L. A. BRIGEL.

HEATING APPARATUS.

APPLICATION FILED MAY 5, 1909.

992,155.

Patented May 16, 1911.

2 SHEETS—SHEET 1.

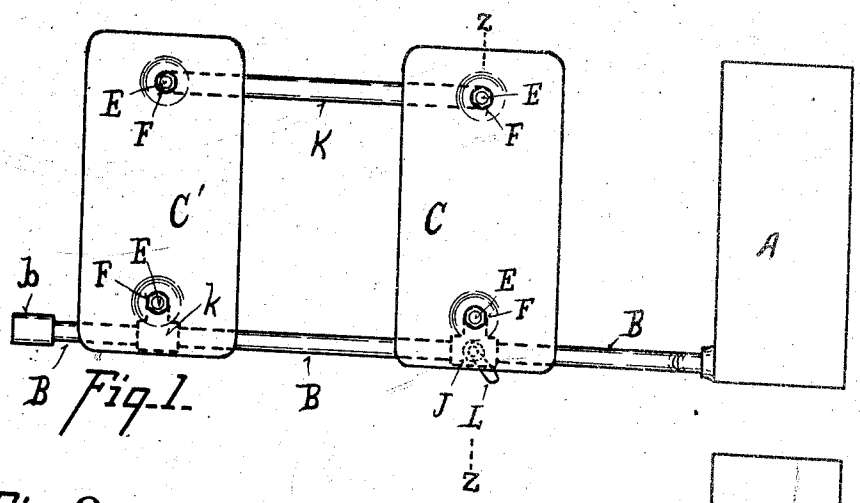

Fig. 1.

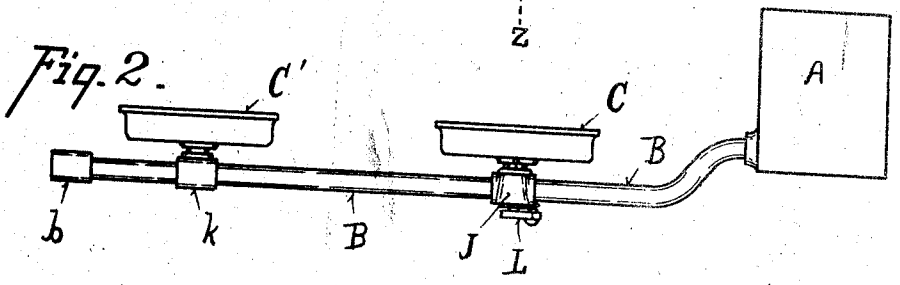

Fig. 2.

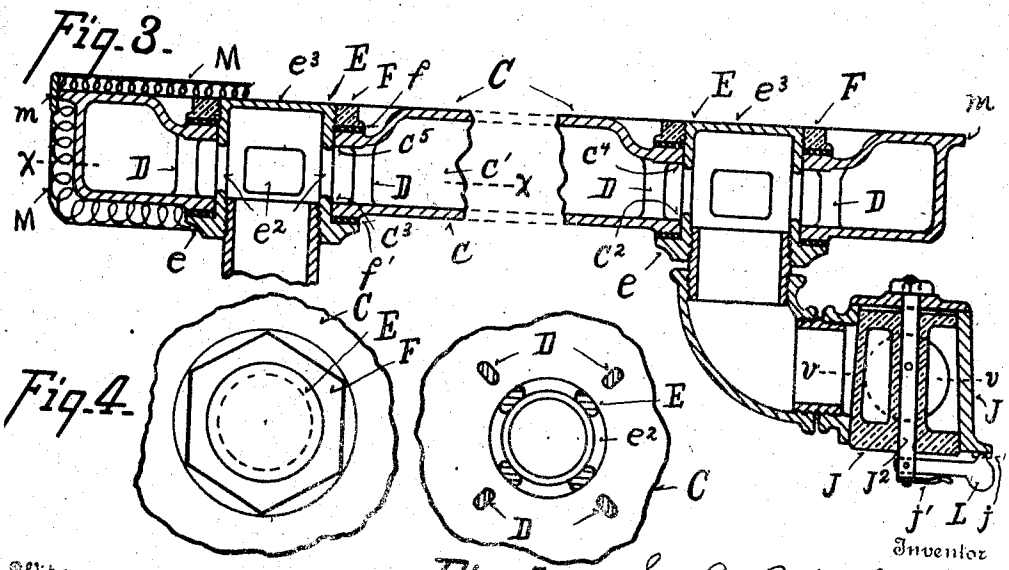

Fig. 3.

Fig. 4.

Fig. 5.

Witnesses

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2 SHEETS—SHEET 2.

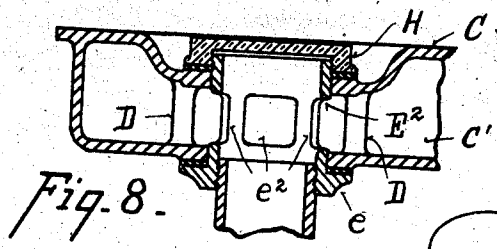

Fig. 8.

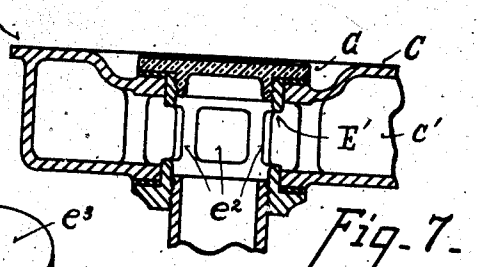

Fig. 7.

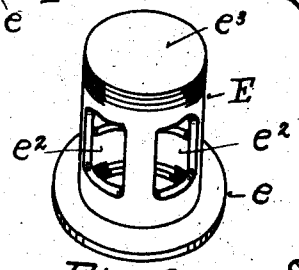

Fig. 6.

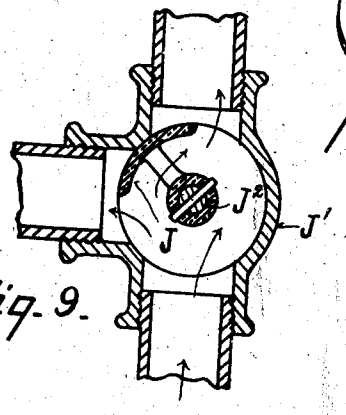

Fig. 9.

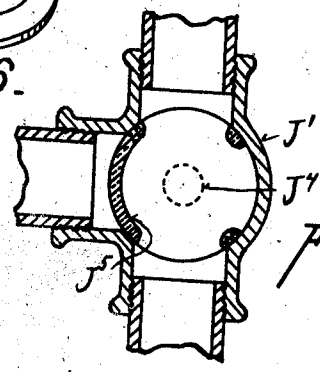

Fig. 12.

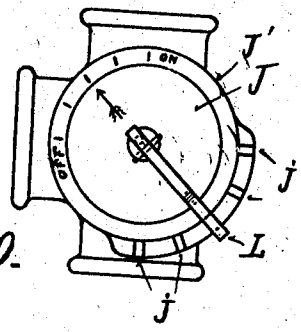

Fig. 10.

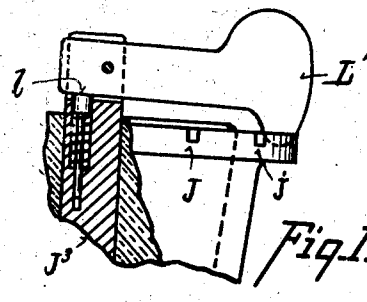

Fig. 11.

Witnesses

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UNITED STATES PATENT OFFICE.

LEO A. BRIGEL, OF CHEVIOT, OHIO.

HEATING APPARATUS.

992,155. Specification of Letters Patent. Patented May 16, 1911.

Application filed May 5, 1909. Serial No. 494,057.

To all whom it may concern:

Be it known that I, LEO A. BRIGEL, a citizen of the United States, residing at Cheviot, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Heating Apparatus, of which the following is a specification.

My invention relates to improvements in heating apparatus and radiators therefor.

One of its objects is to provide an improved radiator adapted to be detachably connected to a heat supply.

Another object is to provide improved radiators adapted to be connected into a system with improved means to regulate the heat supply thereto.

It further consists in certain details of form, combination and arrangement, all of which will be more fully set forth in the description of the accompanying drawings, in which;

Figure 1 is a top plan view of a heat generator, a plurality of radiators, and their connections embodying my improvements. Fig. 2 is a side elevation of the same. Fig. 3 is an enlarged detail sectional view on line *z z* of Fig. 1. Fig. 4 is a top plan view of a portion of the radiator and its pipe connection as shown in Fig. 3. Fig. 5 is a sectional detail on line *x x* of Fig. 3. Fig. 6 is a perspective view of a portion of the radiator pipe connection as shown in Fig. 3. Fig. 7 is a view similar to Fig. 3 showing a modification of the pipe connection. Fig. 8 is a view similar to Fig. 3 showing another modification of the pipe connection. Fig. 9 is a section on line *v v* of Fig. 3 through the controller valve. Fig. 10 is a view in elevation showing the face of the controlling valve shown in Fig. 9. Fig. 11 is a detail view partly in section showing a modification of the valve locking mechanism. Fig. 12 is a view similar to Fig. 9 showing a modification thereof.

My improved heating mechanism is particularly adapted to utilize the exhaust heat from steam, gas, and gasolene engines for heating purposes in automobiles and for similar purposes.

In the accompanying drawings A represents an engine the exhaust from which passes out through pipe B, and finally escapes to the air through a muffler *b*, which muffler may be omitted if desired.

C C′ represent a plurality of radiators, which are composed of metal shells *c* having a closed chamber *c′*. The shells *c* are preferably cast in one piece with openings c^2 c^3 in the bottom wall, and openings c^4 c^5 vertically above the openings c^2 c^3 in the top wall. Cross braces D adjacent to the openings c^2 c^4 and c^3 c^5 are employed to retain the top and bottom walls of the radiator a uniform distance apart. In order to detachably connect the inlet and exit pipes to said radiators I provide shells or sleeves E having a flanged head *e* at one end, which sleeves preferably closely fit the openings c^2 c^4 and c^3 c^5 with the end of the sleeve projecting through the openings in the upper wall of the radiator.

As shown in Figs. 3, 4 and 6 the end of the sleeve projecting through the upper wall of the radiator is closed by the head e^3 formed integral with the sleeve, and the upper end of said sleeve is threaded to receive a nut F, by means of which the sleeve is drawn tightly into place and locked upon the packing rings *f f′* to make a tight joint with the radiator. The end of the pipe leading to or from the radiator is threaded into the lower end of the sleeve E. The upper wall of the radiator is preferably dished or depressed adjacent to the openings c^4 c^5 so that the upper ends of the sleeves and the nuts E will come practically flush with the main portion of the top wall of the radiator.

As shown in Fig. 7 the upper end of the sleeve E′ is open and is threaded on the interior to engage the threads of a metal plug G, which serves to lock the sleeve in place and make a tight joint between the sleeve and the radiator.

In the modification shown in Fig. 8 the upper end of the sleeve E^2 is open and threaded upon the exterior to engage the threads of a cap H which serves to lock the sleeve in place and make the joints tight. In the several sleeves openings e^2 in the side walls serve for the passage of the heating medium to or from the radiator chamber.

As indicated in Figs. 1, 2, and 3 the radiator C is connected with the pipe B by means of a three way valve J which serves to direct the heating medium either directly to the outer air through the muffler *b*, without passing through the radiators, or when desired to pass the heating medium into the chamber of radiator C, from whence it is

passed by pipe K to the radiator C', and thence by a T-connection *k* to the pipe B and muffler *b*. The casing J' of the valve J is provided with a series of notches *j* which are adapted to be successively engaged by a handle L carried by the valve stem J^2, to lock the valve to any adjusted position. As shown in Fig. 3 a spring *j'* serves to hold the handle L in engagement with one of the notches *j* except when the handle is lifted from said notch by the operator to shift the valve. The valve Fig. 3 may be set with the handle below or above the valve as desired for convenient adjustment.

As shown in Fig. 11 the valve handle L' is normally held in engagment with a notch in the valve casing by means of a spring actuated stud 1 seated in a recess in the end of the valve stem J^3.

As shown in Fig. 12 the valve instead of having a through stem as shown in Figs. 3 and 9 is of the shell type and provided with short studs or stems J^4 cast integral with the valve shell J^5.

The outwardly projecting flange *m* formed on the radiators is to facilitate the attachment of a wire mat M to the upper and lower faces of the radiator to prevent contact of any article which might be injured from direct contact with the radiators.

I am thus enabled to provide durable and efficient radiators which can be quickly and conveniently adjusted to position or detached, and with simple and convenient means for controlling and regulating the volume of heating medium, since the valve J may be adjusted to admit any desired volume of heating medium.

The mechanism herein illustrated and described is capable of considerable modification without departing from the principle of my invention.

Having described my invention what I claims is;

1. In radiator structures, a radiator comprising a cast metal one-piece shell having substantially parallel upper and lower walls provided with opposing passages in substantial axial alinement, a perforated sleeve extending into and connecting alined passages, supply and exit conduits for the heating medium below the lower wall and connected to separate sleeves, and means for locking said sleeves with closed joints to said opposing walls, said means being exposed above the upper wall to permit removal of the shell without affecting the connection of sleeve and conduit.

2. In radiator structures, a radiator comprising a cast metal one-piece shell having substantially parallel opposing walls provided with opposing passages in substantial axial alinement, a perforated sleeve extending into and connecting alined passages, supply and exit conduits for the heating medium connected to said sleeves, means for locking said sleeves with closed joints to said opposing walls, and spacing members for supporting the walls against collapsing under the locking pressure of the sleeves, said members being spaced from the sleeves.

3. In a mechanism of the character described, supply and exit conduits, a cast metal shell constituting the radiator and having passages through its opposite walls arranged in pairs. one wall of said shell being depressed in the neighborhood of said passages, perforated sleeves each provided with a flange at one end and threaded at the opposite end, said sleeves being detachably seated in said openings and connected to said conduits, and means seated externally of said depressed wall and within said depressions for locking said sleeves with closed joints to the opposite walls of said shell, said depressions being of a depth at least equal to the thickness of the securing means, whereby said means will be retained from projecting beyond the plane of the outer face of the non-depressed portion of the wall.

4. In an apparatus of the character described, a radiator shell having opposing walls, inlet and exit members for the radiator, said members each being removably supported in both of the opposing walls, means for removably securing each member in position, said means comprising a removable element positioned on the outer face of one of said walls, said latter wall having a depression within which said element extends, the depth of the depression being sufficient to retain the element from projecting outwardly beyond the normal plane of the outer face of the wall.

In testimony whereof I have affixed my signature in presence of two witnesses.

LEO A. BRIGEL.

Witnesses:
WALTER F. MURRAY,
C. W. MILES.