Feb. 20, 1940. S. T. TRICE 2,191,050

COOLING DEVICE

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Fig. 1.

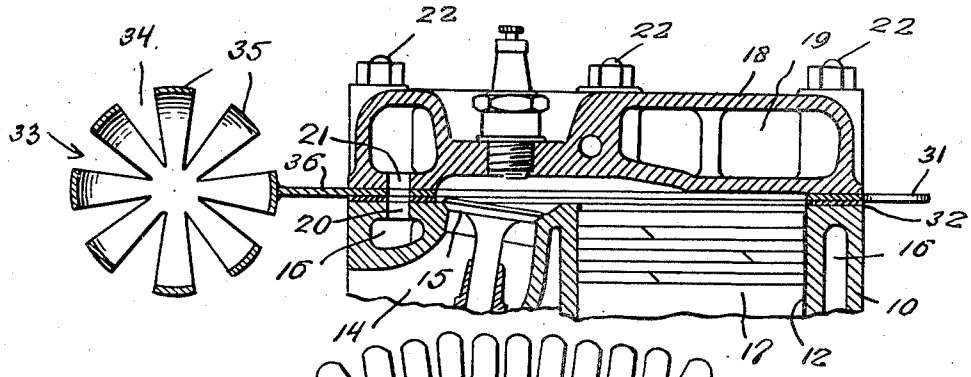
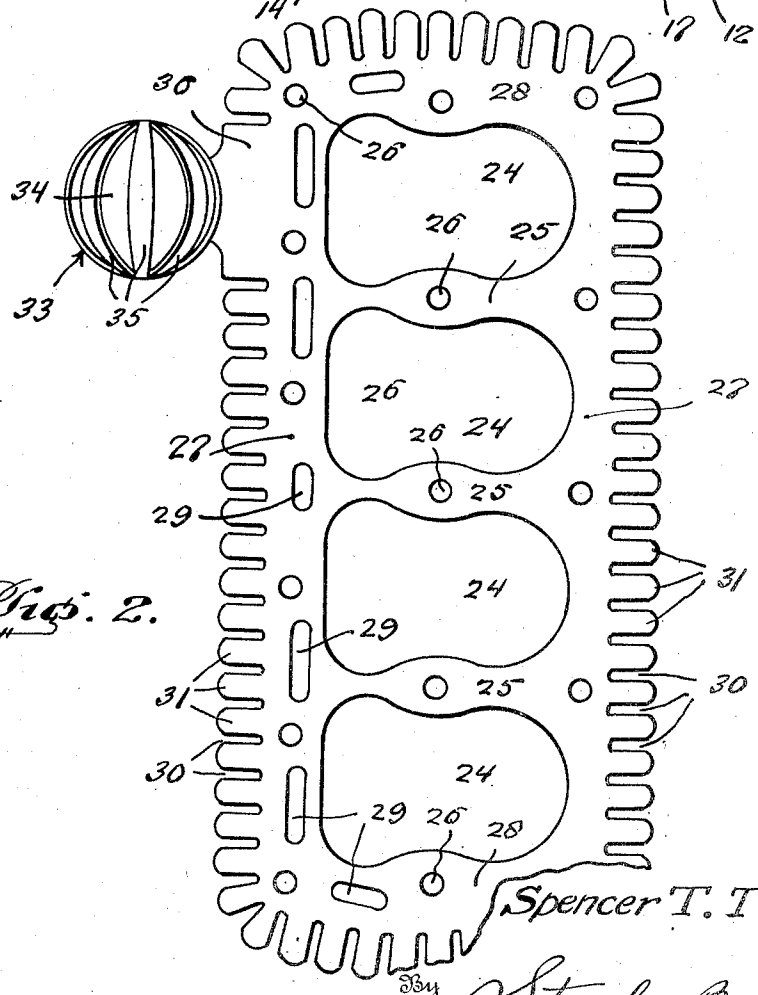


Fig. 2.



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Fig. 3.

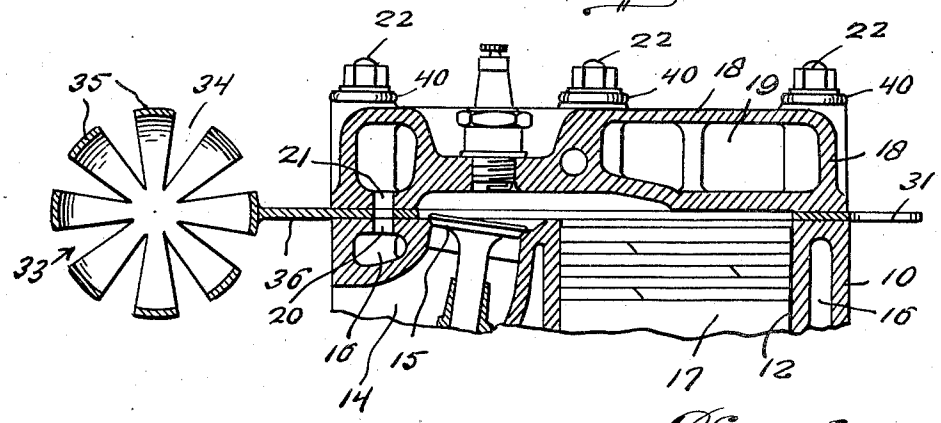


Fig. 4.

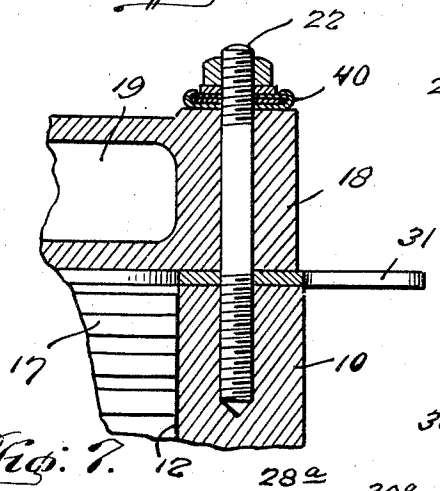


Fig. 5.

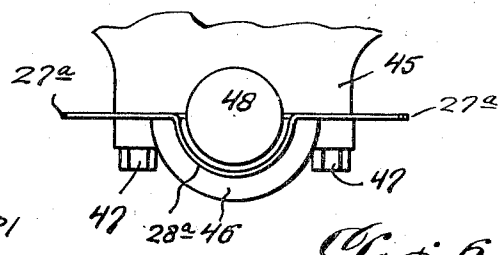


Fig. 6.

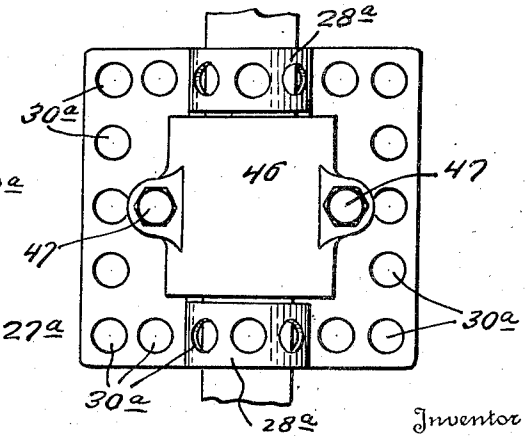
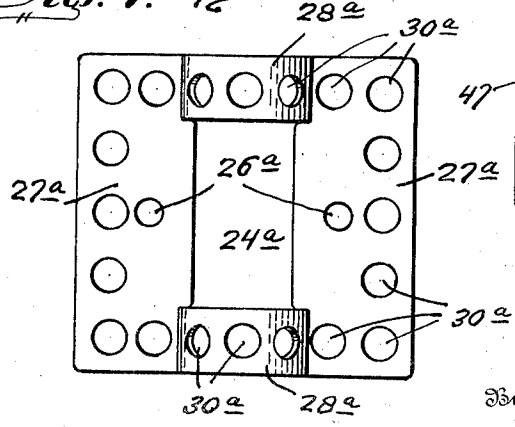


Fig. 7.



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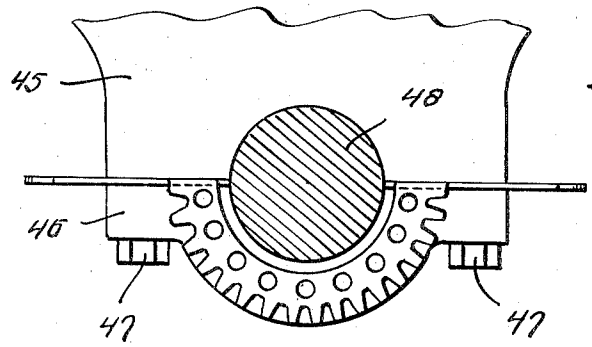


Fig. 8.

Fig. 9.

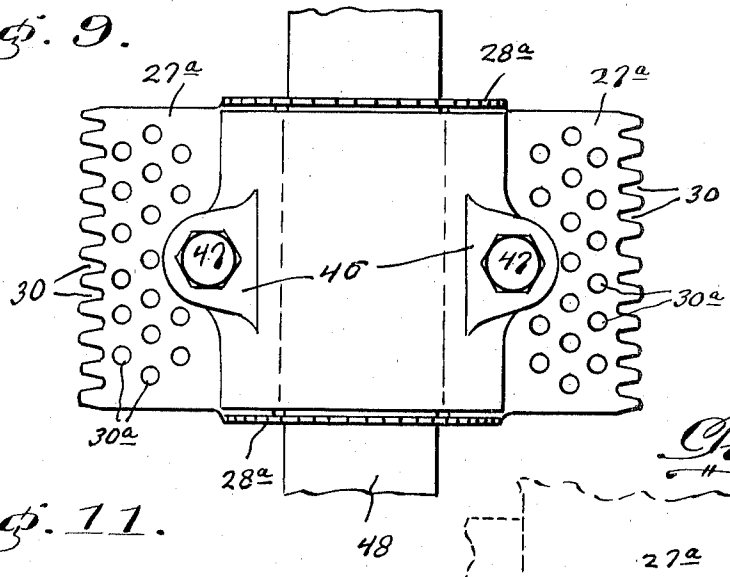


Fig. 10.

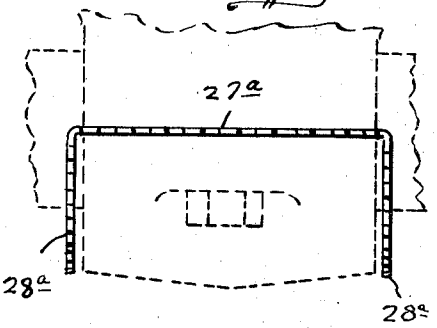
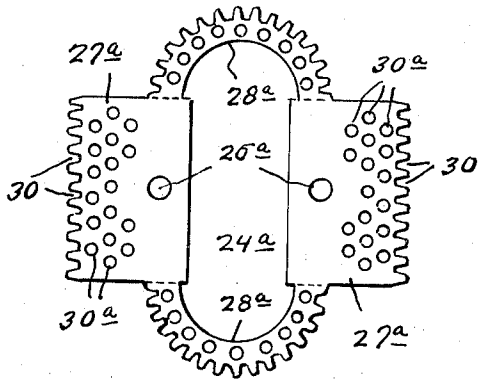


Fig. 11.



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Patented Feb. 20, 1940

2,191,050

UNITED STATES PATENT OFFICE

2,191,050

COOLING DEVICE

Spencer Talley Trice, Mabank, Tex.

Application September 22, 1938, Serial No. 231,239

5 Claims. (Cl. 123—173)

This invention relates to a device for cooling machine parts by radiating the excess heat generated therein.

More particularly, the present invention contemplates the employment of a plate of aluminum alloy or other metal of high heat conductivity between the parts of a machine which are bolted together and where overheating is apt to occur, the plate having openings for passage of the bolts which secure the machine parts together, and being provided with edge portions which project outwardly of said machine parts for contact by the surrounding or passing air so that rapid radiation of said surplus heat is insured.

An important object of the present invention is to provide a cooling device of the above kind which is extremely simple in construction and highly efficient in use.

In order that my invention may be fully understood, I have illustrated in the accompanying drawings two embodiments and uses of the present invention, although the invention is adaptable to use in connection with any portion of a machine or engine where two parts are bolted together and overheating is apt to occur.

In said accompanying drawings:

Figure 1 is a fragmentary view of an internal combustion engine showing a cylinder block and cylinder head in section parallel to the cylinder axis and with a form of my invention applied thereto.

Figure 2 is a plan view of the form of the invention employed in Figure 1, partly broken away.

Figure 3 is a view similar to Figure 1 showing a slight modification of the invention as disclosed in the latter figure.

Figure 4 is an enlarged fragmentary section illustrating details of the construction shown in Figure 3.

Figure 5 is a fragmentary side elevational view of a machine or engine bearing equipped with another form of the present invention.

Figure 6 is a bottom plan view of the construction shown in Figure 5, and

Figure 7 is a bottom plan view of the cooling device per se for use as shown in Figures 5 and 6.

Figure 8 is a view similar to Figure 5, showing a modified form of the cooling device for engine bearings.

Figure 9 is a bottom plan view of the construction shown in Figure 8.

Figure 10 is an edge elevation looking toward the left of Figure 8, and

Figure 11 is a plan view of the blank from which the cooling device of Figure 8 is formed.

Referring more in detail to the drawings, the embodiment of Figures 1 and 2 is employed between the cylinder block and cylinder head of an internal combustion engine. The cylinder block 10 has one or more cylinder bores 12, fuel mixture inlet and exhaust passages, one of which is shown at 14, controlled by a valve 15, and the usual internal passages 16 for circulation of cooling liquid. Piston 17 reciprocates in the cylinder bore 12, and the cylinder head 18 is hollow as indicated at 19 for the circulation of cooling liquid, the block 10 and head 18 having registered openings as at 20 and 21 for the passage of the cooling fluid from one to the other. Also, the head 18 is fastened to the block 10 by the usual nut and bolt means generally indicated at 22. It will be noted that the block 10 and head 18 are made of cast iron, a material of relatively low heat conductivity.

In order to radiate the excess heat generated in the engine, particularly at and around the exhaust port, combustion chamber and upper part of the cylinder block, I provide the cooling device clearly shown in Figure 2 adapted to be clamped between the block 10 and head 18 as shown in Figure 1. This device consists of a plate of aluminum alloy or other metal of high heat conductivity having openings 24 formed therein conforming to the upper ends of the cylinders and the combustion chambers of the engine, defining portions 25 between such openings where the head and block are bolted together. These connecting portions 25 have apertures 26 through which the bolts 22 may pass, and the plate has side portions 27 and end portions 28 adapted to also be clamped between the adjacent portions of the head and block of the engine and provided with similar openings 26 for reception of other of the bolts 22 which fasten the head to the block. Also, the portions 27 and 28 have further openings 29 corresponding to the openings at 20 and 21 so as to allow or not interfere with the free circulation of the cooling fluid between the engine block and the cylinder head. It will be noted that the side and end portions 27 and 28 of the plate are of sufficient width to project outwardly beyond the sides and ends of the cylinder block and cylinder head for contact by the surrounding or passing air so as to insure rapid dissipation of the heat conducted outwardly thereby. The dissipation of the heat in this manner may be made more rapid by providing the projecting portions with openings as at 30 whch, as shown, are in the nature of slots defining outwardly projecting fingers 31 therebetween.

In the embodiment of Figures 1 and 2 the plate of high heat conductivity is made comparatively thin and disposed upon an ordinary cylinder head gasket 32 which allows for slight expansion of the cooling plate in the direction of its thickness, and insures a fluid-tight joint between the head and the block at all times.

The dissipation of heat from the cooling plate as it is conducted outwardly thereby may be greatly facilitated by the use of a hollow spherical heat dissipating element 33 as shown. This element merely consists of a ball of aluminum alloy or other metal of high heat conductivity slotted from one end to the other as at 34 to provide a series of arcuate spaced strip members 35 in contact with which passing air may flow and between which air may pass to the interior of the device for maximum heat dissipating action. This ball-like device is attached to the cooling plate near the end thereof employed at the front of the engine in proximity to the usual fan which draws air through the cooling radiator of the motor vehicle in connection with which the engine is employed. Thus, the dissipating device 33 is in the direct path of and adjacent the draught of air immediately after its delivery rearwardly by the fan in question. The cooling plate preferably has a projecting portion 36 at one side and near the front end of the same to which one of the strip members 35 may be attached by welding or the like.

The embodiment shown in Figures 3 and 4 is exactly the same as that shown in Figures 1 and 2 and described above except that the cooling plate is made of thicker and softer material so that it may be employed between the cylinder head and the cylinder block without the use of a separate cylinder head gasket. However, a plate of this character has greater expansion under heat in the direction of its thickness, and means must be provided to allow for such expansion so that the joint between the cylinder block and cylinder head will not be disturbed. For this purpose, I provide suitable resilient washers or gaskets 40 between the cylinder head 18 and the heads of the bolts 22 or the nuts threaded thereon, as the case may be. These gaskets or washers 40 may be of the general construction followed in the manufacture of cylinder head gaskets wherein a bottom plate of soft material is provided which has its edge turned over upon a top plate of harder material, and a resilient sheet of asbestos or the like interposed between the two sheets as clearly shown in Figure 4. This description is given simply for sake of clearness, the washers or gaskets 40 forming no specific part of the present invention per se. As the construction of Figures 1 and 2 and Figures 3 and 4 are identical in all other respects, like parts are indicated by corresponding reference characters in all of these views.

In Figures 5 to 11 inclusive, I have illustrated embodiments of my invention adapted for use in connection with machine or engine bearings to radiate and dissipate the excess heat generated therein. The bearing shown consists of a bearing block 45 and a bearing cap 46 bolted thereto as at 47, the block 45 and cap 46 having mating bearing recesses in which the journal of shaft 48 is rotatably fitted and held. The present cooling device for use in this connection consists of a metal sheet or plate of aluminum alloy or other metal of high heat conductivity having side portions 27a and end portions 28a of sufficient width to project outwardly beyond the bearing members 45 and 46 for contact by the surrounding or passing air so that rapid dissipation of heat radiated outwardly thereby is insured. These projecting portions have apertures or openings which may be in the form of circular holes 30a in the projecting portions of the plate and/or slots 30. The side portions 27a are clamped at their inner edges between the bearing block 45 and bearing cap 46, being apertured as at 26a for passage of the bolts 47 which secure the bearing parts together. The inner portions of the side members 27a are thus firmly clamped between the parts of the bearing and the outer portions thereof project as described. In these embodiments, the end members 28a of the cooling plates are disposed beyond the sides of the bearing and are of curved form so as to pass around the shaft 48 without contacting the latter. This permits stamping of the cooling plate from a single piece of metal in one part, the central opening 24a in the plate being of a size corresponding to the size of the recesses in the bearing parts which receive the journal of shaft 48. It will be obvious that excess heat generated within this bearing will be radiated outwardly and dissipated from the projecting portions of the cooling plate in an efficient manner. Other variations and modifications of the invention will suggest themselves readily to those skilled in the art, such as required for cooling the bolted joints between engine exhaust manifolds and exhaust pipes, oil pan joints, etc. In the embodiment of Figures 5 to 7 inclusive, the end portions 28a are simply pressed downwardly or upwardly in arcuate form, but in that of Figures 8 to 11 inclusive, they are stamped in arcuate form and bent at right angles to the remainder of the plate. It is noted that the present invention is not required or intended for use on aeroplane motors.

What I claim as new is:

1. In combination with the portion of a machine where overheating is apt to occur and which embodies two parts bolted together and having an inner zone of heat generation, means for radiating and dissipating such heat comprising a plate of metal of high heat conductivity apertured to surround said zone and having its inner edge portions clamped between said parts and provided with openings through which the bolts securing the parts together pass, the outer edge portions of said plate projecting outwardly beyond said parts for contact by the surrounding or passing air, and said projecting outer edge portions having openings to afford additional length of exposed edge and thereby increase the heat dissipating capacity thereof.

2. In combination with the portion of a machine where overheating is apt to occur and which embodies two parts bolted together and having an inner zone of heat generation, means for radiating and dissipating such heat comprising a plate of metal of high heat conductivity apertured to surround said zone and having its inner edge portions clamped between said parts and provided with openings through which the bolts securing the parts together pass, the outer edge portions of said plate projecting outwardly beyond said parts for contact by the surrounding or passing air, and said projecting outer edge portions having openings to afford additional length of exposed edge and thereby increase the heat dissipating capacity thereof, and a hollow sphere of metal of high heat conductivity attached at one side to a side of said plate and provided with arcuate slots from one end to the

other to define spaced strips between the slots for the free circulation of air through and within said sphere.

3. In combination with an engine cylinder block and cylinder head secured together by bolts, means for dissipating excess heat generated at and around the upper part of the cylinder block comprising a plate of metal of high heat conductivity apertured to surround the zones of heat generation and having inner portions clamped between said block and said head as well as apertured to permit passage of the bolts therethrough which secure the head to the block, the outer edge portions of said plate projecting outwardly beyond the cylinder block and cylinder head and provided with openings to afford additional length of exposed edges and thereby increase the heat dissipating capacity of said edge portions.

4. In combination with an engine cylinder block and cylinder head secured together by bolts, means for dissipating excess heat generated at and around the upper part of the cylinder block comprising a plate of metal of high heat conductivity apertured to surround the zones of heat generation and having inner portions clamped between said block and said head as well as apertured to permit passage of the bolts therethrough which secure the head to the block, the outer edge portions of said plate projecting outwardly beyond the cylinder block and cylinder head and provided with openings in the form of slots defining projecting fingers therebetween to afford additional length of exposed edges and thereby increase the heat dissipating capacity of said edge portions.

5. In combination with an engine cylinder block and cylinder head secured together by bolts, means for dissipating excess heat generated at and around the upper part of the cylinder block comprising a plate of metal of high heat conductivity apertured to surround the zones of heat generation and having inner portions clamped between said block and said head as well as apertured to permit passage of the bolts therethrough which secure the head to the block, the outer edge portions of said plate projecting outwardly beyond the cylinder block and cylinder head and provided with openings to afford additional length of exposed edges and thereby increase the heat dissipating capacity of said edge portions, and a hollow sphere of metal of high heat conductivity attached at one side to a side of said plate employed at the front of the cylinder block and head, said sphere being provided with openings to facilitate the flow of air into and through the same.

SPENCER TALLEY TRICE.