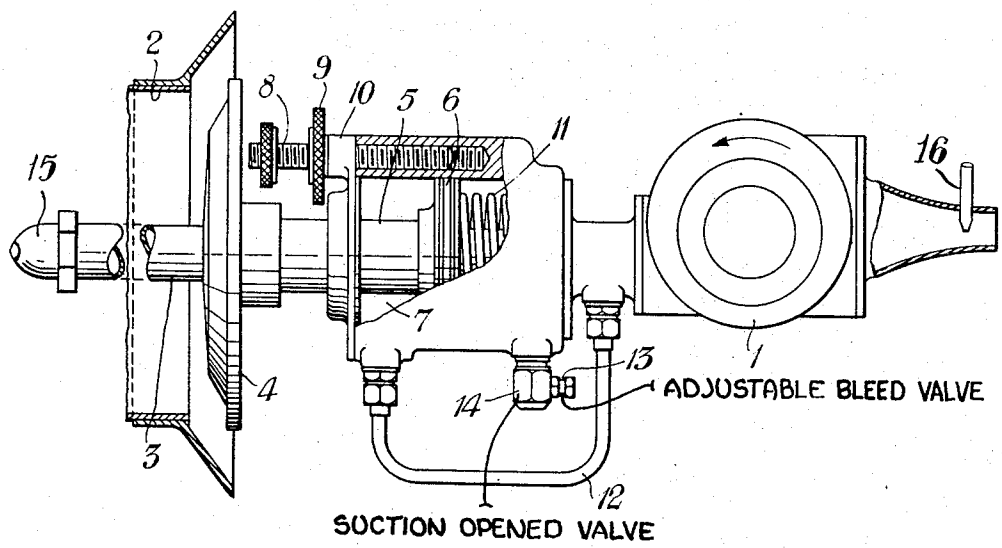
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OIL BURNER HAVING PNEUMATIC SECONDARY AIR CONTROL

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OIL BURNER HAVING PNEUMATIC SECONDARY AIR CONTROL

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4 Claims. (Cl. 158—28)

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This invention is concerned with oil-burners and is especially concerned with those types which are employed for heating domestic boilers, ovens and the like.

A secondary or main air supply is necessary to maintain combustion and is usually either induced by flue vacuum and/or by low pressure air from a fan through a tubular duct fitted into a sealed front cover plate.

When oil-burners are controlled on the "on-off" principle, that is by automatically operated thermal or pressure switches, there are serious thermal losses if provision is not made to prevent cold air entering the boiler or furnace through the secondary air duct during the time the burner is switched off.

An object of this invention is to obviate or mitigate the thermal losses mentioned above by providing a suitable damper or seal so arranged as to prevent the ingress of cold air into the outer end of the secondary air duct or tube, during the periods when the burner is not in actual operation; the movement of the damper into the open or closed position being controlled automatically as the burner is started or switched off.

The damper is arranged to have longitudinal movement on the axis of the air duct, to and from its closing position, and its degree of opening may be regulated as by an adjustable stop to allow control of the volume of secondary air entering the duct.

If required the actual rate of opening and closing can be controlled by a form of automatic damping in either or both directions of movement, this being in some cases desirable in order to arrange a predetermined oil-air mixture ratio for efficient ignition when starting the burner.

The above and other parts of the invention are embodied in apparatus arranged for pneumatic operation which will now be described in some detail by way of example, with reference to the accompanying drawing which is a side view in partial section of a pneumatically controlled damper operator.

An oil burner of the low pressure type supplied with primary air by a rotary compressor 1 is located centrally at the outer end of a tubular duct 2 through which secondary air is induced to flow by flue draught or vacuum.

A primary air tube 3 arranged centrally within the tubular duct 2 leads from the compressor 1 to the burner nozzle, the compressor being located at some distance behind the outer end of the duct.

A damper valve or sealing member 4 is carried

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by the inner end of a tubular sleeve 5 which is mounted on the tube 3 for axial sliding movement. The outer end of the tubular sleeve 5 carries a piston 6 which operates in a pneumatic cylinder 7 which is closed at both ends and is located between the duct 2 and the compressor 1 and surrounds the tube 3.

A bolt 8 fitted with a lock-nut 9 is screwed into a boss 10 on the cylinder to provide an adjustable stop for the outward or opening movement of the damper valve 4.

A compression spring 11 arranged around the primary air tube 3 behind the piston urges the piston 6, tubular sleeve 5 and damper valve 4 towards the closed position.

Air for operating the piston in the opposite or opening direction is led to the inner end of the cylinder 7 through a pipe 12 from the compressor discharge.

A small adjustable air bleed valve 13 is connected to the cylinder space at the outer side of the piston 6, regulation of this valve determining the rate of air displacement from the cylinder during the damper valve opening cycle and therefore the actual rate of the damper valve opening movement.

This valve 13 is provided with a simple one way auxiliary suction valve 14 which operates only upon the return closing cycle of the damper valve, thus allowing a rapid and unrestricted closing of the damper valve.

An oil burner nozzle 15 is connected with the tube 3 within the duct 2. The fuel is fed to the apparatus by a feed line 16.

The operation of the apparatus is as follows: When the burner is switched on, as by a pressure operated or thermosensitive switch the primary air compressor is started. Pressure builds up in the inner end of the cylinder 7 that is, the end adjacent the secondary air duct 2 and moves back the damper valve 4 at a rate determined by the setting of the air bleed valve 13 until contact is made with the adjustable stop 8.

The damper valve will remain in this position until such time as the burner is switched off when the compressor stops and the damper valve is closed at high speed by the compression spring 11, air being admitted through the one way auxiliary suction valve 14 for this purpose.

I claim:

1. In an oil fuel burning heater, a nozzle tube adapted to lead to a nozzle of a burner, a compressor at an end of the nozzle tube for supplying primary air and fuel to the nozzle of the burner, an outer tube for secondary air sur-

rounding the nozzle tube and with its outer end spaced from the compressor and adapted to receive secondary air from a source independent of the compressor, a cylinder closed at both ends and located between the outer tube and the compressor and surrounding the nozzle tube, a piston in the cylinder, an extension sleeve on the piston guided on the nozzle tube for axial sliding movement and extending through the closed end of the cylinder towards the outer end of the outer tube, a damper valve on the inner end of the sleeve for controlling air inlet to the outer or secondary air tube, a by-pass between the compressor and the cylinder for admitting primary air from the compressor to the cylinder's inner end to cause opening movement of the damper valve, and spring means adapted to bias the piston to a position in which the damper valve is closed.

2. In an oil fuel burning heater, a nozzle tube adapted to lead to a nozzle of a burner, a compressor at an end of the nozzle tube for supplying primary air and fuel to the nozzle of the burner, an outer tube for secondary air surrounding the nozzle tube and with its outer end spaced from the compressor and adapted to receive secondary air from a source independent of the compressor, a cylinder closed at both ends and located between the outer tube and the compressor and surrounding the nozzle tube, a piston in the cylinder, an extension sleeve on the piston guided on the nozzle tube for axial sliding movement and extending through the closed end of the cylinder towards the outer end of the outer tube, a damper valve on the inner end of the sleeve for controlling air inlet to the outer or secondary air tube, a by-pass between the compressor and the cylinder for admitting primary air from the compressor to the cylinder's inner end to cause opening movement of the damper valve, spring means adapted to bias the piston to a position in which the damper valve is closed, and an air bleed valve in the outer end of the closed cylinder to control the rate of opening of the damper valve.

3. Apparatus as claimed in claim 2, in which the air bleed valve is adjustable to vary the rate of opening of the damper valve.

4. In an oil fuel burning heater, a nozzle tube adapted to lead to a nozzle of a burner, a compressor at an end of the nozzle tube for supplying primary air and fuel to the nozzle of the burner, an outer tube for secondary air surrounding the nozzle tube and with its outer end spaced from the compressor and adapted to receive secondary air from a source independent of the compressor, a cylinder closed at both ends and located between the outer tube and the compressor and surrounding the nozzle tube, a piston in the cylinder, an extension sleeve on the piston guided on the nozzle tube for axial sliding movement and extending through the closed end of the cylinder towards the outer end of the outer tube, a damper valve on the inner end of the sleeve for controlling air inlet to the outer or secondary air tube, a by-pass between the compressor and the cylinder for admitting primary air from the compressor to the cylinder's inner end to cause opening movement of the damper valve, spring means adapted to bias the piston to a position in which the damper valve is closed, an air bleed valve in the outer end of the closed cylinder to control the rate of opening of the damper valve, and an auxiliary one way suction valve in the outer end of the closed cylinder to permit rapid closing of the damper valve on the cessation of pressure in the inner end of said cylinder.

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