H. W. TURNER.

AIR COOLING SYSTEM FOR INTERNAL COMBUSTION MOTORS.

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1,296,443. Patented Mar. 4, 1919.

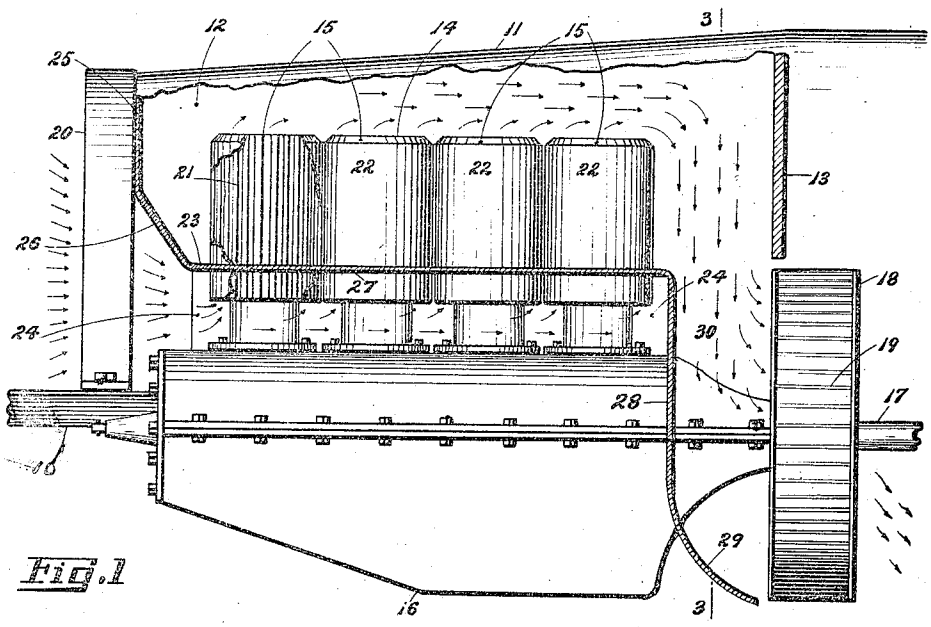


Fig. 1

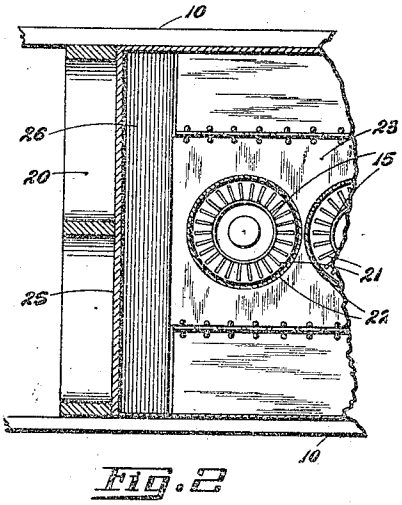


Fig. 2

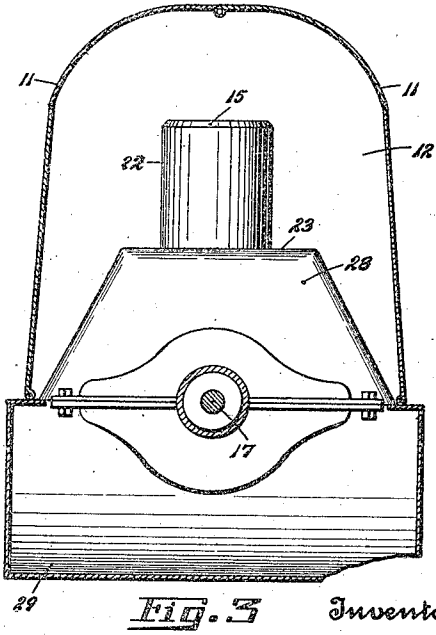


Fig. 3

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AIR-COOLING SYSTEM FOR INTERNAL-COMBUSTION MOTORS.

1,296,443. Specification of Letters Patent. Patented Mar. 4, 1919.

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To all whom it may concern:

Be it known that I, HORACE W. TURNER, a citizen of United States, residing at 902 W. Ninth street, Wilmington, in the county of New Castle and State of Delaware, have invented new and useful Improvements in Air-Cooling Systems for Internal-Combustion Motors, of which the following is a specification.

The invention relates to internal combustion motors, and more particularly to the cooling systems thereof, and has for an object to provide a simple and efficient air-cooling system for the internal combustion motors such as are generally used in motor vehicles.

Among other features, the invention comprehends an air-cooling system for an internal combustion motor, that is so designed and arranged that it will effectively accomplish the cooling of the cylinders of the motor, without disturbing the normal temperature of or of unduly heating other parts of the motor in the drawing off of the heated air at the points of radiation thereof from the motor cylinders.

I am aware that air-cooling systems for internal combustion motors have been used heretofore, in fact, are in practical use at the present day. These systems provide for the introduction of a continuous current of cool air into the usual motor compartment formed by the hood or housing of the motor vehicle; sucking the induced air down through suitable stacks which encircle the cylinders of the motor, so that the air will take off the heat that is radiated from the cylinders and carry this heated air down past and beyond the crank case of the motor, and suck it out through the rear of the motor compartment by the employment of vanes or paddles on the fly wheel of the motor, and which in the revolution of the fly wheel bring about the necessary suction to draw the air that is introduced into the compartment, plus the heated air from the motor cylinders, out through the rear of the motor compartment.

In my air-cooling system, I substantially reverse the principle above referred to by introducing into the motor compartment a quantity of cool air which, instead of being directed to the upper part of the motor and sucked down through the stacks encircling the motor cylinders, is directed upwardly at the base of the motor cylinders, to naturally rise upwardly in the stacks and be accelerated in its upward movement by the heat radiated from the motor cylinders, the combined atmospheres being then carried overhead of the motor cylinders and directed downwardly in the rear thereof, and sucked out at the rear end of the motor by the action of the usual vanes in the fly wheel, which in the rapid revolution of the fly wheel, bring about the desired suction.

In accomplishing this result it should be noted that over the known method of air-cooling described above, I make use of the natural tendency of heated air to rise, and instead of directing a current of cool air overhead of the motor to force the same downwardly against the upward action of the heated air, I permit the cool air which is carried into the motor compartment to naturally rise with the heated air when it comes in contact therewith, thus reducing the energy ordinarily required in known constructions, and in which a force is necessary to cause the cool injected air to move downwardly against and come in contact with, and draw downwardly the heated air from the motors. Further, in the known systems, the resultant heated mixture after the cool air comes in contact with the heated air from the motors, when it is drawn downwardly as mentioned, passes around the sides of the crank case of the motor, and thus unduly heats the crank case by the radiation of the heated air thereto, bringing about various strains and stresses to the crank case, and unduly heating the usual lubricating oils contained in the crank case. With my air-cooling system the heated mixture does not come in contact with the crank case, but is, in fact, drawn away from the crank case by the upward trend of the cooling air, so that the resultant mixture will not unduly heat the crank case, and is later drawn downwardly to the rear of the motor and allowed to pass outwardly from the motor compartment, without affecting the normal temperature of the crank case of the motor.

In the further disclosure of the invention, reference is to be had to the accompanying drawing, constituting a part of this specification, in which similar characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a fragmentary side elevation of a motor with parts broken away and shown in section to disclose the underlying structure, the structure clearly setting forth

the path or cycle of the air introduced to the motor compartment.

Fig. 2 is a fragmentary plan view of the motor compartment, looking at the motor in plan, with parts broken away and shown in section to disclose the underlying structure.

Fig. 3 is a fragmentary vertical sectional view taken substantially on the line 3—3 in Fig. 1.

Referring more particularly to the views, the motor frame or sills are indicated by the numeral 10, the hood by the numeral 11, said hood forming a motor compartment 12 and the usual dash board by the numeral 13, with the motor in its entirety indicated by the numeral 14, and including the usual cylinders 15 and crank case 16. The main shaft or crank shaft 17 projecting from the rear of the crank case 16 carries the usual fly wheel 18, which in this instance is shown as provided with a series of vanes 19 on the periphery of the fly wheel. The front of the hood 11 is provided with a suitable air inlet 20, which is preferably made large enough to carry a sufficient supply of cool air into the motor compartment, when the motor vehicle is advanced along the highway.

The cylinders 15 of the motor are preferably formed with a series of radially extending flanges 21, which may extend longitudinally of the motor cylinders, and each motor cylinder is preferably encircled by a stack 22, spaced a slight distance from the flanges, as shown. Suitably arranged within the motor compartment is an apron 23 forming a lower air compartment 24, said apron having its forward end 25 suitably secured to the forward part of the hood 11, and having a portion 26 inclined downwardly to form a deflecting plate immediately in front of the first or forward motor cylinder, said deflecting plate extending substantially across the motor compartment at that point to form a complete air inlet, as shown. At the lower end of the deflecting plate the apron is formed to provide a horizontally disposed plate 27 encircling the stacks 22, said plate being disposed slightly above the lower edge or end of the motor cylinders, and completely isolating the upper part of the motor compartment from the lower part of the motor compartment, so that the air entering the air inlet 20 will be deflected by the plate 26 to pass beneath the plate 27, and thus will have to enter between the stacks and the motor cylinders, and pass upwardly therebetween into the upper part of the motor compartment. The rear end of the apron at the point of termination of the horizontal plate 27, is bent downwardly to form a depending baffle 28, curving rearwardly at its lower end as at 29 and at which point it will end immediately adjacent the fly wheel, the said baffle 28 providing a flue 30 at the rear of the motor compartment, and immediately behind the motor cylinders.

Now it will be clearly seen that in the operation of the motor, the heat generated, radiating from the flanges 21 of the motor cylinders, will tend to rise upwardly in the stacks 22, and it will be clear that when a current of cool air enters the air inlet 20 and is deflected by the plate 26 into the air compartment 24, the cool air will rise in the stacks and come in contact with the heated air from the flanges of the motor cylinders, and thus form a heated mixture of air. Naturally the rising of the heated air from the motor cylinders through the stacks will tend to bring about a suction, to suck the cool air into the stacks, and the cool air taking up the heated air will thus tend to rise in the stacks without any effort or suction being necessary to bring about this path of movement of the rising mixture. The mixture of cool and heated air now passes outwardly from the upper ends of the stacks, and as shown by the arrows, traverses the upper part of the motor compartment to the rear thereof. At this point the suction created by the vanes 19 of the fly wheel 18 and which is rotating rapidly, will carry this mixture of air downwardly into the flue 30, this being due to the provision of the baffle 28, and the mixture will then be sucked out adjacent the fly wheel, as will be clearly understood.

From the foregoing description, taken in connection with the drawings, it will now be apparent that the construction described accomplishes various advantageous results, by reason of the particular form of apron, baffle and deflector plates employed, taken in conjunction with the path of air admitted to the motor compartment, and its subsequent removal from the motor compartment, and to this end it will be seen that the current of cool air entering the motor compartment will tend to follow a natural path, and without any effort will be sucked or drawn up into the stacks and take away from the motor cylinders the heated air that is radiating therefrom, and which heated air will accelerate the movement of the cool air in the air compartment and the stacks; that the resultant heated mixture is drawn off at the rear of the motor, without coming into contact with the main or central body portion of the crank case; that in directing the heated mixture upwardly through the stacks, less effort is necessary to bring the same to the upper part of the motor compartment, and at which point the suction from the vanes on the fly wheel will come into play to draw the heated air rearwardly and down; and lastly, that by directing the cool air into contact with the heated air from the motor cylinders in the manner described, none of this heated air will come

in contact with that portion of the crank case where the usual quantity of lubricating oil for the crank shaft is carried, especially in a splash system, and thus the crank case will be kept comparatively cool at all times, and the oil therein will not tend to burn up or lose its nutritive lubricating qualities, the main body of the crank case, furthermore, by reason of its construction, being free from any expansive or contractive strains or stresses which ordinarily might occur upon the application of heat and the subsequent cooling thereof.

Although I have shown a particular construction for directing the air currents relative to the motor and motor cylinders, it will be understood that I do not limit myself to the particular arrangement in the construction, as set forth; that various slight changes may be made without departing from the spirit of the invention, the scope of which is defined in the appended claims.

I claim:

1. In a motor including cylinders and a crank case, a hood inclosing the motor, an apron encircling the cylinders and forming upper and lower compartments within the hood, an air inlet through the hood into the lower compartment, stacks encircling the cylinders and providing flues for the air admitted in the lower compartment to pass into the upper compartment, around the cylinders, and a depending partition forming a continuation of said apron and providing a flue separate from the lower compartment and in communication with the upper compartment, to carry off from said upper compartment through said flue, the air received into said upper compartment, whereby said air will be carried exteriorly of said hood.

2. In a motor including cylinders and a crank case, a hood inclosing the motor, an apron encircling the cylinders and forming upper and lower compartments within the hood, an air inlet through the hood into the lower compartment, stacks encircling the cylinders and providing flues for the air admitted in the lower compartment to pass into the upper compartment, around the cylinders, a depending partition forming a continuation of said apron and providing a flue separate from the lower compartment and in communication with the upper compartment, to carry off from said upper compartment through said flue, the air received into said upper compartment, whereby said air will be carried exteriorly of said hood, a rotating fly wheel adjacent the exit of said flue, and means on the fly wheel for inducing a suction through the flue to facilitate the removal of the air therethrough.

3. In a motor including cylinders and a crank case, a hood inclosing the cylinders, an apron within the hood and forming upper and lower compartments with the cylinders projecting into the upper compartment, and the crank case lying in the lower compartment, an air inlet through the hood to the lower compartment, whereby cool air from the exterior can be received into the lower compartment in proximity to said crank case, stacks around the cylinders and forming flues to carry air upward from the lower compartment through the flues and around the cylinders into the upper compartment, and a partition segregating the rear part of the upper compartment from the lower compartment, and forming a flue communicating with the upper compartment to carry off the air received therein.

In testimony whereof I affix my signature.

HORACE W. TURNER.