May 30, 1939. F. M. YOUNG 2,160,633

DEVICE FOR BONDING FINS TO TUBES

Filed July 28, 1937

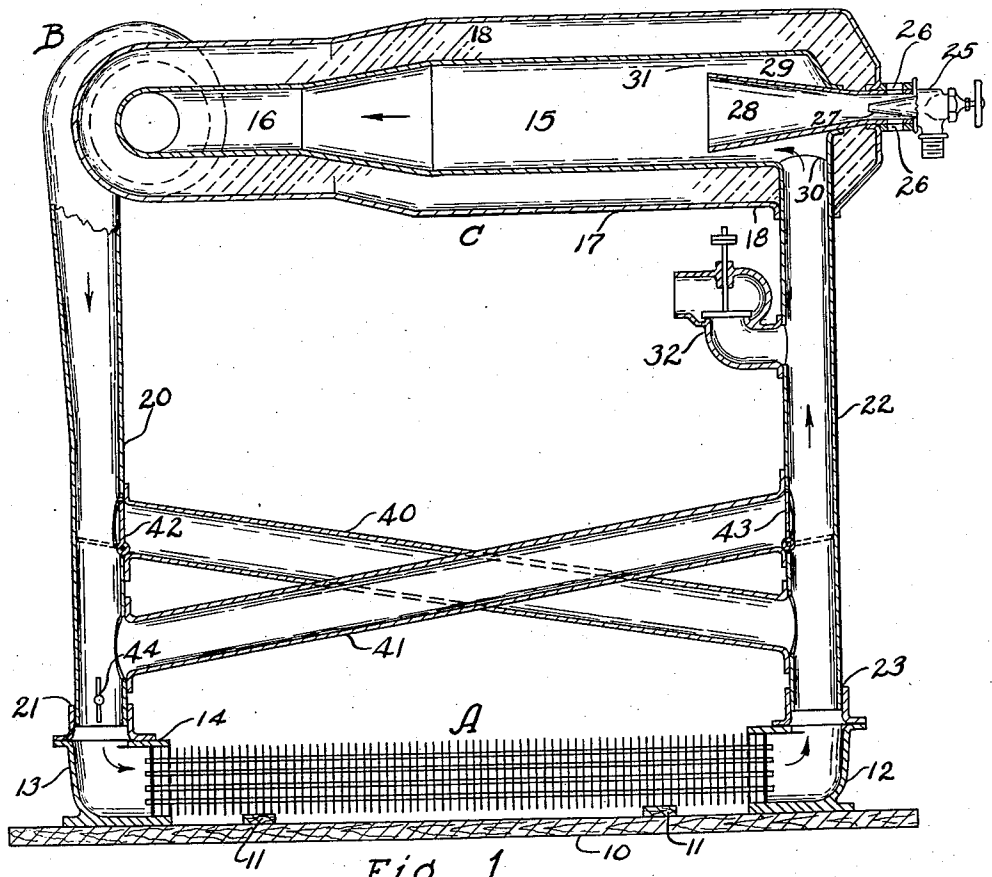


Fig. 1

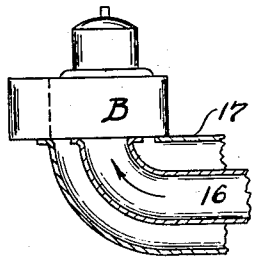


Fig. 2

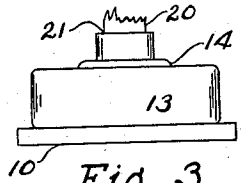


Fig. 3

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Patented May 30, 1939 2,160,633

UNITED STATES PATENT OFFICE

2,160,633

DEVICE FOR BONDING FINS TO TUBES

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Application July 28, 1937, Serial No. 156,078

3 Claims. (Cl. 113—59)

The present invention relates to means for bonding the fins to the tubes, and has for its principal object providing a device adapted to force the heat from a suitable burner through the tubes rather than by applying the heat on the outside as is common practice.

The common practice is to assemble the fins on the tubes which have previously been tinned, after which suitable acid is applied to the tubes and the entire assembly moved into a heating oven where the temperature of the core is brought to a point where the fins are bonded to the tubes. This method is expensive and to some extent uncertain.

One of the objects of the present invention is to simplify the handling operation of the core and another is to provide means for heating the tubes only, except the part of the fin in direct contact therewith.

Another object of the present invention is to perform the operation of bonding the fins to the tubes in a manner which will make possible constant observance of the operation by the attendant, this being impossible where the core is placed in a closed oven.

A further object of the present invention is to reduce the cost of operation and produce a bonding which is more uniform than is otherwise possible.

I accomplish the above enumerated objects by means of a gas burner, a suitable mixing chamber, a blower fan and suitable connections and a relief valve whereby sufficient heat is produced and moved through the tubes, and by permitting a certain volume of the gases to be recirculated and mixed with the fresh gases; however, for certain types of cores I may elect not to recirculate the gases after they have passed through the tubes.

To these and other useful ends my invention resides in features of construction, and parts and combinations thereof or their equivalents and mode of operation as hereinafter described and claimed and shown in the accompanying drawing in which:

Fig. 1 is a diagrammatic drawing of my invention illustrating a conventional radiator core in position for bonding.

Fig. 2 is a diagrammatic top view of a conventional blower fan and its motor as preferably used on my invention, illustrating the inlet connection from the heating chamber.

Fig. 3 is an end view of one of the adapters.

In Figure 1, I illustrate a conventional radiator core which is designated in its entirety by reference character A. The blower fan of my invention is designated in its entirety by reference character B and the heating device of the invention is designated in its entirety by reference character C.

In the invention as illustrated, I provide a table 10 on which the core A is supported by means of suitable blocks 11—11. The core is shown minus the headers or tube plates. However, my device may be equipped with adapters whereby either the ends of the cores as illustrated or header plates may be operatively engaged. It will also be understood, that I may provide means for directing the gases into individual tubes by the use of suitable adapters.

In the present showing I provide preferably a stationary adapter 12 and an adapter 13 which may be moved to and from the core end. Members 12 and 13 are adapted to rest on table 10. Member 13 is preferably slidably connected to its inlet duct as at 14. I may, however, supply a flexible duct which may be rigidly secured to the adapter as at 14.

I provide a mixing chamber 15 having an outlet 16 which is operatively connected to the inlet of the blower fan B as illustrated in Figure 2. These chambers are preferably surrounded by a chamber 17 and the space therebetween filled with a suitable insulating material 18.

I provide a duct 20 forming an outlet from blower fan B which operatively engages chamber 13 as illustrated. This duct has a slidable connection as at 21. I provide another duct 22 which is operatively connected to adapter 12 and having a slidable connection as at 23.

I provide a gas burner 25 having air inlets 26—26 and a gas outlet nozzle 27 and an extended diverging chamber 28 forming an annular space 29 whereby when the gas is turned on and ignited an intense heat will be generated in chamber 28. The gas burner 25 is designed to provide considerable pressure in member 28, thus when fan B is in operation the products of combustion will be moved through the system as indicated by single pointed arrows. Duct 22 has a connection to chamber 29 as at 30. The return mixture leaves chamber 29 as at 31 and joins the fresh products of combustion as they escape into chamber 15.

I provide a relief valve 32; thus surplus gases will be allowed to escape from the system. It will be understood that the volume of escaping gas will be practically equal to the volume of the fresh products of combustion. Thus a continuous movement of the products of combustion, both fresh and recirculated will take place.

In operation, the time required to sufficiently heat the tubes is approximately two minutes. The ends of the tubes adjacent adapter 12 will not heat quite as quickly as the other ends. I therefore provide means whereby the direction of gases passing through the tubes after a stated time, say 1 minute, may be reversed.

I provide duct 40 and a similar duct 41, each connected to ducts 20 and 22 as illustrated. I provide a damper 42 at one end of duct 40 and another damper 43 at the other end of duct 41. These dampers are of a suitable size so that they may be moved to close ducts 40 and 41 or to open these ducts and close ducts 20 and 22 as illustrated by dotted lines in Figure 1.

I illustrate by dotted lines the position of these valves when it is desired to reverse the direction of the flow of the products of combustion through the tubes. Thus after the heat has been allowed to travel through the core as illustrated by single pointed arrows for say 1 minute, dampers 42 and 43 may be moved to the position shown by dotted lines and the products of combustion will then move through core A in the opposite direction. Thus the entire length of the tubes may be bonded in the shortest period of time without wasting heat.

I provide a damper 44 preferably in duct 20 whereby when this damper is closed and dampers 42 and 43 are suitably positioned, the gases will be shunted from duct 20 to duct 22 and prevented from passing through the adapters when the core A is removed.

Clearly the bonding operation may be performed without over-heating the fins or tubes, and during the operations the operator may readily observe the condition of the heat and bonding material.

Having thus shown and described my invention, I claim:

1. A device of the class described, comprising a mixing chamber, a blower fan having inlet connections from one end of said mixing chamber and an outlet duct connection to an adapter, a burner having a fresh air inlet and a combustion chamber which extends into the other end of said mixing chamber providing thereby an annular chamber having at its inner end an annular outlet to said mixing chamber, a second adapter having a duct connection to said annular chamber, a relief valve in said second duct for the escape of surplus products of combustion, cross ducts leading from said first and second ducts having valves whereby the products of combustion may be caused to move through the tubes of said radiator in either direction.

2. A device for bonding fins to tubes, comprising a burner having a fresh air inlet thereto and a combustion chamber and an exhaust fan therefor, inlet and outlet ducts for said chamber and fan having means for connecting radiator tubes therebetween, whereby the products of combustion will be circulated and recirculated through said tubes, means connecting said two ducts whereby the products of combustion may be reversed in their movement through said tubes, a relief valve positioned whereby the surplus products of combustion may escape after leaving said tubes and before returning to said mixing chamber.

3. A device of the class described, comprising a mixing chamber, a blower fan having inlet connections from one end of said mixing chamber and an outlet duct connection to an adapter, a burner having fresh air and gas inlets and a combustion chamber which extends into the other end of said mixing chamber providing an annular chamber having at its inner end an annular outlet to said mixing chamber, a second adapter having a duct connection to said annular chamber, a relief valve in said second duct for the escape of surplus products of combustion whereby a tubular core may be positioned between said adapters and be heated by the circulating gases under pressure, a supplemental duct having connections and valves associated therewith whereby when the core is removed, the heated gas may be shunted directly from said outlet duct to the other duct.

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