(No Model.) 2 Sheets—Sheet 1.

J. T. JACKSON & F. J. TRAVERS.

RADIATOR.

No. 601,655. Patented Apr. 5, 1898.

Fig 4

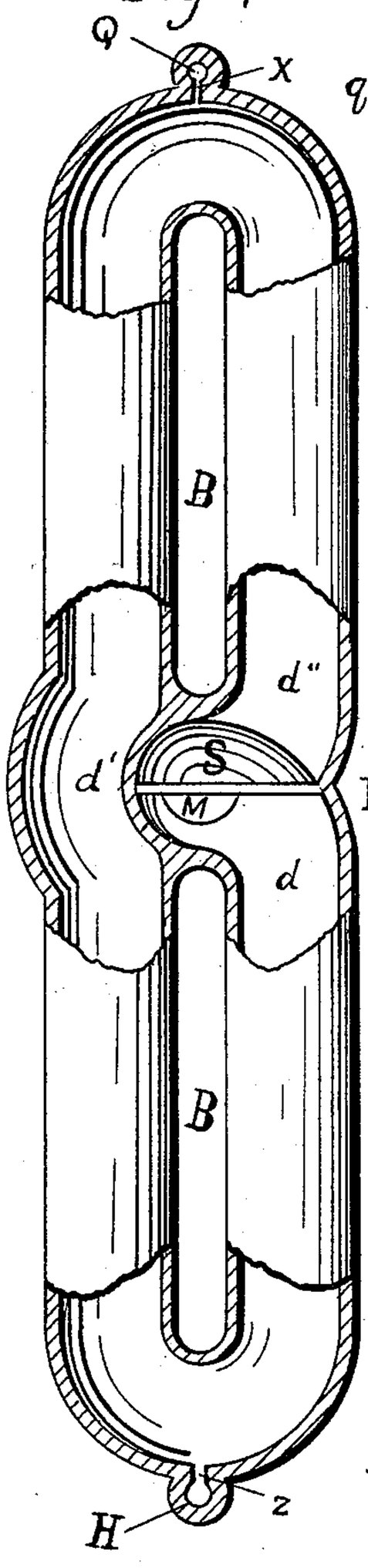


Fig 3

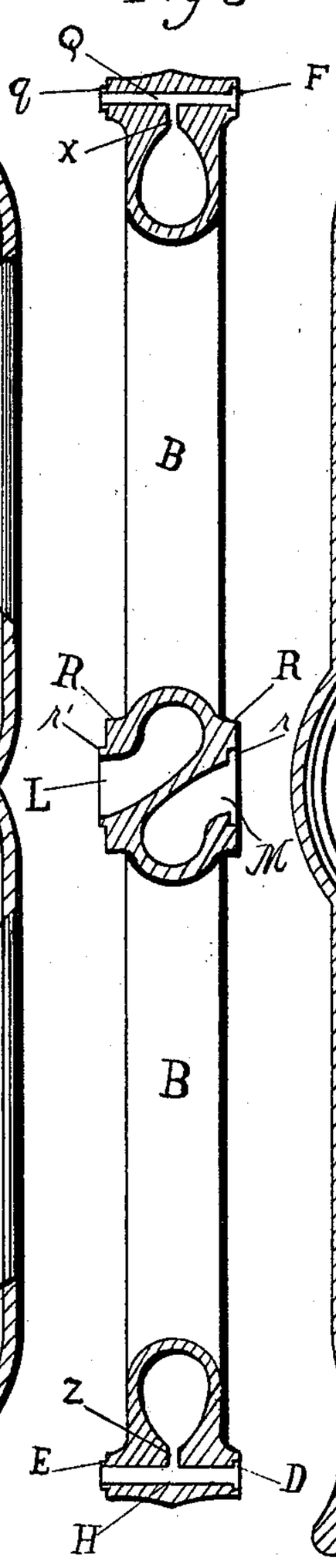


Fig 2

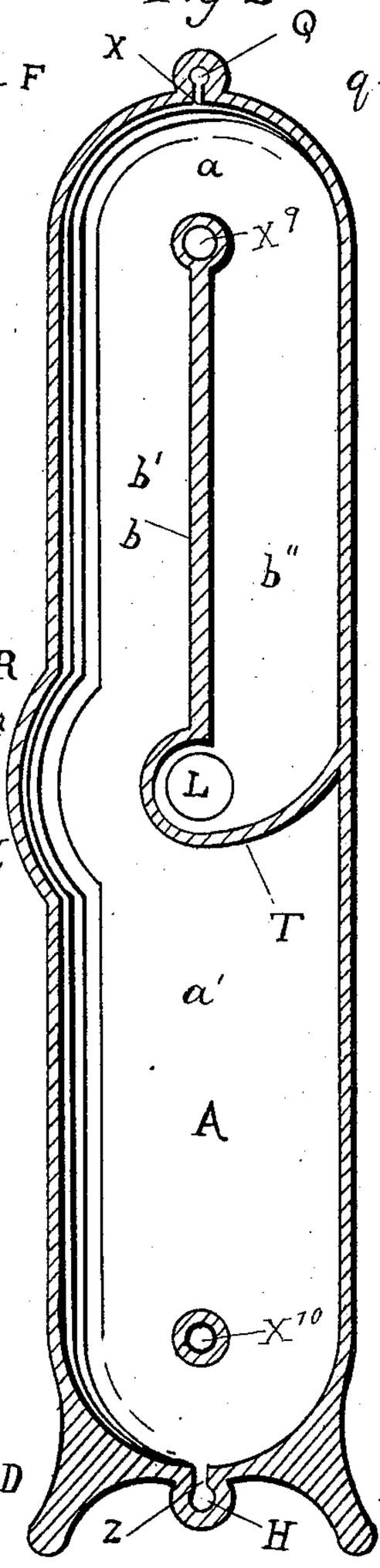
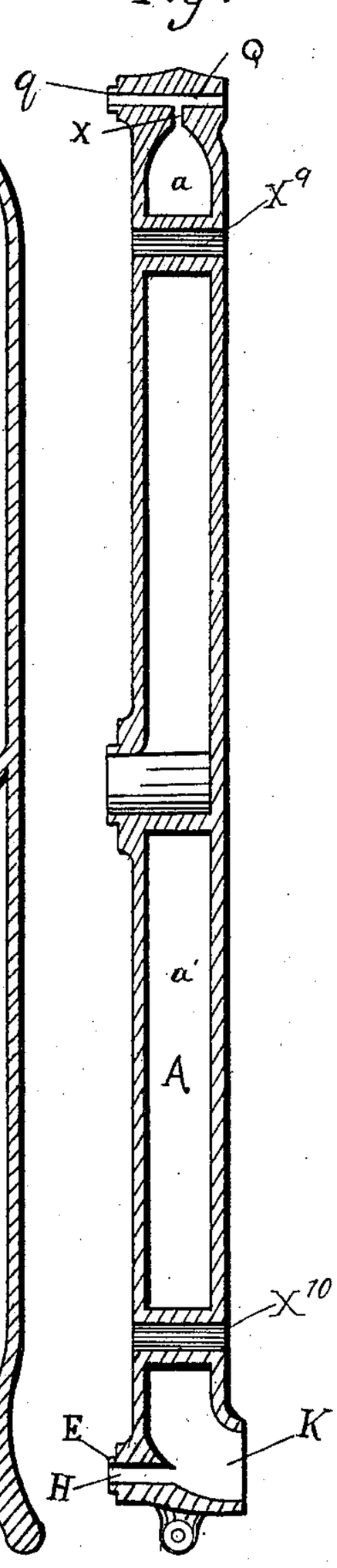


Fig 1



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(No Model.) 2 Sheets—Sheet 2.

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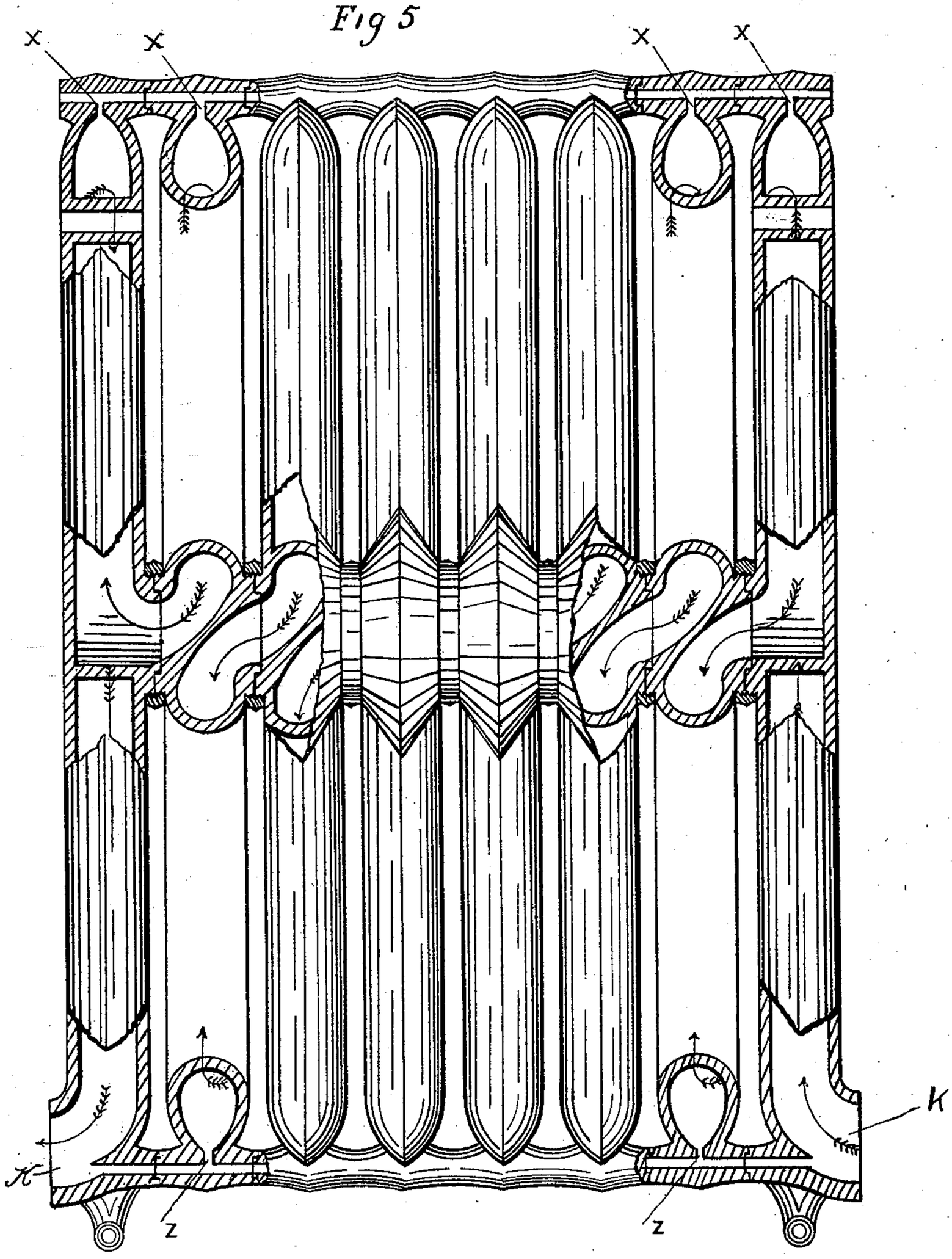
Fig 5



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UNITED STATES PATENT OFFICE.

JOHN THOMAS JACKSON AND FERGUS JAMES TRAVERS, OF TORONTO, CANADA.

RADIATOR.

SPECIFICATION forming part of Letters Patent No. 601,655, dated April 5, 1898.

Application filed April 5, 1897. Serial No. 630,814. (No model.)

To all whom it may concern:

Be it known that we, JOHN THOMAS JACKSON, mechanical engineer, and FERGUS JAMES TRAVERS, subjects of the Queen of Great Britain, residing in the city of Toronto, in the county of York, in the Province of Ontario, Dominion of Canada, have invented certain new and useful improvements in steam and hot-water heating radiators in which a positive and constant circulation of steam and hot water is sustained, of which the following is a specification.

Our invention relates to certain new and useful improvements in steam and hot-water heating radiators.

The object of our invention is to provide a simple type of radiator of such construction that its circulation will be unimpeded, so that a uniform heat will be rapidly established and readily maintained throughout the entire radiator.

A further object is to construct a radiator consisting of a plurality of vertical sections, each having transverse conduits at top and bottom for the escape of air and water of condensation, a steam inlet and outlet opening at the middle portion of each section, and means for clamping the sections together, the conduits and openings of the sections intercommunicating.

The above and such other objects as may occur from the ensuing description are accomplished by the construction of radiator illustrated by the accompanying drawings.

The invention consists, essentially, of the device hereinafter more fully set forth, and more particularly pointed out in the claims.

In the drawings, Figure 1 shows an edge sectional view of the end loop or column. Fig. 2 shows a face sectional view of the end loop or column. Fig. 3 shows an edge sectional view of the inner circulating loop or column. Fig. 4 shows a face sectional view of the inner circulating loop or column. Fig. 5 is a view of the radiator.

Like letters of reference refer to like parts throughout the specification and drawings.

A represents one of the end loops, in which are formed two chambers a a'. The upper chamber a is divided by a vertical partition b into two vertical water-legs b' b'', the vertical water-leg b' being in circulation with the lower chamber a' and the other water-leg, b'', being in circulation at the top with the water-leg b'.

L represents an outlet-port formed centrally in the loop A and in circulation with the water-leg b''.

T represents a curved partition connected to the lower end of the vertical partition b and to the side of the shell of the loop A, immediately below the outlet L, the purpose of the partition T being to separate the water-leg b'' from the lower chamber a' and deflect the water moving through the water-leg b'' through the outlet L into the next adjacent loop.

K represents an inlet for the loop A. The inlet K is located at the lower end of the outer side of the loop A and is fitted to receive the adjacent end of the flow-pipe.

H represents a horizontal exterior tubular passage at the extreme bottom of the radiator-loops and connected with the interior of the said loops by means of the vertical opening Z. One end of the said passage H is provided with a male coupling E, which is adapted to fit into a female coupling D at the other end of the said passage H of the next adjacent loop.

Q represents a horizontal exterior tubular passage at the extreme top of the radiator-loops and connected with the interior of the said loops by means of the vertical opening X. One end of the said tubular passage Q is provided with a male coupling q, which is adapted to fit into a female coupling F at the other end of the said tubular passage Q of the next adjacent loop. The said tubular passage Q by means of the vertical opening X is in circulation with the water-legs b' and b''. The female couplings D and F are each adapted to receive a compressible ring or gasket to prevent leakage from the openings in the top and bottom of the loops.

B represents an intermediate loop which consists of three water-legs d d' d'', respectively. The water-leg d is provided with a central inlet-opening M in circulation with the water-leg d. The lower end of the water-leg d is in circulation with the lower end of the water-leg d', while the upper end of the water-leg d' is in circulation with the upper

end of the water-leg d''. The loop B is provided with an outlet-opening L in circulation with the water-leg d''.

The water-legs $d\,d''$ are separated from each other by a partition S, substantially **S**-shaped in cross-section and so arranged as to separate the inlet and outlet openings M L, respectively, placing the inlet-opening M in circulation with the water-leg d and the outlet-opening L in circulation with the water-leg d''. The inlet-opening M and the outlet-opening L are each surrounded by a hub R, one side of which is fitted with a female connection r to receive the male connection r' of the hub of the next adjacent loop and also to receive a compressible ring or gasket.

The lower end of the loop B is provided with a vertical opening Z, connecting with a horizontal passage H, which said horizontal passage H is in circulation with the horizontal passage H of the loop A, while the top of the loop B is provided with a horizontal passage Q, connected with the interior opening of the said loops, at the extreme top thereof, by means of the vertical opening X, and which said passage Q is in circulation with the passage Q of the loop A, and by means of the said vertical opening X is in circulation with the water-legs d' and d''.

We prefer to screw-thread the hubs of each of the loops with right and left threads and draw the loops together by means of a correspondingly-threaded coupling-nut. We do not confine ourselves to any particular style of coupling, as we may employ any system of coupling the loops together that is now in practical use. In practice when the loops are placed together the male connections r' of the hubs R are inserted into the female connections r of the hub R of the next adjacent loop, a compressible ring or gasket being interposed between the male and female connections. The male connection of the horizontal passage Q of one loop is inserted into the female connection of the said horizontal passage Q of the next adjacent loop, with a compressible ring or gasket interposed between these connections, and the male connection of the horizontal passage H of one loop is inserted into the female connection of the said horizontal passage H of the next adjacent loop, with a compressible ring or gasket interposed between the connections. The coupling-nut or other coupling medium is then tightened and the adjoining loops forcibly brought together, causing the male connections to force the compressible rings into the female connections, thus preventing any leakage from any of the said openings, the horizontal passage H at the end loop or loops being provided with a draw-off cock and the horizontal passage Q with an automatic valve.

The circulation of the water is as follows: The water enters the loop A by means of the inlet-opening K, passes up the water-leg a' into the water-leg b', around the top of the partition b, and down the water-leg b'', out through the opening L into the water-leg d of the next adjacent loop, passing downward through the water-leg d into the lower end of the water-leg d', up the water-leg d' and into the water-leg d'', passing down the water-leg d'' out through the opening L into the water-leg d of the next adjacent loop, and so on into the end loop, which is similar to the loop A, the circulation of the water, however, being reversed from that of the loop A—viz., passing upward through the water-leg b'', down the water-leg b' to the water-leg a', and out through the opening K to the return-pipe.

By means of the horizontal passage H the water caused by the condensation of steam, when the radiator is used as a steam-radiator, can be conveniently drained off by means of the vertical openings Z which are in circulation with the water-legs d and d' of the loop B, and the said horizontal passage H. When the radiator becomes charged with stagnant air, the same may be drawn off the entire radiator by means of the vertical openings X which are in circulation with the water-legs d' and d'' of loop B and the horizontal passage Q.

K′ represents an outlet for the loop A′, fitted to receive the exhaust or return pipe.

The transverse passages x^9 and x^{10} (shown in Figs. 1 and 2) are designed to receive coupling rods or bolts, if it is necessary to use such devices, in addition to the central coupling shown and described.

Having now particularly described and ascertained the nature of our said invention, we hereby declare that what we claim is—

1. The combination of a plurality of vertical radiator-sections each having transverse conduits at top and bottom for the escape of air and water of condensation, respectively, a steam-inlet opening and steam-outlet opening at its middle portion, and means for clamping the sections together, the several conduits and openings of the sections intercommunicating.

2. The combination of a plurality of vertical radiator-sections each having transverse conduits at top and bottom for the escape of air and water of condensation, respectively, a steam-inlet opening and a steam-outlet opening at its middle portion, and means for clamping the sections together, a deflecting-plate in each section separating the central inlet and outlet thereof, the several conduits and openings of the sections intercommunicating.

3. A vertical radiator, comprising a plurality of loops or sections each provided with top and bottom projections which fit together to form steam-tight joints, said projections having passages to allow the sections to communicate with each other, and with central fastening devices which serve to firmly secure the loops together at the center and to draw their top and bottom connections into close union.

4. An end loop of a radiator consisting of

two chambers a, a', the lower chamber a' forming a single water-leg and provided with an inlet-opening, the upper chamber a divided by a vertical partition into two vertical water-legs b', b'', the vertical water-leg b' in communication with the lower chamber a', and the water-leg b'' in communication at the top of the loop with the water-leg b,' the radiator-loop being provided with an outlet-port at the lower end of the water-leg b'', and a curvilinear horizontal partition connected to the lower end of the vertical partition separating the lower end of the water-leg b'' and outlet-port from the lower chamber a' and water-leg b', substantially as set forth.

5. An end loop of a radiator consisting of two chambers a a', the lower chamber a' forming a single water-leg and provided with an inlet-opening, the upper chamber a divided by a vertical partition into two vertical water-legs b', b'', the vertical water-leg b' in communication with the lower chamber a', and the water-leg b'' in communication at the top of the loop with the water-leg b', the radiator-loop being provided with an outlet-port at the lower end of the water-leg b'', and a curvilinear horizontal partition connected to the lower end of the vertical partition separating the lower end of the water-leg b'' and outlet-port from the lower chamber a' and water-leg b' and an exterior integral passage at the lower end of the said loop communicating therewith by a vertical opening, substantially as set forth.

6. An end loop of a radiator consisting of two chambers a, a', the lower chamber a' forming a single water-leg, the upper chamber a divided by a vertical partition into two vertical water-legs b', b'', the vertical water-leg b' in communication with the lower chamber a', and the water-leg b'' in communication at the top of the loop with the water-leg b', the radiator-loop being provided with an outlet-port located at the center of the loop and at the lower end of the water-leg b'', a curvilinear horizontal partition connected to the lower end of the vertical partition separating the lower end of the water-leg b'' and outlet-port from the lower chamber a' and water-leg b', a port at the lower end of the said loop: in combination with an intermediate loop, comprised of vertical water-legs in communication with each other, and separated by vertical partitions, an inlet and outlet for the water-legs separated by a curvilinear horizontal partition, drainage-openings at the bottom of the said loops in connection with each other and with the flow and return pipes, and air-vents at the top of the loops in communication with each other, substantially as set forth.

Dated this 30th day of March, A. D. 1897.

JOHN THOMAS JACKSON.
FERGUS JAMES TRAVERS.

Witnesses:
ELLA GLEASON,
MARY CAROLINE MACDONELL.