Oct. 8, 1940. W. T. BURBANK 2,217,002

AIR COOLING MEANS

Filed Aug. 29, 1938 2 Sheets-Sheet 1

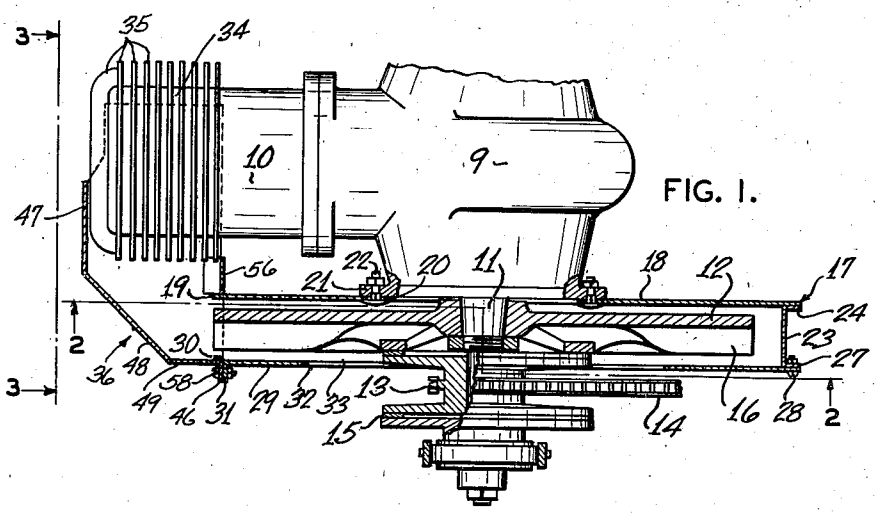


FIG. 1.

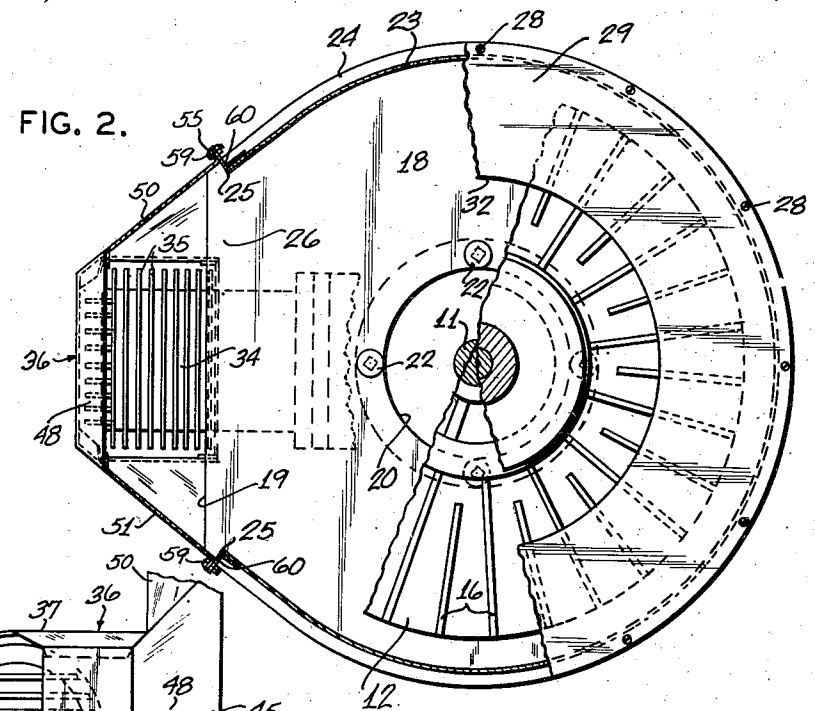


FIG. 2.

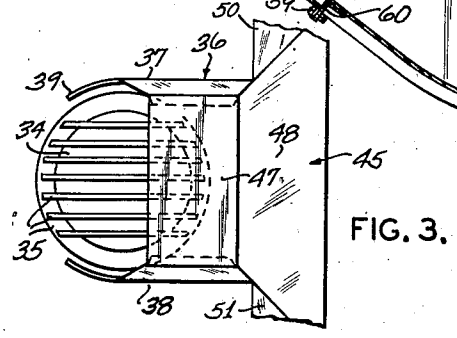


FIG. 3.

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AIR COOLING MEANS

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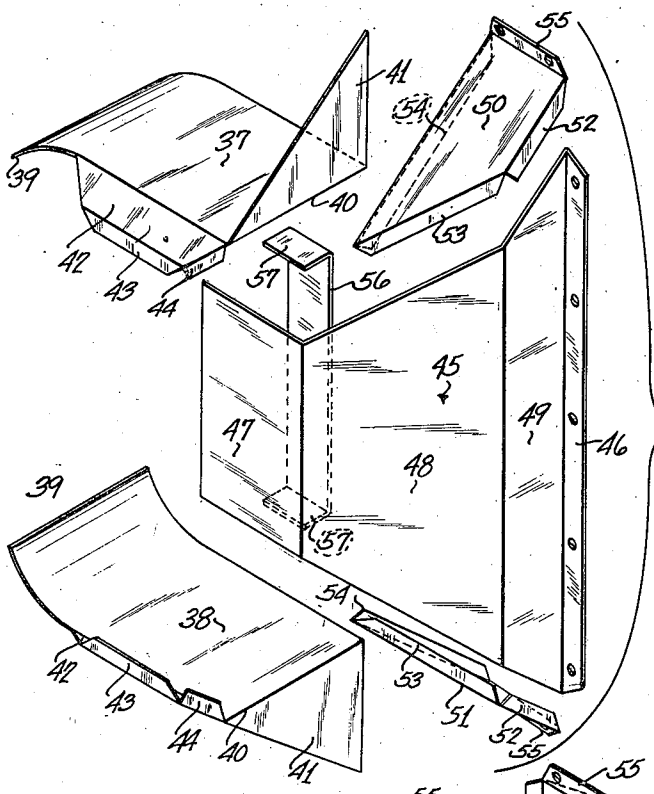


FIG. 4.

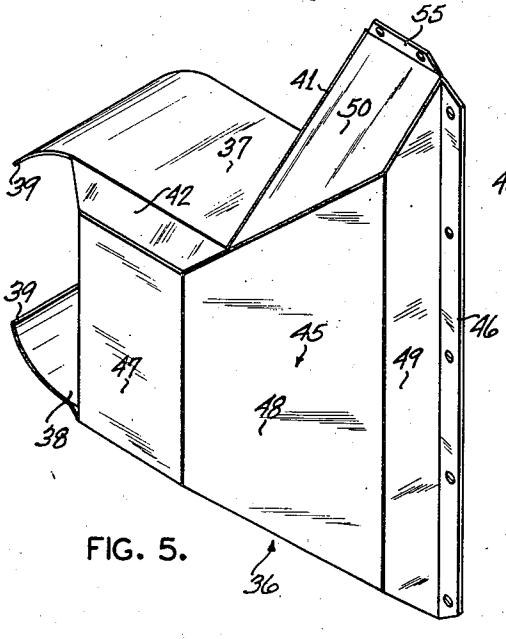


FIG. 5.

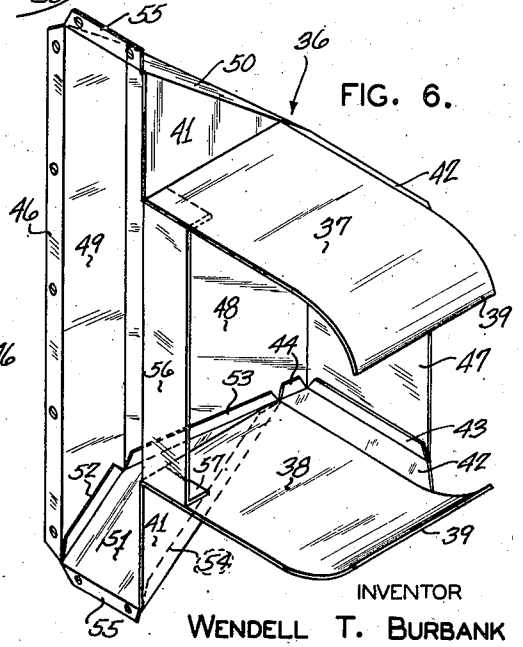


FIG. 6.

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AIR COOLING MEANS

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Application August 29, 1938, Serial No. 227,284

3 Claims. (Cl. 230—133)

This invention relates to improvements in air-cooling means for internal combustion engines, the invention having particular application to relatively low power engines of the type employed to provide motive power for railway motor cars and like vehicles. More particularly, the present invention has to do with an improved housing for a blower or air-impeller driven by the engine, and an improved air-directing or nozzle assembly associated with the housing and arranged for directing an air flow about the engine cylinder structure for cooling the same; the blower and its housing further being arranged so that the suction or in-flow of air thereto serves to cool certain adjuncts of the engine assembly, such as the clutch mechanism operatively associated with the power drive from the engine.

The principal object of the invention is to provide an inexpensive, light-weight blower housing and nozzle structure for the purpose indicated, which is comprised of relatively few parts firmly secured together to provide a strong and durable structure.

Another object is to provide an improved blower housing and air-delivery nozzle assembly for operative association with an air-impeller driven by an internal combustion engine, the assembly being arranged so as to attain air-cooling of the engine cylinder structure and also, air-cooling of the engine power transmission clutch assembly.

A further object resides in the provision of an improved air-directing nozzle structure for a blower assembly, the nozzle being comprised of elements formed from light-weight sheet metal stock and firmly secured together as by spot-welding.

Further objects and advantages will readily appear from the following description as read in connection with the accompanying drawings, in which:

Fig. 1 is a transverse section through a preferred form of blower housing and nozzle assembly forming the subject of this invention, the assembly being illustrated as applied to an internal combustion engine and transmission control clutch assembly, only a part of the engine being shown; Fig. 2 is an assembly elevation of the housing and nozzle, with portions thereof in section to illustrate certain details of construction and assembly, the view being taken from line 2—2 in Fig. 1; Fig. 3 is a fragmentary view of the nozzle structure, as taken from line 3—3 in Fig. 1; Fig. 4 is an enlarged and exploded view in perspective, of the nozzle structure, and Figs. 5 and 6 are assembly views of the nozzle, shown in perspective.

Referring to the drawings by suitable characters of reference, 9 represents an internal combustion engine of a type utilized to provide motive power for railway motor cars and the like. The engine shown includes cylinder 10, crank shaft 11, a flywheel 12 suitably secured to the crank shaft, a drive wheel or sprocket 13 and drive chain 14. Operatively associated with the crank shaft and flywheel is a suitable clutch mechanism 15 shown as of a friction disc type wherein the sprocket wheel 13 also forms an operative part of the clutch in the manner illustrated by Fig. 1. Thus, the power transmission from the engine to the driven means (not shown) via the sprocket 13 and chain 14, may be effectively controlled. The driven means, for example, may be an axle of a railway motor car, since the present invention is designed more particularly for application to engines carried by and providing the driving power for such vehicles. Further, in the present example as shown by Fig. 1, the engine flywheel 12 serves additionally as an air-impeller or blower, being provided with impeller vanes 16 which are, by preference, formed integrally therewith.

It will be understood, of course, that the particular form of clutch and chain type of drive illustrated, form no part of the invention, as any suitable type of clutch and drive may be substituted therefor. However, for the purposes of the present invention, the clutch is arranged relatively adjacent the blower, in order that the suction flow of air to the blower may encompass the clutch to cool the same, as will be pointed out more fully hereinafter.

Enclosing the flywheel-blower 12 is a blower housing 17 which as clearly appears in Figs. 1 and 2, is comprised of a substantially circular side plate 18 provided with a straight-edge 19 on one side, the edge 19 being adapted for abutting engagement with a nozzle structure later to be described. The plate, which has a central aperture 20 to accommodate the engine crank shaft, is secured to an engine frame flange 21, as by bolts 22. A channel member 23 circular in form and providing the peripheral enclosure wall for the blower housing, is secured as by its flange 24, to the plate 18, the manner of securement preferred in the present example, being by spot-welding. As appears in Fig. 2, the channel member terminates in adjacent ends 25 which are spaced to provide an air outlet port

26, which in the assembled structure, communicates with an air-directing or nozzle structure presently to be described. The opposite flange 27 of member 23 is preferably apertured to receive bolts 28 which serve to secure to the member 23 a circular plate 29 which forms the opposite side wall of the blower housing. A straight-edge 30 is provided on one side of the plate for assembly abutment with the nozzle structure hereinafter appearing, the plate further having an outwardly extended flange 31 paralleling edge 30 and preferably formed integrally with the plate. The flange serves as a nozzle mounting element as will later appear. Plate 29 is provided also, with a relatively large diameter opening 32 located axially thereof to accommodate the crank shaft, drive sprocket and clutch mechanism, as clearly appears in Fig. 1. In the assembly position of the plate 29, the opening 32 cooperates with the clutch assembly to form an annular space 33 serving as an air-inlet port to the blower. The arrangement of the inlet port relative to the clutch is such that as will now appear, the flow of air to the inlet port will pass about the clutch mechanism, thereby serving to cool the clutch.

It is to be noted that the side wall plates 18 and 29 and the channel member 23 are formed by preference, from durable metal stock characterized by strength and relatively light-weight. The element of weight is important in railway motor cars, since these cars are manually transferred to and from the rails at frequent intervals during use. Hence, since the blower housing described above is adapted particularly for an engine and blower assembly utilized on railway motor cars, the light weight construction thereof is a desirable factor.

As shown by Figs. 1 and 2, the engine cylinder 10 is provided on its head portion 34 with projections or fins 35 forming cylinder cooling elements, the heat of combustion passing by conduction to the fins and thence to the atmosphere through the medium of air in contact with the fins. To increase the rate of heat transfer from the cylinder head and fins, the forced flow of air created by the blower and ejected through the blower housing outlet port 26, is conducted by an air-directing device or nozzle 36 from port 26 to the zone of the cylinder head and fins 35.

The structure of the nozzle device is clearly illustrated by Figs. 4, 5 and 6, while its assembly relation to the blower housing and cylinder head is shown in Figs. 1, 2 and 3. First describing the structure thereof, it will be observed from the exploded view of Fig. 4, that the nozzle is comprised of but six elements, each formed from suitable, light-weight, thin sheet metal stock. Elements 37 and 38 provide respectively, top and bottom wall portions of the nozzle, the forward ends 39 of which are curved inwardly toward each other, the curvature thereof preferably conforming somewhat to the curvature of the cylinder head 34 as these wall elements overlie portions of the cylinder head and fins in the assembly position of the nozzle (Fig. 3). Projecting oppositely from the rearward ends 40 thereof, are triangular-shaped flanges 41, while projecting at an angle from a corresponding side of each of the elements 37 and 38 is a wall portion 42 provided with side and end flanges 43 and 44 respectively. The nozzle side wall is provided with an angulate member 45, the rearward vertical edge of which is outturned to provide a securing flange 46. Member 45 comprises essentially a forward wall portion 47, intermediate wall portion 48 angularly related to wall 47 and rear wall portion 49 which is disposed substantially at a right angle to wall 47. Also it is to be noted that the wall 47 is substantially rectangular in shape, while each of the walls 48 and 49 is of substantially trapezoidal form, whereby the latter wall portions progressively increase in vertical extent toward the flange 46. Additional top and bottom wall elements 50 and 51 respectively, cooperate with the side wall element 45 and flanges 41 in completing the nozzle enclosure. Each of these additional elements is provided with securing flanges 52, 53 and 54 and an outstruck flange 55 which, as will hereinafter appear, serves as a nozzle mounting element. A brace element or bar 56 completes the elements of the nozzle device.

The nozzle-forming elements are assembled in a manner such that the side wall portion 47 overlaps the flanges 43 on elements 42; the side wall portion 48 overlaps the end flanges 44 on elements 42 as well as the flanges 53 on wall elements 50 and 51; the side wall portion 49 overlaps the flanges 52 on elements 50 and 51, while the triangular flanges 41 on wall elements 37 and 38 overlap respectively, the flanges 54 on elements 50 and 51. The wall elements are then rigidly secured together at the zones of the several flanges, as by spot-welding. The brace 56 which is provided with end flanges 57, is then secured between the upper and lower wall elements 37 and 38, in the position illustrated in Fig. 6, the flanges 57 being, by preference, spot-welded to the walls.

The nozzle is secured to the blower housing through its externally projecting flanges 46 and 55, the flange 46 being connected as by suitable bolts 58, to the housing side flange 31. The upper and lower nozzle flanges 55 are connected respectively, as by suitable bolts 59, to upper and lower angle elements 60 secured to the ends 25 of the housing element 23, as by spot-welding.

In the assembly relation of the blower housing and nozzle, it will be observed particularly from Fig. 1, that the air-flow created by the blower and passing through the blower outlet port 26 into the nozzle, is directed by means of the angulate trend of the nozzle passage, over and about the cylinder head and cooling fins. Thus effective cooling of the engine cylinder is attained. It is to be noted that by reason of the preferred shape and trend of the nozzle conduit, the air-flow is substantially concentrated at the cylinder head, the nozzle-like restriction thereof serving to increase the rate of air-movement past the cylinder cooling fins, whereby to effect a desirably rapid rate of heat absorption and dissipation by the stream of air in contact with the cylinder fins.

The foregoing description relates to a preferred embodiment of the invention, as illustrated by the drawings. The improved blower housing and air-directing nozzle assembly related as described to the engine and power transmission controlling clutch mechanism, serves effectively to provide a cooling stream of air in contact with the clutch and the engine cylinder. The structure of the assembly is of a relatively inexpensive but durable type, comprising elements of sheet material readily formed as by stamping and pressing, and assembled together quickly and easily by spot-welding. Further, the blower housing and nozzle assembly while presenting a strong and rigid structure, is however, relatively light in weight,

a factor greatly to be desired in the elements making up a railway motor car to which the present invention is particularly adapted.

It will be appreciated however, that the particular structure and assembly arrangement of the blower housing and nozzle device may be altered or modified without departing from the spirit and full scope of the invention as defined by the appended claims.

I claim:

1. In combination with a blower and housing therefor, the housing having an air discharge opening, an air-directing conduit device extending from said discharge opening, said device comprising pre-formed wall elements of relatively thin sheet metal, securing flanges on said elements, portions of said wall elements overlapping the flanges on adjacent wall elements and being welded together in assembly, mounting flanges on certain of said wall elements at one end of the conduit device, provided for the attachment of the device to said blower housing, and certain of the wall elements at the opposite end of the conduit device, being spaced apart a predetermined distance and each terminating in an inwardly curved end portion.

2. In combination with a blower and housing therefor, the housing having an air discharge port, an air-directing conduit device extending from said discharge port, said device comprising pre-formed wall elements of relatively thin sheet metal, securing flanges on said elements, portions of said wall elements overlapping the flanges on adjacent wall elements, said overlapped wall portions and flanges being spot-welded together, a strengthening member connecting certain of said wall elements, mounting flanges projecting from certain of the wall elements at one end of the conduit device, by which the conduit device is secured to said blower housing and the wall elements at the opposite end of the device being formed and arranged to provide a pair thereof in spaced, parallel planes and each terminating in an inwardly curved end portion, and a side wall spanning said spaced walls and terminating rearwardly of said curved ends of the latter walls.

3. In an air cooling arrangement for an internal combustion engine having an exposed cylinder, a blower, and a conduit for conducting air from the blower to said cylinder, said conduit being comprised of pre-formed wall elements of relatively thin sheet metal welded together in assembly, the wall elements thereof forming the discharge end of the conduit, being adapted for partly enclosing said cylinder and including a pair thereof arranged in substantial parallelism and having converging end portions, and a side wall interconnecting said pair of walls and terminating rearwardly of said converging end portions.

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