C. H. DE LA MONTE.

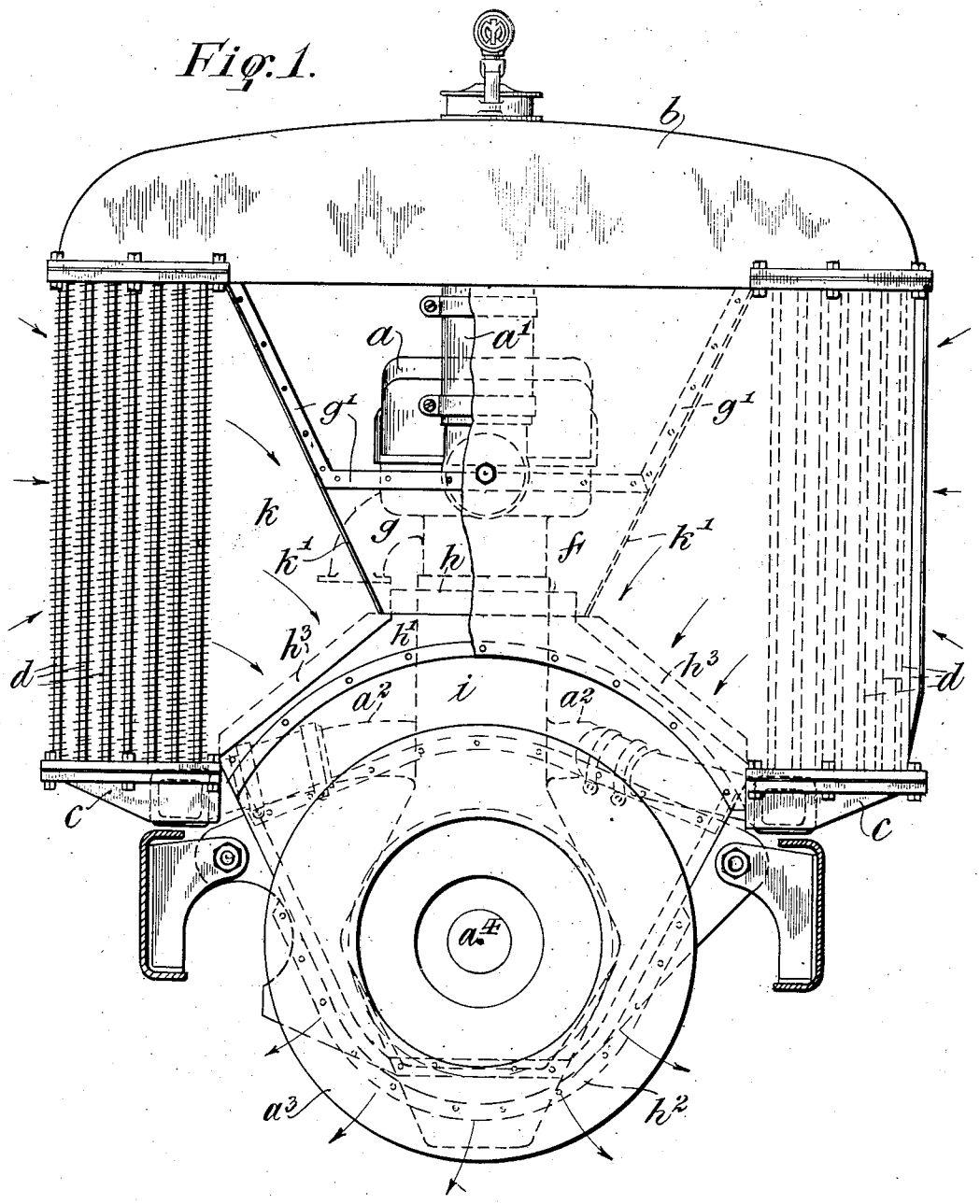
RADIATOR.

APPLICATION FILED AUG. 29, 1919.

1,404,304. Patented Jan. 24, 1922.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESS

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RADIATOR.

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3 SHEETS—SHEET 2.

Fig. 3.

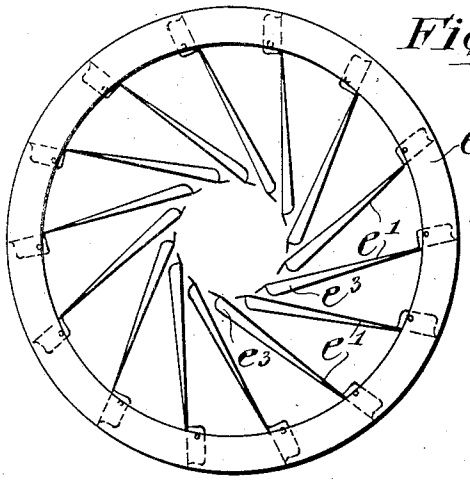


Fig. 2.

WITNESSES

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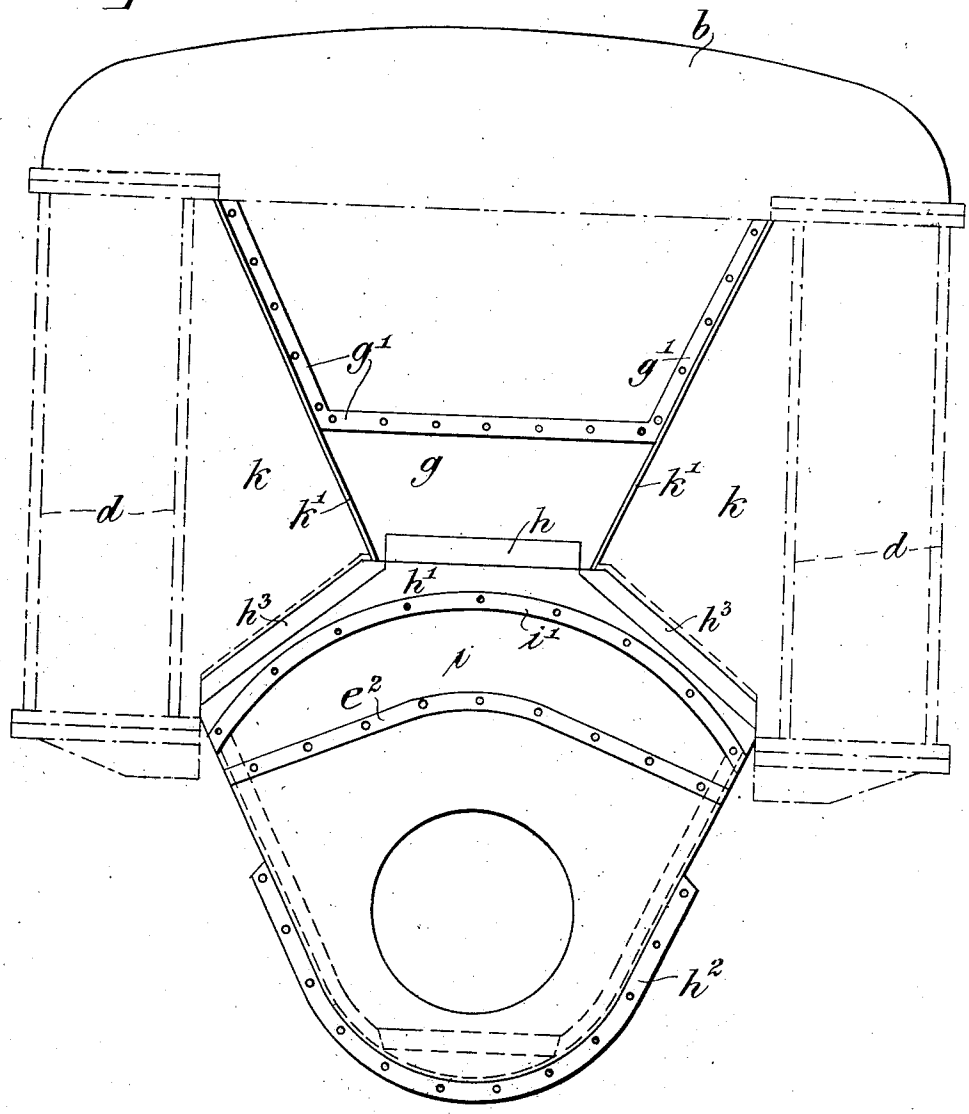
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3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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RADIATOR.

1,404,304. Specification of Letters Patent. Patented Jan. 24, 1922.

Application filed August 29, 1919. Serial No. 320,550.

To all whom it may concern:

Be it known that I, CASCIOUS H. DE LA MONTE, a citizen of the United States, residing in the borough of Manhattan of the city of New York, in the State of New York, have invented certain new and useful Improvements in Radiators, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

In cooling systems for radiators where a fan is employed for causing constant circulation of cool air through the bundles of tubes, it becomes somewhat of a problem to limit the volume of air subject to the fan action in such manner that maximum circulation of air over the parts to be cooled will be obtained. Generally speaking, in order to attain the results sought, efforts have been made to place the fan in a more or less confined space open to the atmosphere only by way of the tubes and the discharge opening. In known constructions, for instance, it has been proposed to make the entire area under the hood of a motor practically air-tight except for the inlet passages over the radiator tubes and the outlet discharge at the fan. Such attempts have not resulted in practical constructions since it is difficult for the manufacturer to build a chamber of this character and, during use, the degree of suction is lessened by reason of the relatively large area subjected to the fan action. In accordance with the present invention a cooling system is provided in which a series of air channels or ducts are so built up between the radiator tubes and the fan as to insure direct action of the fan on the volume of air which is to be drawn through the radiator tubes, the suctional action secured being increased to maximum degree and the air circulating in currents only at the areas to be cooled. The principal object of the invention is to provide a simple and inexpensive construction for the purpose described which may be built in, in and around a radiator and motor of standard form. The channels are built up by sheet metal walls of such form and so disposed with relation to one another as to subject the air disposed therein to the direct action of the fan and cause the air to travel from the tubes directly to the fan blades and be discharged therefrom in the usual manner.

The invention will be described in greater detail in connection with one practical embodiment thereof as illustrated in the accompanying drawings, in which—

Figure 1 is a view in rear elevation of a radiator mounted at the rear of a motor, part of the rear wall being broken away to show the relation of the sheet metal walls forming the air channels.

Figure 2 is a view partly in section and partly in side elevation of the radiator and motor shown in Figure 1.

Figure 3 is a view in elevation showing the fan structure proper.

Figure 4 is a view in rear elevation of the radiator shown in Figure 1 with its rear wall, motor and fan removed.

The motor a of any type has its jackets in communication with the head b and foot c of the radiator through water connections a', a^2, as usual, and the radiator unit illustrated is completed by means of bundles of vertically disposed water tubes d which connect the head b of the radiator with the foot c at opposite sides of the head. The invention is not concerned with the specific character of the elements thus far described. The problem dealt with is the circulating of cooling currents of air through the tubes d in the most effective manner. In the illustrated embodiment the fan e (illustrated in Figure 3) is shown as mounted on the fly-wheel a^3 of the motor, but as the description proceeds it will be evident that the invention is not to be limited to the type of fan employed nor to its relation to the fly-wheel. The fan shown, however, has been found to have certain advantages which make it most efficient in use. This fan is made up of a series of blades e' which are carried by a ring e^2 and extend inwardly but eccentrically with respect to the center of the ring. The edges of the blades e' are bent, as at e^3, and these edges are intended to extend somewhat beyond the rear face of the support for the fan, which in the present instance is the fly-wheel a^3, so as to bite the air and thus create a maximum suctional effort.

The improved air channels whereby the air is drawn directly from the tubes d to the fan and there expelled will now be described. The rear wall f of the radiator is imperforate and has its lower edge curved to accommodate the fan e. On the reverse face

of the rear wall f is supported a downwardly and rearwardly inclined plate g which may have formed therewith straps g' to permit it to be readily riveted to the wall f. The sheet g has its lower rear edge overlapped by a flange h on the upper side of a plate h' which is bolted to the motor. The plate h' is formed with a generally cylindrical opening to receive the supporting shaft a^4 for the fly-wheel a^3. The lower portion of the sheet h' is bent forwardly to conform generally to the outline of the fly-wheel, and at its edge is provided with a flange h^2 for a purpose which will appear. On the reverse face of the rear wall f below the horizontal line where the plate g is riveted, is riveted as at i', another plate i which is so inclined rearwardly and downwardly as to extend into juxtaposition with the front edges of the fan blades e', the opening in the plate i being of generally cylindrical form to conform to the shape of the fly-wheel. The opening left in the sheet i is in such position with relation to the opposite edges e^3 of the fan blades e' as to permit these edges to extend into the channels adjacent the fan and bite the air. The flange h^2 on the lower portion of the sheet h is riveted to the lower portion of the plate i.

As will be evident from Figures 1 and 2 one wall of the air channel of the tubes d to the fan is formed by the rear wall f of the radiator. The other wall is indicated at k and comprises a sheet of metal disposed at the front side of the radiator tubes d and extending inwardly to a point in line with the straps g' where the sheet k is bent at right angles and extends across the space between the plate k and the wall f, this angle section constituting an inclined wall k' to deflect the air currents downwardly toward the fan. The plate k is supported by riveting the wall section k' to the straps g'. The sheet h' carried by the motor is formed with a flange h^3 which laps over and abuts against the wall k as indicated in dotted lines in Figure 1.

In Figure 4, the arrangement of the various channel walls with respect to each other is illustrated. The strap g' connecting the baffle plate g and the inclined walls k' is clearly shown. The flange h of the plate h' overlaps the bottom edge of the plate g. The reference character i' indicates the line of riveting where the upper edge of the plate i is connected to the front radiator wall.

From the description given it will be evident that the air around the tubes d is confined between the rear wall f and the front wall k, with respect to each bundle of tubes. The inclined wall k' facilitates the direct inward movement of the air and deflects it downwardly under the suctional action of the fan. Passing from the channels thus formed, the air continues in its travel between the plate h' and sheet i where it is picked up by the fan blades e' and thrown out radially therefrom, being discharged at the outer side of the wall f into the atmosphere. The plate g and the downwardly extending wall sections k' of the wall k form a dead air pocket and cuts off the air channels from the motor space. The channels formed are of such relatively restricted cross-sectional area and all of the parts described are so united as to constitute a restricted path for the air and since practically only the volume of air about the tubes is acted upon by the fan blades the maximum suctional effort is obtained at the place desired and the maximum cooling effect is secured. None of the suctional effort of the fan is dissipated by having it act on air which does not contact with the area to be cooled. The plates are further so arranged as to direct the air along continuous unbroken channels so as to minimize eddy currents and frictional losses. The construction is such as to facilitate assembling and disassembling of the sheets forming the improved cooling system. For instance, the outside dimensions of the plate i are such as to permit this plate to clear the lower edge of the inclined plate g. The sheet h' is carried by the motor a so that if the motor be removed the sheet will be carried with it permitting free access to the remaining sheets which are secured to the rear wall f.

As pointed out hereinbefore the invention is not to be limited, in its broader aspects, to the particular type of motor or radiator employed since the elements described, in so far as they are new, are brought together for the purpose of establishing restricted and directional communication between the radiator tubes and a fan. Reference is to be had to the appended claims for a more definite statement of the scope of the invention.

I claim as my invention:

1. In a radiator, a bundle of water tubes, a fan, imperforate walls at either side of the tubes, imperforate transverse walls mounted within the bundles of tubes and separating them, an imperforate vertical plate extending across the front of the radiator, and a second plate spaced therefrom and disposed between the fan and the first named plate, said second named plate having an opening to expose the air to the fan blades, and said first and second named plates forming a channel communicating with the channels formed around each bundle of tubes by said first named vertical and transverse imperforate walls.

2. In a radiator, vertically disposed bundles of tubes at opposite sides of the radiator and extending between the upper and lower reservoirs thereof, an imperforate rear wall

for the radiator, imperforate walls at the front side of the bundles of tubes, imperforate transverse walls between said last named walls and the rear wall and extending downwardly and inwardly from the tubes, an imperforate plate extending across the front of the radiator, and a second plate spaced therefrom and disposed between the fan and the first named plate, said second named plate having an opening to expose the air to the fan blades and said first and second named plates forming channels communicating with the channel formed around each bundle of tubes by said imperforate front, rear and transverse walls.

3. In a radiator, vertically disposed bundles of tubes at opposite sides of the radiator and extending between the upper and lower reservoirs thereof, an imperforate rear wall for the radiator, imperforate walls at the front side of the bundles of tubes, imperforate transverse walls between said last named walls and the rear wall and extending downwardly and inwardly from the tubes, an imperforate plate extending across the front of the radiator, a second plate spaced therefrom and disposed between the fan and the first named plate, said second named plate having an opening to expose the air to the fan blades and said first and second named plates forming channels communicating with the channel formed around each bundle of tubes by said imperforate front, rear and transverse walls, and an inclined imperforate plate extending from the rear wall to said first named plate and disposed between said transverse walls.

4. In a radiator, a bundle of water tubes, a fan, imperforate walls at either side of the tubes, an imperforate plate extending across the front end of the radiator, and a second plate secured to the rear wall and spaced from the first plate and disposed between the fan and the first named plate, said second named plate having a circular opening to expose the air to the fan blades and said first and second named plates forming a channel communicating with the channel formed between said imperforate walls.

5. In a radiator, a fly-wheel, vertically disposed bundles of tubes at opposite sides of the radiator extending between the upper and lower reservoirs, an imperforate rear wall for the radiator, imperforate walls at the front side of the bundle of tubes bent to form imperforate transverse walls extending between the front and rear walls and inclined downwardly and inwardly from the tubes, an imperforate plate extending across the front end of the radiator, a second plate supported on the rear wall and spaced from the first named plate and disposed between the fly-wheel and the first named plate, said second named plate having a circular opening concentric with the fly-wheel, fan blades carried on the fly-wheel and having bent edges extending through the last named opening, said second and first named plates forming a channel communicating with the channel formed between said imperforate front and rear walls for the tubes, and an inclined imperforate plate extending from the rear wall to the first named plate and disposed between said transverse walls.

This specification signed this 27th day of August, A. D. 1919.

CASCIOUS H. DE LA MONTE.