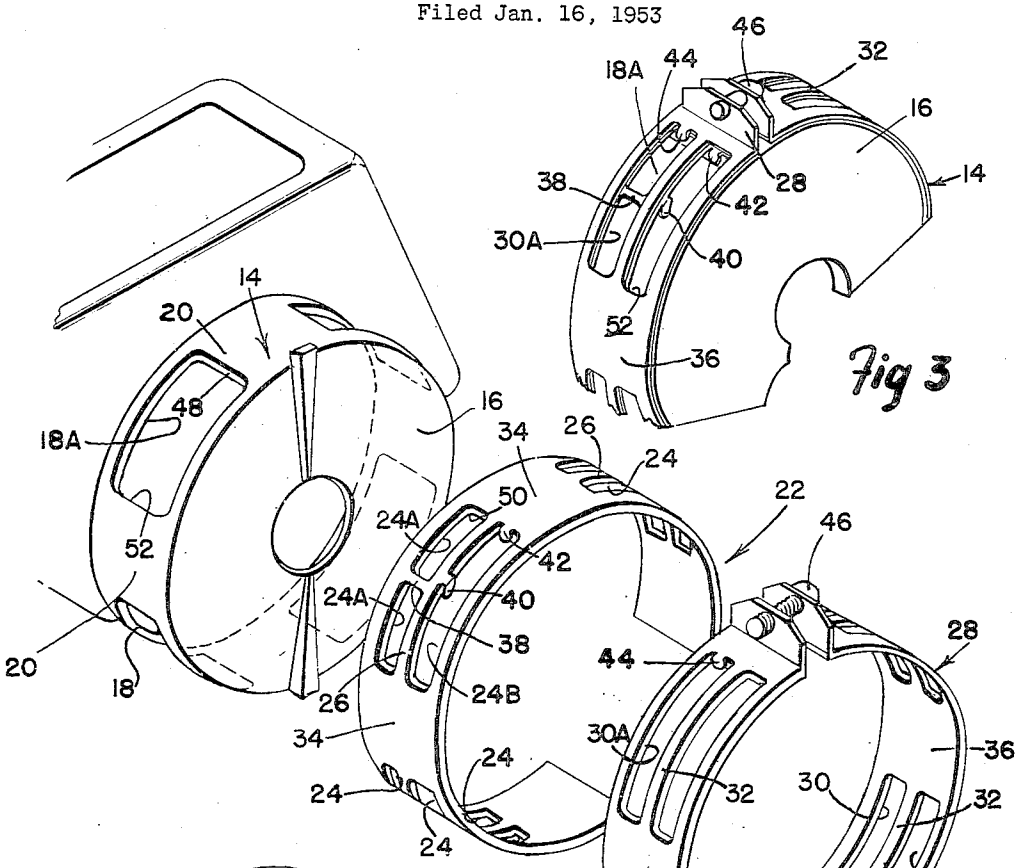
June 17, 1958 C. V. COPELAND 2,839,080

AIR ADJUSTING DEVICE FOR A FURNACE HEATING UNIT

Filed Jan. 16, 1953



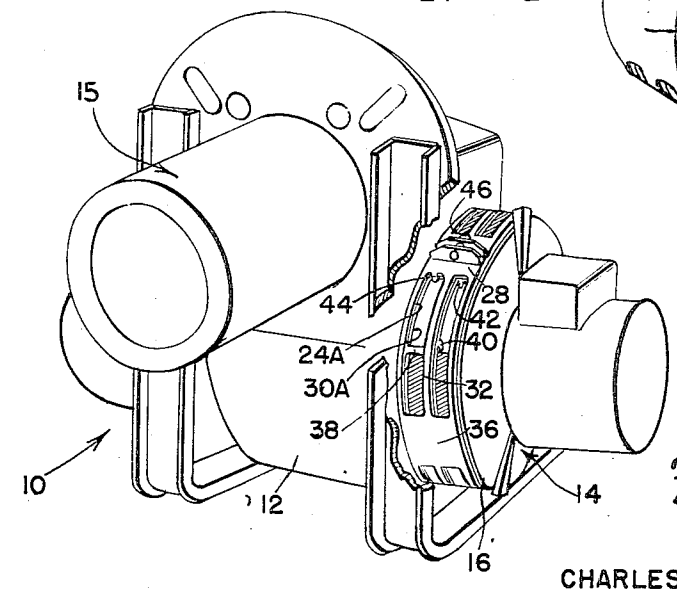


Fig 2

Fig 1

INVENTOR.

CHARLES V. COPELAND

BY

Lockwood, Galt, Woodard & Smith

ATTORNEYS

United States Patent Office

2,839,080

Patented June 17, 1958

2,839,080

AIR ADJUSTING DEVICE FOR A FURNACE HEATING UNIT

Charles V. Copeland, Fort Wayne, Ind., assignor to Wayne Home Equipment Company, Fort Wayne, Ind., a corporation of Indiana

Application January 16, 1953, Serial No. 331,697

6 Claims. (Cl. 137—625.4)

The present invention relates to heater units for furnace installations, and more particularly to an air adjusting device for such heater units.

It is a well known fact, for efficient operation and consequent economy, the mixture of air and fuel must be in proper proportions to assure complete combustion of the fuel. Various damper or shutter devices have been used for controlling a quantity of air admitted to the burning fuel, and such devices are generally similar in the fact that an air intake opening is controlled in size to effect admission of just the proper quantity of air. In existing burner units wherein more air is required for efficient operation, it is usually necessary to provide auxiliary air intake openings, and since almost all burner units are the ultimate in compactness, sufficient area in the burner housing is just not available for providing such auxiliary openings. This necessitates the re-design of the burner unit with consequent increase in burner cost to cover the necessary developmental and fabrication requirements concomitant with any new design.

It is, therefore, an object of this invention to provide in a fuel burning unit an air intake-adjusting device which will provide more controllable air intake-opening area for a given size of air-intake housing than has heretofore been available.

It is another object of this invention to increase the maximum air intake-opening area in an air intake housing without requiring any alterations in the housing dimensions.

It is still another object of this invention to increase the range of air intake adjustment in an existing burner assembly without necessitating any complex or costly changes in design or alteration of the burner assembly itself.

Other objects will become apparent as the description proceeds.

To the accomplishment of the above and related objects, my invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that specific change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

In the drawing:

Fig. 1 is a perspective illustration, partially broken away, of an oil burning unit which incorporates an embodiment of this invention;

Fig. 2 is an exploded view of the embodiment of Fig. 1; and

Fig. 3 is an enlarged perspective view of a portion of the embodiment of Fig. 1 in assembled condition.

Referring to the drawings, an oil burning unit, indicated generally by the reference 10, is comprised of a blower or fan housing 12 in which operates a fan which draws air from the intake housing 14 and exhausts it from the conventional air tube 15 for utilization in the usual manner.

The intake housing 14 is of cylindrical shape having a closed end 16 (when assembled in a complete burner unit 10) and a series of annularly arranged, circumferentially extending inlet ports 18, 18*a* which are spaced apart by solid portions 20 as seen more clearly in Fig. 2. The arcuate extent of the ports 18, 18*a* and solid portions 20 are of particular proportionate dimensions as will be explained more fully hereinafter.

An inner adjusting band 22 preferably formed of sheet metal is slidably received on the peripheral surface of the housing 14, and is provided with a series of annularly arranged, circumferentially extending openings 24, 24*a*, 24*b* which are substantially coextensive in size, and registrable with the respective ports 18, 18*a* in the housing 14. In order to obtain suitable rigidity in the structure of the band 22, suitable circumferential strengthening ribs 26 are used which provide laterally adjacent openings 24.

This band 22 is preferably preformed so as to have a snug fit on the housing 14 but yet be circumferentially slidable thereon for a purpose which will be explained more fully hereafter.

Another band 28 very similar in design to that of the band 22 is received on the outer periphery of the band 22. This band 28 is also provided with openings or apertures 30, 30*a* axially spaced by reinforcing webs 32, the apertures being substantially coextensive with the openings 24 in the band 22 and ports 18 of the housing 14. As in the case of the housing 14, solid portions 34 on the band 22 and solid portions 36 on the band 28 separate adjacent ends of the openings 24 and 30 respectively.

With these bands assembled on the housing 14 in the manner shown in Fig. 3, the ports 18 will be completely open.

One of the openings 24 in the band 22 is provided between its ends with a transverse web or abutment 38 of solid material. The adjacent opening 24*b* is provided on one edge with a radially inwardly bent stop 40, and a similar stop 42 projects radially inwardly from the right hand end of the opening 24*b*. The opening 30*a* of the band 28 which registers with the opening 24*a* of the band 22 is provided on its right end with a radially inwardly projecting abutment lug 44. The ends of the band 28 are flanged outwardly to receive a screw clamp 46 for tightening the adjusted bands in position.

As seen more clearly in Fig. 3, the stop 42 of band 22 is engageable with the end edge 48 of port 18*a* in the housing, and similarly, the abutment lug 44 of the band 28 is also engageable with this end edge 48 and in addition is engageable with the end edge 50 of the inner band opening 24*a*. The intermediate stop 40 in the band 22 is engageable with the left end edge 52 of the housing port 18*a*, and the lug 44 is engageable with the web 38 which crosses the inner band opening 24*a*.

In the preferred arrangement, the solid portions 20, 34 and 36 of the housing and the two bands respectively, have equal arcuate lengths equal to one-half of the arcuate dimension of the housing ports 18. With the screw clamp 46 loosened, the outer band 28 may be rotated counterclockwise relative to the inner band 22 and housing 14 until the solid portions 36 cover one-half of the registered openings and ports 24 and 18, respectively. With this adjustment the lug 44 just touches the inner band abutment 38 whereupon continued rotational advancement of the outer band 28 serves to pick up the inner band and rotate it until the stop 40 engages the end 52 of the housing port 18*a*. With both bands adjusted to this position, the housing ports 18, 18*a* will be completely closed, the solid portion 34 of the inner band covering one half of the respective port 18, and the solid portion 36 of the outer band 28 covering the remaining half of the respective port 18.

In opening the housing ports, the outer band **28** is rotated clockwise (see Fig. 1) relative to the band **22** and housing **14** until the lug **44** engages the end edge **50** of the inner band opening **24***a*. Continued clockwise movement of the outer band **28** will carry the inner band **22** therewith until the inner band stop **42** contacts the end edge **48** of the housing port **18***a*. This contact limits the clockwise movement of both bands relative to the housing **14** and results in complete opening of the housing ports **18**, **18***a*.

Depending upon the heating requirements of the burner **10**, the two bands **22** and **28** should be adjusted accordingly. Maximum air delivery to the air tube **16** is available when the bands **22** and **28** are adjusted to open fully the housing ports **18**, **18***a*. The quantity of air delivered may be reduced by closing the ports **18**, **18***a*, as described in the foregoing.

An important advantage achieved in the use of the foregoing described embodiment of this invention is better understood by considering the prior art air-adjusting device which employed only one band for completely opening and closing the air intake-housing ports. As is apparent, the solid portions of such a single band arrangement corresponding to the portions **20** and **34** in Fig. 2 of the drawing, must be of larger arcuate extent, since in order to obtain complete enclosure of the housing ports, the solid portion of the band must be coextensive in arcuate dimension with the respective port. Thus only one half of the outer peripheral surface of the housing **14** may be ported for obtaining a supply of air for the blower **12** as contrasted with the present invention wherein the described construction permits use of one third more of the peripheral surface of the housing **14**.

By use of this invention, no radical design changes are necessary in existing constructions for effecting the greater air adjustment, nor is it necessary to increase the width or axial dimension of the housing **14** in order to accommodate an increase in the size of air intake openings.

These features are of considerable importance in supplying the market with a more versatile heating unit which may be readily and reliably adapted to a given heating requirement which falls within a relatively wide range of operating conditions.

What is claimed is:

1. An air-adjusting device for a fuel-burning unit and comprising a cylindrical air-intake housing having a plurality of annularly arranged circumferentially extending inlet ports in the outer peripheral surface thereof, the adjacent end of said ports being separated by the solid material of said housing, an inner sheet metal adjusting band slidably received on the ported periphery of said housing and having adjusting openings which match said ports, and an outer sheet metal adjusting band slidably received on the outer periphery of said inner band and having adjusting apertures which match said ports, said ports, openings and apertures being of such size that said bands may be adjusted to open or close completely the housing ports, the outer band having a radially inwardly projecting abutment lug at one end of one of said apertures engageable with the circumferentially spaced end edges respectively of one port whereby the circumferential movement of said outer band is limited to the arcuate dimension of the one port, said inner band having an abutment interposed midway between the circumferentially spaced ends of one opening, said lug of the outer band being engageable with said abutment to move said inner band on said housing and being further engageable with one of said ends of said one opening to move said inner band in the opposite direction, said inner band having a radially inwardly projecting stop interposed midway between the ends of said one opening engageable with one end edge of said one port, and a second stop on said inner band adjacent one end of said one opening and engageable with the other end edge of said port whereby the circumferential movement of said inner band on said housing will be limited by the spacing between said stops.

2. An air-adjusting device for a fuel-burning unit and comprising a cylindrical air-intake housing having a plurality of annularly arranged circumferentially extending inlet ports in the outer peripheral surface thereof, the adjacent ends of said ports being separated by the solid material of said housing, an inner adjusting band slidably received on the ported periphery of said housing and having adjusting openings which match said ports, and an outer adjusting band slidably received on the outer periphery of said inner band and having adjusting apertures which match said ports, said ports, openings and apertures being of such size that said bands may be adjusted to open or close completely the housing ports, the outer band having a radially inwardly projecting abutment lug at one end of one of said apertures engageable with the circumferentially spaced end edges respectively of one port whereby the circumferential movement of said outer band is limited to the arcuate dimension of the one port, said inner band having an abutment interposed midway between the circumferentially spaced ends of one opening, said lug of the outer band being engageable with said abutment to move said inner band on said housing and being further engageable with one of said ends of said one opening to move said inner band in the opposite direction, said inner band having a radially inwardly projecting stop interposed midway between the ends of said one opening engageable with one end edge of said one port, and a second stop on said inner band adjacent one end of said one opening and engageable with the other end edge of said port whereby the circumferential movement of said inner band on said housing will be limited by the spacing between said stops.

3. An air-adjusting device for a fuel-burning unit and comprising a cylindrical air-intake housing having a plurality of annularly arranged inlet ports in the outer peripheral surface thereof, the adjacent end of said ports being separated by the solid material of said housing, an inner adjusting band slidably received on the ported periphery of said housing and having adjusting openings which match said ports, and an outer adjusting band slidably received on the outer periphery of said inner band and having adjusting apertures which match said ports, said ports, openings and apertures being of such size that said bands may be adjusted to open or close completely the housing ports, the outer band having a radially inwardly projecting abutment lug at one end of one of said apertures engageable with the circumferentially spaced end edges respectively of one port whereby the circumferential movement of said outer band is limited to the arcuate dimension of the one port, said inner band having an abutment interposed midway between the circumferentially spaced ends of one opening, said lug of the outer band being engageable with said abutment to move said inner band on said housing and being further engageable with one of said ends of said one opening to move said inner band in the opposite direction, said inner band having a radially inwardly projecting stop interposed midway between the ends of said one opening engageable with one end edge of said one port, and a second stop on said inner band adjacent one end of said one opening and engageable with the other edge of said port whereby the circumferential movement of said inner band on said housing will be limited by the spacing between said stops.

4. An air-adjusting device for a fuel-burning unit and comprising a cylindrical air-intake housing having a plurality of annularly arranged inlet ports in the outer peripheral surface thereof, the adjacent end of said ports being separated by the solid material of said housing, an inner adjusting band slidably received on the ported periphery of said housing and having adjusting openings

which match said ports, and an outer adjusting band slidably received on the outer periphery of said inner band and having adjusting apertures which match said ports, said ports, openings and apertures being of such size that said bands may be adjusted to open or close completely the housing ports, the outer band having a lug at one end of one of said apertures engageable with the circumferentially spaced end edges respectively of one port whereby the circumferential movement of said outer band is limited to the arcuate dimension of the one port, said inner band having an abutment interposed midway between the circumferentially spaced ends of one opening, said lug of the outer band being engageable with said abutment to move said inner band on said housing and being further engageable with one of said ends of said one opening to move said inner band in the opposite direction, said inner band having a stop interposed midway between the ends of said one opening engageable with one end edge of said one port, and a second stop on said inner band adjacent one end of said one opening and engageable with the other end edge of said port whereby the circumferential movement of said inner band on said housing will be limited by the spacing between said stops.

5. An air-adjusting device for a fuel-burning unit and comprising a cylindrical air-intake housing having a plurality of annularly arranged circumferentially extending inlet ports in the outer peripheral surface thereof, the adjacent end of said ports being separated by the solid material of said housing, an inner sheet metal adjusting band slidably received on the ported periphery of said housing and having adjusting openings which match said ports, an outer sheet metal adjusting band slidably received on the outer periphery of said inner band and having adjusting apertures which match said ports, said ports, openings and apertures being of such size that said bands may be adjusted to open or close completely the housing ports, means on both bands operatively engageable with each other to limit the relative movement therebetween to an extent equal to one-half the circumferential length of one port, and means on the inner band engageable with said housing for limiting relative movement therebetween after traversing the other half of the circumferential length of said port.

6. An air-adjusting device for a fuel-burning unit and comprising a cylindrical air-intake housing having a plurality of annularly arranged circumferentially extending inlet ports in the outer peripheral surface thereof, the adjacent end of said ports being separated by the solid material of said housing, an inner adjusting band slidably received on the ported periphery of said housing and having adjusting openings which match said ports, an outer adjusting band slidably received on the outer periphery of said inner band and having adjusting apertures which match said ports, said ports, openings and apertures being of such size that said bands may be adjusted to open or close completely the housing ports, means on both bands operatively engageable with each other to limit the relative movement therebetween to an extent equal to one-half the circumferential length of one port, and means on the inner band engageable with said housing for limiting relative movement therebetween after traversing the other half of the circumferential length of said port.

References Cited in the file of this patent

UNITED STATES PATENTS

206,890	McDowell	Aug. 13, 1878
1,036,302	Miller	Aug. 20, 1912
1,488,568	Thompson	Apr. 1, 1924
1,611,735	Garland	Dec. 21, 1926
1,740,626	Petrelli	Dec. 24, 1929

FOREIGN PATENTS

522,006	Germany	1931