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PATENTED OCT. 23, 1906.

J. H. THISSEN & J. R. VANDER PUTTEN.

RADIATOR.

APPLICATION FILED SEPT. 26, 1905.

2 SHEETS—SHEET 1.

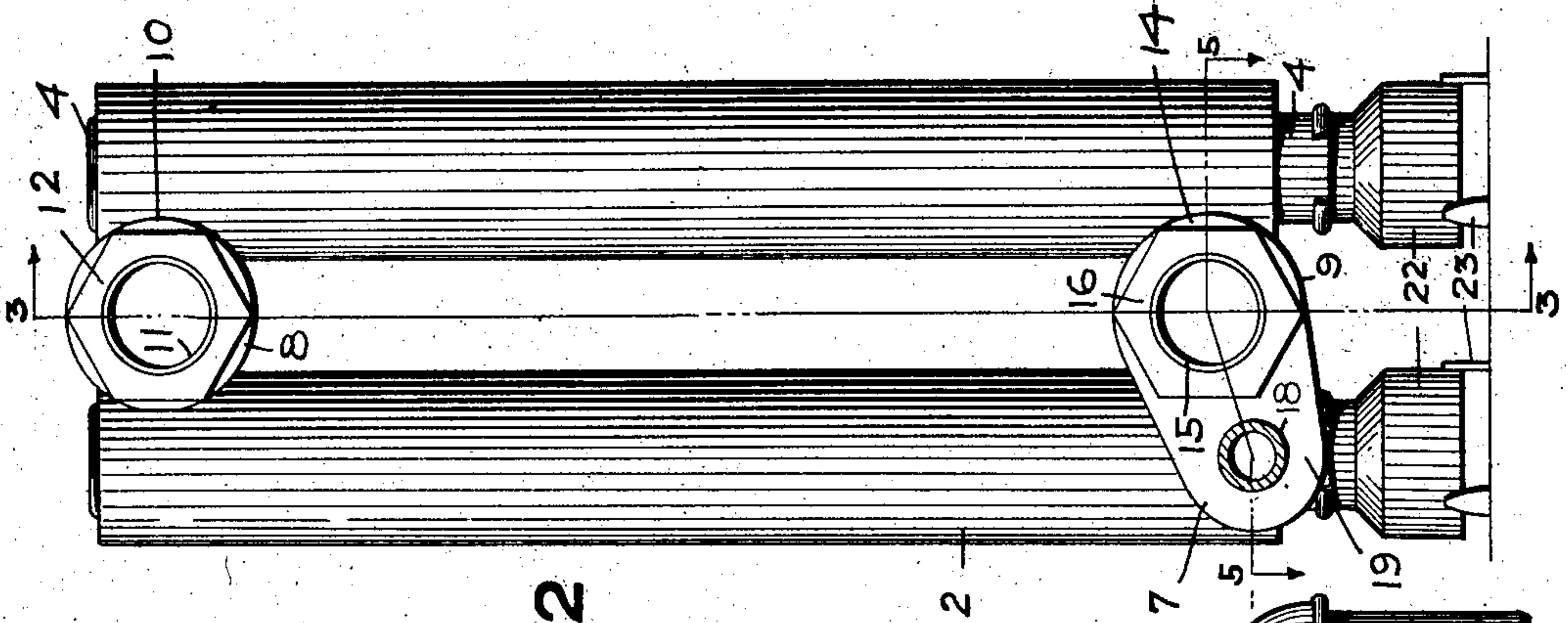


FIG. 2

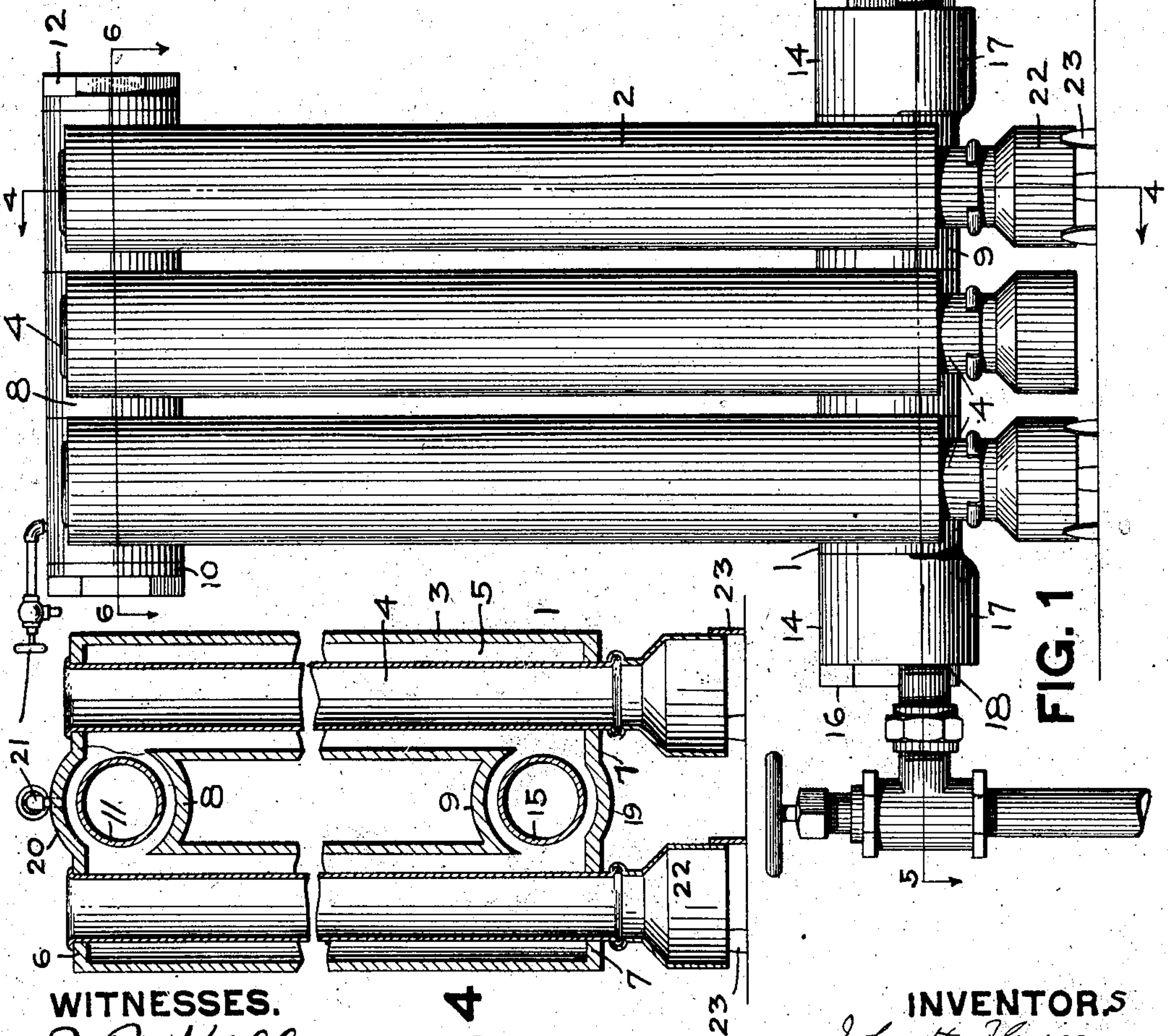


FIG. 1

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FIG. 4

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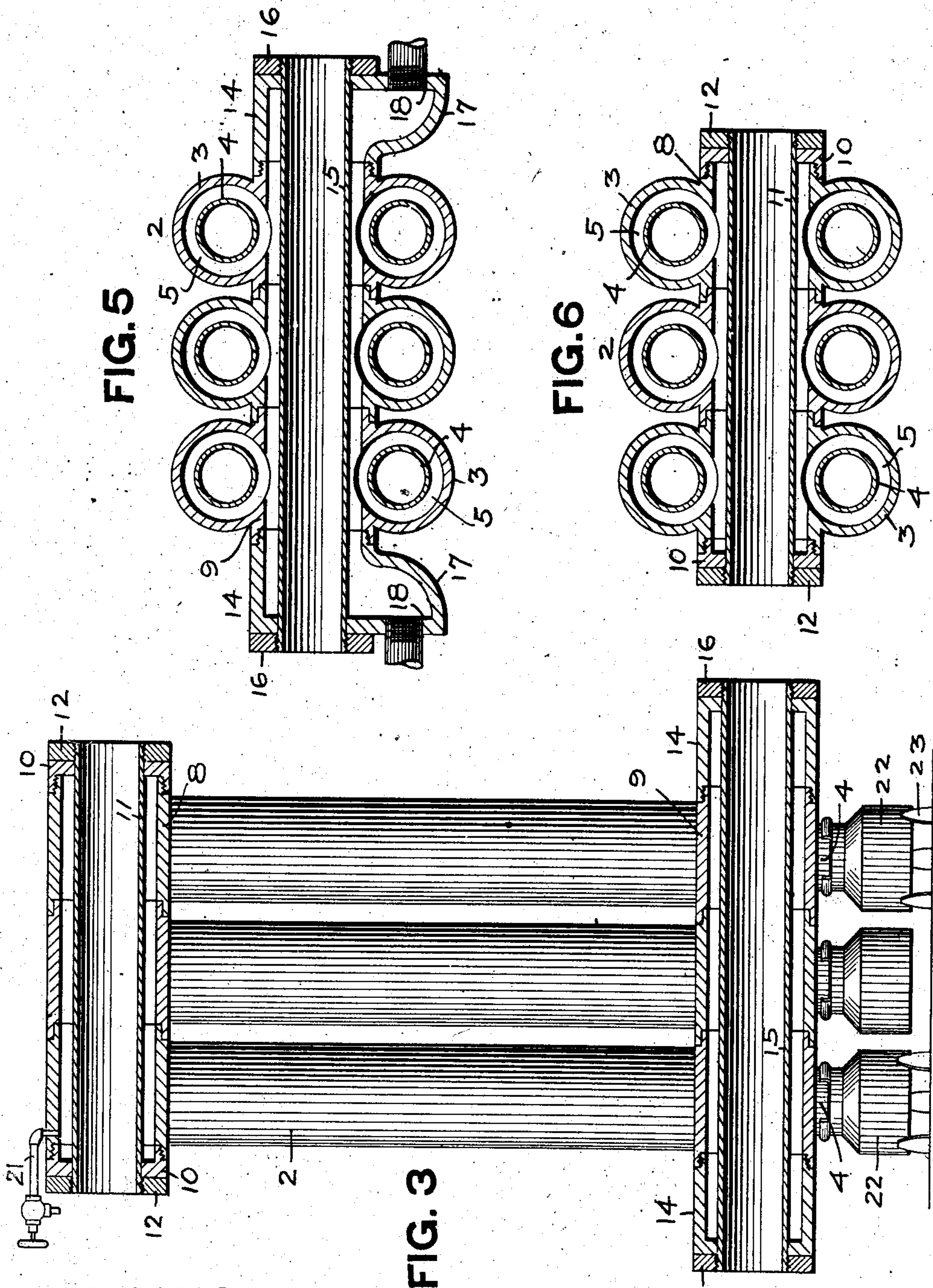
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UNITED STATES PATENT OFFICE.

JOHN H. THISSEN AND JOHN R. VANDER PUTTEN, OF KNOXVILLE,
PENNSYLVANIA.

RADIATOR.

No. 833,857.

Specification of Letters Patent.

Patented Oct. 23, 1906.

Application filed September 26, 1905. Serial No. 280,203.

To all whom it may concern:

Be it known that we, JOHN H. THISSEN and JOHN R. VANDER PUTTEN, residents of Knoxville, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Radiators; and we do hereby declare the following to be a full, clear, and exact description thereof.

This invention relates to steam and hot water radiators; and the object is to increase the efficiency of this class of devices.

The invention consists, generally stated, in a special construction of columns or units providing inner and outer heating-surfaces and horizontal circulation connections between said columns or units, which also provide inner and outer heating-surfaces.

The invention also consists in other details of construction and arrangement hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of the radiator. Fig. 2 is an end elevation. Fig. 3 is a vertical longitudinal section through the radiator on the line 3 3, Fig. 2. Fig. 4 is a transverse vertical section thereof on the line 4 4, Fig. 1; and Figs. 5 and 6 are horizontal sections on the lines 5 5 and 6 6, respectively, Fig. 1.

Our radiator is built up of sections or units 1, each of which may be composed of any desired number of vertical columns 2, the drawings showing two such columns making up a unit. Each of these columns comprises an outer tube or member 3, and an inner tube 4, providing between the same a water or steam space 5. The columns are preferably castings having suitable top and bottom walls 6 and 7, provided with openings of sufficient size to admit the inner tube 4. The latter is slipped in place and expanded into the top and bottom walls of the casting.

The several units are provided near their tops with sleeves or nipples 8 and near their bottoms with similar members 9. The sleeves of the several units are connected one to the other, as shown in Fig. 3, and when so connected form the circulation-connections between several units. The circulation-connections of the end units at the top of the radiator are closed by means of caps 10, having their openings of less diameter than said sleeves. Inserted through the circulation connections and fitting the openings in the caps 10 is a tube 11, which at its ends is

threaded to receive nuts 12, which serve to clamp the several units firmly together. The tube 11 is open at its ends, so that it serves not only to unite the several units of the radiator, but also forms an inner horizontal heating-surface. At the bottom of the radiator the circulation connections at the end units have suitably secured thereto castings 14, which at their ends also are provided with openings for receiving a tube 15, which is threaded to receive the locking-nuts 16. This tube likewise is open at its ends and serves the same function as the tube 11 at the upper part of the radiator.

The castings 14 are provided with lateral hollow projections 17, provided with openings 18 for receiving the inlet and outlet pipes.

It will be observed from Fig. 4 that the bottom circulation connections 9 have their lower walls 19 lower than the bottom walls 7 of the columns. As a consequence the radiator can be perfectly drained, and there is no pocket for the accumulation of dead water or steam; but all portions of the fluid is in circulation. Likewise the top walls of the upper circulation connections 8 have a portion 20, which is higher than the top wall of the columns. Here, likewise, no pocket for dead water is present. In this highest point of the radiator we connect a valve 21 of any suitable construction by means of which the air may be released from the radiator.

By reason of the construction just described all water or steam in the radiator must be in circulation and is equally divided or distributed over the entire heating-surfaces of the radiator and in comparatively thin bodies. This is a great advantage, as it requires much less water or steam to heat a given area of heating-surface than in a radiator in which the water or steam is unequally distributed or held in a thick body. The latter construction requires the heating of a large body of water at a corresponding cost of fuel and without increase of heating capacity. Furthermore, the cross-sectional area of the horizontal water-spaces is substantially equal to the cross-sectional area of the vertical water-spaces, this also tending to keep all portions of the water in circulation. The result is that the efficiency of the radiator is high.

The vertical inner tubes 4 form inner heating-surfaces, and consequently there is a cir-

5 culation of air upwardly through these tubes. It is well known that the stratum of air next to the floor of a room is the coldest. If the heater is far removed from the floor, there is
 10 generally a cold layer of air which is not disturbed by the circulation caused by the heater. To prevent this, we provide each of the inner vertical tubes 4 with an extension which projects down into close proximity to
 15 the floor, so that the air circulating up through these tubes is drawn from the lowest and coldest stratum. These extensions may be integral parts of the tubes 4. In the drawings they are shown as separate tubular
 20 members 22, somewhat bell-shaped and hung onto the lower flanged ends of the tubes 4. They may, however, be connected or supported in any suitable manner. The bell-shaped members 22 at the ends of the radiator are provided with feet 23, these being the support for the radiator.

In the drawings the several tubes, both horizontal and vertical, are shown as circular in cross-section. Obviously, however, the
 25 shape may be varied within wide limits. We prefer, however, in all cases to have the inner tube follow in cross-sectional shape that of the outer tube. Various other modifications will suggest themselves to the builder or user
 30 of this class of devices.

Our radiator is adapted for any heating medium, such as hot water or steam. In case steam is used only one connection need be made to the bottom of the radiator. The
 35 radiator is simple in construction and of high efficiency, since it provides a large area of radiating-surface for the quantity of water or steam used.

What we claim is—

40 1. A radiator comprising a series of vertical units contacting with each other and provided with circulation-openings therebe-

tween, and a tube of smaller cross-sectional area than, and extending through, said circulation-openings and being secured to the end
 45 units and serving to connect the units together and being open at its ends.

2. A radiator comprising a series of vertical units contacting with each other and provided with circulation-openings from one to
 50 another both at the top and the bottom, and tubes of smaller size than, and extending through, said circulation-openings and being secured to the end units and serving to connect the units together and being open at
 55 their ends.

3. A radiator comprising a series of vertical units contacting with each other and provided with circulation-openings from one to
 60 another, each unit including an inner tube open at its ends and an outer tube, and a tube of smaller size than, and extending through the circulation-openings and being secured to the end units and serving to connect the units together and being open at its
 65 ends.

4. A radiator comprising vertical units provided with circulation connections therebetween, and a tube of smaller size than and extending through said connections and being
 70 secured to the end units and open at its ends, the circulation connections at the end units being provided with lateral hollow projections providing means for the connection of the inlet and outlet pipes.

In testimony whereof we, the said JOHN H. THISSEN and JOHN R. VANDER PUTTEN, have
 75 hereunto set our hands.

JOHN H. THISSEN.

JOHN R. VANDER PUTTEN.

Witnesses:

G. H. RANKIN.

F. W. WINTER.