

C. H. HOOK
HEATER.

APPLICATION FILED SEPT. 15, 1909.

964,423.

Patented July 12, 1910.

Fig. 1.

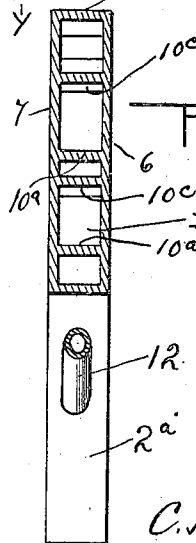
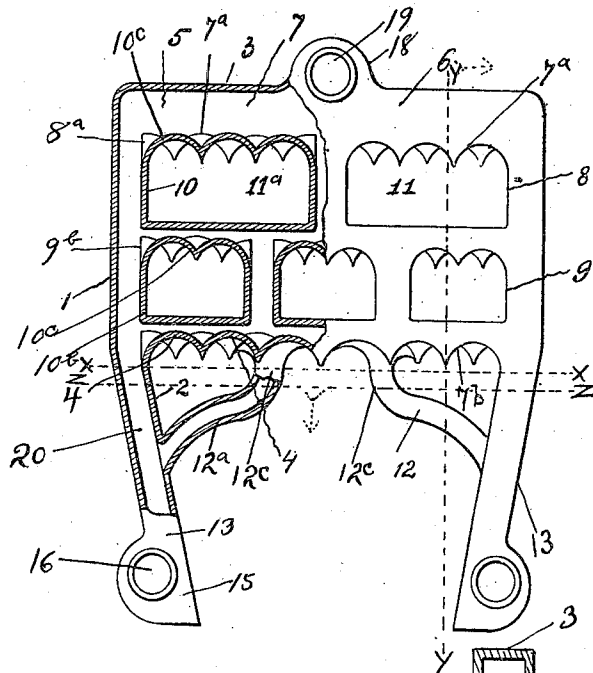


Fig. 2.

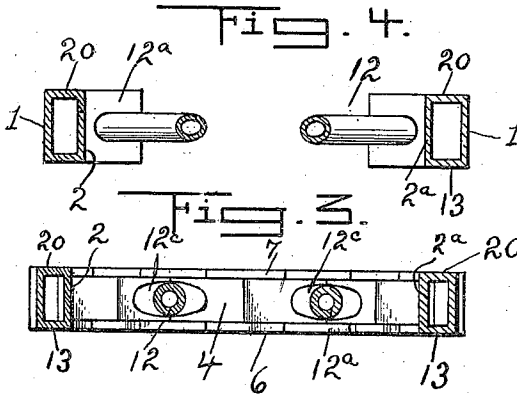


Fig. 3.

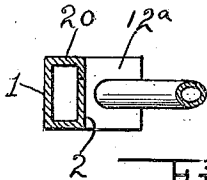


Fig. 4.

Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES HOWARD HOOK, OF PITTSBURG, PENNSYLVANIA.

HEATER.

964,423.

Specification of Letters Patent.

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Application filed September 15, 1909. Serial No. 517,932.

To all whom it may concern:

Be it known that I, CHARLES HOWARD HOOK, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Heaters, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to heaters, and to certain new and useful improvements in connection with my Patent No. 919,172, granted April 20th, 1909.

Besides having the same objects in view as in the above mentioned patent, the present invention aims to provide a unitary heating apparatus in which each unit is provided with novel means for increasing the heating area thereof.

A further object of the invention is to provide a water containing unit or section of a heating apparatus in a manner as hereinafter set forth with water tubes projecting from and communicating with the water space of the unit and arranged within the fire box of the apparatus and by means of which portions of the water of the unit and within the tubes are subjected to the direct action of the flames which surround the tubes thereby increasing the heating of the water more rapidly.

A further object of the invention is to provide a single unit of the heating apparatus with a plurality of water tubes projecting from the roof sheet of the fire box and so set up as to allow for the contraction and expansion of the tubes thereby preventing possibility of the cracking or breaking of the tubes at their joints.

With the foregoing and other objects in view the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views: Figure 1 is a front elevation of the unit, partly broken away and partly in section, Fig. 2 is a vertical sectional view on line *y-y*, Fig. 1

looking in the direction of the arrows, Fig. 3 is a horizontal section on line *x-x*, Fig. 1 looking in the direction of the arrows, and Fig. 4 is a horizontal section on line *z-z*, Fig. 1 looking in the direction of the arrows.

The unit or section comprises a front and a back plate, each of which comprising a body portion indicated respectively at 6, 7, the former having relatively narrow depending extensions 13 which incline inwardly and toward each other and each of which has its lower end enlarged as at 15 and apertured as at 16. The body portion 6 at its top approximately centrally thereof is offset as at 18 and apertured as at 19. The body portion 7 is of the same contour as the body portion 6 and the extensions of the body portion 7 are indicated by the reference character 20. The body portions 6, 7 are formed integral with the top wall 3 and also with the side walls 1 and are also cut away to provide the openings 8, 8^a, 9, 9^a and 9^b. The upper wall of each of said openings is crenelled, as at 7^a and the lower edge of the body portions 6, 7 are also crenelled as at 7^b.

Formed integral with the extensions of the body portion 7 and with the opposing extensions of the body portion 6 are the inclined webs 2, 2^a which terminate at their top in a horizontally-extending bridge piece 4 which is formed integral with the body portions 6, 7 at the lower part thereof and which is crenelated in contour. The webs 2, 2^a bridge piece 4 referred to in connection with the body portions 6, 7 form a section of the roof of the fire box or combustion chamber of the apparatus.

The openings 8, 8^a, 9, 9^a and 9^b are substantially rectangular in contour and are disposed transversely with respect to the front and back plates, the openings 9, 9^a and 9^b are arranged in parallelism with respect to each other and the opening 8 is arranged in parallelism with respect to the opening 8^a, but the openings 8, 8^a are arranged over the openings 9, 9^a and 9^b and are of greater length and width. Interposed between and formed integral with the body portions 6, 7 are the rectangular webs 10, 10^a, 10^b, 10^c and 10^d, each of said webs having the upper portion thereof crenelated as at 10^e. These webs are formed integral with the body portions 6, 7 at the openings thereof, so that the unit or section will be provided with the flues 11, 11^a, 11^b, 11^c and 11^d for the passage of the

heat units above the wall of the fire box and which travel in one direction through the flues 11, 11^a, that is in the direction toward the front of the apparatus, and in a contra-
 5 direction through the flues 11^b, 11^c and 11^d.

The bridge piece 4 and the webs 10, 10^a, 10^b, 10^c and 10^d provide in connection with the body portions 6, 7 and side and top walls 1 and 3 a water space or chamber 5, the bot-
 10 tom wall of said space or chamber being formed by the bridge piece 4. The water in said space being heated by the passage of the heat unit through the flues and also from the flame acting against the portions of
 15 the webs 2, 2^a and bridge piece 4 which form part of the roof of the fire box or combustion chamber. The extensions 13, of the front plate and the extensions 20 of the back plate in connection with the inclined
 20 portion of the side wall 1 and the webs 2, 2^a form what may be termed a pair of hollow legs for supporting the unit when it is mounted in an operative position, the said
 25 legs opening at their top with the water space 5.

To increase the heating area of the unit and to further cause a rapid heating of portions of the water carried by the unit or section, the unit is provided with a pair of
 30 oppositely-disposed water tubes 12 and 12^a of ogee curvature, each having its upper end flared as at 12^c and formed integral with the bridge piece 4 and opening into the water chamber or space 5. Each of the
 35 tubes has its lower end flared and formed integral with a web 2 or 2^a, as well as communicating with a hollow leg. The diameter of each of the water tubes is less than the width of a leg or the width of the unit. By
 40 such an arrangement the water tubes are disposed in the fire box or combustion chamber and are subjected to the direct action of the flames, which are also caused to surround the tubes for the reason that the
 45 diameter of the tubes is less than the width of the unit; under such arrangement passages will be formed between the tubes of the units and the flames can also attach throughout the roof of the fire box. As the
 50 tubes open at their upper ends into the chamber 5 and at their lower ends into the hollow legs portions of the water are rapidly heated, due to the direct action of the flame. The tubes furthermore materially increase
 55 the heating surface of the unit and also act

as braces for the roof of the fire box, as well as for the hollow legs.

The forming of the water tubes of ogee curvature provide for the expansion and contraction of the tubes without breaking or
 60 cracking at their joints. To obtain this advantage it is essential that the tubes have what may be termed a duplex bend, so that portions thereof will, during contraction and expansion, operate in a manner to prevent
 65 the breaking off or cracking of the tubes at their connection with the webs, which would not be the case if the tubes were straight or formed with but a single bend. By setting
 70 up a pair of tubes in the manner as shown and connecting the tubes at each side of the transverse center of the bottom wall of the water space it prevents the formation of a gas pocket and therefore allows of the flames
 75 to wrap around the tubes so as to thoroughly heat the water.

What I claim is:—

A sectional unit of a heating apparatus having means to constitute a water space and a pair of depending hollow legs com-
 80 municating with said space and each having its inner face extending in the same plane throughout, the bottom wall of the water space forming the roof of the fire box, oppositely-disposed independent water tubes
 85 having portions bent to extend in opposite directions with respect to each other, said portions at the side of the center of the length of the tubes, each of said tubes having an outer flaring end extending trans-
 90 versely with respect to the fire box and further having a lower flaring end extending in a direction of the leg, each of said pipes having its flared upper end formed integral with the bottom wall of the water
 95 space at one side of the center thereof and communicating with the water space and having the flared lower end formed integral with one of the said legs in proximity to the center thereof and communicating with the
 100 interior of the leg, said water tubes projecting into the fire box and each having that portion between the flared ends of the pipe of a diameter less than the width of the unit.

In testimony whereof I affix my signature
 105 in the presence of two witnesses.

CHARLES HOWARD HOOK.

Witnesses:

MAX H. SROLOVITZ,
 KARL H. BUTLER.