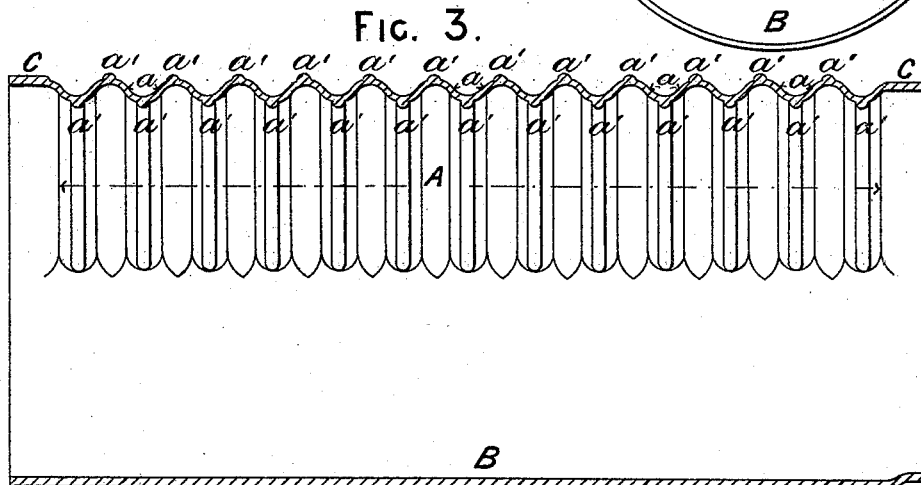
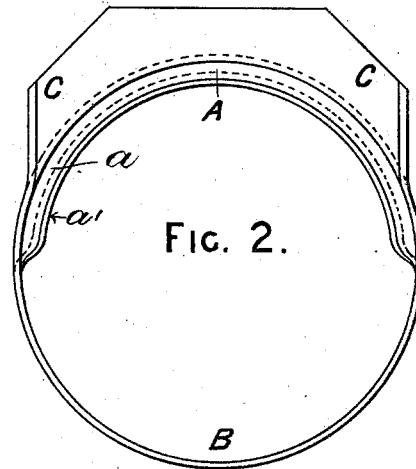
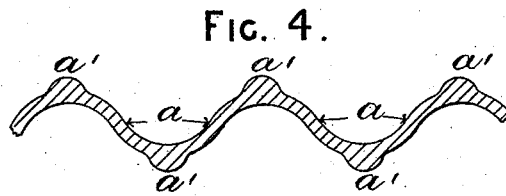
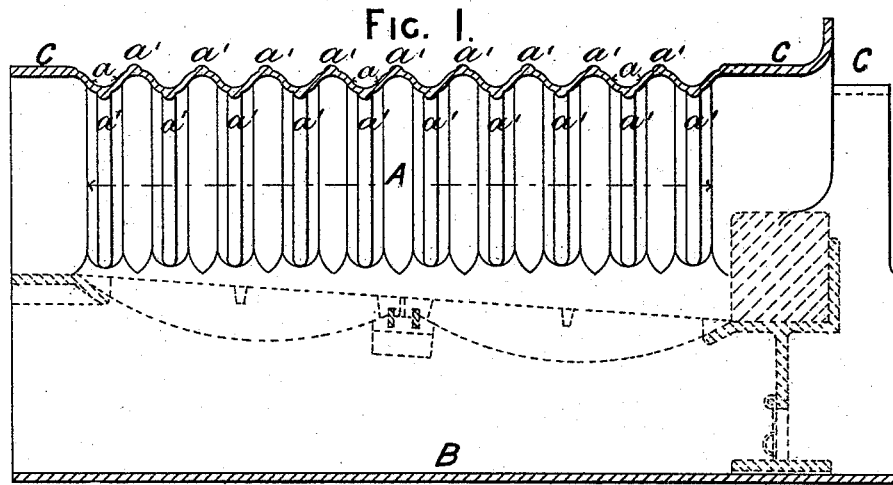


(No Model.)

S. FOX.  
CORRUGATED FURNACE AND FLUE.

No. 417,818.

Patented Dec. 24, 1889.



Witnesses.  
*Josh Blackwood*  
*J. M. Ginn*

Inventor  
*Samson Fox*  
*Wm. H. Apple*

# UNITED STATES PATENT OFFICE.

SAMSON FOX, OF HARROGATE, COUNTY OF YORK, ENGLAND.

## CORRUGATED FURNACE AND FLUE.

SPECIFICATION forming part of Letters Patent No. 417,818, dated December 24, 1889.

Application filed January 25, 1888. Serial No. 261,919. (No model.) Patented in England March 9, 1886, No. 3,329, and in Germany December 15, 1886, No. 40,093.

*To all whom it may concern:*

Be it known that I, SAMSON FOX, a subject of the Queen of Great Britain and Ireland, residing at Harrogate, in the county of York, Kingdom of Great Britain and Ireland, have invented a new and useful Improved Corrugated Furnace and Flue for Steam-Boilers, of which the following is a specification.

This invention has reference to improvements, hereinafter described, in the construction of corrugated furnaces or flues for steam-boilers, the invention having been patented in England March 9, 1886, under No. 3,329, and in Germany December 15, 1886, under No. 40,093.

In the annexed drawings, Figure 1 is a longitudinal vertical section of a furnace-tube; Fig. 2, an end elevation at the rear end. Fig. 3 shows in longitudinal vertical section a modification of a flue-tube suitable for a land-boiler; Fig. 4, an enlarged section of the corrugations.

Heretofore in constructing corrugated boiler furnaces and flues plates of metal have been bent to tubular form and welded. Then corrugations have been formed out of the thickness of the metal by rolling in a suitable mill, and, finally, the wings and end rings or parts for attachment to the body of the boiler have been formed in a flanging-machine or otherwise to a thickness approximately the same as that of the corrugated portions of the furnace or flue; but according to my present invention I use for the manufacture of the furnace or flue a plate of greater thickness than heretofore. For example, where heretofore I have used a plate of half an inch thick, I should for a furnace or flue according to my present invention to resist the same pressure use a plate of three-fourths of an inch thick.

The plate is bent to the form of a tube of suitable section and welded, then is placed in a corrugating-mill, and has corrugations A formed partly but not entirely around it, abruptly terminating in and leaving a plain uncorrugated portion of the plate B throughout the length of the furnace or flue to form a strong longitudinal welded joint. Afterward the end rings and wings C are formed in the ordinary way, but approximately of

the thickness of the original plate, so as to be sufficiently strong for use without lateral stays, such as are required with furnaces made as heretofore, as above referred to. For the purpose of affording additional resistance to collapsing strain without increasing the depth of the corrugations and without any preliminary rolling process, the corrugations in this improved construction of furnace can advantageously be made in accordance with my invention forming the subject of another application by me for Letters Patent of the United States, bearing even date herewith, Serial No. 261,920—that is to say, by forming and arranging the corrugating-rolls in such a manner as to produce at the inner and outer ridges beads or additional ridges *a'*, leaving the thickness at these parts nearly the same as that of the original plate, whereas the remaining parts *a* of the corrugations are drawn thinner by the process of corrugating; but this mode of forming the corrugations is, however, not separately claimed under my present application for a patent, but only as applied in combination or conjunction with the other features constituting the special construction of improved furnace or flue herein specified.

In the plain lower part B, which is of the normal thickness of the plate from which it is formed, is located the welded joint, which therefore is not liable to injury during the process of corrugating, but constitutes a rigid longitudinal or tensile stay to the ends of the boiler and forms a reliable substitute for separate stays.

By the above-described constructions I am enabled to dispense not only with separate longitudinal stays, but also with lateral stays—such as are applied to the wings and end rings as heretofore made—and, moreover, as the corrugations are not formed entirely around the welded tube the process of manufacture is rendered less tedious and costly, because there is no longer any liability to injury of the welded joint in the process of corrugating.

What I claim is—

1. A steam-boiler furnace or flue made in the form of a tube of suitable section with a longitudinal welded joint along the lower or

uncorrugated part and with corrugations A at the upper part only, said corrugations extending only partly around the tube and being of approximately constant depth throughout their length, except where they join the plain part of the tube, where they abruptly terminate, substantially as described.

2. A steam-boiler furnace or flue made in the form of a tube of suitable section with a longitudinal welded joint along the lower or uncorrugated part with corrugations A extending partly around the tube at the upper part thereof, and with rings and wings C for connection with the body of a boiler, said corrugations being of approximately equal depth throughout their length, except where they join the plain part of the tube, where they abruptly terminate, and said rings and wings being of a thickness corresponding (or thereabout) to the normal thickness of the plate of which the tube is constructed, substantially as herein described, for the purpose specified.

3. A steam-boiler furnace or flue made in the form of a tube of suitable section with a longitudinal welded joint along the lower part and with corrugations at the upper part only, said corrugations extending only partly around the tube and being formed of greater thickness at the tops and bottoms of the corrugations than at the other parts thereof, and the thickness at the thicker parts being the same (or thereabout) as the normal thickness of the plate from which the furnace or flue is made, substantially as described, and for the purpose specified.

4. A steam-boiler furnace or flue made in the form of a tube of suitable section with a

longitudinal welded joint along the lower part and with corrugations at the upper part only, said corrugations extending only partly around the tube and being formed of greater thickness at the tops and bottoms of the corrugations than at the other parts thereof, and the parts of said tubes constituting the end rings and wings for joining to the body of a boiler being of a thickness (or thereabout) corresponding to the normal thickness of the plate of which the tube is constructed, all substantially as described, for the purpose specified.

5. A steam-boiler furnace or flue made in the form of a tube of suitable section with a longitudinal welded joint along the lower part and with corrugations at the upper part only, said corrugations extending only partly around the tube and being made of greater thickness at the tops and bottoms of said corrugations than at the other parts thereof by forming beads at said top and bottom parts, and the parts of said tube constituting the end rings and wings for joining to the body of a boiler being of a thickness (or thereabout) corresponding to the normal thickness of the plate of which the tube is constructed, all substantially as described, for the purpose specified.

Leeds, October 3, 1887.

SAMSON FOX.

In presence of—

THOS. E. CRAVEN,  
C. E., *Fel. Inst. Patent Agents*, 24 Victoria  
Chambers, Leeds.  
WM. SADLER,  
Leeds.