No. 897,532. PATENTED SEPT. 1, 1908.

R. HERMAN.

COOLING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED AUG. 12, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

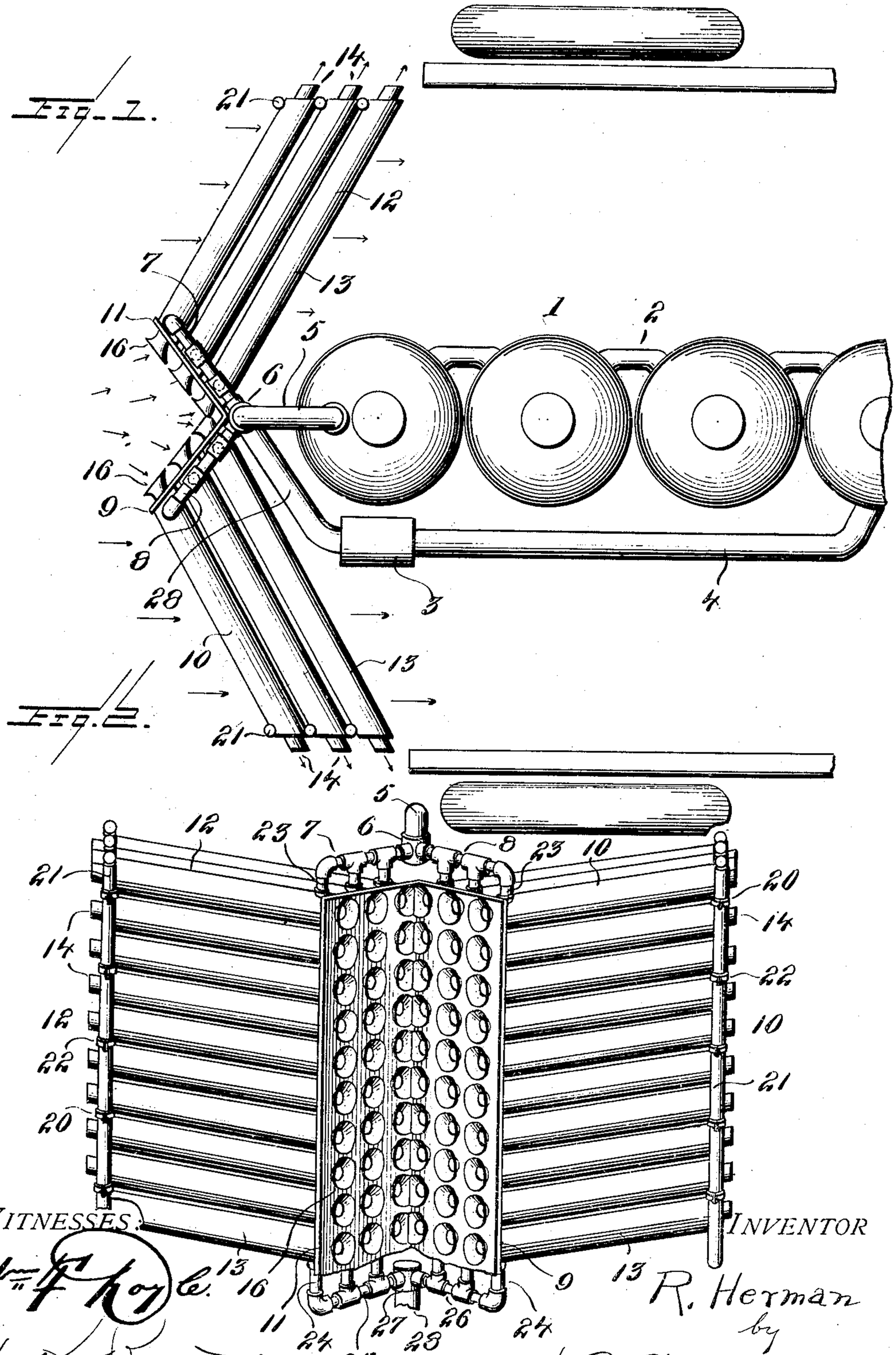


Fig. 2.

WITNESSES:

Wm. F. Hoffe.

L. R. Bryant.

INVENTOR

R. Herman

by

H. C. Evert & Co.,

Attorneys.

No. 897,532. PATENTED SEPT. 1, 1908.

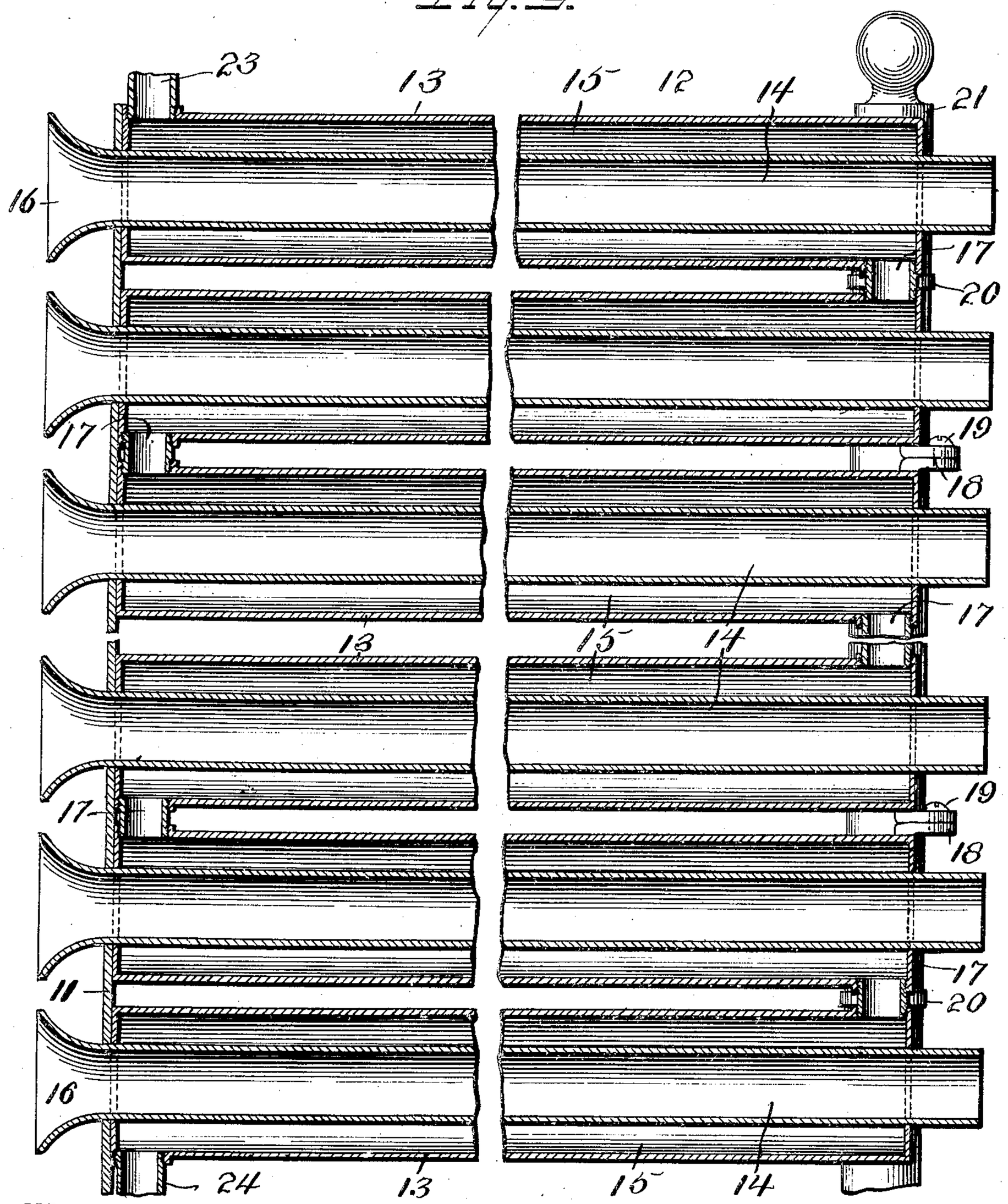
R. HERMAN.

COOLING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED AUG. 12, 1907.

2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

W. F. Noble

T. R. Bryant.

INVENTOR

R. Herman,

BY

N. C. Evert & Co. Attorneys.

UNITED STATES PATENT OFFICE.

REINHOLD HERMAN, OF CRAFTON, PENNSYLVANIA.

COOLING DEVICE FOR EXPLOSIVE-ENGINES.

No. 897,532. Specification of Letters Patent. Patented Sept. 1, 1908.

Application filed August 12, 1907. Serial No. 388,157.

To all whom it may concern:

Be it known that I, REINHOLD HERMAN, a citizen of the United States of America, residing at Crafton, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Cooling Devices for Explosive-Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to cooling device for use in connection with motor vehicles or for other purposes wherein it is found applicable and aims to provide in a manner as hereinafter set forth a device of such class whereby the heated water from the jacket of the engine or other source is caused to circulate in thin film like manner successively through a plurality of conduits, these latter being so disposed as not only to be subjected interiorly to a cooling medium but also exteriorly, such action quickly cooling the water as it circulates through the conduits, the currents of air passing exteriorly through the conduits being so conducted as not to come in contact with the air which passes exteriorly or over the carriers. The direction of the air which passes exteriorly or over the conduits being such as to constitute a cooling medium for the parts of the engine, owing to the fact that the cooling device is so disposed with respect to the engine as to enable the air which passes exteriorly or over the conduits to contact with the parts of the engine thereby cooling them.

The invention further aims to provide a cooling device for the purpose set forth which is unusually compact, but at the same time having parts so disposed as to form peripheral air conducting surfaces of great area, internal air conducting surfaces of great area, simple in construction, strong, durable, efficient in its use, readily set up in operative position, and comparatively inexpensive to manufacture.

With the foregoing and other objects in view the invention consists of the novel construction, combination and arrangement of parts hereinafter more fully described and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts through the several views; Figure 1 is a plan of a cooling device in accordance with this invention. Fig. 2 is a perspective, and Fig. 3 is a vertical sectional view showing the arrangement of the conduits.

When the cooling device is used in connection with a motor vehicle, it is arranged forwardly of the engine and is in communication with the water jacket of the engine cylinder for receiving the hot water therefrom and is furthermore in communication with a pump whereby the cooled water can be drawn from the tubes and forced into the jacket of the cylinder. By way of example an engine is shown of the four-cylinder type referred to generally by the reference character 1 and having the jackets of the cylinders connected together by the coupling pipes 2.

The pump is indicated by the reference character 3 and from which leads a conducting pipe 4 to the jacket of the rear cylinder. From the jacket of the forward cylinder stands a discharge pipe 5 having attached thereto a two-way coupling 6, with which communicates the hot water conducting pipes 7—8 which open into the conduits of the cooling device in a manner as hereinafter referred to.

A cooling device in accordance with this invention comprises groups of sets of water and air conduits, the sets of each group extending in an opposite direction with respect to the sets of the other group, the sets of each group furthermore extending at an inclination, the sets of each group are supported at the inner end in a vertically extending substantially V-shaped pocket-forming member for the air. Such member is formed of a rectangular plate bent in a substantially V-shaped manner so that one leg 9 thereof will support the inner end of the sets of one group which is referred to generally by the reference character 10 and the other leg 11 of said plate is adapted to support the inner end of the sets of the other group which is referred to generally by the reference character 12. As the air and water conduits of each set is of a like construction, but one will be described, the same reference characters being applied to the other. Each set of air and water conduits consists of a plurality of outer tubes 13 and a plurality of inner tubes 14. These latter are arranged within the former and the diameter of the latter with respect to the former are such as to form a

contracted passage 15 for the passage of the hot water. The tubes 13 constitute the conduits for the passage of the hot water, while the tubes 14 constitute the air conduits. The tubes 13 are of less length than the tubes 14, these latter projecting from each end of the tubes 13. The inner end of the tubes 14 project through the legs 9—11 of the pocket-forming member and are bell-shaped as at 16. The inner ends of the tubes 13 abut against the legs 9—11. The tubes 13 are so disposed as to alternately communicate with each other and for this purpose contracted coupling pipes 17 are provided for establishing communication between the tubes. Between the ends of the tubes 13 which are not connected by the branch pipe 17 the tubes 13 are formed with laterally extending lugs 18 which are connected together by the holdfast devices 19. Lugs 18 and devices 19 not only constitute a means for connecting the tubes 13 together, but further provide means for spacing the tubes 13 apart. The branch pipe 17 also provides means for connecting the tubes 13 together as well as means for spacing the tubes apart at the end opposite that to which the lugs 18 are connected.

A means is provided for supporting the sets of tubes of each group and which consists of casting or otherwise securing annular members 20 to the pipes 17 and extending through the members 20 are the uprights 21 which are connected to the members through the medium of the set screws 22 or other suitable devices.

As shown each of the legs 9—11 of the pocket-forming member supports three sets of air and water conduits, but this number can be increased or diminished as desired. The conducting pipes 7—8 are provided with branches 23 which open into the upper tube of each set and by such arrangement the hot water is conducted to the water conduits and travels through the water conduits in a sinuous manner until it reaches the lower conduits of the sets and from there it is let off by the outlet pipes 24, which communicates with the branch pipes 25, 26, these latter opening into a two-way coupling 27 which is attached to the suction pipe 28 of the pump.

During the travel of the water through the tubes 13, it is cooled by the passage of air over and between the said tubes 13 and through the tubes 14. As the vehicle travels the air will be pocketed by the supporting member for the sets of conduits and will pass from the pocket into the bell-shaped mouths of the tubes 13 and exhausted from the tubes 14 at the rear end thereof. The passage of the air when acting as a cooling medium for the water is indicated by the arrows in Fig. 1. The air which is used for interiorly cooling does not come in contact with the air used for exteriorly cooling, this latter air passes over and between the tubes 13; owing to such fact, it can then pass to cool the parts of the engine, the air passing rapidly over and through the tubes 13 will not be heated to such an extent as to impair its function for the cooling of the parts of the engine. Owing to the manner in which the air is conducted and used as a cooling medium for the hot water, it is evident that the water will be quickly cooled as the water conduits are not only subjected to a peripheral cooling but also to an internal cooling.

What I claim is:

1. A cooling device for the purpose set forth comprising groups of sets of combined water and air conduits, the water conduits of each set of each group being suitably spaced apart and the air conduits being open at each end and disposed within the water conduits, each of said air conduits opening at each end directly into the atmosphere whereby the air will be conducted by the sets of air conduits of each group in the same general direction and in currents independent of each other, the combined conduits of each group extending in an opposite direction with respect to the conduits of the other group.

2. A cooling device for the purpose set forth comprising groups of combined water and air conduits, the water conduits of each group being suitably spaced apart and the air conduits open at each end and disposed within the water conduits, the combined conduits of each group extending in an opposite direction with respect to the conduits of the other group, and a combined supporting and air pocket-forming member interposed between the group.

3. A cooling device for the purpose set forth comprising groups of sets of water conduits, the sets of each group extending at an inclination and in opposite directions with respect to the sets of the other group, the water conduits of each set alternately communicating with each other, and an air conduit extending through each of the water conduits and of a diameter with respect to the water conduit to form a contracted water passage, each of said air conduits opening at each end directly into the atmosphere whereby the air will be conducted by the sets of air conduits of each group in the same general direction and in currents independent of each other.

4. A cooling device for the purpose set forth comprising groups of sets of water conduits, the sets of each group extending at an inclination and in an opposite direction with respect to the sets of the other group, the water conduits of each set alternately communicating with each other, and an air conduit extending through each of the water conduits and of a diameter with respect to the water conduit to form a contracted water passage, each of said air conduits having a bell-shaped mouth, each of said air conduits

opening at each end directly into the atmosphere whereby the air will be conducted by the sets of air conduits of each group in the same general direction and in currents independent of each other.

5. A cooling device for the purpose set forth comprising groups of sets of water conduits, the sets of each group extending at an inclination and in an opposite direction with respect to each other, the water conduits of each set at alternative ends communicating with each other, an air conduit extending through each of the water conduits and of a diameter with respect to the water conduits to form a contracted water passage, and a combined supporting and air pocket-forming means interposed between the groups of sets of water conduits and connected to the air conduits.

6. A cooling device for the purpose set forth comprising diagonally-disposed water conducting means, means whereby said water conducting means is cooled externally by the passage of air, annularly-disposed means whereby said water is cooled internally by the passage of air, said means opening at each end directly into the atmosphere and deflecting the air so it will not admix with the air used to cool the water conducting means externally and thereby prevent the utilization of that air for cooling after having once performed such function.

7. A device for the purpose set forth comprising the combination with a support, of a plurality of conduits for conducting water in a sinuous manner and communicating with each other at alternative ends, said conduits disposed diagonally with respect to said supports, air conduits extending through each of said water conduits, said air conduits opening at each end directly into the atmosphere and independent of each other and thereby prevent the utilization of that air for internal cooling after having once performed such function, and means whereby said water conduits are cooled externally by the passage of air.

8. A cooling device for the purpose set forth comprising groups of air and water conduits, the water conduits of each group being suitably spaced apart and communicating with each other at alternative ends, said air conduits disposed within said water conduits and opening at each end directly into the atmosphere and a combined storing and air pocket forming member interposed between the groups.

9. A cooling device for the purpose set forth, comprising groups of sets of combined water and air conduits, the sets of each group arranged in parallelism with respect to each other and extending diagonally with respect to a suitable support, the sets of one group extending in an opposite direction with respect to the sets of the other group, said air conduits projecting from each end of the water conduits and opening at each end directly into the atmosphere and thereby prevent the utilization of that air for internal cooling after having once performed such function, the water conduits of each set at alternative ends communicating with each other.

10. A cooling device for the purpose set forth, comprising groups of sets of combined water and air conduits, the sets of each group arranged in parallelism with respect to each other and extending diagonally, the sets of one group extending in an opposite direction with respect to the sets of the other group, said air conduits projecting from each end of the water conduits, the water conduits of each set at alternative ends communicating with each other, and a pocket forming member interposed between the groups and mounted upon one end of the air conduits.

11. A cooling device for the purpose set forth, comprising groups of sets of combined water and air conduits, the sets of each group arranged in parallelism with respect to each other and extending diagonally, the sets of one group extending in an opposite direction with respect to the sets of the other group, said air conduits projecting from each end of the water conduits, the water conduits of each set at alternative ends communicating with each other, and a pocket forming member interposed between the groups and mounted upon one end of the air conduits, said pocket forming member substantially V-shape in contour and that end of the air conduits upon which the pocket forming member is mounted being bell-shape.

12. A cooling device for the purpose set forth comprising the combination with a support, of groups of sets of combined water and air conduits diagonally disposed with respect to said support, the sets of one group extending in an opposite direction with respect to the sets of the other group, the water conduits of each set of each group being suitably spaced apart and the air conduits being open at each end, disposed within the water conduits, and said conduits opening directly into the atmosphere and thereby prevent the utilization of that air for internal cooling after having once performed such function.

13. A cooling device for the purpose set forth comprising the combination with a support, of groups of sets of combined water and air conduits, the air conduits of each set being open at each end and annularly disposed within the air conduits said air conduits opening directly into the atmosphere and thereby prevent the utilization of that air for internal cooling after having once performed such function, the combined conduits of each group extending in an opposite direction with respect to the combined conduits of the other group, the water conduits of each

set being so disposed with respect to each other as to form air passages between them whereby said water conduits will be externally cooled.

14. A cooling device for the purpose set forth comprising the combination with a support, of groups of sets of combined water and air conduits diagonally disposed with respect to said support, the sets of one group extending in an opposite direction with respect to the sets of the other group, means for spacing the water conduits of each set of each group apart, said air conduits of greater length than the water conduits and each having a bell shaped mouth, the air conduits of each set having the ends thereof opening directly into the atmosphere and thereby preventing the utilization of that air for internal cooling after having once performed such function, a common water supply pipe for each group, separate inlet means between each set and the supply pipes, and a separate outlet means for each set.

In testimony whereof I affix my signature in the presence of two witnesses.

REINHOLD HERMAN.

Witnesses:
GILMORE HERMAN,
JAMES W. WATSON.