W. H. PEIRCE.

METALLURGIC CONVERTER.

APPLICATION FILED NOV. 8, 1909.

944,905.

Patented Dec. 28, 1909.

2 SHEETS—SHEET 1

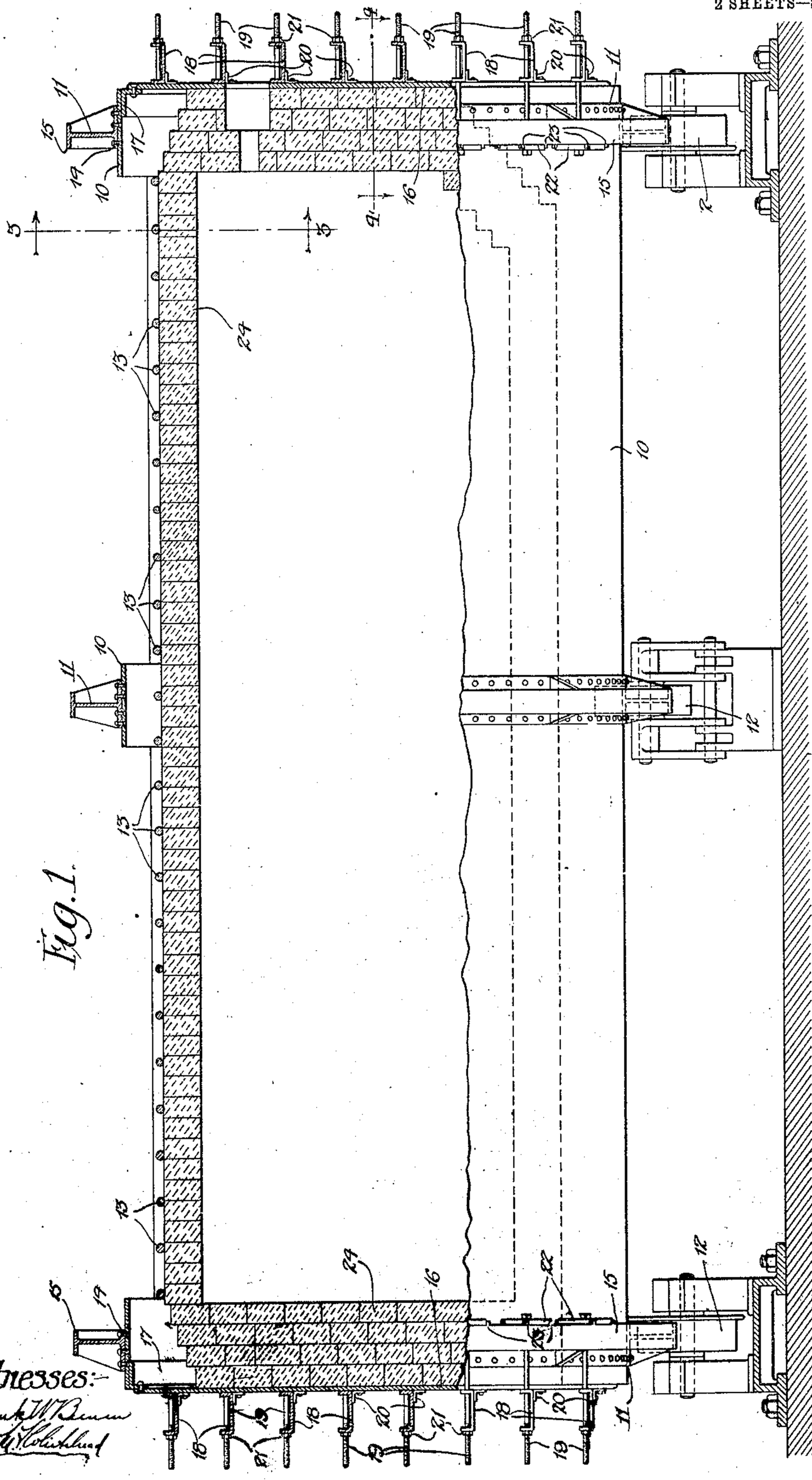

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 3.

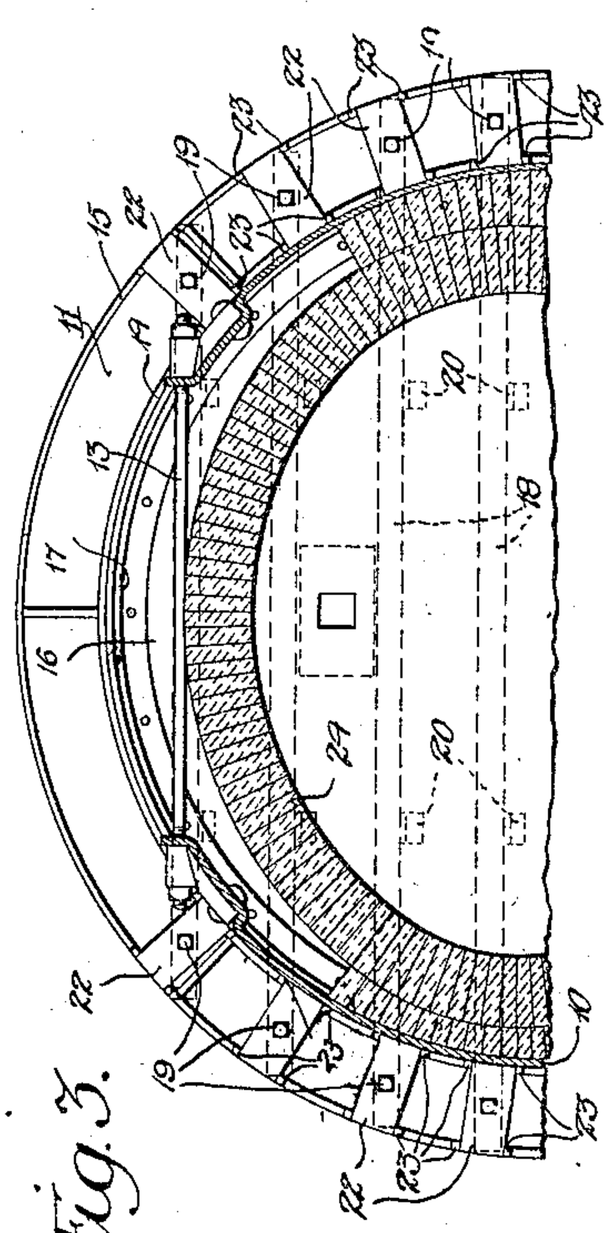


Fig. 5.

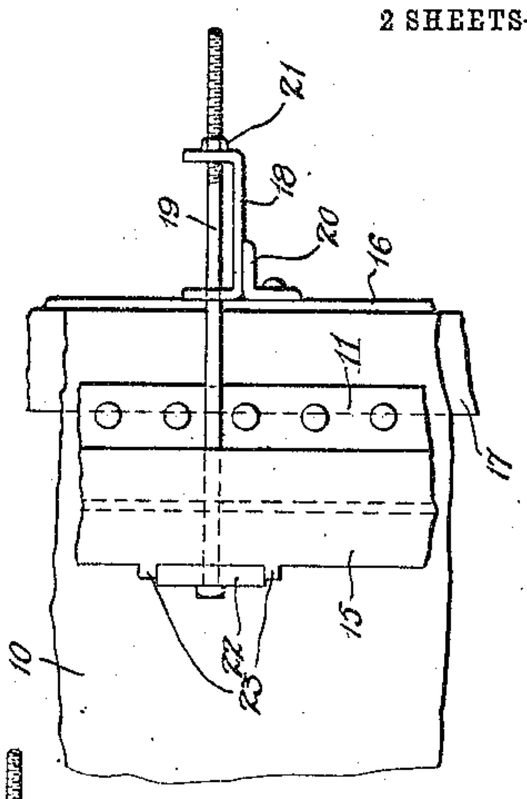


Fig. 4.

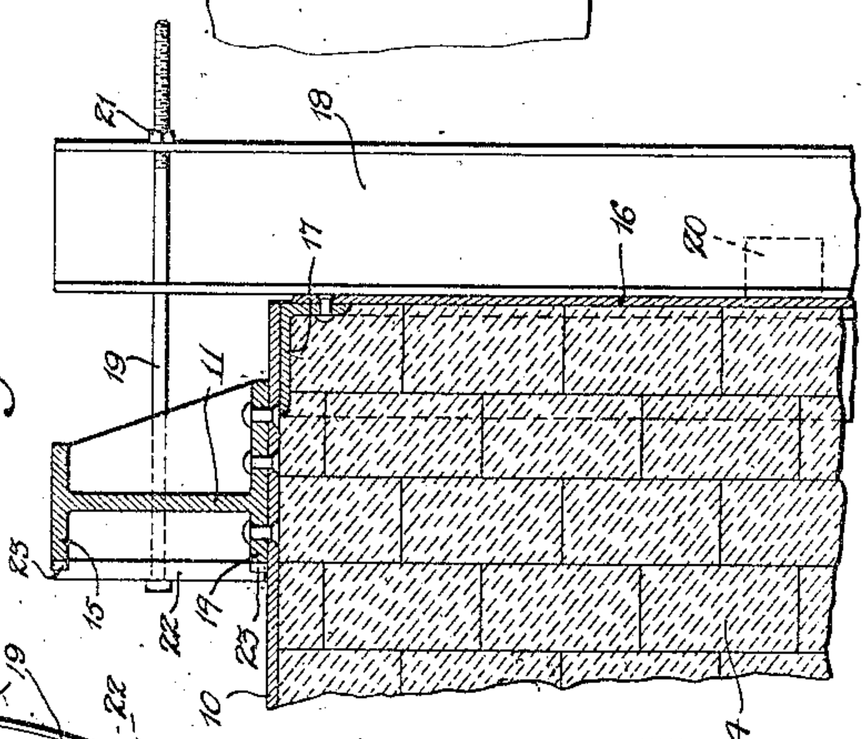
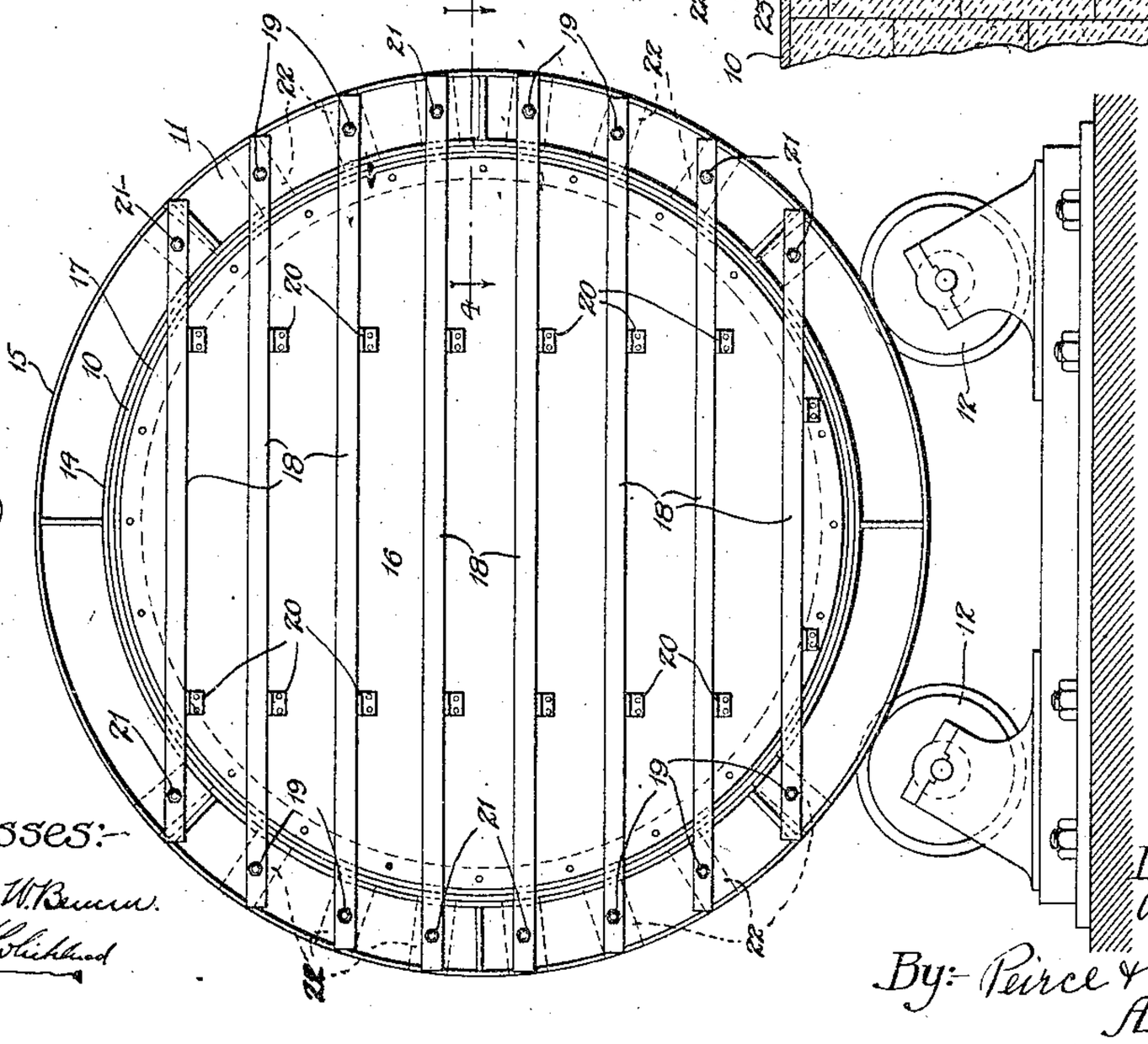


Fig. 2.



Witnesses:-

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UNITED STATES PATENT OFFICE.

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METALLURGIC CONVERTER.

944,905. Specification of Letters Patent. **Patented Dec. 28, 1909.**

Application filed November 8, 1909. Serial No. 526,863.

To all whom it may concern:

Be it known that I, WILLIAM H. PEIRCE, a citizen of the United States, and a resident of the city of Baltimore and State of Maryland, have invented certain new and useful Improvements in Metallurgic Converters, of which the following is a specification.

The improvement relates to metallurgic converters and more particularly to copper matte converters having an expansible, non-corrodible lining, such as set forth in a prior application filed in the United States Patent Office jointly by Elias A. C. Smith and myself, on July 13, 1908, Serial No. 438,286.

An acid converter lining of silica sand or finely ground ore expands but little. Moreover, such a lining unites with the iron present in the charge to form a slag so that it quickly corrodes and is renewed after a few hours' run. In a basic, non-corrodible lining, particularly when formed of brick, there is considerable expansion under the influence of the high heat developed during the course of treatment, and this expansion continues practically throughout the life of the lining, which should last for several months. To prevent the disintegration of the lining or the rupture of the converter shell, provision must be made for permitting this expansion and heaving of the lining.

The present invention seeks to provide an improved construction in which the converter shell is provided with a head or heads shiftable relatively thereto in correspondence with the expansion of the lining. Means are provided for connecting the head or heads to the shell so that they assist in protecting and sustaining the lining and the burden of the charge, but the connections are adjustable or yielding to permit the movement of the heads as the lining expands.

The preferred form of the invention comprises a cylindrical shell, rotatably sustained in horizontal position, and having flanged heads telescopically engaging the ends of the shell, with cramp bars extending across the outer face of the heads and connected at their ends to the shell by tie bolts. As the lining expands, the tie bolts are slackened off so that the head may be forced outwardly. To relieve the strain on the connected parts, in case it becomes so great as to place in jeopardy the structural strength thereof, the tie bolts are preferably provided with yielding washers or equivalent devices.

In the drawings, which illustrate the preferred embodiment of the invention, Figure 1 is a view partly in side elevation and partly in longitudinal section of the converter; Fig. 2 is an end view; Fig. 3 is a partial cross section on the lines 3—3 of Fig. 1; Fig. 4 is an enlarged detail section on the line 4—4 of Figs. 1 and 2; and Fig. 5 is an enlarged end view of one of the cramp bars and its connection to the shell.

The cylindrical metal shell 10 of the converter is provided with exterior, projecting rings 11 securely bolted or riveted thereto and resting on rollers 12 to support the converter and allow for its axial turn as may be requisite during the course of treatment to properly receive the matte and discharge the slags, white metal or blister copper. The shell is preferably open at its upper side and the opposite sides of the opening are connected by tie rods 13. The rings 11, shown, are of I-shape in cross section, having inner and outer laterally projecting flanges 14 and 15, and two of the rings are arranged adjacent the ends of the shell. The circular metal heads 16 are provided with edge flanges 17 that extend within and telescopically engage the ends of the shell 10. In the form shown, the flanges 17 are formed of angle bars bent to circular form and riveted to the heads 16. A number of parallel cramping bars 18 extend horizontally across the outer faces of the heads 16 and are arranged in vertical series one above the other from the top to the bottom of the heads. The ends of the cramping bars are connected to the shell by tie bolts 19.

In the construction shown, the bars 18 are formed of channel iron. They are not rigidly connected to the heads 16, but rest upon pairs of L-shaped supporting clips 20 that are riveted to the outer faces of the heads. The tie bolts 19 extend through the vertical flanges of the channel bars 18 adjacent their ends and centrally through the webs of the end rings 11 on the shell. The outer threaded ends of the tie bolts are provided with nuts 21 which bear against the ends of the cramping bars 18. The inner headed ends preferably engage a series of rectangular, wrought metal washers 22, arranged on the inner sides of the end rings 11 and the

ends of which washers are seated on the inner and outer flanges 14 and 15 of the rings. Lugs 23 formed on these flanges engage the washers and hold them in position.

The shell 10 and heads 16 are provided with an inner, continuous lining 24 of non-corrodible basic material, arched over at the open top of the shell and preferably formed, at its more exposed portions, of magnesite brick luted with a cement composition of ground magnesite and linseed or molder's core oil.

When the converter is newly lined, the relatively shiftable heads are set well within the ends of the shell. The lining is free to expand relatively to the shell under the influence of the high heat developed in the use of the converter. As this expansion occurs, the nuts 21 are slackened from time to time to permit a corresponding outward movement of the heads 16. The flanges 17 protect and support the lining at the joints between the ends of the shell and the relatively shiftable heads, as the latter move outwardly. The washers 22 are bridged across the flanges of the rings 11 and the heads at the inner ends of the tie bolts 19 centrally engage the washers. Before the strain due to the expansion of the lining becomes sufficient to rupture any of the parts, the washers will yield or bend between the flanges 14 and 15 of the rings. When this occurs, the strain may be relieved by slackening the nuts 21. The heads are stoutly braced and held in position to support the lining and the burden of the furnace charge by the cramp bars and tie bolts, but in such a manner that the heads can move outwardly as the lining expands and before the strain is sufficient to rupture the shell or any of the other parts. It is obvious that other yielding devices could be substituted for the washers 22 and that other changes in the details set forth could be made without departure from the essentials of the invention, as defined in the claims.

I claim as my invention:—

1. A metallurgic converter comprising a cylindrical shell provided with an expansible lining and with heads held in position to support the lining, but shiftable outwardly relatively to the shell in correspondence with the expansion of the lining.

2. In a metallurgic converter, the combination with a cylindrical shell having an expansible lining, of a flanged head telescopically egaging said shell, and means for adjustably connecting said head to said shell to permit the outward movement of the head as the lining expands.

3. In a metallurgic converter, the combination with a cylindrical shell provided with a lining free to expand within the shell under the influence of high heat, of a head for the end of said shell and yielding connections between said head and said shell permitting the shift of said head relatively to the shell as the lining expands.

4. In a metallurgic converter, the combination with a cylindrical shell provided with a lining free to expand within the shell under the influence of high heat, of a flanged head telescopically engaging the end of said shell and yielding, adjustable connections between said head and said shell permitting the outward movement of the head in correspondence with the expansion of the lining.

5. A metallurgic converter comprising a cylindrical shell rotatably sustained in horizontal position and open at its upper side, an inner, continuous lining arched over at the top and free to expand under the influence of heat, flanged heads telescopically engaging the ends of said shell, and adjustable, yielding connections between said heads and said shell, substantially as described.

6. A metallurgic converter comprising a cylindrical shell, an inner, expansible, non-corrodible lining formed of brick, and heads adjustably conected to said shell and relatively shiftable thereto as the lining expands.

7. In a metallurgic converter, the combination with the converter shell having an inner expansible lining, of a head for said shell, cramp bars extending across said head, and connections between the ends of said cramp bars and said shell permitting the movement of said head relatively to the shell in correspondence with the expansion of the lining.

8. In a metallurgic converter, the combination with the converter shell having an inner expansible lining, of a flanged head telescopically engaging said shell, cramp bars extending across said head, and yielding, adjustable ties between the ends of said cramp bars and said shell.

9. A metallurgic converter comprising a cylindrical metal shell, a ring having inner and outer flanges secured to said shell adjacent its end, a relatively shiftable head for the end of said shell, cramp bars extending across said head, tie-bolts extending through the ends of said cramp bars and through said ring, and yielding washers extending across the flanges of said ring and engaging the inner ends of said bolts.

10. In a metallurgic converter, the combination with a cylindrical shell provided with an expansible lining and having external rings secured thereto, rollers engaging said rings and supporting said shell in horizontal position, flanged heads telescopically engaging the ends of said shell, cramp bars extending across said heads, tie bolts extending through the ends of said bars and yieldingly connected at their inner ends to said rings.

1. A metallurgic converter comprising a cylindrical shell rotatably sustained in horizontal position, and provided with an expansible lining, a yielding head for said shell having supporting ledges on its outer face, a series of horizontal cramping bars extending across the outer face of said head and resting on said ledges, and adjustable, yielding connections between the ends of said bars and said head.

12. A metallurgic coverter comprising a cylindrical shell open at its top and rotatably sustained in horizontal position, flanged heads telescopically engaging the ends of said shell, an inner, continuous, noncorrodible lining arched over at the top and free to expand under the influence of heat, cramp bars extending across the outer faces of said heads, and adjustable, yielding ties connecting the ends of said bars to said shell.

WILLIAM H. PEIRCE.

Witnesses:
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