H. RUDE.

WATER JACKET.

APPLICATION FILED MAY 14, 1915.

1,204,688. Patented Nov. 14, 1916.

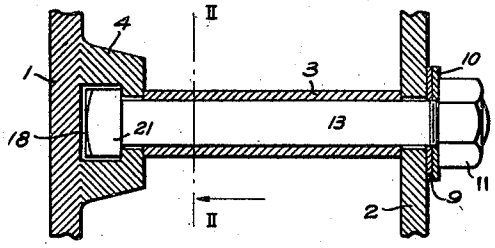


Fig. 1

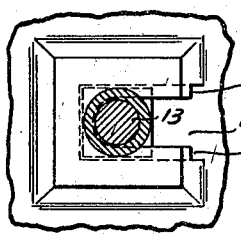


Fig. 2

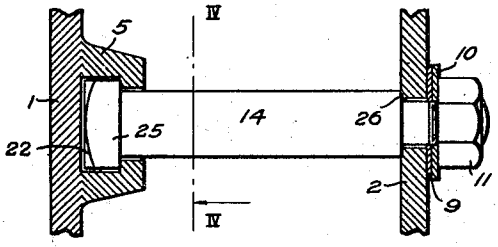


Fig. 3

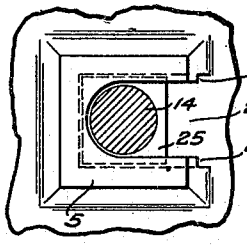


Fig. 4

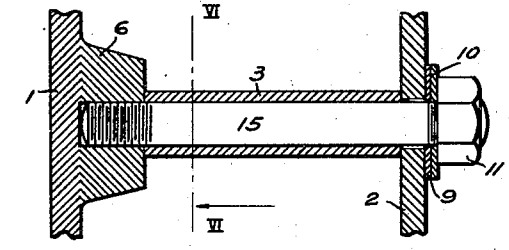


Fig. 5

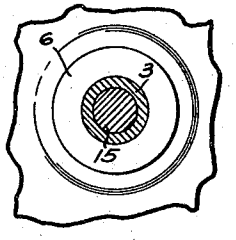


Fig. 6

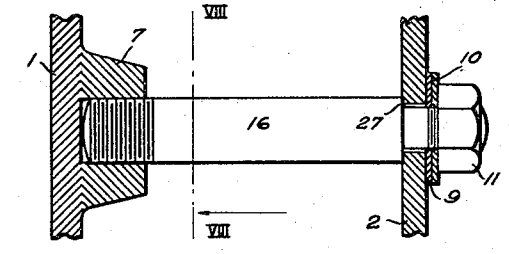


Fig. 7

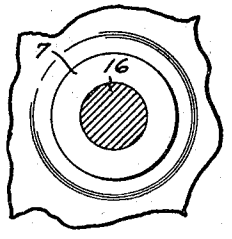


Fig. 8

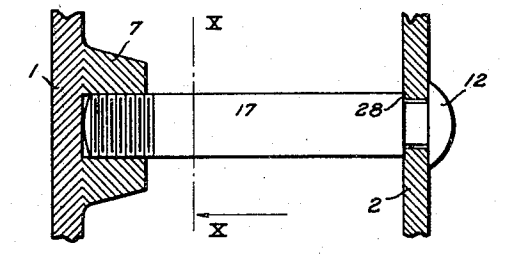


Fig. 9

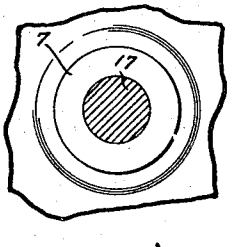


Fig. 10

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WATER-JACKET.

1,204,688. Specification of Letters Patent. Patented Nov. 14, 1916.

Application filed May 14, 1915. Serial No. 28,793.

To all whom it may concern:

Be it known that I, HENRY RUDE, a citizen of the United States, residing at West Allis, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Water-Jackets, of which the following is a specification.

This invention relates to improvements in the construction of water jackets for cupola, blast and similar furnaces, and particularly to improvements in stay-bolts for such water jackets.

An object of the invention is to provide a water jacket for cupola, blast and similar furnaces which is simple in construction and efficient in operation.

Another object is to provide a simple and efficient stay-bolt especially applicable to furnace water jackets.

It has heretofore been proposed in the manufacture of furnace water jackets, to provide a stay-bolt having one end welded to the inside or fire sheet and having its opposite free end passed through an opening in the outside sheet and riveted to the outside sheet. It has also been proposed to substitute for the riveted connection to the outside sheet, devices independent of the stay-bolt for securing the free end thereof to the outside sheet. A further development in the art of manufacturing these water jackets was to weld both ends of the stay-bolt to the inside and outside sheets, respectively. A still further development was to provide alined openings through the two sheets and to pass a stay-bolt through these openings riveting or otherwise fastening the end of the stay-bolt adjacent the outside sheet to that sheet, and welding the opposite end to the inside sheet, the opening through the sheet adjacent the welded end of the stay-bolt being subsequently closed by means of a welded plug.

It is now proposed, in order to avoid perforating the inside or fire sheet, to weld or otherwise secure a boss to this sheet and to detachably secure the stay-bolt to the boss, the opposite end of the stay-bolt being secured to the outside sheet by any suitable means. This construction has the advantage of maintaining the fire sheet imperforate at its portion adjacent the stay-bolt and also permits ready insertion and removal of the stay-bolt.

A clear conception of several embodiments of the invention may be had by referring to the drawing accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Figure 1 is a section through a fragment of a water jacket showing one form of stay-bolt. Fig. 2 is a transverse section through the stay-bolt disclosed in Fig. 1 showing a fragment of the fire sheet, the section being taken along the line II—II of Fig. 1 looking in the direction of the arrow. Fig. 3 is a section through a fragment of a water jacket showing another form of stay-bolt. Fig. 4 is a transverse section through the stay-bolt disclosed in Fig. 3 showing a fragment of the fire sheet, the section being taken along the line IV—IV of Fig. 3 looking in the direction of the arrow. Fig. 5 is a section through a fragment of a water jacket showing a third form of stay-bolt. Fig. 6 is a transverse section through the stay-bolt disclosed in Fig. 5 showing a fragment of the fire sheet, the section being taken along the line VI—VI of Fig. 5 looking in the direction of the arrow. Fig. 7 is a section through a fragment of a water jacket showing still another form of stay-bolt. Fig. 8 is a transverse section through the stay-bolt disclosed in Fig. 7, showing a fragment of the fire sheet, the section being taken along the line VIII—VIII of Fig. 7 looking in the direction of the arrow. Fig. 9 is a section through a fragment of a water jacket showing a fifth form of stay-bolt. Fig. 10 is a transverse section through the stay-bolt disclosed in Fig. 9, showing a fragment of the fire sheet, the section being taken along the line X—X of Fig. 9 looking in the direction of the arrow.

Water jackets for cupola, blast and similar furnaces usually comprise a pair of spaced parallel sheets having the water chamber formed between them. The inside or fire sheet 1 is ordinarily made of somewhat heavier material than that used for the outside sheet 2. In order to prevent collapse of the jacket it is desirable to tie the two sheets 1, 2, firmly to each other at various portions of the jacket. For this purpose suitable stay-bolts are provided.

Referring specifically to Figs. 1 and 2, the inside or fire sheet 1 has a square boss 4 secured thereto preferably by welding. The

boss 4 is formed with an interior pocket 18 having shoulders 19 therein between which a slot 20 is formed. A stay-bolt 13 having a square head 21 at one end thereof is inserted within the slot 20 with the head 21 engaging the shoulders 19. A bushing 3 surrounds the stay-bolt 13 and has its opposite ends abutting against the end surface of the boss 4 and the inner surface of the outside sheet 2, respectively. The outer end of the stay-bolt 13 passes through an opening in the outside sheet 2, being screw-threaded to receive a suitable clamping nut 11. An asbestos washer 9 surrounds the stay-bolt 13 at a portion adjacent the opening in the outside sheet 2, and prevents leakage of water from within the jacket through the outside sheet. An ordinary washer 10 is placed adjacent the asbestos washer, being clamped firmly against the washer 9 by the nut 11. With this construction it will be observed that the stay-bolt 13 is normally under tension, thereby preventing outward distortion of the water jacket, while the sleeve or bushing 3 is normally under compression whereby inward distortion of the sheets 1, 2, is prevented. The stay-bolt 13 and bushing 3 may be readily removed by removing the nut 11 and washers 9, 10, and shifting the headed end of the bolt along the slot 20 until the head 21 is clear of the boss 4. Insertion of a bolt 13 is readily accomplished by reversing these steps.

Referring specifically to Figs. 3 and 4, the inside or fire sheet 1 has a square boss 5 secured thereto, preferably by welding. The boss 5 is formed with an interior pocket 22 having shoulders 23 therein between which a slot 24 is formed. A stay-bolt 14 having a square head 25 at one end thereof is inserted within the slot 24 with the head 25 engaging the shoulders 23. The stay-bolt 14 is provided with a shoulder 26 at its opposite end which normally engages an inner surface of the outside sheet 2. The reduced end of the stay-bolt 14 beyond the shoulder 26 passes through an opening in the outside sheet 2 and is screw-threaded to receive a suitable clamping nut 11. An asbestos washer 9 surrounds the stay-bolt 14 at a portion adjacent the opening in the outside sheet 2, and prevents leakage of water from within the jacket through the outside sheet. An ordinary washer 10 is placed adjacent the asbestos washer, being clamped firmly against the washer 9 by the nut 11. With this construction it will be observed that the portion of the stay-bolt 14 between the head 25 and the screw-threaded end thereof is normally under tension, thereby preventing outward distortion of the water jacket, while the portion of the stay-bolt 14 between the shoulder 26 and the headed end is normally under compression whereby inward distortion of the sheets 1, 2, is prevented. The stay-bolt 14 may be readily removed by removing the nut 11 and washers 9, 10, and shifting the headed end of the bolt along the slot 24 until the head 25 is clear of the boss 5. Insertion of the bolt 14 is readily accomplished by reversing these steps.

Referring specifically to Figs. 5 and 6, the inside or fire sheet 1 has a circular boss 6 secured thereto, preferably by welding. The boss 6 is formed with a screw-threaded socket within which a screw-threaded end of the stay-bolt 15 is normally inserted. A bushing 3 surrounds the stay-bolt 15 and has its opposite ends abutting against the end surface of the boss 6 and the inner surface of the outside sheet 2, respectively. The outer end of the stay-bolt 15 passes through an opening in the outside sheet 2, being screw-threaded to receive a suitable clamping nut 11. An asbestos washer surrounds the stay-bolt 15 at a portion adjacent the opening in the outside sheet 2 and prevents leakage of water from within the jacket through the outside sheet. An ordinary washer 10 is placed adjacent the asbestos washer, being clamped firmly against the washer 9 by the nut 11. With this construction it will be noted that the stay-bolt 15 is normally under tension to prevent outward distortion of the water jacket, while the sleeve or bushing 3 is normally under compression whereby inward distortion of the sheets 1, 2, is prevented. The stay-bolt 15 and bushing 3 may be readily removed by unscrewing the end of the stay-bolt from the boss 6. Insertion of the bolt 15 may be readily accomplished by screwing the same into the socket within the boss 6 and applying the clamping nut 11 to the protruding end of the bolt.

Referring specifically to Figs. 7, 8, 9 and 10, the inside or fire sheet 1 has a circular boss 7 secured thereto, preferably by welding. The boss 7 in each case is provided with a screw-threaded socket adapted to receive the screw-threaded end of a stay-bolt 16, 17. Each of the stay-bolts 16, 17, is provided with a shoulder 27, 28, which normally engages the inner surface of the outside sheet 2. The stay-bolt 16 is provided with a screw-threaded reduced portion projecting beyond the shoulder 27 which passes through an opening in the outside sheet 2 and which is adapted to receive the clamping nut 11. An asbestos washer 9 surrounds the stay-bolt 16 at a portion adjacent the opening in the outside sheet 2 and prevents leakage of water from within a jacket through the outside sheet. An ordinary washer is placed adjacent to the asbestos washer, being clamped firmly against the washer 9 by a nut 11. With this construction it will be noted that the portion of the stay-bolt 16

between the threaded ends thereof, is normally under tension to prevent outward distortion of the water jacket, while the portion of the bolt 16 between the shoulder 27 and the end thereof which engages the boss 7, is normally under compression whereby inward distortion of the sheets 1, 2, is prevented. The stay-bolt 16 may be removed by first removing the nut 11 and washer 9, 10, then distorting the outside sheet to clear the bolt and subsequently unscrewing the end of the stay-bolt 16 which normally engages the boss 7.

The stay-bolt 17 has a reduced portion beyond the shoulder 28 thereof, which is passed through an opening in the outside sheet 2 and riveted over to form a head 12. The stay-bolt 17 may be removed upon removal of the riveted head 12 and distortion of the outside sheet 2 to permit withdrawal of the end of the stay-bolt 17 from the boss 7.

It will be noted that in each of the several constructions of stay-bolts disclosed, the bolt may be readily applied without necessitating perforation of the fire sheet 1 adjacent the bolt, thereby eliminating possible leaks through the jacket on the heated side thereof. This feature is the result of the use of the boss secured to the fire sheet, to which the stay-bolt is secured. By providing removable clamping means adjacent the end of the stay-bolt which engages the outside sheet, the bolt may be readily inserted in, and removed from the jacket.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications within the scope of the appended claims will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent,—

1. In combination, an inside sheet, an outside sheet, a boss secured to one of said sheets at an imperforate portion thereof, a stay-bolt detachably secured at one end to said boss only, and means for securing said stay-bolt to the other of said sheets.

2. In combination, an inside sheet, an outside sheet, a boss welded to said inside sheet at an imperforate portion thereof, a stay-bolt detachably secured at one end to said boss only, and means for securing said stay-bolt to said outside sheet.

3. In combination, an inside sheet, an outside sheet, a boss secured to said inside sheet, a stay-bolt detachably secured at one end to said boss only, and means for securing said stay-bolt to said outside sheet.

4. In combination, an inside sheet, an outside sheet, a boss secured to one of said sheets at a portion of said sheet which is imperforate and of uniform thickness, a stay-bolt detachably secured to said boss, and means for securing said stay-bolt to the other of said sheets.

5. In combination, an inside sheet, an outside sheet, a boss welded to said inside sheet, said inside sheet adjacent said boss being imperforate and of uniform thickness, a stay-bolt detachably secured to said boss, and means for securing said stay-bolt to said outside sheet.

In testimony whereof the signature of the inventor is affixed hereto.

HENRY RUDE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."