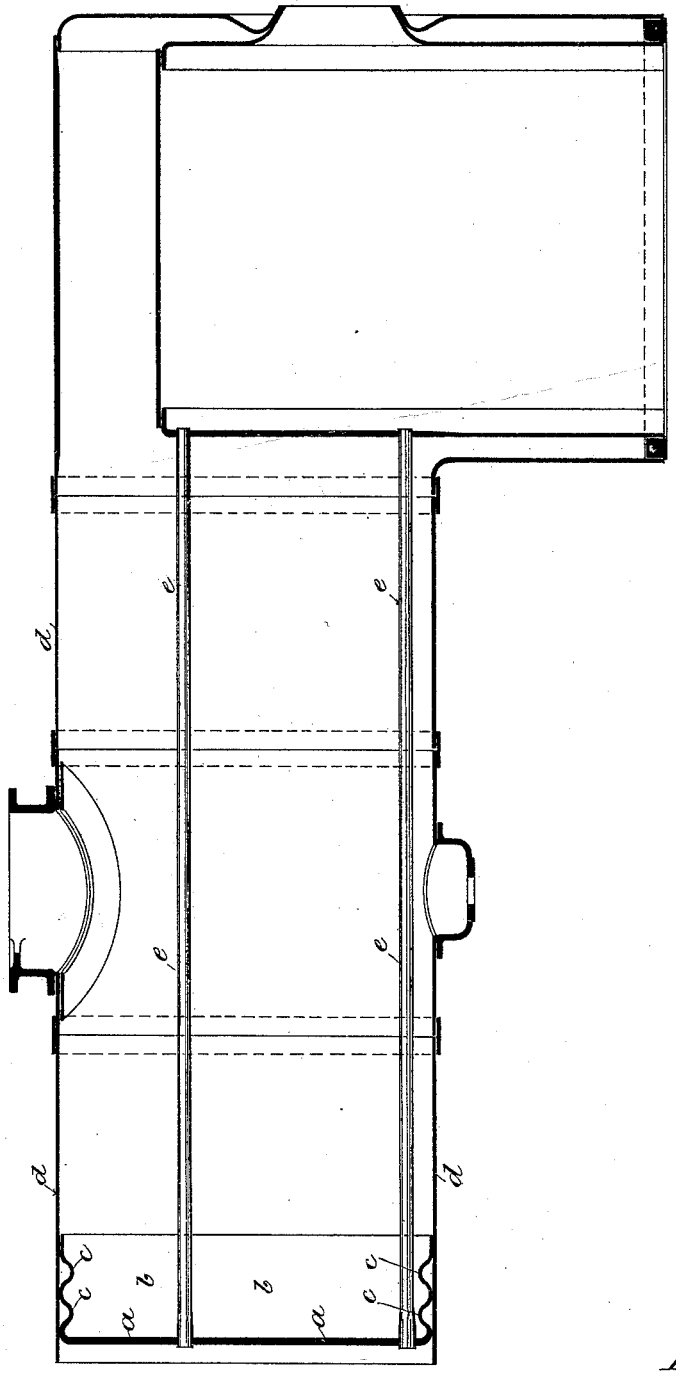
(No Model.) 6 Sheets—Sheet 1.

M. ATOCK.

LOCOMOTIVE BOILER.

No. 423,406. Patented Mar. 18, 1890.

Fig. 1.



Witnesses.
I. F. Rowe
G. C. Hopkins

Inventor.
Matthew Atock

(No Model.) 6 Sheets—Sheet 2.

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LOCOMOTIVE BOILER.

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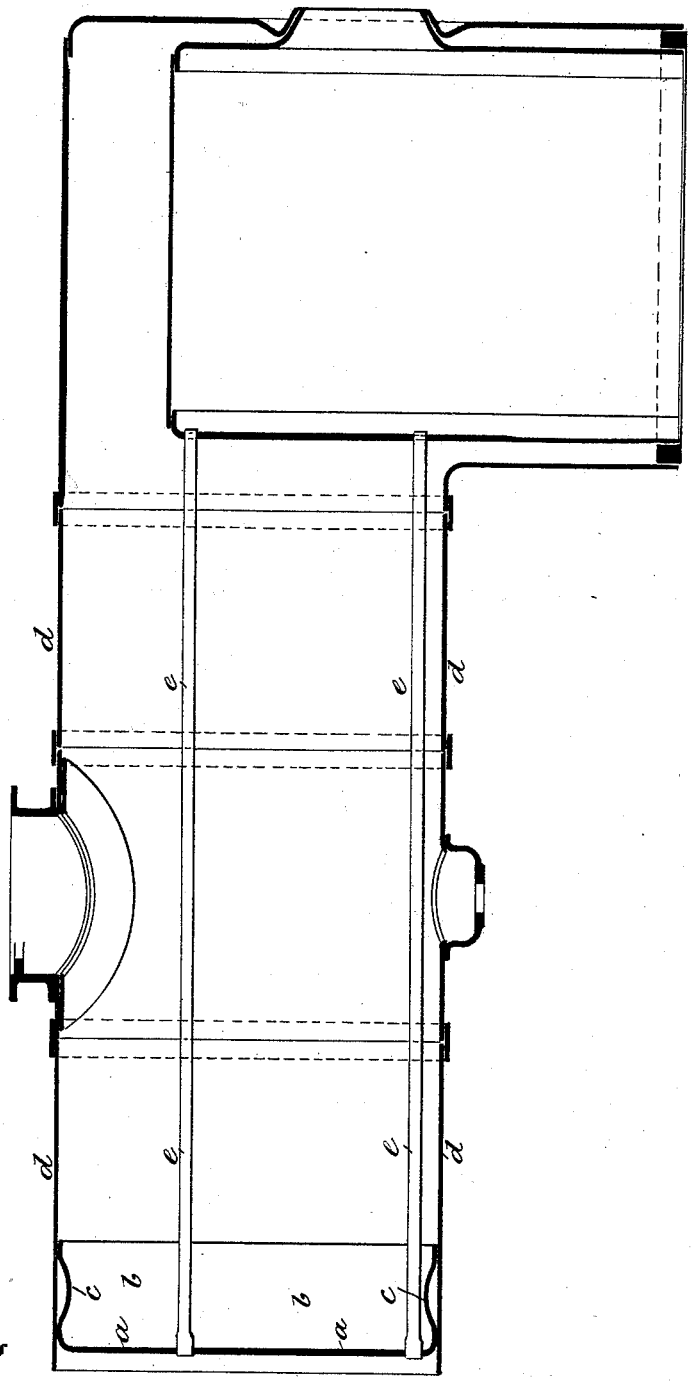
Fig. 2.



Witnesses
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(No Model.) 6 Sheets—Sheet 3.

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LOCOMOTIVE BOILER.

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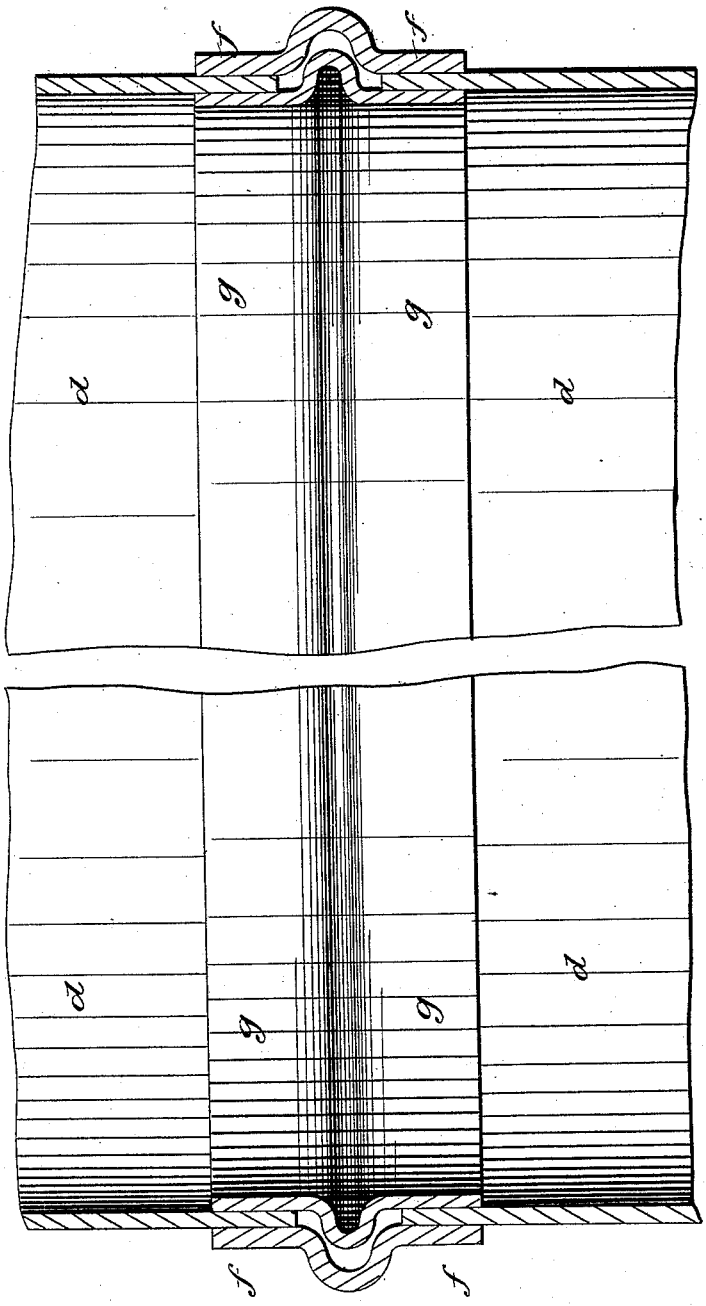

Fig. 3.

Witnesses.
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(No Model.) 6 Sheets—Sheet 4.

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LOCOMOTIVE BOILER.

No. 423,406. Patented Mar. 18, 1890.

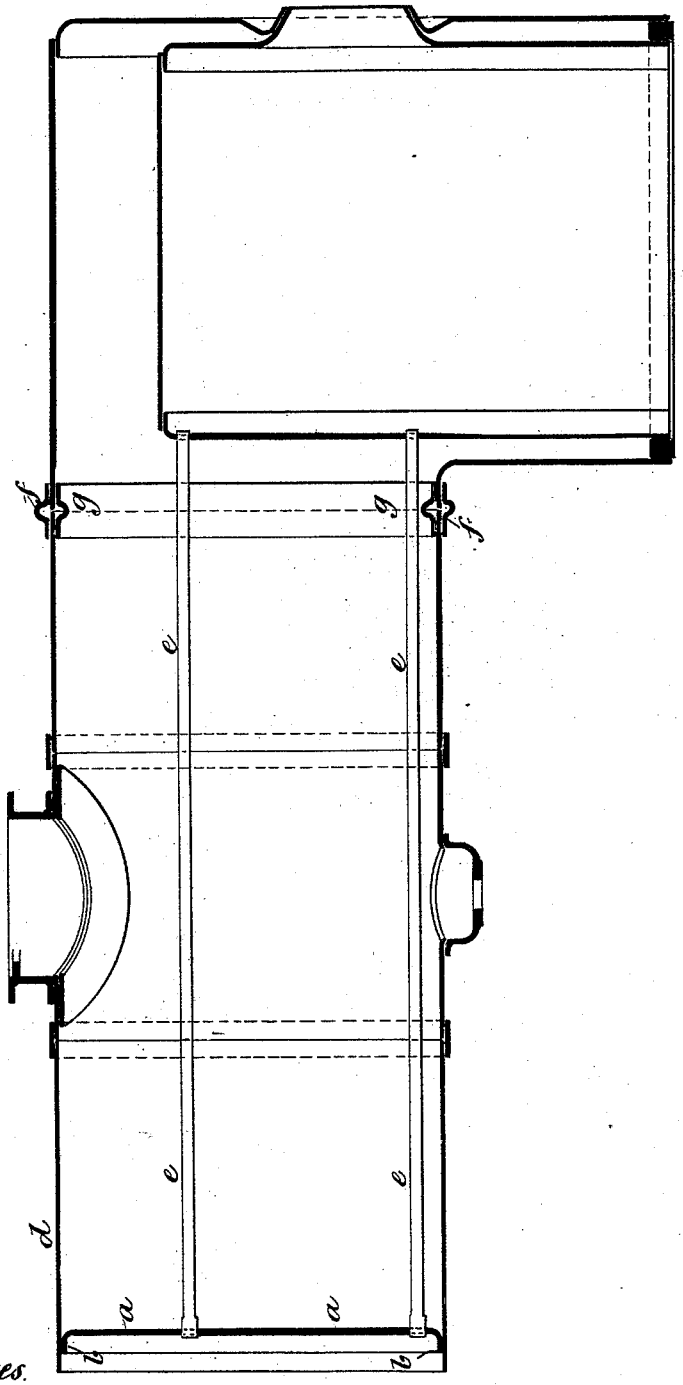

Fig 1.

Witnesses.
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(No Model.) 6 Sheets—Sheet 5.

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LOCOMOTIVE BOILER.

No. 423,406. Patented Mar. 18, 1890.

Fig 1.

Witnesses.
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(No Model.) 6 Sheets—Sheet 5.

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LOCOMOTIVE BOILER.

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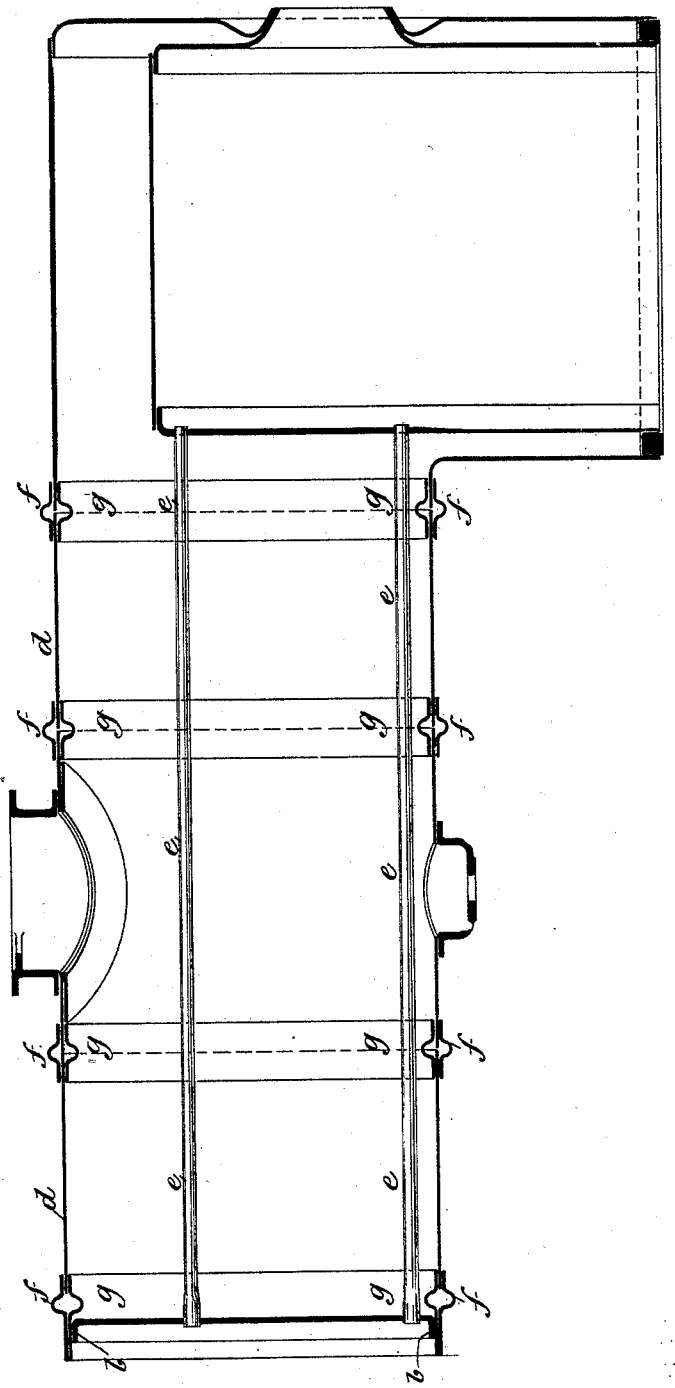

Fig 5.

Witnesses.
I. Y. Rowe
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(No Model.) 6 Sheets—Sheet 6.

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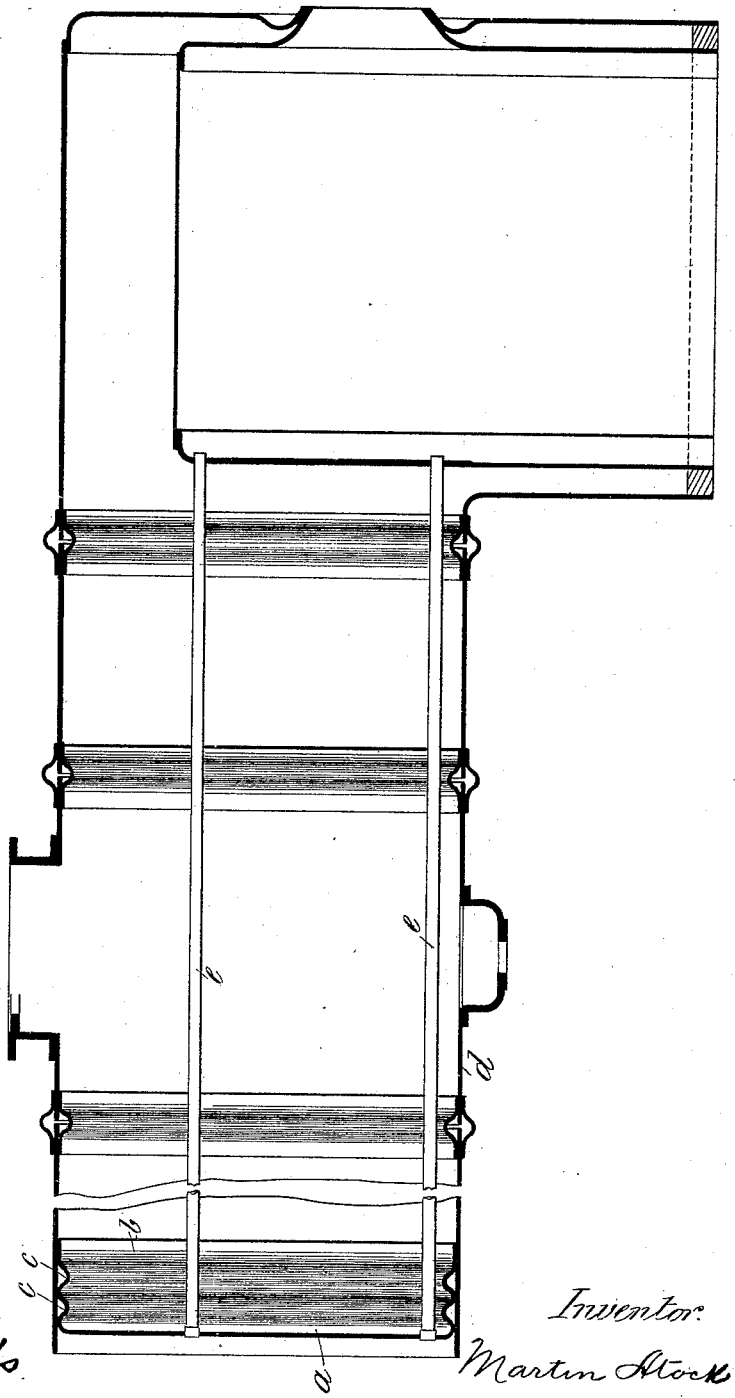

Fig. 6.

Witnesses.
F. P. Davis
James T. DuBois

Inventor:
Martin Atock
per R. G. Dyer & Bro.
Attorney.

UNITED STATES PATENT OFFICE.

MARTIN ATOCK, OF DUBLIN, IRELAND.

LOCOMOTIVE-BOILER.

SPECIFICATION forming part of Letters Patent No. 423,406, dated March 18, 1890.

Application filed February 12, 1889. Serial No. 299,660. (No model.)

To all whom it may concern:

Be it known that I, MARTIN ATOCK, a subject of the Queen of Great Britain and Ireland, residing at Royal Canal House, Broadstone, Dublin, Ireland, have invented Improvements in or connected with the Shells or Barrels of Locomotive and similar Boilers, of which the following is a specification.

This invention has reference to means for providing elasticity in the shells or barrels of locomotive and similar boilers with the view to obviating undue strain arising from expansion and contraction. For this purpose corrugated rings are applied to or are made to form part of the boiler-shell or of the tube plate or plates. Should the tubes expand more than the boiler-shell, the corrugated portions will readily give way and prevent undue stress coming either on the tubes or the shell. According to one arrangement the tube-plate at the smoke-box end is formed with a corrugated flange that may either be arranged to turn inward within the barrel of the boiler or may be reversed and turned outward. By making the flange with two or more corrugations I increase the life of this part of the boiler. The constant working (due to expansion and contraction) that takes place on the inside of such corrugations tends to grooving, and this is minimized by dividing the movement over two or more corrugations. The corrugated part is either entirely within the barrel or a part of it may project beyond the front tube-plate. The arrangement of the whole tube-plate and flange entirely within the barrel is advantageous in a multitubular locomotive-boiler, because it allows the front plates of the barrel itself to be carried forward for attachment to framing and cylinders in a locomotive-engine, as in ordinary practice. In my arrangement there is the greatest possible freedom given to the tube-plate to move without restraint or undue strain coming on any one part of it. Furthermore, the arrangement within the barrel affords a guide whereby the tube-plate is guided and supported, while free, as above stated, to allow for expansion and contraction of the tubes. In addition to or in lieu of the corrugated flange of the tube-plate the circumferential joints of the barrel may be provided with corrugated rings, there being at each joint so provided both an inner ring and an outer ring, the inner one being made of copper or other non-corrosive metal and having for its object not only to add strength to the joint, but also to protect the outer ring from pitting or other injury that might otherwise arise from contact with water. The convex part or ridge of the inner ring may enter the annular concavity or channel of the outer ring, or the ridge of the inner ring may project inwardly instead of outwardly.

Referring to the annexed five sheets of drawings, Figure 1 is a section of a locomotive-boiler having a tube-plate with a corrugated flange according to this invention. Fig. 2 shows a modification of the same. Fig. 3 is a section, to a larger scale, showing a corrugated circumferential joint-ring for the barrel of a boiler according to this invention. Fig. 4 shows such a joint-ring slightly modified in position in a locomotive-boiler. Fig. 5 shows a boiler having several such joint-rings. Fig. 6 is a vertical section showing a boiler having a tube-plate with a corrugated flange and several corrugated circumferential joint-rings according to this invention.

Referring to Fig. 1, *a* is the tube-plate. It is formed with a deep flange *b*, in which are two corrugations *c c*. The tube-plate and its flange lie completely within the barrel *d*, to which the flange is riveted at its edge. *e e* represent the tubes, which are secured at the ends in any suitable manner. As the tubes expand relatively to the shell, either owing to their attaining a greater temperature or being formed of a metal having a higher coefficient of expansion, the corrugations *c c* become flatter and allow the tube-plate *a* to take up a new position relatively to the shell.

In Fig. 2 the tube-plate is shown with one corrugation *c* only.

In Figs. 3, 4, and 5 the corrugations are not formed on the flange of the tube-plate, but are applied to the shell of the boiler as joint-rings. Each corrugated joint-ring *f* has a corrugated cover *g*, of non-corrosive metal, interposed between it and the water to prevent pitting. The number of corrugated joint-rings to be employed depends upon the dimensions of the boiler and the conditions under which it is to be worked. Fig. 4 shows one only, while Fig. 5 shows four such rings.

Fig. 6 shows a boiler with three of such joint-rings and with a tube-plate *a*, having a corrugated flange *b*, in which are two corrugations *c c*, as in Fig. 1.

What is claimed is—

1. In a boiler of the locomotive type, the combination, with the barrel of the boiler, of a tube-plate formed with a corrugated flange inclosed within the barrel of the boiler and secured thereto, substantially as described.

2. In a boiler of the locomotive type, a barrel having a joint made with inner and outer rings, in combination with a tube-plate having a corrugated flange located within and secured to said barrel, substantially as described.

3. In a boiler of the locomotive type, the combination of a corrugated joint-ring with a corrugated internal cover-plate protecting the joint-ring from contact with the water, substantially as described.

4. In a boiler of the locomotive type, the combination, with the barrel of the boiler, of a tube-plate *a*, having a flange *b*, formed with two or more corrugations *c c*, inclosed within the said barrel and secured thereto, substantially as described, and shown in the drawings.

5. In a boiler of the locomotive type, a corrugated joint-ring *f*, in combination with a corrugated cover-plate *g*, substantially as described and shown.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MARTIN ATOCK.

Witnesses:

J. NEWENHAM KELLY,
Highfield N. C. Rd., Dublin,

A. WM. LABERTOUCHE,
Notary Public, Dublin.