L. C. REIS.

BUCKSTAY AND METHOD OF FABRICATING SAME.

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1,402,444. Patented Jan. 3, 1922.

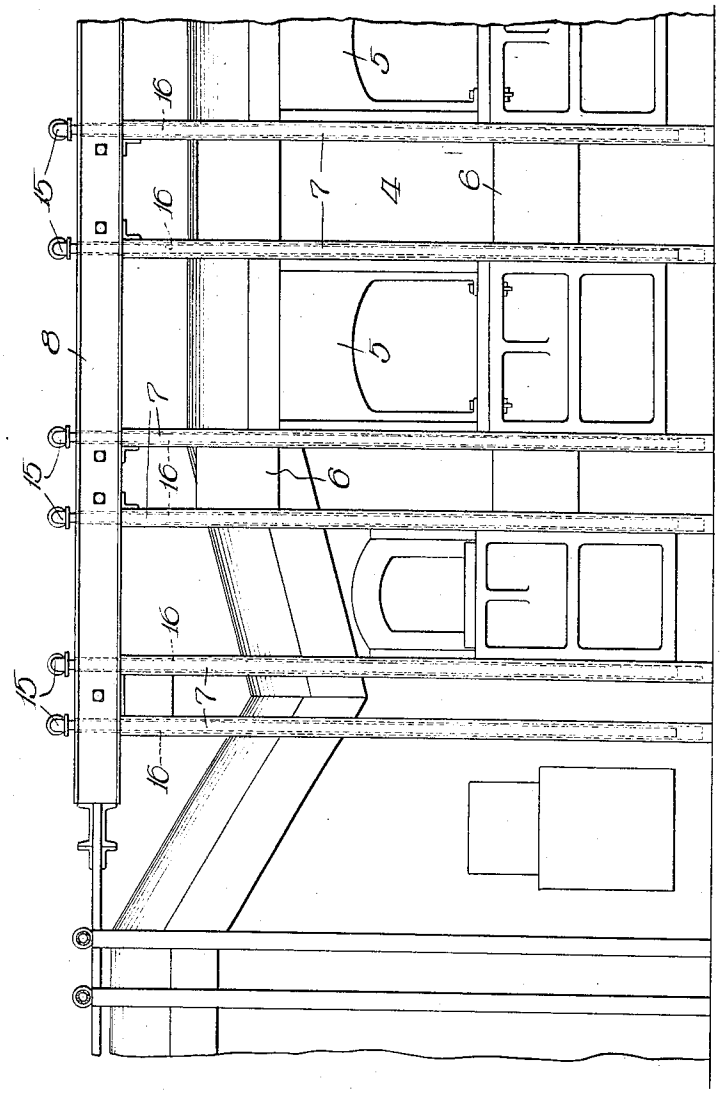



Fig. 1

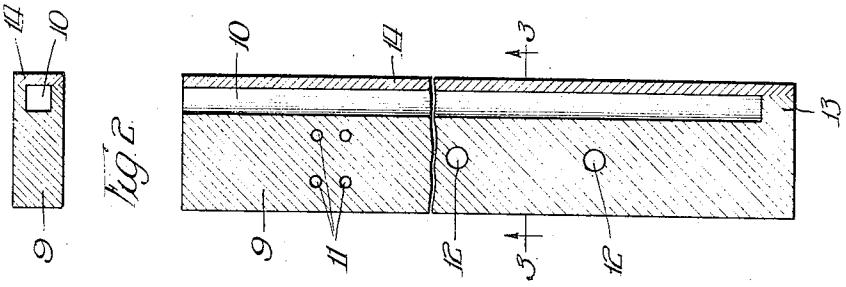



Fig. 3

Fig. 2

Witness:
R. Burkhardt.

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# UNITED STATES PATENT OFFICE.

LOUIS C. REIS, OF DULUTH, MINNESOTA.

## BUCKSTAY AND METHOD OF FABRICATING SAME.

1,402,444. Specification of Letters Patent. Patented Jan. 3, 1922.

Application filed November 10, 1920. Serial No. 423,181.

*To all whom it may concern:*

Be it known that I, LOUIS C. REIS, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Buckstays and Methods of Fabricating Same, of which the following is a specification.

My invention relates to a furnace for the manufacture of steel and more particularly to a new and improved water cooled buckstay for use in connection with open hearth furnaces and like structures. Furnaces of this character when provided with buckstays without cooling means, are inefficient in that the heat of the furnace causes wearing away of the adjacent furnace walls, which in turn permits this heat to burn away the buckstays or to cause them to warp or spread and thus destroy them or render them useless. Buckstays have heretofore been in some cases formed of cast steel or iron with interior spaces for the circulation of cooling water. Such buckstays frequently crack and leak which necessitates cutting off the water supply, after which the buckstay is destroyed by the furnace heat, as has been stated. Buckstays have also been formed of standard steel plates and shapes riveted together to form a hollow structure and supplied with cooling water. Buckstays of this character are ordinarily made of relatively light shapes and are frequently bent by being struck by the furnace charging car, which may cause them to leak or may disrupt the water circulation and render the structure inefficient and subject to rapid deterioration.

It has also been suggested to form buckstays from wrought or rolled slabs by drilling holes longitudinally of the slab for the purpose of providing water circulation. Buckstays, however, to obtain the best results should be made of a length sufficient to extend from below the furnace hearth to above the furnace roof, which involves a length of approximately ten to fifteen feet. In slabs of this length it is extremely difficult to drill a hole which will extend throughout the length of the buckstay.

It is an object of this invention to provide a new buckstay construction which may be readily manufactured and which may be constructed at comparatively low cost. It is a further object to provide a buckstay which may be easily built in lengths sufficient for the purpose and may be provided with a water circulation channel throughout its length. It is also an object to provide a buckstay which is strong in construction and durable in use. Other and further objects will appear as the description proceeds.

More specifically my invention comprises a buckstay consisting of a rolled or wrought slab having a slot or groove milled longitudinally along one edge thereof with a flat bar welded to that edge of the slab in such manner as to close the slot or groove to form a channel for circulation of cooling water.

I have illustrated a preferred embodiment of my invention in the accompanying drawings in which—

Figure 1 is a view showing in elevation a portion of an open hearth furnace provided with buckstays embodying my invention;

Figure 2 is a longitudinal section of my improved buckstay, portion being broken away; and,

Figure 3 is a horizontal cross section on the line 3—3 of Figure 2.

In the drawings, the open hearth furnace of the usual construction is designated by the reference character 4, the furnace being provided with the usual door frames 5 and spreaders 6 which are supported upon vertical buckstays 7. The tops of the buckstays are secured to the horizontal girder 8. The buckstay is shown in detail in Figures 2 and 3 and comprises the slab 9 having the longitudinal slot 10 formed in one edge thereof, and having holes 11 and 12 drilled therethrough for the purpose of attaching the door frames and spreaders. As shown in Figure 2 the slot 10 does not extend through the bottom of the slab, but is closed by the portion 13. It is obvious, however, that if desired for facility of milling, the slot may be made to extend from end to end of the slab and the portion 13 may be a separate element inserted and welded in place after the milling operation. While the slot has been referred to as milled or planed, it may be formed during the rolling operation when making the slab. The slot 10 is closed by the flat bar 14 which is welded in place and, as shown, extends across the full width of the face of the slab 9. This latter point is highly desirable in securing a simple and rigid structure.

As shown in Figure 1, pipes 15 are introduced into the openings 10 from the top

and extend down to a point adjacent the bottom of the openings. Water is introduced through these pipes and rising due to the flow and to the heating action of the furnace, is carried off by suitable discharge pipes indicated at 16 which may be connected to the buckstay adjacent its upper end. These discharge or outlet pipes are, of course, preferably placed above the point where the buckstay contacts with the furnace. The buckstay is placed in position with the bar 14 in contact with the furnace and thus with the cooling water opening extending adjacent the heated portion of the furnace. While the construction shown is the preferred form of the device, the cooling channel may obviously be made other than square in form, and the bar 14 may or may not extend across the full width of the adjacent face of the slab, it simply being necessary that the open side of the slot 10 be fully covered.

While I have described more or less precisely the details of construction of my invention, I do not wish to be understood as limiting myself thereto, as I contemplate changes in form and the proportion of parts and substitution of equivalents as circumstances may suggest or render expedient, without departing from the spirit of my invention.

I claim:

1. A buckstay comprising a rolled metal slab having a slot formed longitudinally thereof and a flat bar welded to the slab to cover the open side of the slot.

2. A buckstay comprising a rolled metal slab having a slot milled longitudinally thereof and a flat bar welded to the slab in such manner as to close the open side of the milled slot.

3. A buckstay comprising a metal slab rectangular in cross section, having a slot milled longitudinally of one of the narrower faces of the slab, and a flat bar welded to the slab to cover the open side of the slot, the bar extending across the full width of the narrow face of the slab.

4. The method of making a buckstay consisting in milling a slot longitudinally of a slab, covering the open side of the slot with a flat metal bar and welding said bar to the slab to form a channel for water circulation in said buckstay.

5. The method of making a buckstay consisting in milling a slot longitudinally of one of the narrower faces of a rolled metal slab rectangular in cross section, covering the open side of the slot with a flat bar of metal covering the full width of the face of the slab and welding said bar to the slab to form a channel for water circulation in said buckstay.

Signed at Duluth, Minnesota, this 3rd day of November, 1920.

LOUIS C. REIS.