

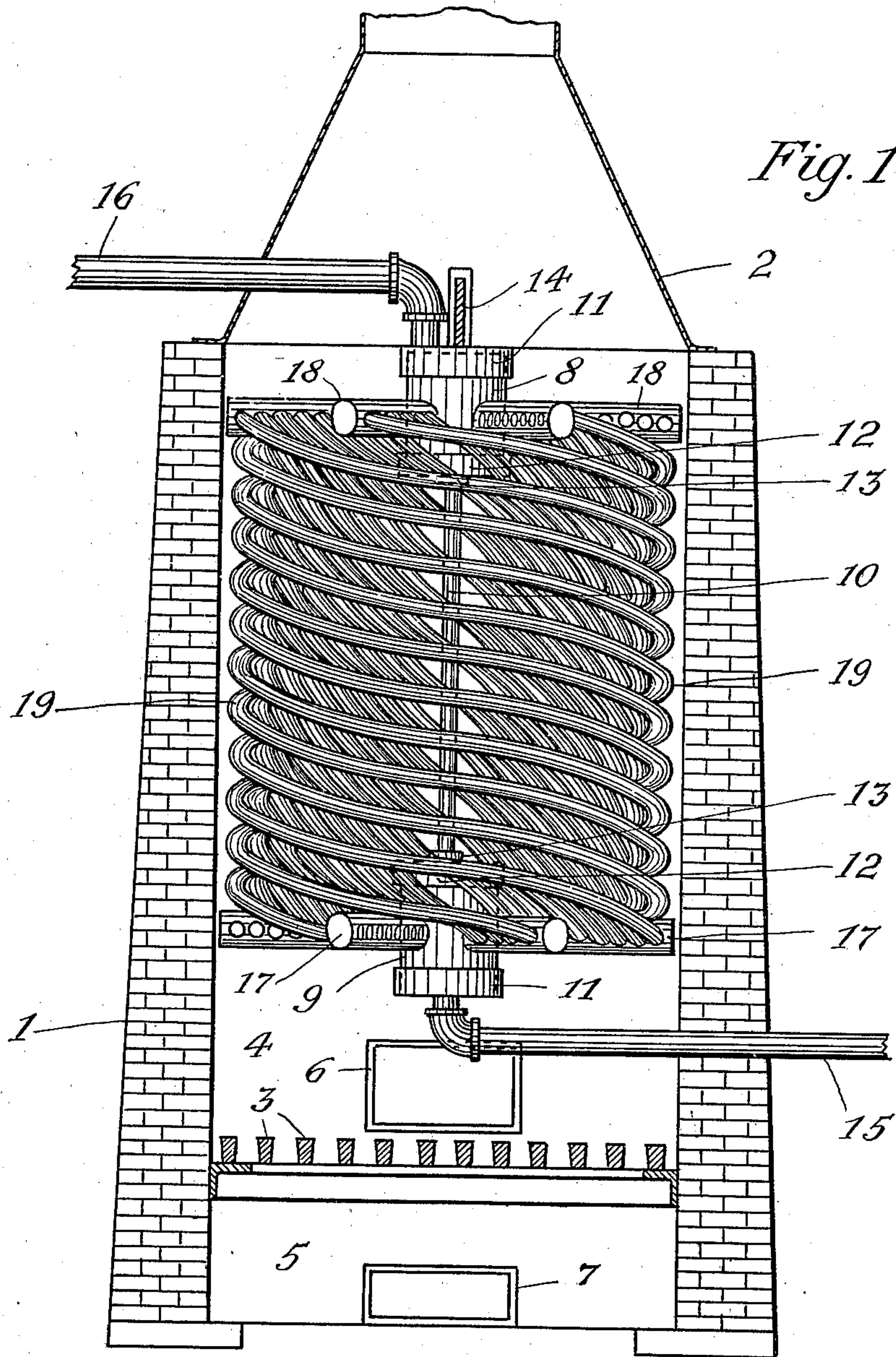
No. 756,886.

PATENTED APR. 12, 1904.

H. E. PENNEY.
WATER HEATING APPARATUS.
APPLICATION FILED OCT. 1, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
Theo. Lagard
H. A. Bowman

Inventor:
Herbert E. Penney
By *O. H. Gunkel*
his Attorney.

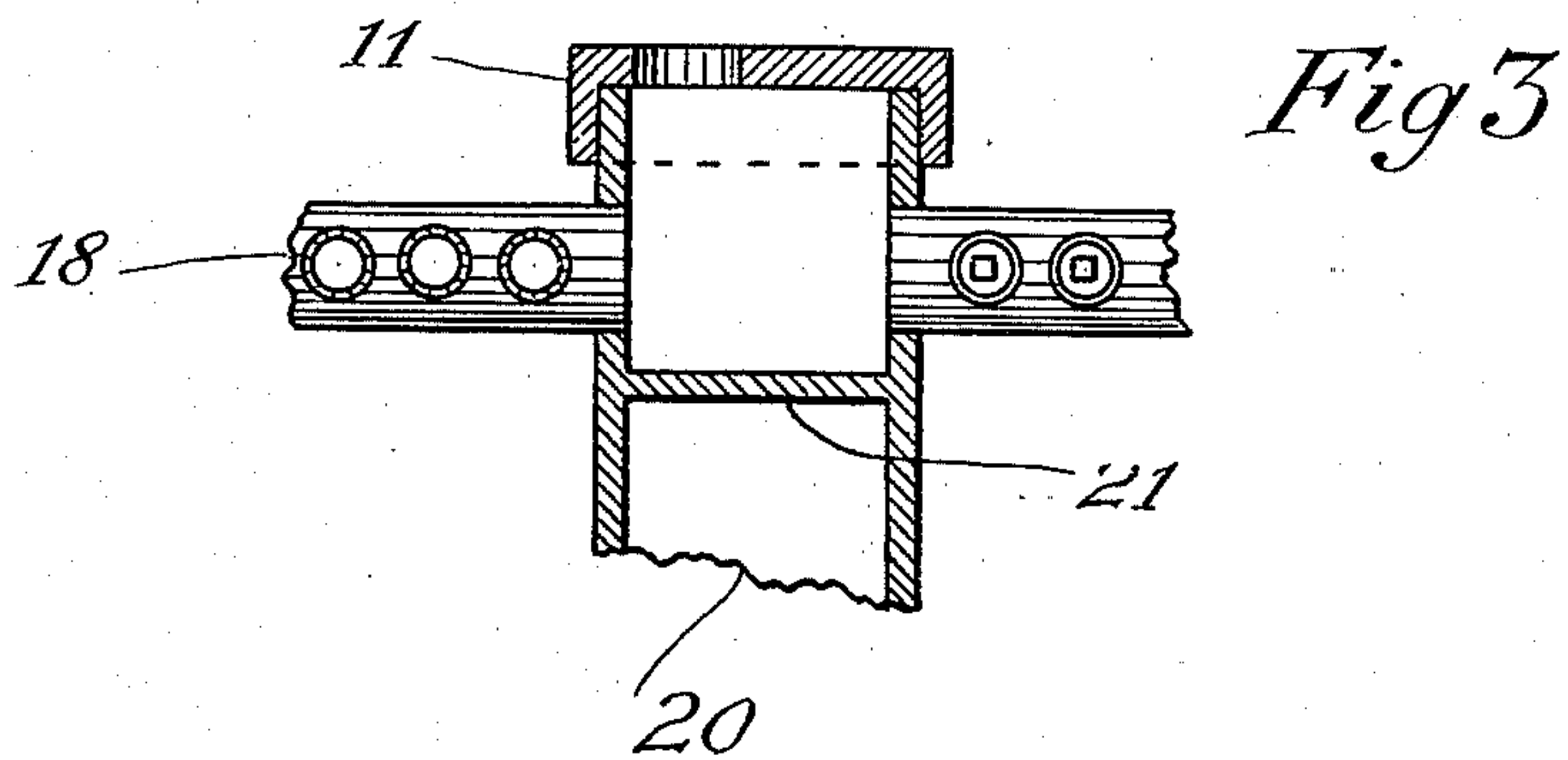
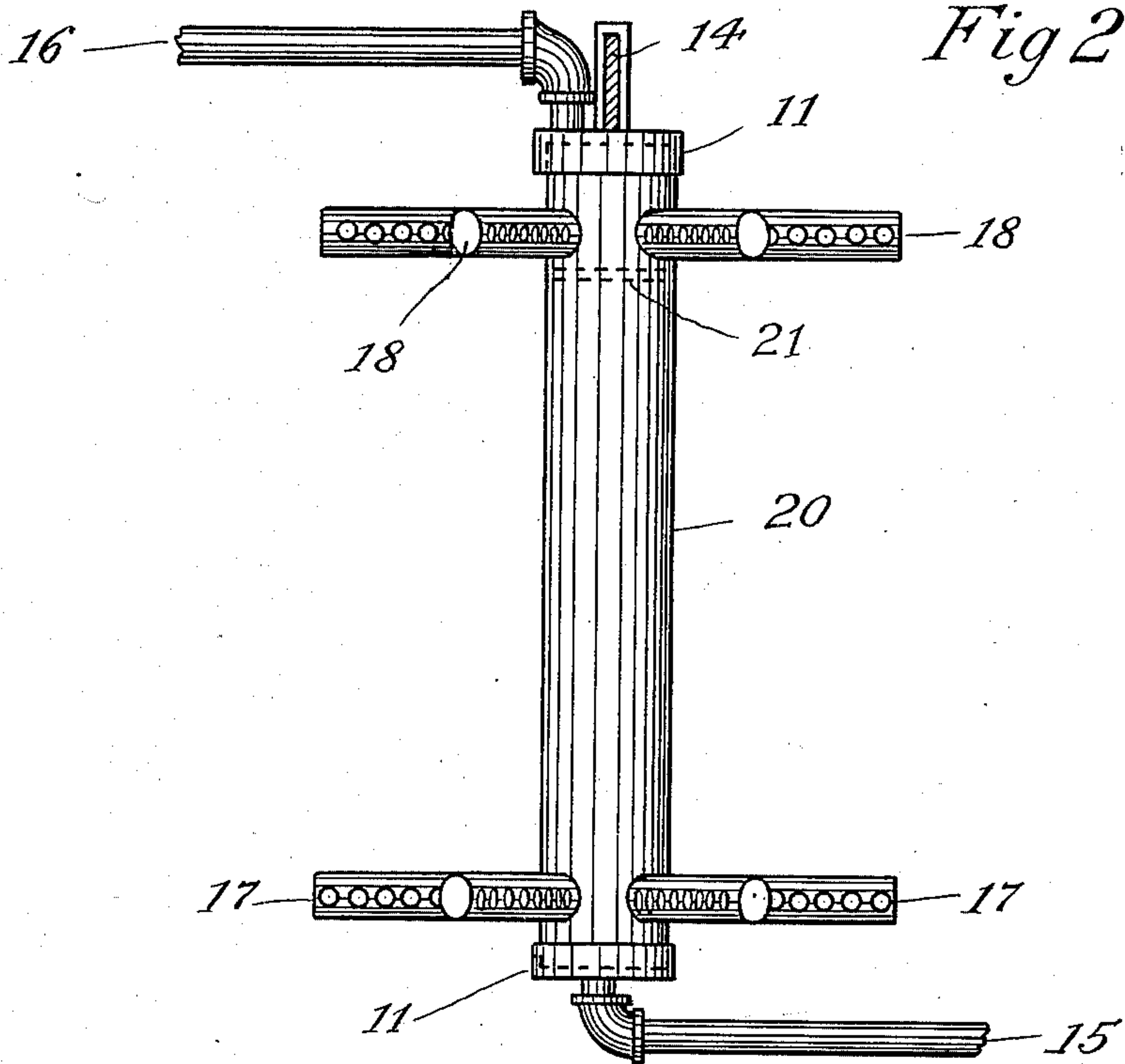
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UNITED STATES PATENT OFFICE.

HERBERT E. PENNEY, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO W. S. NOTT COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION.

WATER-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 756,886, dated April 12, 1904.

Application filed October 1, 1903. Serial No. 175,285. (No model.)

To all whom it may concern:

Be it known that I, HERBERT E. PENNEY, a citizen of the United States, residing at Minneapolis, county of Hennepin, and State of Minnesota, have invented certain new and useful Improvements in Water-Heating Apparatus, of which the following is a specification.

My invention relates to apparatus for heating water in a hot-water heating system; and its object is to provide a water-heater composed, mainly, of tube-sections consisting of headers and coil-tubes connecting them adapted to heat water to the desired temperature by the use of a minimum quantity of fuel.

My improvements are illustrated in the accompanying drawings, in which—

Figure 1 shows in elevation the series of tube-sections composing the water-heater, the water connections, and a masonry structure which houses in the heater and combustion-chamber. Fig. 2 shows a modification of the means for connecting and supporting the headers of the tube-sections, and Fig. 3 is a sectional view of the upper portion of the central column shown in Fig. 2.

In the drawings, 1 designates a housing of masonry or other suitable material, preferably cylindrical in form, and 2 a smoke-stack thereon. In the lower interior space is a grate 3, above which is the combustion-chamber 4 and below which is an ash-pit 5. Doors 6 and 7 in the casing afford access to the combustion-chamber and ash-pit.

In the central space are two water-drums 8 and 9, the former in the upper portion of the space and the latter in the lower portion immediately above the fire-box and suspended from the upper drum by a rod 10. The drums may consist of short cylinders, the ends of which are closed by screw-caps 11 and 12, and the rod 10 may be screwed into bosses 13, provided on the caps 12. The upper cap of the upper drum is suspended from a bridge-tree 14, supported by the masonry walls. The purpose of these drums is to provide suitable means for connecting the tube-sections

with the inflow and outflow pipes 15 and 16 of the circulatory water-heating system, and they may be of any suitable shape or construction.

To the drums are detachably secured radial headers 17 and 18, that extend to points near the masonry walls and have their outer ends closed. As shown, six such headers are employed in each series, and the headers of the two series are preferably placed in vertical alinement.

To each lower header 17 and each upper header 18 that is in vertical alinement with it is connected a series of coiled tubes 19, that are coiled two complete turns in their spiral courses between the headers, to which they are connected at corresponding distances from the header ends. It is desirable to use tubes of comparatively small diameter placed as close together as practicable in order that a considerable number may be employed. In the construction illustrated eight tubes are shown connected to each header, making an aggregate of forty-eight coiled tubes in the boiler, and as such construction has proven satisfactory in use it is suggested as a desirable form for that purpose; but I do not wish to be limited as to the size and number of tubes employed.

The tubes of a series connected to a pair of upper and lower headers are coiled concentrically and in parallel courses and are so bent that all of the coils of a series or tube-section will trend on the same inclined plane, and the tubes of the successive tube-sections are so bent adjacent to their respective headers as that the coils of the successive tube-sections will be disposed equidistantly—that is, will trend in spiral courses on substantially equidistant inclined planes, as indicated in Fig. 1. In such arrangement of the tube-sections the intervening spaces provide spiral passage-ways, through which the major portion of the hot gases take their upward course; but I do not wish to confine myself to a construction in which all of the coils of a tube-section make two turns in their course nor

one in which all of the coils of a tube-section trend on a common inclined plane nor one in which the coils of the different tube-sections are arranged on equidistant planes, for in all
 5 of these respects the construction may be varied somewhat without changing the character of the heater, although such variations might tend to make a quicker or slower water-heater by varying the passage-ways of the
 10 gases and increasing or diminishing the heating-surfaces of the coils.

The coils should be detachably connected to their headers, so that a defective tube can be readily detached and removed by pulling upon
 15 it and at the same time twisting it conformably to its spiral shape and position with reference to adjacent coils, and the headers should also be detachably connected to the drums, so that when freed from the coil-tubes
 20 both the coils and headers of a tube-section can be readily removed.

In the modified construction shown in Fig. 2 there is substituted for the two drums 8 and 9 and the rod 10 connecting them a hollow
 25 column 20, having a suitably-located transverse partition 21, and the headers 17 and 18 are connected to the column at suitable points above and below the partition.

In an application, No. 171,725, filed September 3, 1903, I have set forth a form of
 30 steam-generator composed of concentric shells and a central column or drum in communication with the water and steam spaces between the shells and a series of tube-sections composed of upper and lower radial headers connected to the drum and water-tubes extending spirally around the drum and connecting the upper and lower headers. Patentable subject-matter disclosed herein relative to the
 40 construction of the drum and tube-sections is reserved to be claimed in said pending application.

Having described my invention, what I

claim, and desire to secure by Letters Patent, is—

1. In a water-heating apparatus, the combination with a suitable housing, of a water-heater therein composed of lower and upper drums and a group of tube-sections connected thereto and comprising series of lower and upper radially-disposed headers and series of
 50 coils arranged in close radial order connecting pairs of the headers and extending on substantially equidistant spiral planes around a common vertical axis and providing spiral
 55 passage-ways intermediate the courses of the series of coils of adjacent tube-sections, and pipes connected to the drums for maintaining the circulation, substantially as set forth.

2. In a water-heating apparatus, the combination with a suitable housing, of a water-heater therein composed of lower and upper drums and a group of tube-sections connected thereto and comprising series of lower and upper radially-disposed headers and spiral tubes
 65 connecting them, each tube-section consisting of a lower and an upper header and a series of coils connected to them in close radial arrangement and extending in spiral courses on a common spiral plane, and the tube-sections of the
 70 group being disposed concentrically about a common vertical axis, whereby passage-ways in spiral courses around the common axis are produced intermediate the coils of adjacent tube-sections, and pipes connected to the
 75 drums for maintaining the circulation, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 28th day of September, 80
 1903.

HERBERT E. PENNEY.

Witnesses:

P. H. GUNCKEL,
 H. A. BOWMAN.