F. E. KLING.

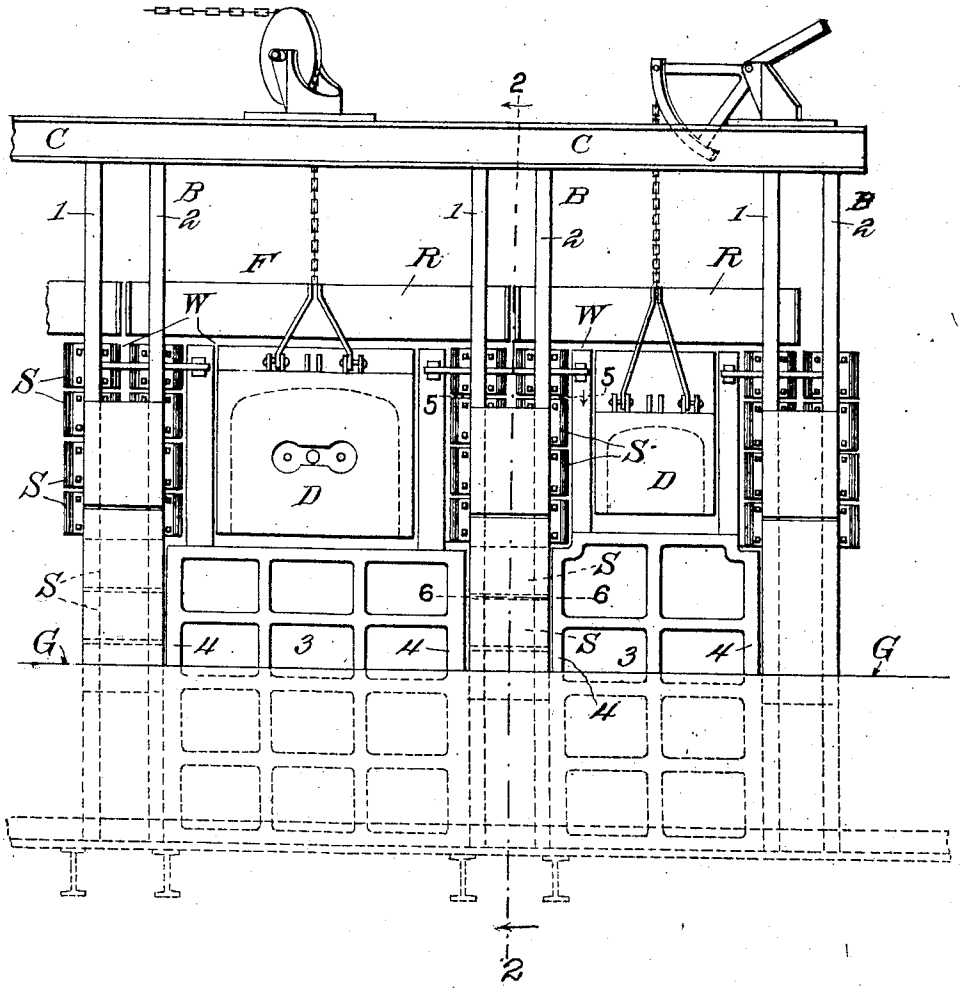
BUCKSTAY SHOE.

APPLICATION FILED JUNE 19, 1920. RENEWED AUG. 22, 1921.

1,399,127. Patented Dec. 6, 1921.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

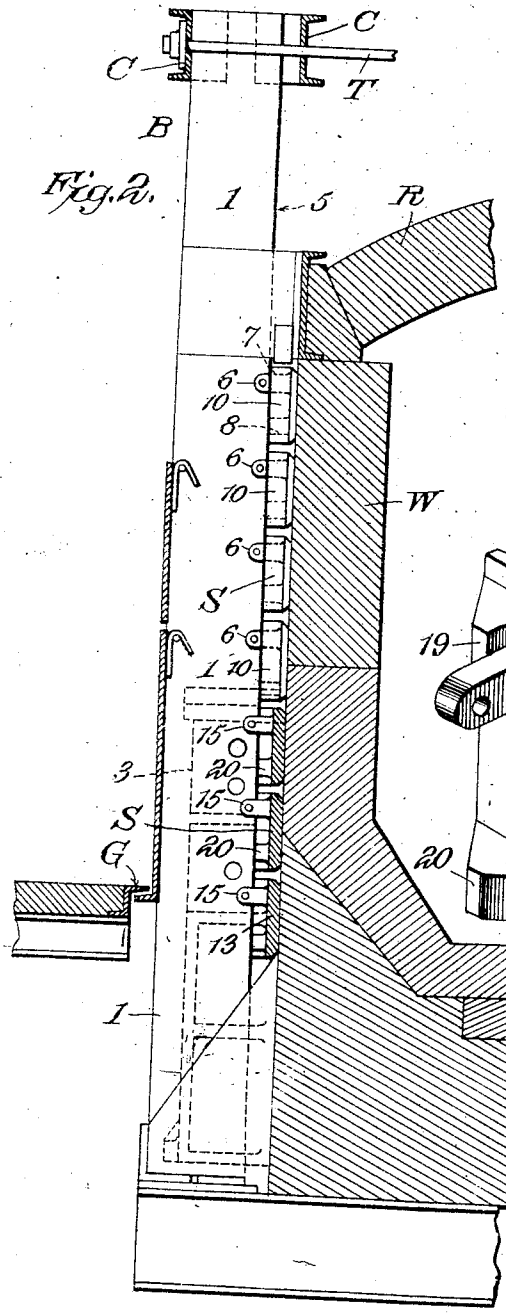


Fig. 3.

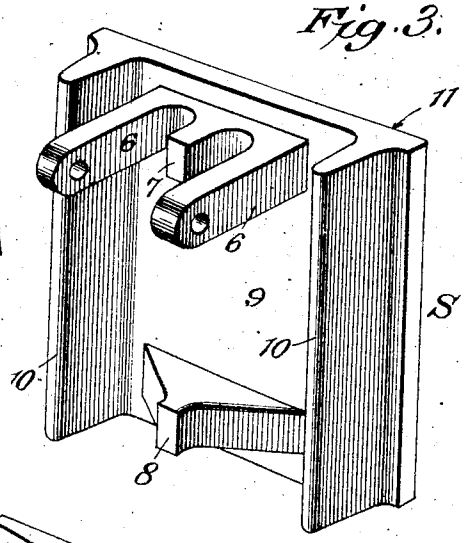
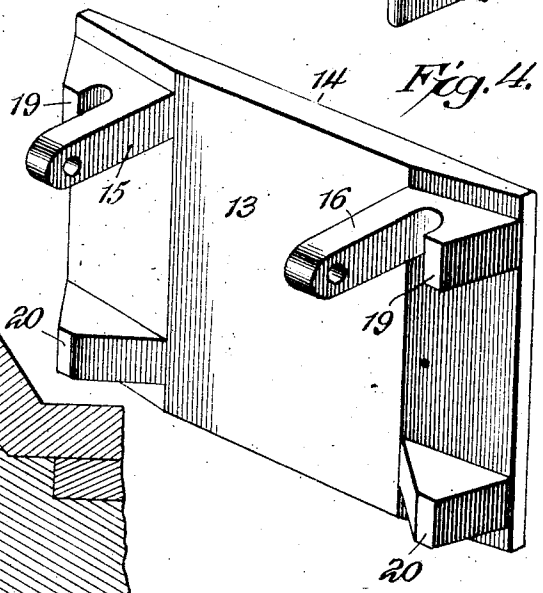


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

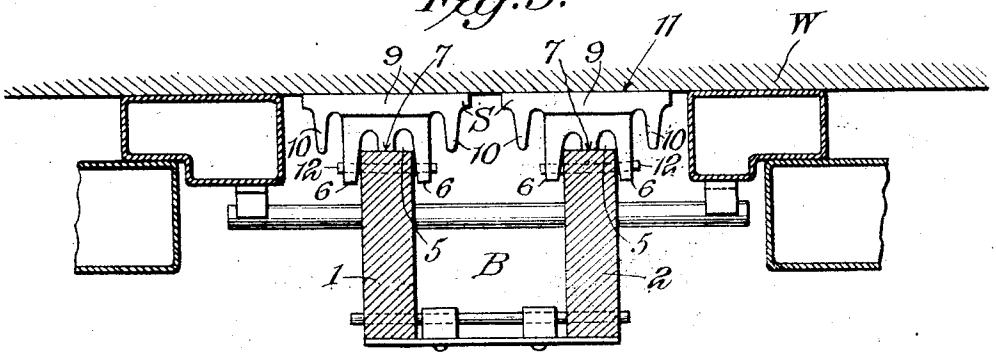
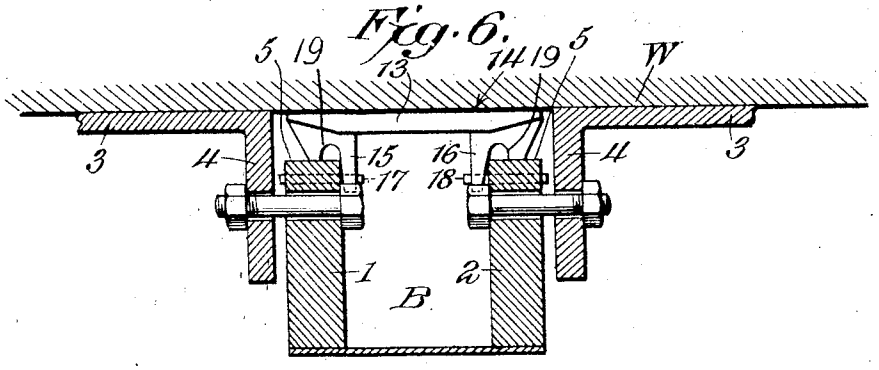


Fig. 6.



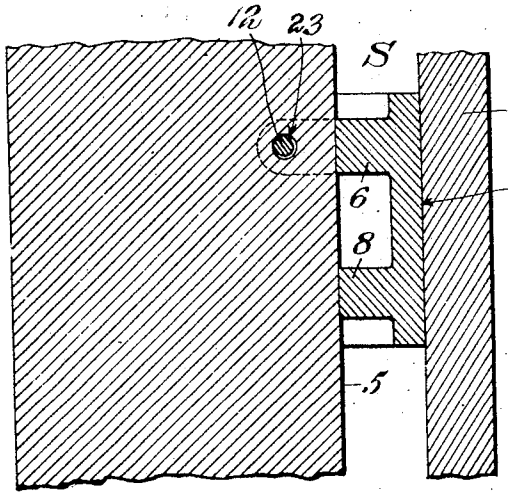


Fig. 7.

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UNITED STATES PATENT OFFICE.

FRED E. KLING, OF YOUNGSTOWN, OHIO.

BUCKSTAY-SHOE.

1,399,127. Specification of Letters Patent. **Patented Dec. 6, 1921.**

Application filed June 19, 1920, Serial No. 390,256. Renewed August 22, 1921. Serial No. 494,375.

To all whom it may concern:

Be it known that I, FRED E. KLING, citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Buckstay-Shoes, of which the following is a specification.

This invention relates to furnaces and has particular reference to an improvement in furnace structures, whereby the brick-work of the same is reinforced and strengthened in such manner as to protect the reinforcing means from undue strain from the heat of the furnace.

As is well known, the brick-work of an open hearth furnace is held together by steel framework, the vertical members of which are termed buckstays. The buckstays at the middle of the furnace, where the inside temperature is usually the highest, frequently warp and bulge out of shape on account of the extreme heat in the brick-work bearing against them, and this trouble increases as the brick-work becomes reduced in thickness through the effect of the heat and flames. This, of course, very materially reduces the support afforded by the buckstays.

It has been proposed to overcome this difficulty by making the buckstays hollow, and running water through them to keep the metal cool. This, however, requires a constant flow of water which greatly adds to operating expenses, and furthermore, the buckstay of this character is, in itself, expensive.

Accordingly, the present invention has in view a novel buckstay construction of a more or less skeleton character which does not come in direct contact with the wall, thereby providing a buckstay which has little or no heat transmitted to it from the walls of the furnace.

A further object of the invention is to provide a simple and substantial construction which is not only economically manufactured, but which is also easily kept in repair and, in fact, requires practically no attention after being installed, thus lessening the cost of maintenance and reducing operating expenses.

With the above and other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is an elevation of a portion of an open hearth furnace, showing the general location and arrangement of the buckstays.

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1, looking in the direction of the arrows.

Fig. 3 is a perspective view of one of the single wall bearing shoes forming a part of my invention.

Fig. 4 is a perspective view of one of the double wall bearing shoes.

Fig. 5 is a horizontal sectional view on the line 5—5 of Fig. 1.

Fig. 6 is a horizontal sectional view on the line 6—6 of Fig. 1.

Fig. 7 is a detail sectional view through one of the buckstays, showing more clearly the relation of the shoe carried thereby to the wall of the furnace.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

Referring to Fig. 1 of the drawings, it will be observed that there is shown a portion of an open hearth furnace, designated generally as F, and including the masonry side walls W and roof R. According to the present invention, it is proposed to provide suitable reinforcing buckstay elements, designated generally as B, arranged at suitable intervals along the exterior of the furnace and extending below the ground or floor level G to provide a firm foundation or base, and also extending upwardly above the roof R, where they are connected by suitable reinforcing channel beams or like members C, which latter may be connected with corresponding members on the opposite side of the furnace by the tie rods T in the well known manner.

In connection with the buckstay members B, it will be observed that the same preferably include the separate vertically disposed slabs or beams 1 and 2, the upper ends of which, as previously stated, are rigidly connected with the channel beams C of the

overhead structure, while the lower ends thereof extend down to the bottom of the foundation of the furnace. These beam members 1 and 2, constituting the buckstay B, are spaced from each other, as will be observed from Fig. 1, and, as will hereinafter more fully appear, are also spaced from the masonry furnace walls W. Each buckstay element, including the beams 1 and 2, is also spaced from the other by means of a reinforcing casting element, designated generally as 3. This reinforcing base casting may be of any suitable character and design, and as shown, extends from the lower part of the foundation of the furnace to a point above the floor or ground line G, while the opposite side frame members 4 thereof, are rigidly connected or bolted to the beam members 1 and 2 of the buckstays, as will be more clearly apparent from Figs. 1 and 6 of the drawings.

It has been already stated that the beam members 1 and 2 of each buckstay, aside from being spaced from each other, are spaced from the masonry of the side walls W of the furnace, and by reference to Fig. 2 this will be obvious. Primarily, the object in spacing these beam members from the wall is to prevent the conduct of heat thereto from the hot furnace walls. Therefore, as shown, the inner edges 5 of each of the members 1 and 2 are spaced a suitable distance from the masonry walls W, in such manner as not to impair their support or the strength of the furnace structure. To accomplish this, I provide each member with a plurality of separate and detachable wall bearing shoe members, designated generally as S. These shoe members are preferably of such a construction that the inner face thereof bears against the wall, while the opposite side has only a limited area of contact with the beams of the buckstay, and is furthermore so constructed as to provide heat radiating surfaces for dissipating the heat from the furnace wall so that practically none of the same is conducted to the buckstays.

Referring now to the novel construction of the wall-bearing shoes S, it will be observed that the same are preferably of single and double type. Owing to the construction heretofore described, in which the base reinforcing and casting members 3 extend up to a point just below the doors D of the furnace, it would be impossible to use a shoe of the single type, shown in Fig. 3, at any point below the top of the castings 3, on account of the side frame members 4 of the latter being bolted to the outer or exposed faces of each of the beams. Therefore, it is necessary to use double shoes such as are shown in Fig. 4, and which are connected to both members 1 and 2 of the buckstay below the top of the base castings 3.

Accordingly, it is proposed to provide that portion of each of the beams 1 and 2 above the castings 3 with a single shoe such as is shown in Fig. 3, and which essentially includes the spaced attaching arms 6 and an intermediate beam-bearing or abutment boss 7 which is in vertical alinement with another beam-bearing boss 8 projecting from the body 9 of the shoe. The base of the shoe S is provided, in addition to the members just described, with the offset flanges 10, which are so arranged that, with the other members formed on the outer face of the shoe, they present an extended cooling surface. The inner face 11 of this single shoe is preferably of flat formation and extended area, whereby a firm and rigid contact with the masonry side walls W may be obtained.

Each of the shoes above described is pivotally and detachably secured to the beams 1 and 2 by means of the pin 12 passing through the holes 23 in the beams and holes in the arms 6 which register therewith. When the shoe is thus held in position on the beam, the lugs 7 and 8 will ordinarily contact therewith, as shown in Fig. 2, to maintain the face 11 parallel with the vertical face 5 of the beam. However, owing to the pivotal connection of the shoe to the beam, it will be apparent that a limited amount of play is provided for the shoe to compensate for the expansion and contracting due to the action of the heat on the furnace walls.

The double shoes, such as shown in Fig. 4 of the drawings, preferably include a relatively flat body portion 13, having a flat wall contacting face 14 of extended area, and the beam attaching arms 15 and 16. Between each of the arms 15 and 16 and the outer side edges of the shoe, there is provided a beam bearing boss 19, in vertical alinement with boss 20 formed at the lower part of the shoe. When the shoe is attached to the beam members 1 and 2, as shown in Fig. 6 of the drawings, the bosses 19 and 20 will bear against the face 5 of each beam member, and thereby tend to maintain the wall contacting face 14 parallel to the said face 5.

From the foregoing it will be apparent that a novel and distinctive feature of my invention is a buckstay including a stay element which is spaced from the masonry walls of the furnace, and an intervening wall-bearing shoe having a limited contact area with the stay and an extended contact area with the wall of the furnace. Obviously, if the shoes S at any time, need replacing this may be done at a minimum cost and in a short period of time, thus, greatly economizing in the maintenance of this important part of the furnace structure.

Without further description, it is thought that the many features and advantages of the invention will be readily apparent, and it

will, of course, be understood that changes in the form, proportion and minor details of construction may be resorted to without departing from the spirit of the invention or scope of the appended claims.

I claim:

1. In a furnace construction, the combination with the furnace wall, of a buckstay spaced from said wall and loosely carrying a series of wall contacting shoes each having a limited area of contact with the buckstay, and an extended area of contact with the wall.

2. In a furnace construction, the combination with the furnace wall, of a buckstay spaced from said wall and pivotally carrying a heat dissipating wall contacting shoe having a limited area of contact with the buckstay, and an extended area of contact with the wall.

3. In a furnace construction, the combination with the furnace wall, of a buckstay element spaced from said wall and loosely carrying a plurality of separate shoe members having flat wall contacting surfaces on one side and heat radiating flanges on the other.

4. In a furnace construction, the combination with the furnace wall, of a buckstay element spaced from said wall and pivotally carrying a plurality of wall-contacting shoes, said shoes each including offset attaching arms for engaging with said buckstay and stay abutment and spacing bosses having a limited area of contact with the buckstay.

5. In a furnace construction, the combination with the furnace wall, of a buckstay spaced from said wall and including separate stay members, a plurality of wall-contacting shoes carried by the upper portions of said stay members, and other wall-contacting shoes carried by the lower portion of said stay members, said other wall-contacting shoes connecting both stay members.

6. In a furnace construction, the combination with the furnace wall, of a buckstay element including separate vertically arranged spaced stay members, a plurality of separate and independent wall-contacting shoes carried by each of said stay elements at their upper portions and having a limited area of contact therewith and having an extended area of contact with said wall, double shoe members at the lower part of said buckstay element and connecting both of said stay members thereof, said double shoe members having a limited area of contact with each of the stay members, and an extended area of contact with the furnace wall.

In testimony whereof I do hereunto affix my signature in the presence of two witnesses.

FRED E. KLING.

Witnesses:
JOHN A. DITHIAN,
CLARA HINDSON.