R. L. TEMPLIN.

WATER HEATER.

APPLICATION FILED APR. 23, 1906. RENEWED APR. 20, 1911.

1,007,749.

Patented Nov. 7, 1911.

3 SHEETS—SHEET 1.

Fig. 1.

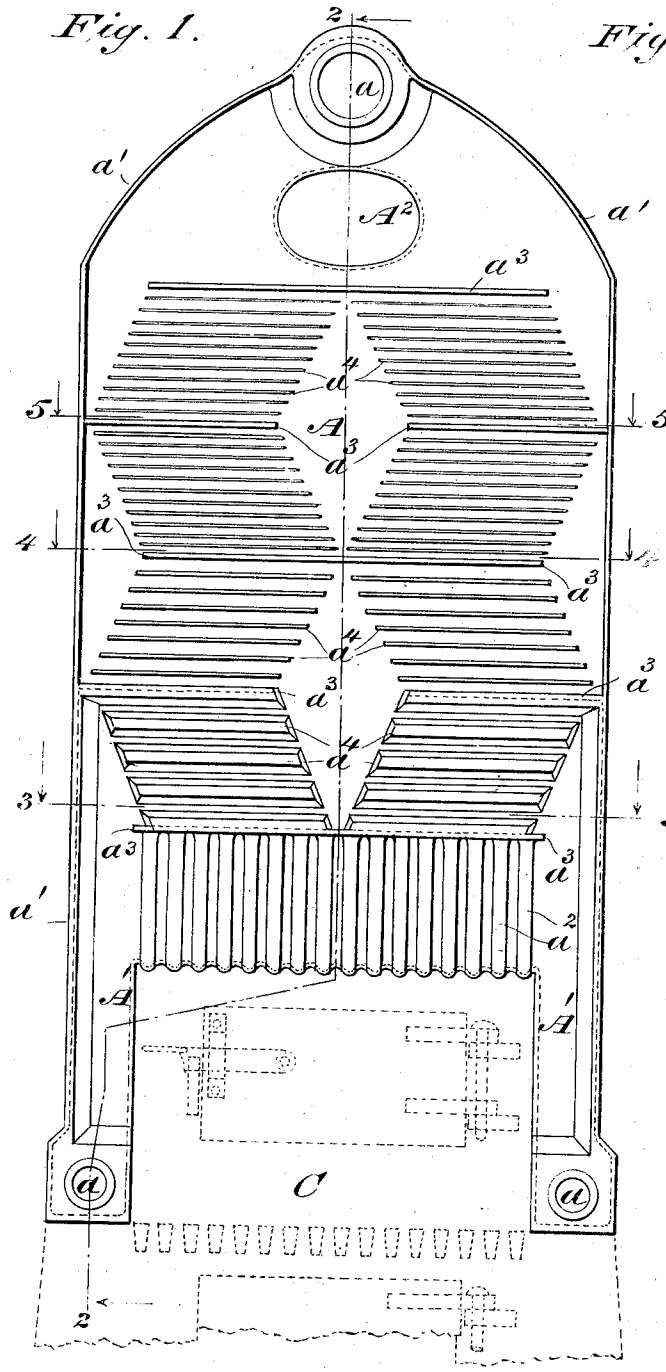
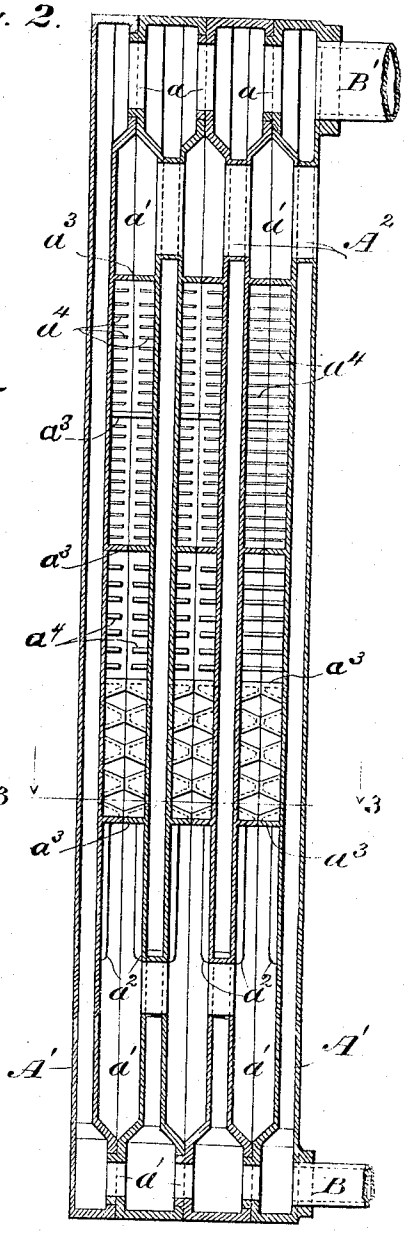


Fig. 2.



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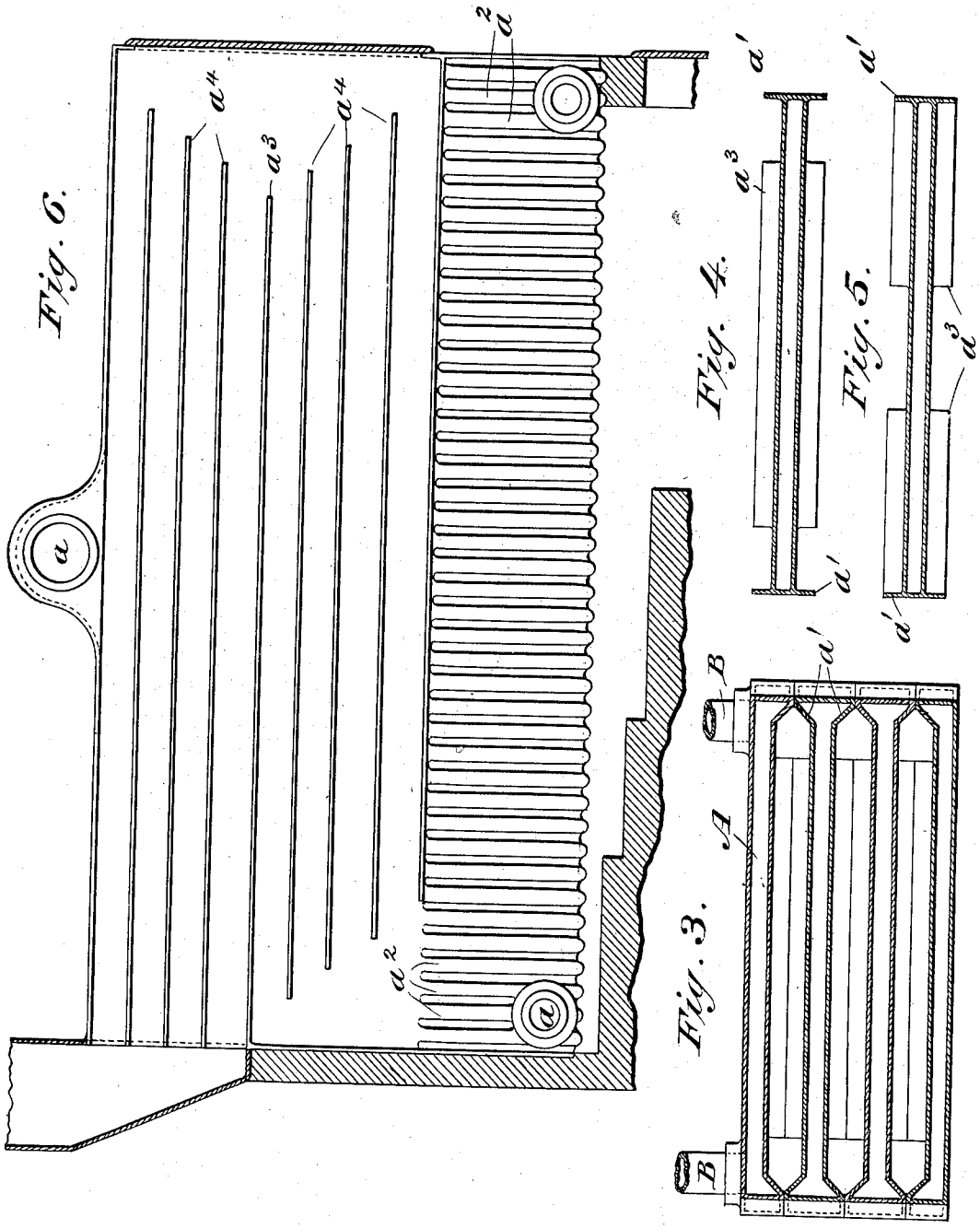
3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 8.

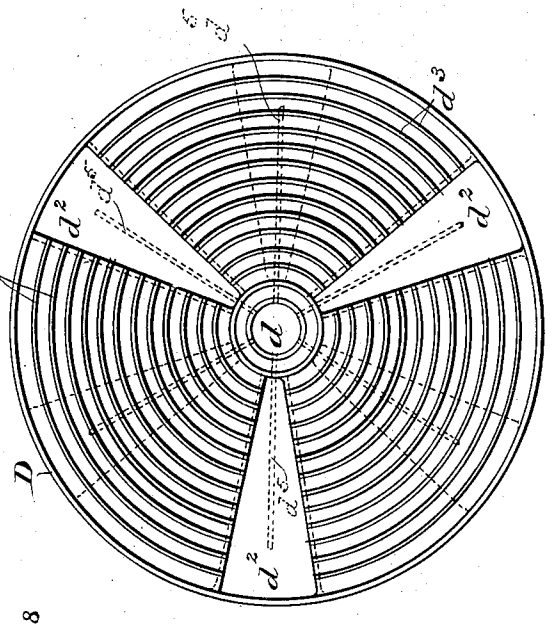
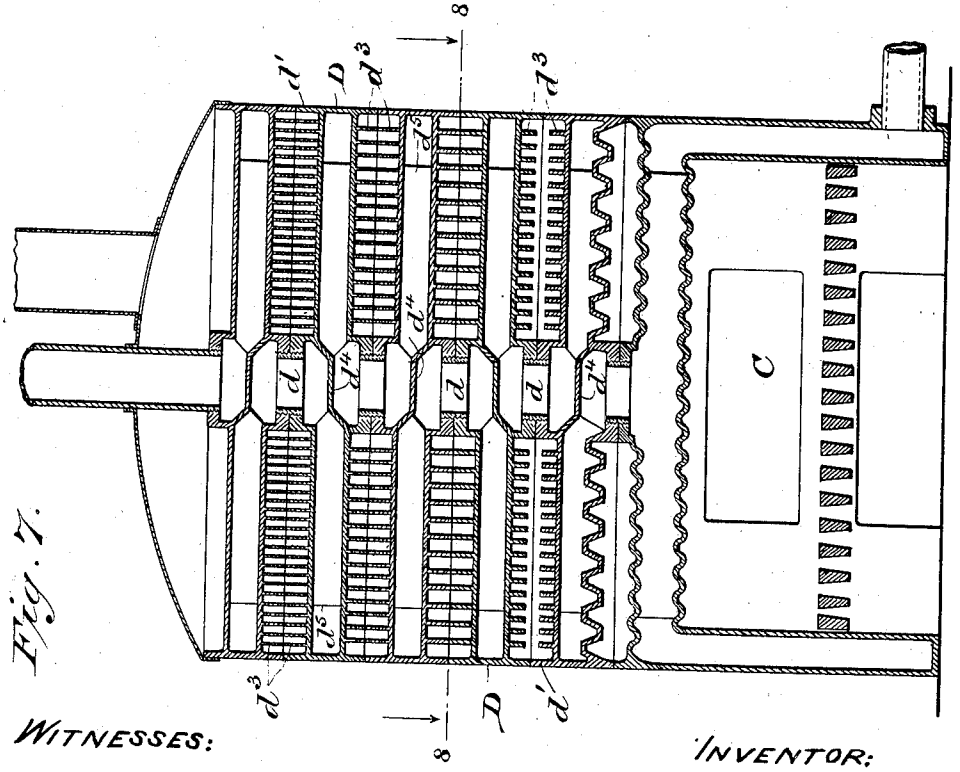


Fig. 7.



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UNITED STATES PATENT OFFICE.

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WATER-HEATER.

1,007,749. Specification of Letters Patent. Patented Nov. 7, 1911.

Application filed April 23, 1906, Serial No. 313,224. Renewed April 20, 1911. Serial No. 622,325.

To all whom it may concern:

Be it known that I, RICHARD L. TEMPLIN, a citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Water-Heaters, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to improvements in devices for heating water and particularly to devices of this character that are of sectional construction.

The object of the invention is to produce a water heater that will present the desirable qualities of simplicity of construction and efficiency of operation, and that will provide a maximum heating space for a minimum amount of water.

Said invention consists of means hereinafter fully described and particularly set forth in the claims.

The annexed drawings and the following description set forth in detail certain means embodying the invention, such disclosed means constituting but one of various forms in which the principle of the invention may be used.

In said annexed drawings: Figure 1 represents a front elevation of one of the sections that go to make up a vertical water heater embodying my improvements; Fig. 2 is a vertical, longitudinal cross-section of such a heater represented for the sake of simplicity as being made up of only four sections; Fig. 3 represents a horizontal transverse cross-section of such heater taken on line 3—3, Figs. 1 and 2; Figs. 4 and 5 represent similar horizontal transverse cross-sections of single sections of the heater respectively taken on planes indicated by the lines 4—4 and 5—5, Fig. 1; Fig. 6 is a side elevation of a section showing the manner in which my invention may be adapted to a horizontal heater; while Figs. 7 and 8 are respectively a vertical and a horizontal cross-section of yet another form of my heater.

The primary use for which a heater of the type illustrated is intended is in the heating of rooms or apartments by means of radiators connected in the usual manner. It may, however, be readily adapted for use in heating water for domestic purposes as for the laundry, bath, and kitchen. It is furthermore designed for use with a fuel that produces little or no soot or ash that is likely to be carried along with the gaseous products of combustion and deposited in its passages or flues; in other words, it is intended primarily for use with gas, but coke and anthracite coal, with little or no modification in its structure, may be equally successfully employed. It is well known that with gas in particular much difficulty is experienced in obtaining heating results commensurate with the calorific value of the fuel.

I shall now proceed to describe the structure of my improved heater and later point out wherein it is enabled to utilize to the fullest extent this fuel energy for the specific purpose in hand, that of heating water.

In Fig. 1 is shown in elevation one of the intermediate water-holding sections that enter into the heater structure. Such section is designed to be cast integrally of iron or like metal. In outline it follows the design commonly found in sectional heaters, and consists of a hollow body-portion A with legs A′ extending downwardly therefrom on each side and inclosing the fire-box C. Each section is further formed with an aperture or flue A^2 for the smoke near its upper end. Successive sections are joined together so as to have free internal connection through apertures *a*, of which there are three, one in each leg and a third at the top of the sections. Such junction is effected by means of either slip-nipple joints or rubber washers fitted between the abutting lips of the apertures, as may be desired, and is immaterial so far as concerns my present invention. Conduits B, B′, connected with the apertures *a* of the end sections of the heater, Fig. 2, respectively serve to conduct the water to and from the heater. Water sections A are flat, and are formed with a perfectly smooth interior, save for a short distance directly over the fire-box C which is corrugated. The corrugations a^2 are vertically disposed and extend preferably for but a small fraction of the entire length of the section. Each section is provided around its outer edge with laterally projecting flanges *a′* that serve when the sections are assembled together to keep adjacent sections a fixed distance apart. It is evident that such flanges serve at the same time

to completely inclose the open spaces thus formed between the sections except directly over the fire-box and around flue openings A^2. Such flanges a' are preferably made hollow for about half the height of the sections as appears in Figs. 1 and 3, in order that they may better resist the more intense heat of the fire-box as well as more fully utilize the same. The open spaces between adjoining sections, it is obvious, serve to conduct the heated gases, that arise from the combustion taking place in the fire-box upwardly along the walls of said sections and thence out flue A^2. The flow of such gases is not direct, however, but is diverted by means of transverse flanges or splines a^3 disposed on the faces of the sections and alternately of the form shown in Figs. 4 and 5; these flanges or splines, being similarly arranged on opposing faces, form flues through which the aforesaid gases are obliged to pass, Figs. 1 and 2. Intermediately of flanges a^3 are projections designed primarily as heat-absorbing means. These projections may take the form either of pins arranged in rows, or preferably of other flanges a^4 somewhat lighter than flanges a^3, and arranged in the zig-zag manner clearly shown in Fig. 1. These flanges may be either of the same width as flanges a^3 or else narrower. In Fig. 2 they are shown in the space to the right as being of equal width with flue-forming flanges a^3, while in the remaining spaces of such figure they are shown as being of less width. In the latter form they serve solely as heat-absorbing flanges whereas in the first form they in addition serve to subdivide the flues formed by flanges a^3 into a number of smaller flues. By the zig-zag arrangement of these intermediate flanges the current of gases passing along the main flues is equally apportioned among such smaller flues. Flanges a^4 lying intermediate of the first two major flanges a^3 as also the latter themselves are made hollow after the same fashion as lateral flange a', and for the same reason.

I prefer to employ the intermediate flue construction when the device is designed to be used with gas, either natural or artificial, as a fuel; on the other hand the intermediate flanges should not extend entirely across the passage but should serve as heat-absorbing flanges simply, when anthracite coal and coke are being used since they usually require a stronger draft such as the relatively unobstructed passage thus formed would more readily admit.

In Fig. 2, in addition to the intermediate sections which have been described above, there is shown a front and rear section also, the total number of sections being purposely made less than would ordinarily be employed in order to permit of their inclusion. Such front and rear sections it will be seen, however, differ in no wise from the standard intermediate sections, except that, as might be expected, all the flanges are omitted from their outer faces, and the hollow body-portion A extends entirely to the bottom, there being no legs. In the front section, moreover, the smoke-flue A^2 is closed and an opening provided for the doorway, the door whereby it is closed being hinged on studs cast integral with such section and projecting from its face. From an inspection of Fig. 6 it will likewise be clear without detailed description that my improved form of construction is readily adaptable to a horizontal heater, the arrangement of flanges a^3 being modified accordingly. In this horizontal form, moreover, I do not employ so many intermediate flanges a^4 and those that are used are of the same dimensions as flanges a^3. But little more modification is required to adapt my heater for use with a base-burner instead of with the style of fire-box illustrated in both Figs. 1 and 6; while in Figs. 7 and 8 I show how my system may be embodied in a vertical heater in which the sections are horizontally disposed instead of up and down as in the first-described form. The sections are preferably circular as shown, being in fact hollow disks D with central bosses provided with openings d whereby successive sections are joined together so as to have free internal connection and at the same time leave an open space between opposing outer faces, such space being inclosed by the peripheral flanges d' of the sections. Such joining of the sections may be effected by means of screw-threaded nipples since the several sections having but the single connection may be rotated with respect to each other. The arrangement of grate or burner C is the same as before and provision is made for the escape of the products of combustion upwardly by providing each section with a plurality of segmental smoke or flue openings d^2, three being shown in the heater illustrated. Successive sections, Fig. 8, are arranged so as to bring these flue openings into staggered relation with each other. Accordingly in passing from the flue openings of one section to those of the section next above the heated gases are obliged to pass through the space intermediate of said two sections which is subdivided into a greater or less number of small passages, as may be desired, by concentrically disposed flanges d^3 on the opposing faces of the sections. The character of these flanges is exactly the same as those described in connection with the first form and they, of course, serve the same function. In order to insure a thorough circulation of the water within the individual sections each is subdivided into compartments as indicated, by means of diaphragms d^4 transversely dis-

posed intermediately of the two central openings d of such section and by partitions d^5 extending radially into the segmental chambers formed between the flue openings d^2. The ascending current of water is thus compelled to circulate entirely through one section before it can reach the one above. If desired, in order to prevent undue radiation of heat from the boiler in either form, the whole may be incased in an asbestos-lined jacket in the same way in which furnaces and steam pipes are thus protected. Furthermore, where the nature of the fuel is such as to suggest the necessity of periodically cleaning the flues of the heater, the lateral or peripheral flanges may be omitted from one side of the sections and a removable cover or door provided whereby access may be had to the open spaces between the sections and soot or dust easily removed.

From the foregoing description it is seen that by my construction the water to be heated is held in thin sheets in the flat vertically disposed sections. Around the latter play the heated gases ascending from the fire-box, such gases being forced to wind in and out among the main flues formed by flanges a^3 and delivering up the major portion of their heat to the intermediate heat-absorbing flanges lying within such main flues before they finally escape by way of the smoke flue. The walls of the section are in this manner prepared to absorb the greatest possible amount of heat from such gases and this they, of course, radiate in turn to the water within them. Such water, in the preferred form of heater, flows unimpeded upwardly as fast as it is heated, there being no projections on the inner walls of the sections, or other obstructions in its course. In other words, instead of passing the water back and forth through devious ways across the heated space, I expose it in thin, freely-flowing sheets to the heat-absorbing walls of the sections. The means employed, although quite simple, thus expose a minimum amount of water to a maximum heating surface, and a relatively high degree of efficiency is accordingly developed.

Having thus described my invention in detail, that which I particularly point out and distinctly claim, is:

1. In a sectional water-heater, a plurality of flat, hollow sections adapted to hold water and provided with discontinuous lateral flanges or splines, said flanges or splines being disposed horizontally and adapted to substantially contact and thereby form flues when said sections are put together, the openings of successive flues being out of alinement.

2. In a sectional water-heater, a plurality of hollow sections adapted to hold water and provided with horizontally disposed lateral flanges or splines, certain of said flanges or splines being adapted to substantially contact and thereby form flues when said sections are put together, said flue-forming flanges being discontinuous and the openings thereby formed between successive flues being out of alinement.

3. In a sectional water-heater, a plurality of flat, hollow sections adapted to hold water and provided with horizontally disposed lateral flanges or splines of different widths, the wider of said flanges or splines being adapted to form flues when said sections are put together, said flue-forming flanges being discontinuous and the openings thereby formed between successive flues being out of alinement.

4. In a sectional water-heater, a plurality of flat, hollow sections adapted to hold water and provided exteriorly with relatively heavy horizontally disposed flanges or splines adapted to form flues parallel with such flanges or splines when said sections are put together, and with relatively light heat-absorbing flanges or splines intermediately of said heavy flanges said flue-forming flanges being discontinuous and the openings thereby formed between successive flues being out of alinement.

5. In a sectional water-heater, a plurality of flat, hollow sections having a substantially smooth interior surface and provided exteriorly with horizontally disposed flanges or splines adapted to form flues parallel with such flanges or splines when said sections are put together.

6. In a sectional water-heater, a plurality of flat, hollow sections having a substantially smooth interior surface and provided exteriorly with relatively heavy horizontally disposed flanges or splines adapted to form flues parallel with such flanges or splines when said sections are put together and with relatively light heat-absorbing flanges or splines intermediately of said heavy flanges said flue-forming flanges being discontinuous and the openings thereby formed between successive flues being out of alinement.

7. In a sectional water-heater, flat hollow water-holding sections having a substantially smooth interior surface, and provided exteriorly with horizontally disposed flanges or splines adapted to form flues when said sections are put together, certain of said flanges or splines being hollow.

8. In a sectional water-heater, flat hollow water-holding sections having a substantially smooth interior surface, and provided exteriorly with horizontally disposed relatively heavy flanges or splines adapted to form flues when said sections are put together, certain of said flanges being hollow, and with relatively light heat-absorbing flanges or splines disposed intermediately of the remaining heavy flanges.

9. In a sectional water-heater, a plurality of flat water-holding sections having a substantially smooth interior surface and provided exteriorly with horizontally disposed flanges or splines adapted to form flues parallel with such flanges or splines when said sections are put together, and with heat-absorbing projections intermediately of said flanges.

10. In a sectional water-heater, a plurality of flat, hollow sections having a substantially smooth interior surface and provided exteriorly with relatively heavy flanges or splines adapted to form flues when said sections are put together and with relatively light heat-absorbing flanges or splines intermediately of said heavy flanges, said heat-absorbing flanges being arranged in zig-zag fashion substantially as shown and described.

11. In a sectional water-heater, a plurality of flat, hollow sections having a substantially smooth interior surface and provided exteriorly with relatively heavy horizontally disposed flanges or splines adapted to form flues when said sections are put together and with relatively light heat-absorbing flanges or splines intermediately of said heavy flanges, said heat-absorbing flanges being arranged in zig-zag fashion substantially as shown and described.

Signed by me, this 20th day of April, 1906.

RICHARD L. TEMPLIN.

Attested by—

G. W. SAYWELL,

JNO. F. OBERLIN.