

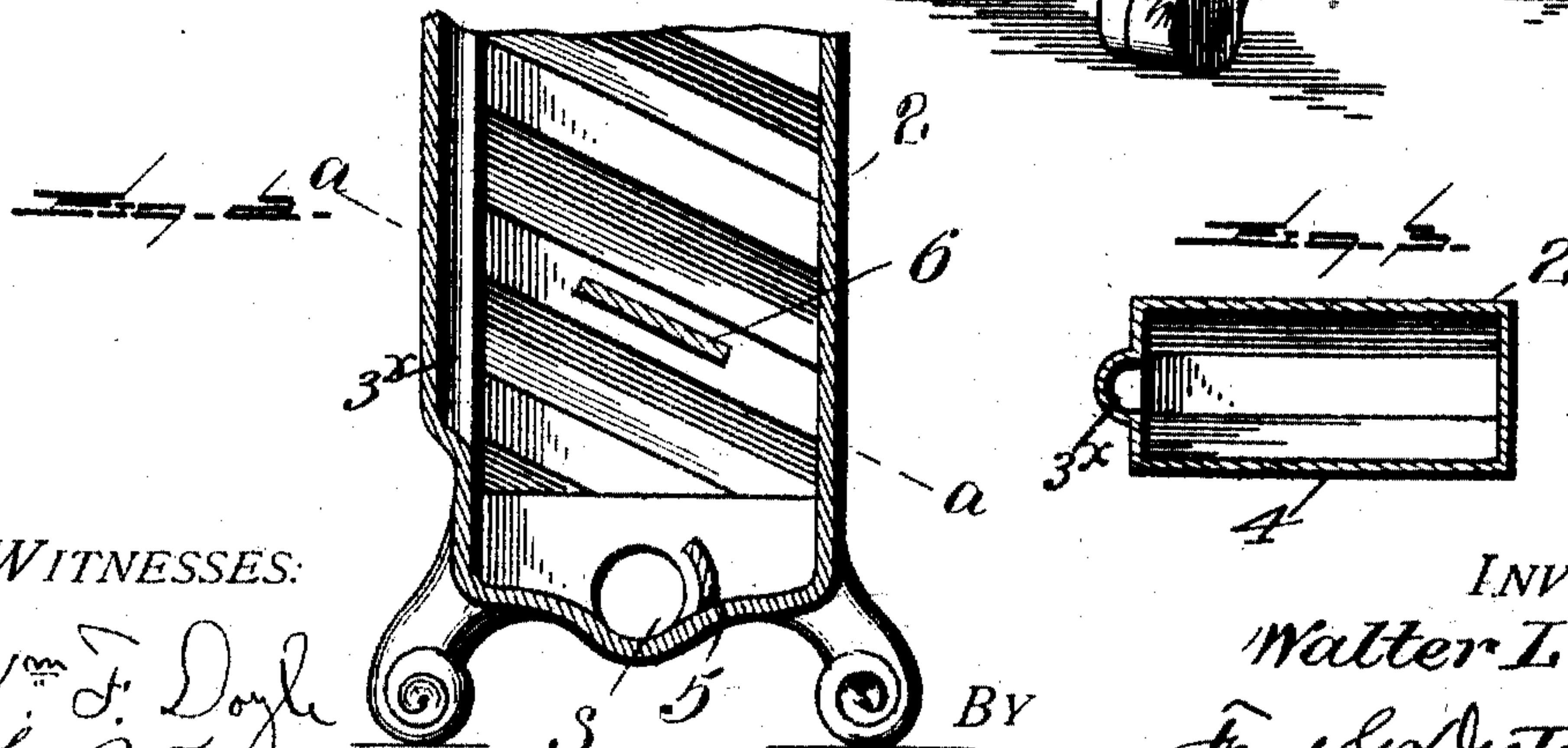
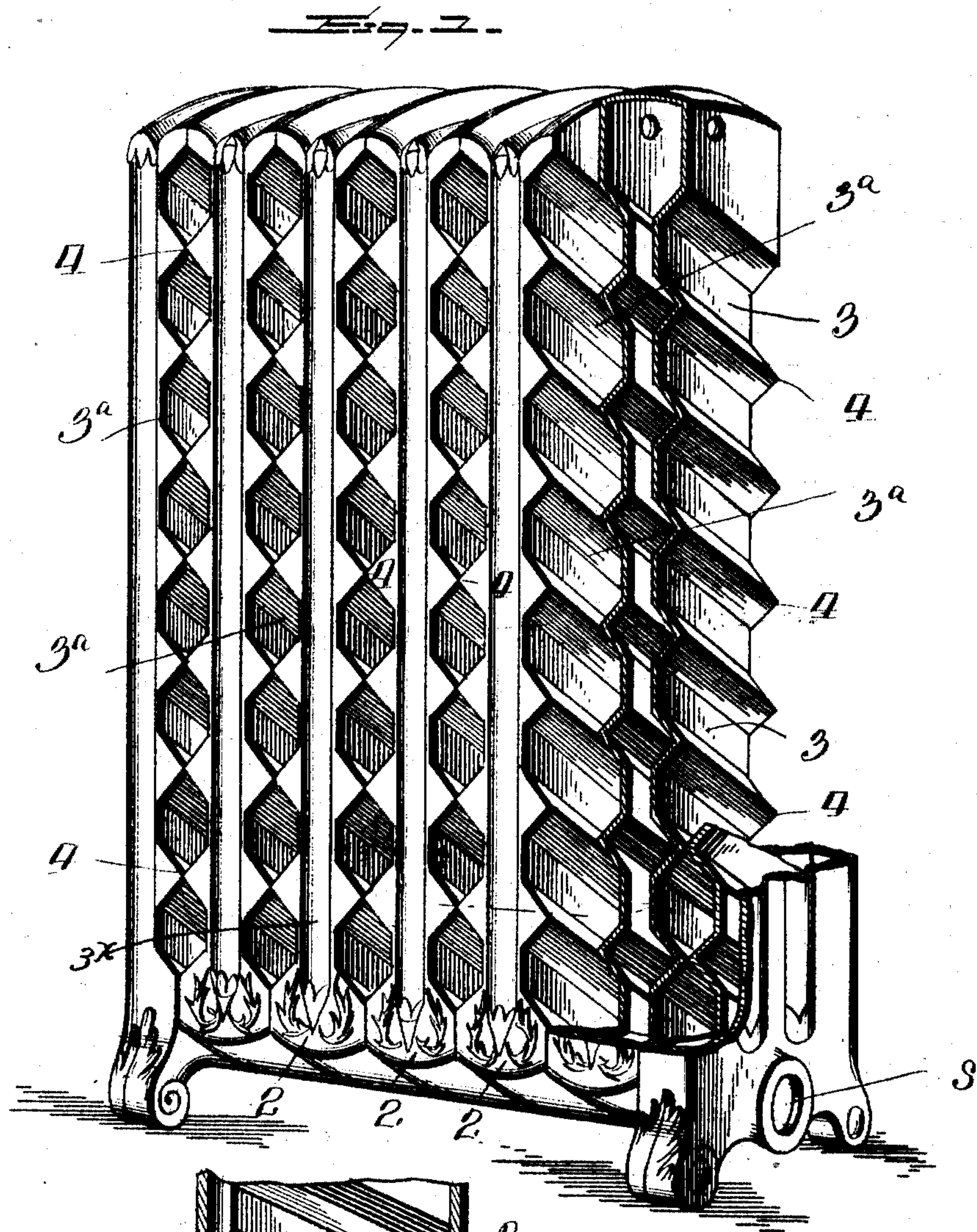
No. 777,036.

PATENTED DEC. 6, 1904.

W. LEEK.  
RADIATOR.

APPLICATION FILED AUG. 18, 1902.

NO MODEL.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

WALTER LEEK, OF VANCOUVER, CANADA.

## RADIATOR.

SPECIFICATION forming part of Letters Patent No. 777,036, dated December 6, 1904.

Application filed August 18, 1902. Serial No. 120,125. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER LEEK, a citizen of the Dominion of Canada, residing at Vancouver, in the Province of British Columbia, Canada, have invented a new and useful Radiator, of which the following is a specification.

My invention relates to improvements in heat-radiators, such as are used for heating the air of rooms by the circulation of a heated fluid within the sections or loops of the radiator; and my object is to obviate the admitted defects of radiators of this class in common use without materially adding to the cost of manufacture.

The defects common in a greater or less degree in all radiators at present on the market are the pocketing of air within the loops or sections and consequent reduction of efficiency. In a system of heating by water this fault is not difficult to deal with, as the air can readily be withdrawn; but where steam is the medium on account of the slight difference in the specific gravities of steam and air the direct withdrawal is impracticable and it becomes necessary to effect its removal by facilitating its displacement by the steam and allowing it to be carried away with the water of condensation. A further fault in existing radiators lies in the vertical radiating-surfaces which have hitherto been considered necessary in order to obtain a simple construction. Such, however, results in a very serious loss of efficiency on account of the already heated air rising in contact with a further radiating-surface, and there is the additional disadvantage that the column of heated air from the radiator rises directly up the wall of the room, where its benefit is little felt and where it causes a discoloration of the wall and ceiling adjacent to the radiator. These faults and the incidental one of cross-radiation are what I have endeavored to remove in a simple manner and that while much improving the adaptability of the radiator to purposes of ornamentation in the direction demanded by room-decorators.

The construction of my radiator and the explanation of its action are fully described in the following specification and illustrated by the drawings which accompany it, in which—

Figure 1 is a part perspective and part section of a steam-heated radiator embodying my features of construction. Fig. 2 is a part vertical section of one of the loops, and Fig. 3 a cross-section on the line *a a* in Fig. 2.

In the drawings each section or loop of the radiator is represented by 2, and they are connected together at the bottom, where they receive the steam-inlets at either end. My novel construction consists in forming the side walls of each section with a series of uniform external corrugations angled upward from back to front, as clearly shown in the drawings. These corrugations consist of the furrows 3, which are preferably of a truncated V shape in cross-section, and ridges 4 between each furrow, which ridges are of a simple V shape in cross-section, so that when the walls of the adjacent section are brought together, as in building up a radiator, the apices of the ridges 4 of one section are substantially in contact with those of adjoining sections and a series of passages 3<sup>a</sup>, hexagonal in cross-section, are formed which slope upward from back to front and inclose the oppositely-disposed radiating-surfaces of the sections. The front faces of the sections have convexed portions 3<sup>x</sup> on their outer surfaces which form concaved portions upon the inner surfaces to assist in directing the circulation of the steam within the section. The outside wall of each end section may be corrugated in the same manner as the inner ones or may be pillared and finished in any desired manner to suit the requirements of decoration.

The effect of this construction is twofold—it enables the required circulation and displacement of air within to be attained, and without it gives an increased radiating-surface having an approximately horizontal character, while the upward incline from back to front projects the air as soon as heated from the radiator toward the center of the room. Considering these effects separately and taking the matter of interior circulation first, the steam entering at the inlet *s* will at once rise to fill the internal space, but will impinge on the inwardly-projecting ridges formed by the external furrows. These being inclined upward to the front will tend to throw the circulation of the steam in that direction; but,



further, the steam will condense on the walls, and the water of condensation will naturally run down the incline of the corrugations toward the back, so that when in use the back of the radiator will be sensibly cooler than the front, and a circulation will consequently be induced up the front and down the back, which will carry any included air with it. The air being the heavier, both by virtue of its greater specific gravity and also from the fact of its being cooler than the steam, will naturally aid this circulation, and it will gravitate to the bottom and pass out with the water of condensation. I provide a baffle at the steam-inlet to each separate section to prevent the steam from flowing toward the back of the radiator and confusing the downward stream of the circulation. I may further, if found necessary, provide a series of baffles between the central part of the opposing corrugations where they project into the steam-space; but I consider that such will not be required, as the difference of temperature between back and front will induce a sufficient circulation without the use of baffles.

We will now consider the effect of my construction on the radiation from the exterior. As pointed out, the combination of the trough-shaped corrugations in the opposing walls of the adjacent sections forms a series of hexagonal passages sloping upward from back to front of the radiator, and the walls of these passages form the entire radiating-surfaces of the between walls of the several sections, as the apices of the ridges touch or approximate to one another at mere lines. The air within these passages will as soon as it is heated rise and moving along the incline of the corrugations will be projected from the radiator toward the center of the room. The flow of cool air will enter the passages at the back and will receive its final accession of heat from the hottest part of the radiator—viz., the front. This impingement of the cool air on the back will increase the internal circulation in the manner previously explained. It must be obvious that the immediate escape from the radiating-surface of air as soon as it is heated will greatly increase the efficiency of the radiator, and the consequent increased condensation will react to produce the desired internal circulation.

The whole combination of favorable conditions will result in a radiator of much greater general efficiency, and that at a trifling, if any, addition to the cost of manufacture. It will also be evident that the solid-looking front plane of the radiator, pierced with hexagonal apertures, will lend itself to a novel and eminently-attractive scheme of surface ornamentation and will dispense with any necessity for the expensive screen-fronts which are demanded for the present radiators for decorative purposes, but which are entirely objec-

tionable as seriously impairing the efficiency of the radiating-surface, as they most effectually hug the heated air to it.

Having now particularly described my invention and wherein its advantages are, I declare that what I claim as new, and desire to be protected in by Letters Patent, is—

1. In a heating-radiator as described, a series of sections rigidly fastened together, said sections having downwardly and rearwardly extended corrugations including ridges and furrows said ridges being V-shaped in cross-section, said sections being constructed so that the apices of the V-shaped ridges of one section contact with the corresponding apices of the other section to form inclined air-passages between the sections, baffles arranged in the sections between the V-shaped ridges, said baffles directed to deflect the steam as it enters the radiator toward the front thereof, causing the steam to flow up the radiator and permitting the water of condensation to be deflected toward the rear of the sections, said sections having concaved portions in the front face extending the length thereof to allow an uninterrupted flow of the steam up the front part of the radiator for the purposes specified.

2. A heating-radiator comprising in combination, a series of communicating sections each of which has V-shaped ridges that incline downwardly and rearwardly from the front end of the sections, the several sections being so arranged that the apices of the V-shaped ridges of one section contact with the corresponding apices of the adjacent section to form inclined air-passages between the sections, the front face of the sections having a concavity that extends the vertical length thereof, the deflectors arranged to the rear of the inlet to deflect the entering steam toward the front of the radiator and the said deflectors being arranged adjacent the steam-inlets at the bottom of the sections, the deflectors arranged parallel with and between the V-shaped ridges and inclined downwardly and rearwardly from the front of the sections to deflect the steam toward the front of the sections and the water of condensation toward the rear of the sections, said deflectors and said concavity being so coöperatively arranged that when the steam enters a section, the deflectors and 6 will deflect the steam toward the concavity to permit it to flow upwardly in the front of the radiator while the water of condensation will be deflected toward the rear of the radiator for the purposes specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER LEEK.

Witnesses:

ARTHUR PERRY,  
ROWLAND BRITAIN.