Feb. 10, 1953 C. R. ZAINO 2,628,017

FAN

Filed May 31, 1950

FIG. 1

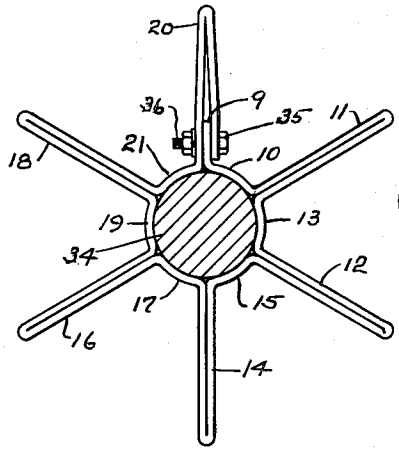


FIG. 2

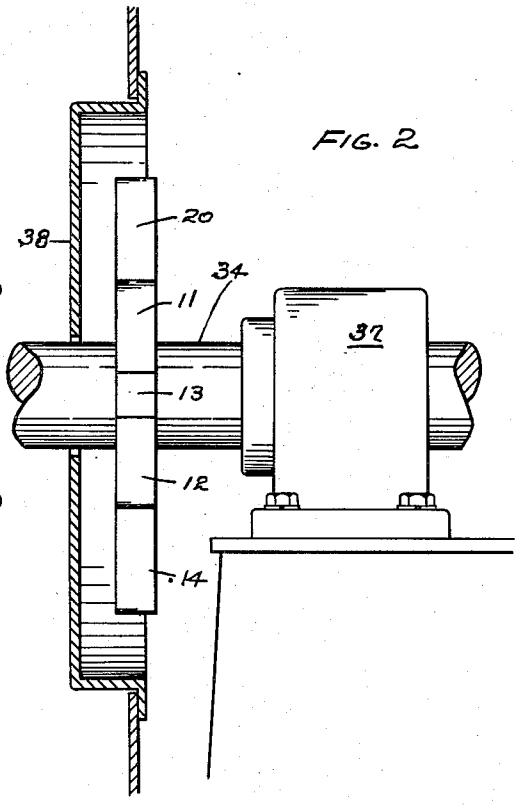


FIG. 3

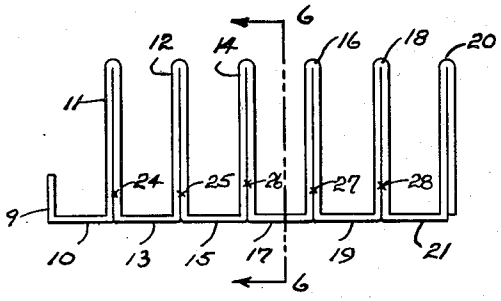


FIG. 4

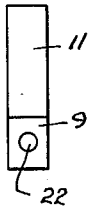


FIG. 5

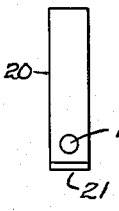
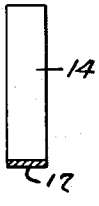


FIG. 6



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5 Claims. (Cl. 230—134)

1

This invention relates to fans, and relates more particularly to auxiliary fans for cooling the bearings of main fans which move gases having high temperatures.

The bearings of fans which are used for moving gases having high temperatures, are subject to damage by heat from the gases. The market for such fans is usually not sufficient to justify the stocking of fans especially designed for high temperature duties, so that it has been the practice to use conventional fans for such duties, and to provide for cooling the bearings of such fans by attaching an auxiliary fan to the shaft of such fans adjacent their bearings for preventing the overheating of the bearings. In the past, such an auxiliary fan has consisted of fan blades attached to two, semi-circular, hub sections which were pulled together on a shaft of a main fan by bolts extending through opposite sides of the hub sections. Such an auxiliary fan is usually installed after the assembly of the main fan with which it is used, at the factory, or in the field.

This invention provides an auxiliary fan for preventing the overheating of the bearings of main fans used for moving high temperature gases, which is less expensive, and more efficient than the prior auxiliary fans provided for such a purpose.

In one embodiment of this invention, a metal strap is folded back and forth to form a plurality of hub sections extending in a common plane, separated by blade sections extending perpendicular to the plane of the hub sections. The strap so formed is wrapped around the shaft of a fan so that the hub sections conform to the curvature of the shaft, and the blade sections extend radially, and is clamped to the shaft by a single bolt extending through the ends of the strap.

An object of the invention is to decrease the manufacturing cost of auxiliary fans such as are used for preventing the overheating of the bearings of main fans.

Another object of the invention is to provide an auxiliary fan for preventing the overheating of a bearing for a main fan used for handling high temperature gases, in which there is more efficient heat transfer between the shaft of the fan and the blades of the auxiliary fan.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is an end elevation of a fan embodying this invention, clamped to the shaft of a main fan;

2

Fig. 2 is a side elevation of the auxiliary fan, and of the shaft, a bearing and a casing wall of a main fan with which it is used;

Fig. 3 is a side elevation of a strap folded to form the auxiliary fan;

Fig. 4 is an end elevation looking at the left hand end (facing the drawing) of the fan of Fig. 3;

Fig. 5 is an end elevation looking at the right hand end of the fan of Fig. 3, and

Fig. 6 is a sectional view along the lines 6—6 of Fig. 3.

Referring first to Fig. 3 of the drawing, a flexible, metal strap is bent so as to have the relatively short, end flange 9 perpendicular to a first hub portion 10. The strap is then folded back on itself to form the first blade 11 perpendicular to the hub portion 10. The strap is then folded back on itself to form the second blade 12 which is parallel to the blade 11 and spaced therefrom by the second hub portion 13 which extends in horizontal alignment with the hub portion 10. In the same way the strap is folded back on itself to form third, fourth, fifth and sixth blades 14, 16, 18 and 20 respectively, which are spaced apart by the hub portions 15, 17, 19 and 21 respectively.

The hub portions 10, 13, 15, 17, 19 and 21 are all of the same length and all extend in horizontal alignment. The blades 11, 12, 14, 16, 18 and 20 all have the same length and are parallel, two strap portions forming each blade portion, lying in contact. The blades are several times the length of the end flange 9. The right hand portion of the blade 20 terminates flush with the upper surface of the aligned hub portions.

After the blades and the hub portions are formed as described in the foregoing, a circular hole 22 is drilled through the end flange 9, and a similar hole 23 is drilled through the blade 20. The two strap portions forming each of the blades 11, 12, 14, 16 and 18 are then spot welded together at 24, 25, 26, 27 and 28 respectively, near their associated hub portions.

The auxiliary fan at this time appears as illustrated by Fig. 3 of the drawing, and is stored or shipped in that shape. When it is desired to attach the fan to a shaft of the size for which it was designed, the hub portions of the fan are wrapped around the shaft 34, and the two portions of the blade 20 are placed on opposite sides of the flange 9. A bolt 35 is then placed in the holes 22 and 23 in the flange 9 and the blade 20 respectively, and a nut 36 is pulled up on the

bolt until the hub portions 10, 13, 15, 17, 19 and 21 tightly grip the surface of the shaft 24.

Fig. 2 illustrates such a fan placed on a shaft 34 of a main fan for handling hot gases, the main fan having the casing wall 38 separating its bladed rotor which is not illustrated, from the bearing 37.

The auxiliary fan blades act as extended, heat radiating surfaces for dissipating heat from the heated shaft 24. Due to their rotation by the shaft, by fan action they move the air into which they radiate heat, thus increasing their cooling of the shaft. By fan action they also move air over the surfaces of the bearing 37, thus directly cooling it as well as decreasing the heat transmitted through the shaft 34 to the bearing.

The fan may be formed manually by bending metal strap; it may be formed manually using a jig, or may be formed by a hand-driven or a power driven machine.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact construction and method of construction described, since departure therefrom may be suggested by those skilled in the art without departure from the essence of the invention.

What I claim as my invention, is:

1. A fan rotor member for application to a rotary shaft comprising a metal strap forming a flange at one end and forming a fan blade at the other end, said flange and blade having aligned openings therein for the reception of a bolt for securing said member to the shaft, said strap forming a plurality of spaced hub portions for contacting said shaft extending in straight line alignment in a common plane between said flange and blade, said hub portions having other fan blades formed from said strap therebetween, each of said other fan blades having two blade portions, one on the adjacent side of each adjacent hub portion, said blades and said flange extending substantially parallel to each other and perpendicular to said hub portions.

2. The invention claimed in claim 1 in which the two blade portions of each of the blades are secured together adjacent their respective hub portions.

3. A fan comprising a cylindrical rotary shaft, a continuous metal strap having a flange substantially radial to the axis of said shaft formed at one end, and having a fan blade substantially radial to said axis formed at the other end, and having a plurality of spaced-apart hub portions wrapped around said shaft, a first one of said hub portions being joined at one end to said flange, and a second one of said hub portions being joined at one end to said blade, others of said hub portions being between said first and second portions, said strap being folded back on itself between the other end of said first and the adjacent end of an adjacent one of said other portions, between the other end of said second and the adjacent end of an adjacent one of said other portions, and between adjacent ends of said other portions, and forming other fan blades, each consisting of two strap portions contacting throughout their lengths and extending substantially radial to said axis, and means comprising a threaded bolt extending through said flange and said first mentioned blade for tightening said hub portions on said shaft.

4. The invention claimed in claim 3 in which the said strap portions of each of said other blades are secured together adjacent their respective hub portions.

5. The invention claimed in claim 3 in which the strap is folded back on itself to form the first mentioned blade in two portions between which the flange extends.

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