L. B. NUTTING.

STEAM SUPERHEATER.

APPLICATION FILED AUG. 28, 1906.

921,878. Patented May 18, 1909.

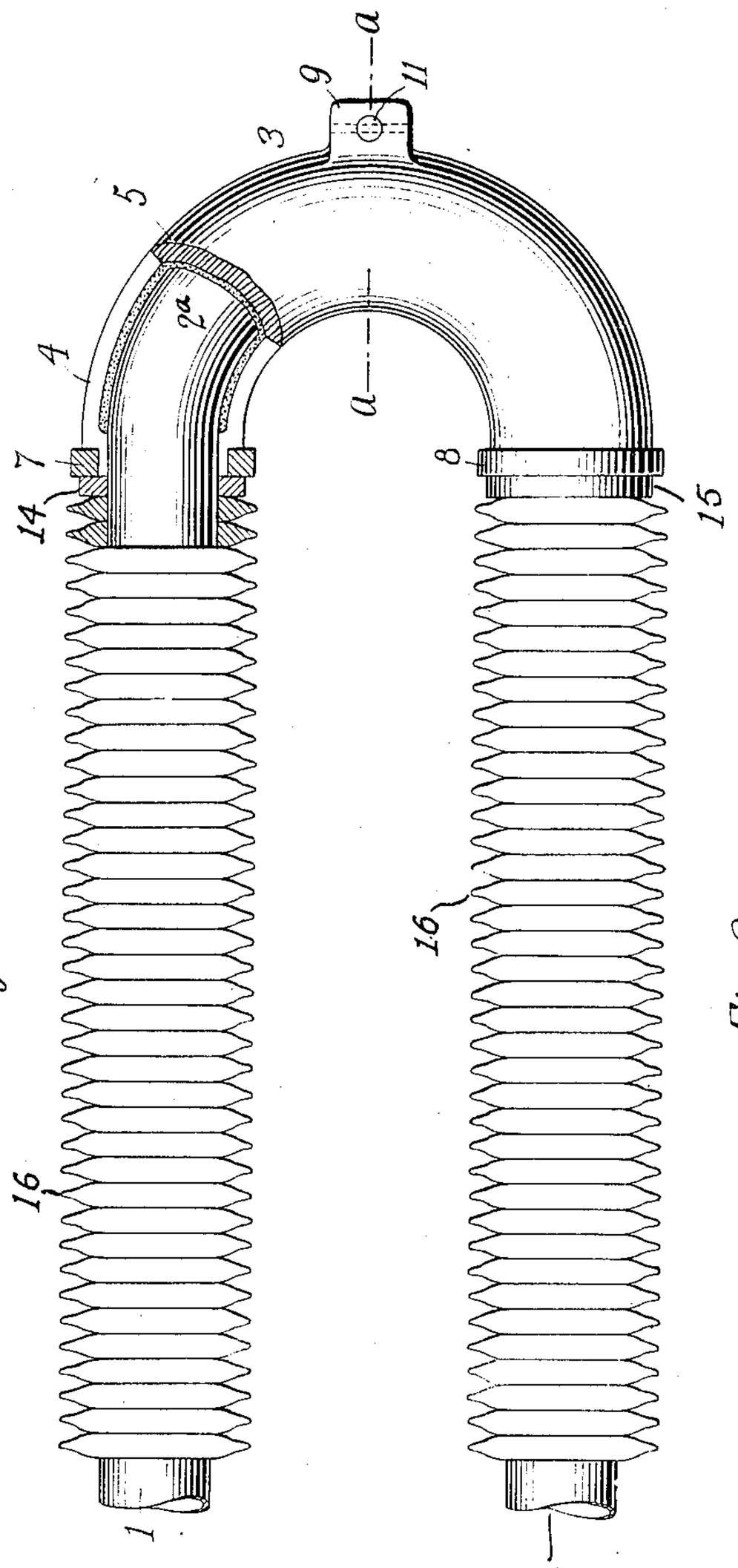

Fig. 1

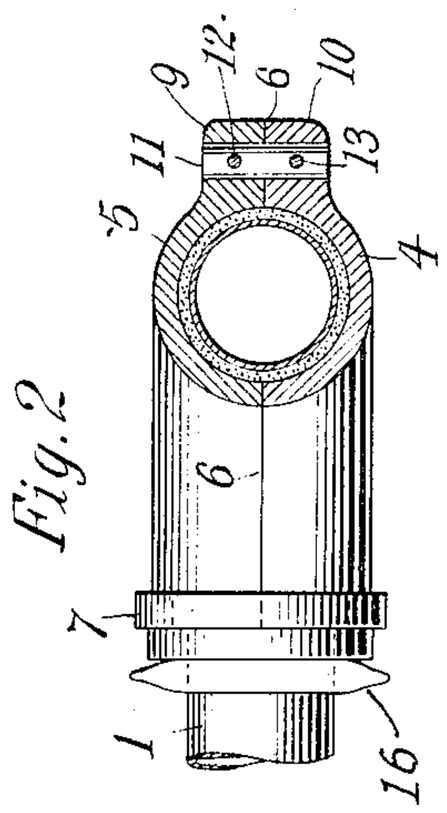

Fig. 2

Witnesses
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UNITED STATES PATENT OFFICE.

LOUIS B. NUTTING, OF PELHAM, NEW YORK, ASSIGNOR TO POWER SPECIALTY COMPANY OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

STEAM-SUPERHEATER.

No. 921,878. Specification of Letters Patent. Patented May 18, 1909.

Application filed August 28, 1906. Serial No. 332,312.

To all whom it may concern:

Be it known that I, LOUIS B. NUTTING, a citizen of the United States, residing at Pelham, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Steam-Superheaters, of which the following is a specification.

In a well known type of superheater the elements or pipes which conduct the steam are arranged in pairs, connected at one end to the inlet header and outlet header, respectively, and at the other end to a "return" header. The high temperature, and high internal pressure, to which superheaters are unavoidably subjected, require that such joints be constructed in the most careful manner. Furthermore, it has come to be generally accepted as good practice to incase superheater elements or pipes in closely fitting jackets or casings of cast iron, usually in the form of cast iron rings shrunk in place on the pipe, forming a corrugated element with large heating surface, the outer portion of the element being of cheap cast metal, which fully protects the strong and more costly inner foundation pipe.

The object of my present invention is to provide a superheater element in which the use of a return header is entirely obviated, and a further object of the invention is to provide a protective casing for elements of this kind, that is, in which no return header is used.

The invention itself, which consists in the novel features of construction and combinations of parts hereinafter described, and more particularly pointed out in the claims, will be more readily understood from a description of the preferred embodiment, which is illustrated in the annexed drawing. Therein,

Figure 1 is a plan view, with part of the bend casing broken away, and Fig. 2 is a section on line *a*—*a*.

The superheater element consists essentially of an inner or foundation pipe, indicated by 1, and an outer protective casing or jacket, preferably of cast metal. In the element illustrated, one end of the foundation pipe, say the end 2, is joined to the inlet header, not shown, from which steam enters the element. This end of the element may be conveniently designated the inner end. At the outer end of the element the pipe is usually connected to a return header, to the other side of which is connected a return pipe, leading back to the inner end of the element and there connected to the outlet header, not shown. It is of course clear that the element is subjected to a high temperature and to high internal pressure; and to withstand the strains resulting therefrom the joints at the headers must be very carefully constructed. I therefore propose to improve the superheater by eliminating the return header. In lieu of such header, and instead of using two pipes, I employ a single pipe, bent into U-shape at the point where the steam is to return, as indicated at 2^a, and connected at its ends to the inlet and outlet headers respectively.

The bend in the pipe is covered by a casing constructed preferably as follows: The bend casing or jacket is indicated at 3, and as shown is semicircular in plan and circular in cross section, to conform as closely as possible to the pipe which it incloses. The casing, which is preferably of cast iron, while the inner pipe is of steel, is formed of two sections, 4, 5, separable on the line 6. The ends of the casing are rabbeted to receive binding rings 7, 8, which are just large enough that when heated they can be slipped into place. Upon cooling the rings contract and bind the two parts of the casing firmly and securely together. On the curve of the casing the sections are provided with bosses 9, 10, through which passes a pin 11. Extending transversely through the bosses and the said pin are pins 12, 13. This arrangement is very satisfactory, inasmuch as the points where the pins engage each other are entirely inside the bosses and hence thoroughly protected from oxidation.

The jacket or casing on the bend should preferably fit tightly against the inner pipe, so as to convey the heat readily to the latter, but it is difficult, if not impossible, to secure a perfect fit at all points, on account of uneven bending of the pipe. However, it is possible to secure substantial continuity of the pipe and casing by tightly packing the space between the two with a refractory material of good heat conductivity. For this purpose a quantity of iron filings is mixed with a small quantity of clay and sufficient water to form a stiff dough or paste. The inner surfaces of the two casing sections are then coated with a layer of this material and placed in position, so that when the sections

are bound together the plastic material will be brought into intimate and firm contact with all the parts, any slight excess of material being squeezed out at the edges of the halves. The heat to which the superheater is subjected vaporizes the water in the packing material and causes a slight rusting of the iron, but the amount of water is so small that rusting is practically negligible. Likewise the quantity of clay need be very small, so that the packing will be substantially all iron and therefore of good heat conductivity.

Fitting firmly against the binding rings, 7, 8, are retaining rings 14, 15, shrunk on the inner pipe, to prevent any possible displacement of the binding rings. From the retaining rings to the inlet and outlet headers the two legs of the pipe are covered with tapered cast iron rings 16, applied hot and allowed to contract by cooling into very firm contact with the pipe. These rings are in contact with each other, and hence make the pipe corrugated, in effect, with large heating surface.

From the foregoing it will be seen that there are no steam joints whatever at the return end of the element. The inner or foundation pipe, which furnishes to a large extent the strength of the element is inclosed in a cast iron casing which fully protects the pipe. At the same time the casing is comparatively inexpensive, and damaged parts thereof may be replaced with little trouble and at slight cost, whereas if the steel pipe were exposed it would suffer rapid deterioration and injury to any part of it could be repaired only by substituting an entire new pipe.

The embodiment herein specifically described has been found in practice to be entirely satisfactory, and is the form preferred but it will be clear to those skilled in the art that the invention may be embodied in various devices without departure from its proper scope as defined by the appended claims.

What I claim is:—

1. A super-heater element, comprising straight pipes united by a U-bend, said bend being inclosed in a protective casing in close heat conducting relation therewith but out of contact with said bend throughout the extent thereof, and heat conducting protective coverings on the straight pipes in close contact therewith and the said protective casing.

2. A super-heating element, comprising a foundation pipe including straight pipe portions united by a U-bend, a sectional protective casing inclosing the U-bend throughout the curved portions thereof, and coverings for the straight pipe sections, said last mentioned coverings being separate and independent from the casing for the U-bend.

3. A superheater element comprising in combination a bent foundation pipe, a protective heat-conducting casing inclosing the bend of the pipe, and a packing of heat-conducting material between the casing and the pipe, as set forth.

4. A superheater element comprising in combination a bent foundation pipe, a protective heat-conducting casing for the bend of the pipe, constructed in sections parallel with the bend, and binding rings around the ends of the sections to secure the same together, as set forth.

5. A superheater element comprising in combination a bent foundation, a protective heat-conducting casing for the bend of the pipe, conforming to contour of the bend and constructed in two parts parallel to the bend, and binding rings shrunk on the ends of the parts to secure the same together.

6. A superheater element comprising in combination a bent foundation pipe and a protective heat-conducting casing for the bend of the pipe, consisting of parts or sections parallel to the bend and conforming to the curvature thereof, provided with registering bosses, a pin extending through the bosses, cross pins extending through the bosses and the first-mentioned pin, and binding rings on the ends of the casing to bind the sections thereof together, as set forth.

7. A superheater element comprising in combination a foundation pipe having a return bend, a protective heat-conducting casing inclosing the bend of the pipe, and a plurality of independent protective heat-conducting rings on the remaining portions of the pipe in contact with the latter and in heat conducting relation to the said casing, as set forth.

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