No. 841,220. PATENTED JAN. 15, 1907

M. F. BATES.

WATER COOLER.

APPLICATION FILED NOV. 10, 1905.

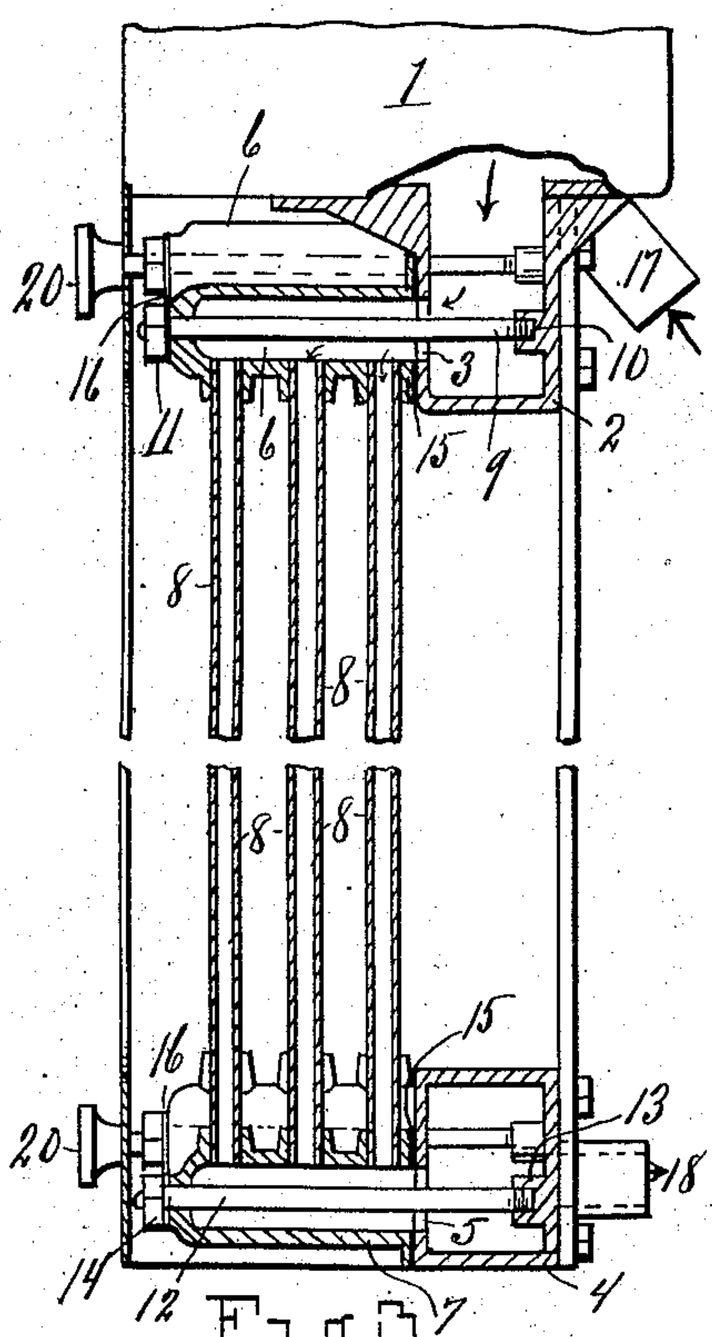

Fig. 0.

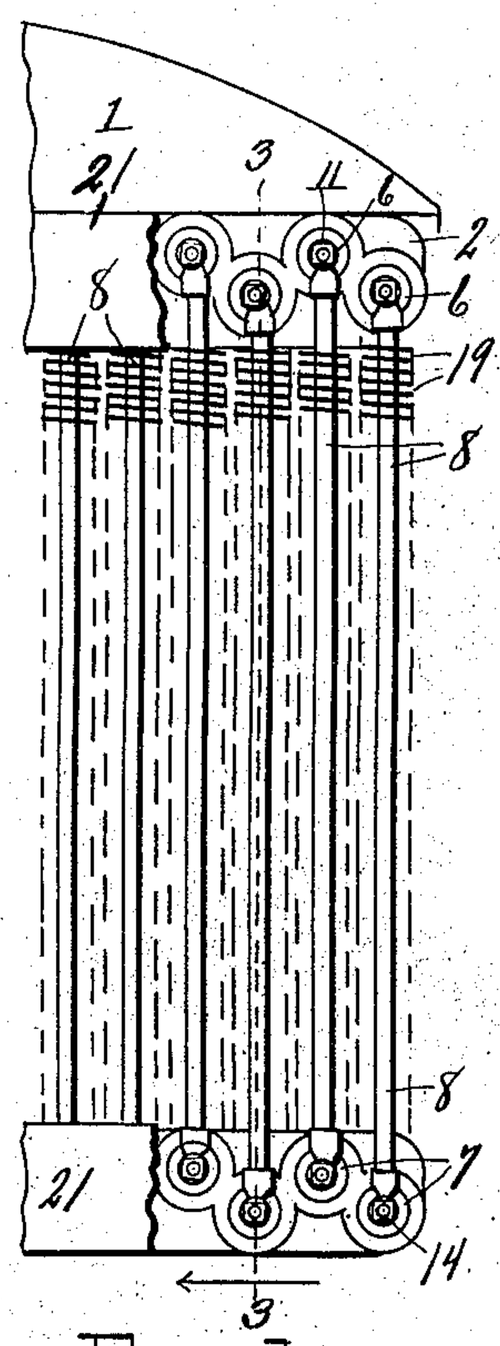

Fig. 1.

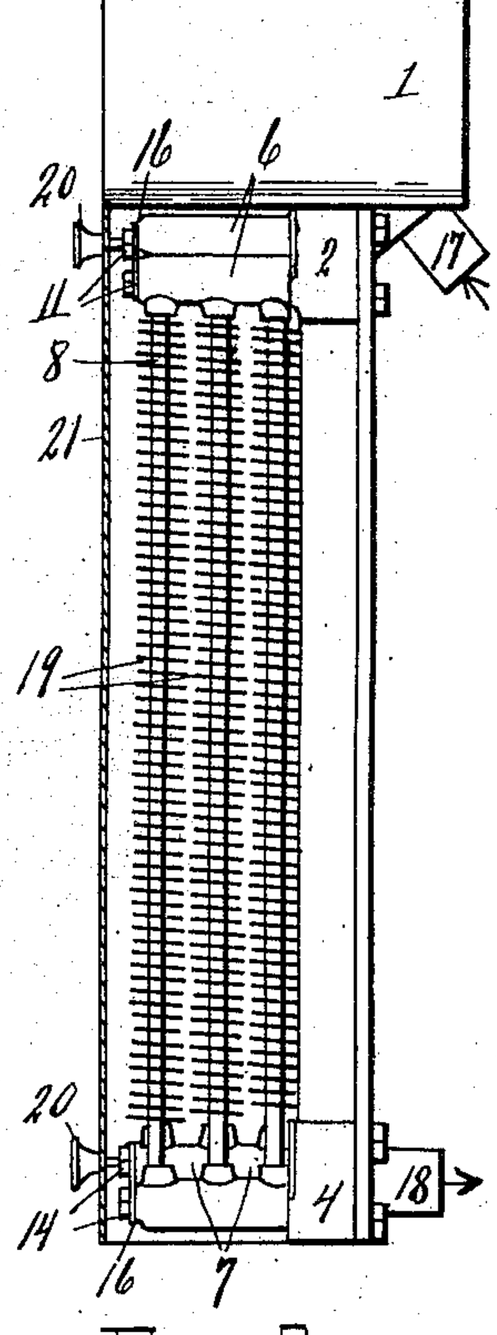

Fig. 2.

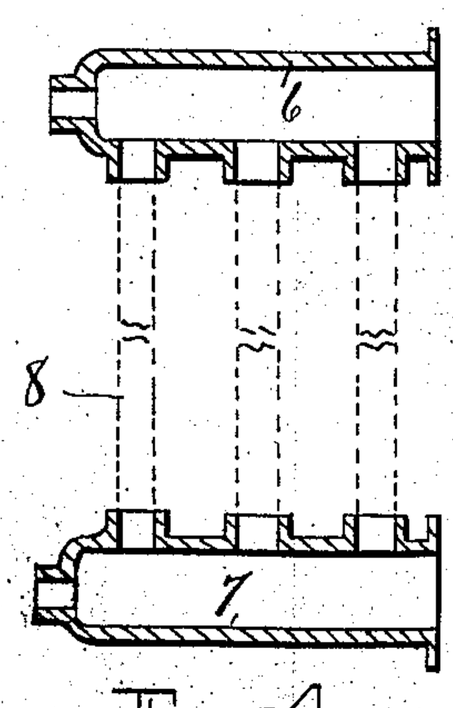

Fig. 4.

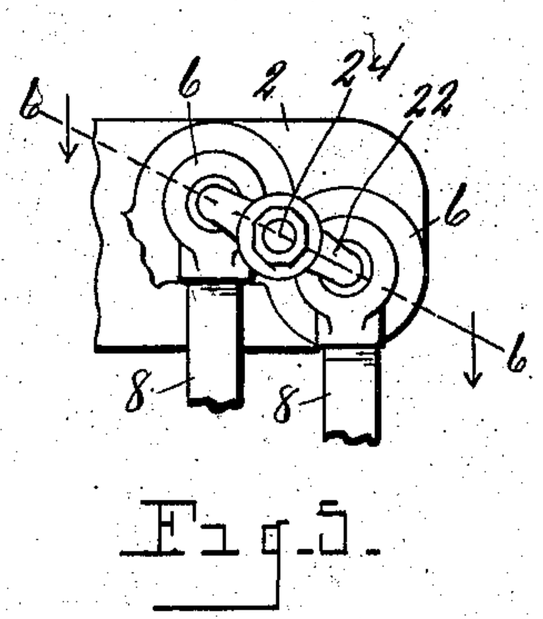

Fig. 5.

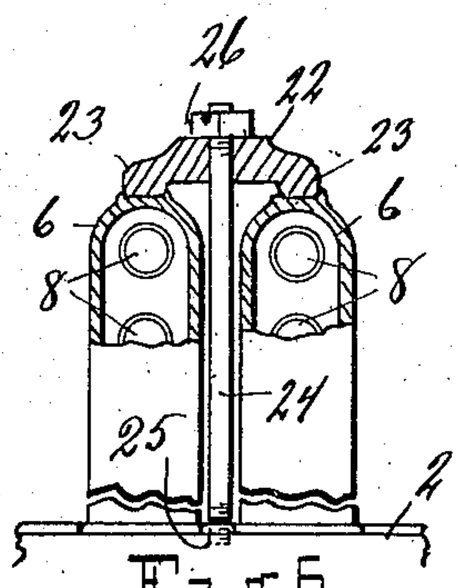

Fig. 6.

Witnesses.
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UNITED STATES PATENT OFFICE

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WATER-COOLER.

No. 841,220. Specification of Letters Patent. Patented Jan. 15, 1907.

Application filed November 10, 1905. Serial No. 286,653.

To all whom it may concern:

Be it known that I, MADISON F. BATES, a citizen of the United States, residing at Lansing, in the county of Ingham, State of Michigan, have invented certain new and useful Improvements in Water-Coolers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to a water-cooling device for explosive-engines; and it consists in the construction and arrangement of parts hereinafter fully set forth and claimed.

The object of the invention is to produce a cooler of the class described wherein the arrangement is such as to allow facility of movement of the connected parts without danger of opening the joints between the tubes and heads into which they are coupled and to allow of the ready removal of any one of a plurality of divisions of the cooling-tubes for the purpose of repair in case said tubes become injured by an accident or are damaged by freezing.

The above object is attained by the structure illustrated in the accompanying drawings, in which—

Figure 1 is an end elevation of a cooler embodying my invention, a part of the metal casing or hood being broken away to show the ends of the tie-bolts, which connect the heads of the cooler with the upper and lower water-sections. Fig. 2 is an end elevation with a portion of the hood in section. Fig. 3 is an enlarged vertical section through one of the divisions of the cooler as on line 3 3 of Fig. 1. Fig. 4 is a longitudinal section through the upper and lower heads of a cooler-section. Fig. 5 is a fragmentary view in elevation, showing a modified form of attaching the heads to the water-sections. Fig. 6 is a fragmentary view in section as on line 6 6 of Fig. 5.

Referring to the characters of reference, 1 designates a suitable water-reservoir, with which the upper section 2 of the cooler communicates. Formed through the front face of said section 2 and communicating with the interior thereof are the apertures 3, arranged staggeringly in alternate order. At the bottom of the cooler is a hollow section 4, having like apertures 5 through the front wall thereof. A cooler-division comprises an upper head 6 and a lower head 7, into which are connected the opposite ends of a series of tubes 8.

A cooler may be composed of as many divisions as required, and each division is secured in place by passing a tie-bolt 9 through the upper head and screwing the inner end thereof into a tapped boss 10 on the inner face of the back wall of the upper section and by passing a tie-bolt 12 through the lower head 7 in like manner and screwing it into the boss 13 on the wall of the lower section 4, the outer ends of said bolts 9 and 12 passing through the heads 6 and 7 and receiving the nuts 11 and 14, respectively. To make a tight joint between the heads and the water-sections, a gasket 15 is placed between the inner ends of the heads 6 and 7 and the faces of the upper and lower sections, against which said heads bear around the respective openings 3 and 5, and a gasket 16 is placed between each of the nuts 11 and 14 and the outer ends of the heads 6 and 7. By this arrangement I provide for facility of movement between the component parts of the cooler without liability of opening the joints, enabling the parts to spring and return again to their normal position without injury, whereas a cooler formed by soldering the tubes into the heads, as commonly practiced, is caused to leak should the parts become twisted or sprung to any extent. It will also be evident that by this arrangement I am enabled to readily repair a division of the cooler whose tubes become broken by removing the nuts 11 and 14 from the tie-bolts 9 and 12 without disturbing any other portion of the cooler.

Communicating with the reservoir 1 is an inflow-pipe 17, and leading from the lower water-section 4 is an outflow-pipe 18. These pipes in practice are connected with a suitable pump (not shown) or other device for maintaining a circulation of water through the cooler and through the water-space of the engine-cylinder. Upon the tubes 8 are the ordinary radiating rings 19. Upon the front of the heater are suitable fastening devices 20 for the purpose of maintaining the hood 21 in position. It will be noted that the water passes from the reservoir downwardly through the water-section 2 into the upper heads 6, thence downwardly through the tubes 8 into the lower heads 7, thence into the lower wa-

ter-section 4, and through the pipe 18 back to the pump or source of supply.

In constructing coolers for small engines wherein the heads 6 and 7 would be of comparatively small diameter it may be found expedient to employ the construction shown in Figs. 5 and 6 for connecting the heads with the water-sections, which construction consists in employing a clip 22, having projecting end portions 23, which bear against the ends of the water-heads 6 and are held in place by a tie-bolt 24, which passes centrally through said clip and between the heads 6, its inner end screwing into the wall of the water-section 2, as shown at 25. By this arrangement two heads are held in place by one tie-bolt, and the tie-bolt is permitted to pass between the heads instead of through one of them, thereby obviating a reduction in the water-space of the head incident to the passage of the tie-bolt therethrough. A nut 26 is screwed onto the end of the bolt 24 for the purpose of drawing the heads tightly into place.

Having thus fully set forth my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a water-cooling device, the combination with the reservoir, of the upper water-section communicating therewith and having water-circulatory openings through the wall thereof, the lower water-section also having water-circulatory openings through the wall thereof, the cooler-divisions comprising the upper and lower heads connected by a series of vertical tubes said heads being open at their inner ends, and means for removably securing said heads to the upper and lower water-sections respectively over said openings in said water-sections to establish communication between said sections through said heads and tubes.

2. In a water-cooling device, the combination with the upper and lower water-sections of relatively large area, of the cooler-divisions comprising the upper and lower hollow heads of relatively small area connected by a plurality of vertical tubes and communicating with said water-sections through openings equaling in diameter the diameter of said heads, and the tie-bolts passing longitudinally through said heads and secured in said sections respectively to detachably couple the heads and sections together.

3. In a water-cooler, the combination with the upper water-section having openings in the wall thereof, a plurality of upper heads open at their ends communicating independently with said upper section through the openings therein, a lower water-section having openings in the wall thereof, a plurality of lower heads open at their ends communicating independently with said lower section through said openings, vertical tubes connecting the upper and lower heads in pairs, tie-bolts passing through the upper and lower heads and screwing into the upper and lower sections respectively, nuts upon the outer ends of said bolts and gaskets between the heads and sections, and between said nuts and the ends of said heads.

4. In a water-cooling device, the combination with the reservoir, of the upper water-section communicating therewith, the lower water-section said water-sections having openings in their side walls, the cooler-divisions comprising the upper and lower heads connected by a series of vertical tubes and open at their ends, and tie-bolts for removably securing said heads to the upper and lower water-sections respectively to establish communication between said sections through said heads and tubes.

In testimony whereof I sign this specification in the presence of two witnesses.

MADISON F. BATES.

Witnesses:
CHARLES F. HAMMOND,
M. GURBER.