

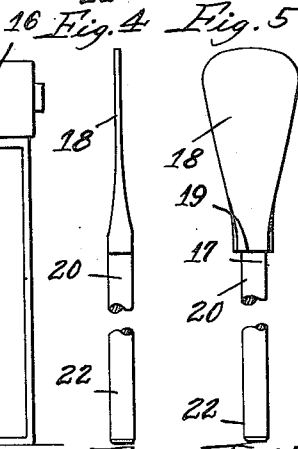
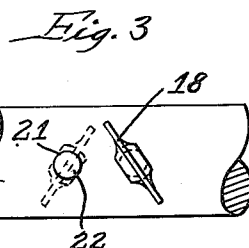
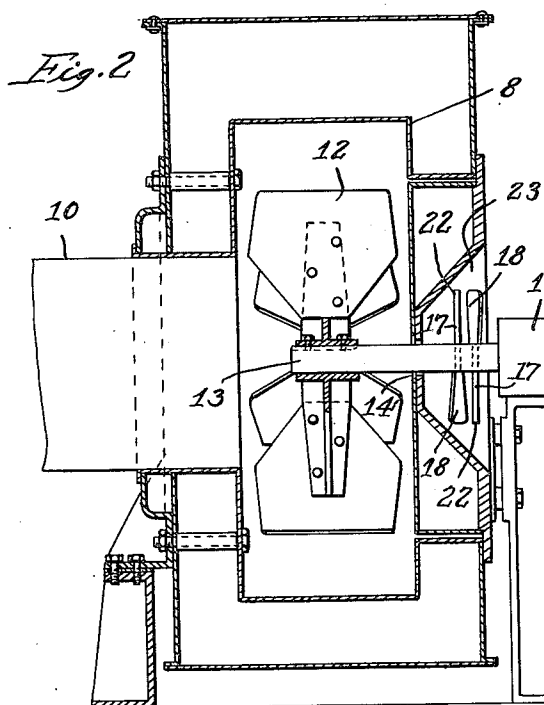
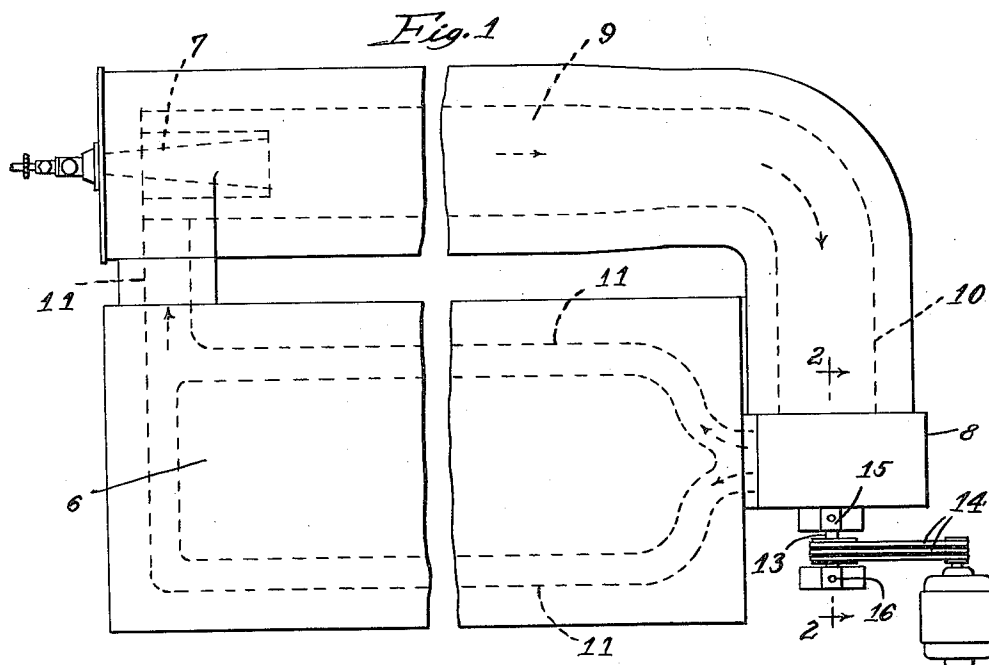
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2,397,012

COOLING MEANS FOR SHAFTS

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COOLING MEANS FOR SHAFTS

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2 Claims. (Cl. 308—77)

This invention relates to cooling means for a shaft which operates in a hot chamber and is journaled outside the chamber as, for example, in the case of a shaft supporting a blower fan which is used to circulate hot gases and hot air in a heat treating furnace, in which case the heat is conducted by the shaft to the outside bearing.

The primary object of this invention is to provide simple and inexpensive means for cooling the shaft and minimizing heat conduction to its bearing or bearings.

My invention contemplates the provision of a plurality of heat dissipating members of high heat conductivity such as copper, each shaped to provide a shank which is pressed through a diametrical bore in the shaft in good heat conducting relation thereto at a position intermediate the hot member and the adjacent bearing, and having a paddle or fan blade at its outer end, whereby heat will be conducted from the shaft and dissipated in the atmosphere when the shaft is rotated. In the preferred embodiment, the shank portion of each blade is extended beyond the shaft on the side opposite from the blade to provide dynamic balance.

Referring to the accompanying drawing:

Figure 1 is a diagrammatic plan view of a heat treating furnace to which my invention is applied;

Fig. 2 is a vertical section on an enlarged scale taken substantially on the section line 2—2 of Fig. 1;

Fig. 3 is a detailed view on a further enlarged scale looking at the cooling means from one side of the shaft; and

Figs. 4 and 5 are edge and face views, respectively, of one of the heat dissipating members according to my invention.

My invention may be used in many applications where it is desired to cool a shaft or some other rotating body, where a portion of the shaft or body is disposed within a hot chamber and it is desired to keep at a lower temperature a portion of the shaft or body located outside such chamber.

In the illustrative case shown in the attached drawing, my invention is applied to a shaft which carries a blower fan which, in turn, is used in a hot air recirculating furnace. This furnace comprises, briefly stated, a suitable structure providing a work chamber 6, a fuel burner 7, a blower 8, and suitable conduits whereby the heated air and gases from the burner chamber

9 are drawn through a conduit 10 into the blower and are forced by the latter through conduits 11 back to the burner chamber and are thus recirculated. In this case the blower fan 12 is carried on one end of a shaft 13 which passes through an opening 14 in the blower housing and is journaled beyond the same in bearings 15 and 16. The shaft may be rotated, usually at a relatively high speed by suitable means as, for example, by motor driven belts 14. This type of recirculating furnace is shown merely for purpose of illustrating an application of my invention.

The cooling means of my invention comprises a plurality of heat dissipating members applied to the shaft intermediate the blower housing and the adjacent bearing 15. In the preferred embodiment, each member comprises a rod designated generally by 17, shaped at one end to provide a paddle or fan blade 18 and a shoulder 19 at the base of the blade. The rod or shank portion 20 of this member is pressed into a diametrical bore 21 in the shaft, the bore being of the proper diameter with respect to the shank to insure good heat conductivity between the shaft and the shank. The blade member is preferably of a metal such as copper, having high heat conductivity, so that when the shaft is rotated, the blade member will act as a good thermal conductor and will dissipate heat from the shaft to the atmosphere.

When applying each blade member to the shaft, its shank may be forced through the bore until the shoulder 19 seats against the shaft. The end 22 of the shank is preferably made of sufficient length as to provide dynamic balance for the blade member when it is installed on the shaft. A suitable plurality of these blade members may be used, and I have found that two such members applied in the manner shown in Figs. 2 and 3 will satisfactorily serve the intended purpose. I also prefer to shape the adjacent side of the blower housing to provide a pocket 23, the walls of which converge inwardly, and to arrange the blade members substantially within this pocket as shown in Fig. 2. Thus, the blades coact with the pocket and walls and, when rotated at a high speed, they induce a flow of air inwardly at the center area and thence outwardly along the lines of the diverging walls so that in this circulation the cool air is drawn in at the center where it picks up heat from the shaft, and the air is forced out by the blades. The blades, being good thermal conductors, serve to rapidly dissipate heat from the shaft. Further-

more, the air flow caused by the rotating blades serves to disperse the heated air escaping through the opening 14, and this also promotes cooling of the shaft.

It is believed that the above description conveys a clear understanding of my invention, and it will be apparent that changes will be made in details of construction without departing from the spirit and the scope of the invention as expressed in appended claims, in which I claim—

1. In apparatus of the character described wherein a blower fan is utilized for circulating heated air and the blower fan operates within a housing and is mounted on a drive shaft which extends to the exterior of the housing and wherein the extended shaft is journaled in a bearing at the exterior of said housing and wherein the shaft portion disposed within the blower housing is subjected to high temperatures and that portion of the shaft intermediate said bearing and the blower housing is exposed to the atmosphere, the combination with said shaft of cooling means applied to said intermediate shaft portion comprising one or more diametrical bores through said intermediate shaft portion, and heat dissipating members of a material having high heat conductivity, each such member comprising a rod having a shank portion pressed into one of said bores with its peripheral surface in good heat conduction with the shaft along the full length of the 30

bore and shaped at one end to provide a radially projecting blade adapted to dissipate heat conducted through said shank from the shaft when the latter is rotated.

2. In apparatus of the character described wherein a blower fan is utilized for circulating heated air and the blower fan operates within a housing and is mounted on a drive shaft which extends to the exterior of the housing and wherein the extended shaft is journaled in a bearing at the exterior of the housing and wherein the shaft portion disposed within the blower housing is subjected to high temperatures and that portion of the shaft intermediate said bearing and the blower housing is exposed to the atmosphere, the combination with said shaft of cooling means applied to said intermediate shaft portion comprising one or more heat dissipating members, each member being of a material having high heat conductivity, said intermediate portion of the shaft having a diametrical bore for each member, and each member having a shank passing through one of said bores with its peripheral surface in good heat conduction with the shaft along the full length of the bore, each member having a blade projecting from its shank at one side of the shaft and having its shank extended beyond the opposite side of the shaft to provide dynamic balance. 30

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