May 6, 1930. R. PALM 1,757,682

FURNACE ARCH SUPPORT

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Fig. 1.

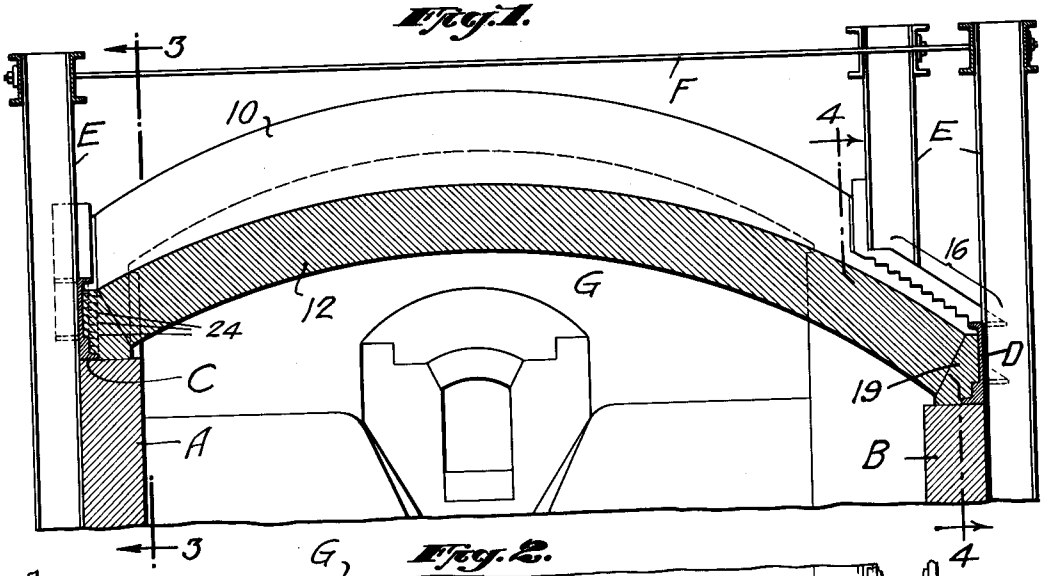


Fig. 2.

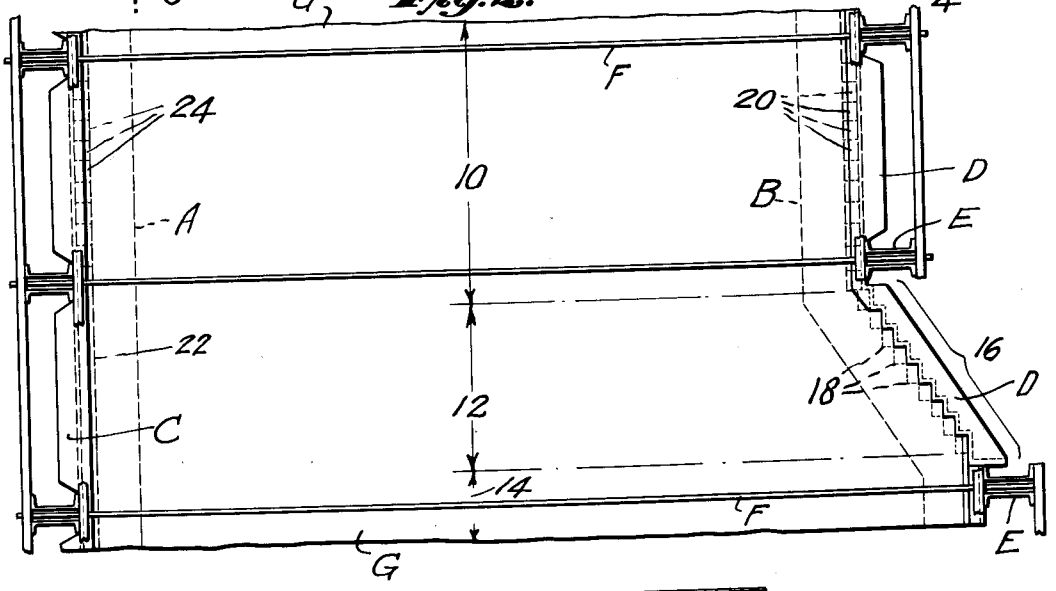
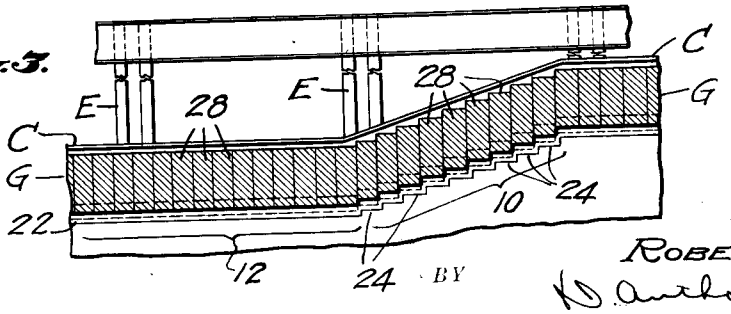


Fig. 3.



INVENTOR
ROBERT PALM.
BY
ATTORNEY

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Fig. 5.

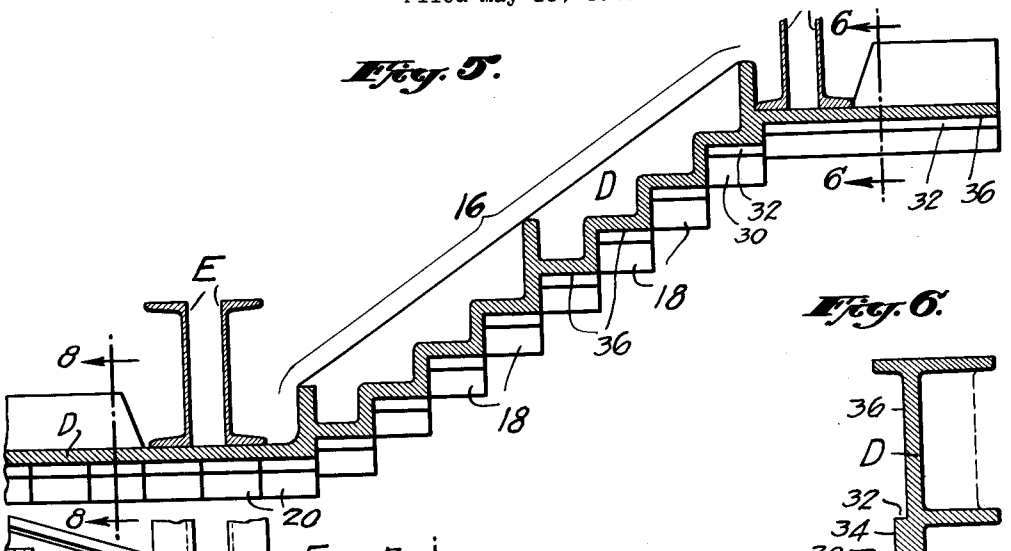


Fig. 6.

Fig. 4.

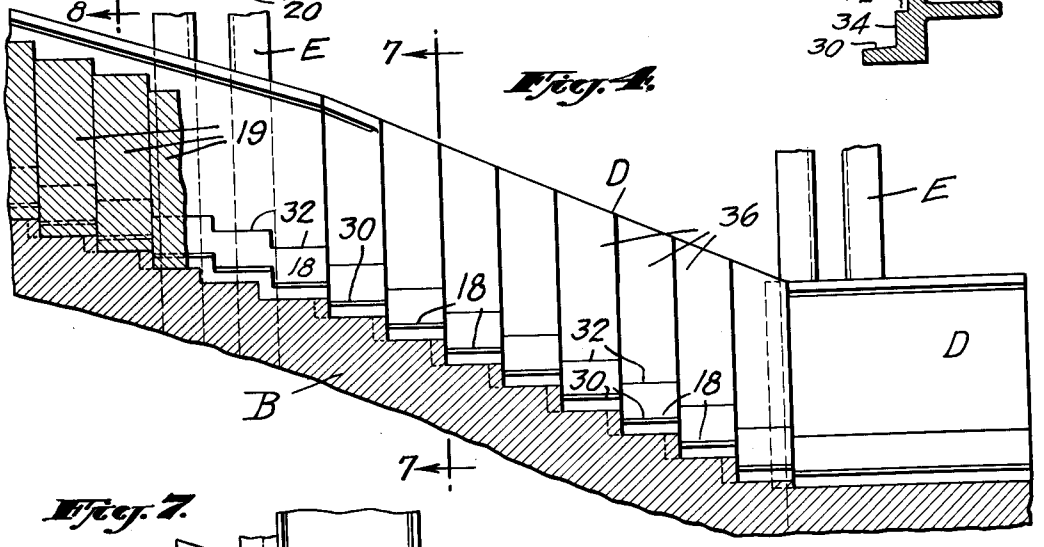


Fig. 7.

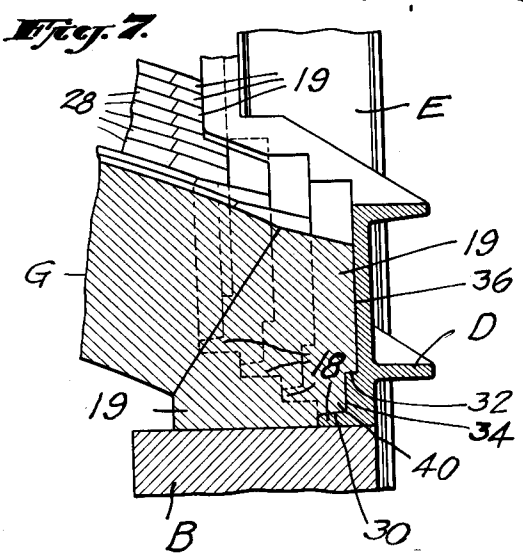
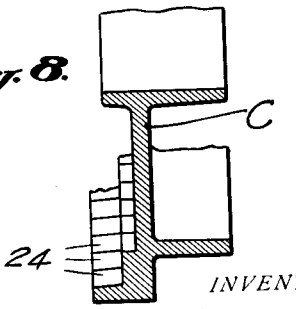


Fig. 8.



INVENTOR

ROBERT PALM.

BY Anthony Vesma

ATTORNEY

Patented May 6, 1930

1,757,682

UNITED STATES PATENT OFFICE

ROBERT PALM, OF FAIRFIELD, ALABAMA

FURNACE-ARCH SUPPORT

Application filed May 18, 1928. Serial No. 278,746.

This invention relates to a novel arch support and aims particularly to provide a construction in which both the vertical and horizontal components of force due to arch thrust will react against square bearings. While not limited thereto the invention has particular reference to the construction of open hearth furnaces. The invention will be fully apparent from the following specification when read in connection with the accompanying drawings and the points of novelty will be defined with particularity in the appended claims.

In the drawings:—

Fig. 1 is a transverse section through one end of an open hearth furnace illustrating arch supports embodying the invention;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a vertical longitudinal section taken on line 3—3 of Fig. 1;

Fig. 4 is a section on staggered line 4—4 of Fig. 1;

Fig. 5 is a sectional plan view of the arch supporting structure of Fig. 4;

Fig. 6 is a section on line 6—6 of Fig. 5;

Fig. 7 is a section on line 7—7 of Fig. 4;

Fig. 8 is a section on line 8—8 of Fig. 5.

Referring in detail to the drawings, A and B represent, respectively, front and back walls of a furnace which at each end of the furnace carry arch supporting members C and D. The furnace is provided with the usual buck-stays E which are tied together at the top by cross-rods F.

The furnace roof G is in the form of an arch having an inclined portion 10 of constant span, a horizontal portion 12 of varying span and a horizontal portion 14 of constant span. Because of the change in span of the portion 12 of the furnace roof, the arch support D is formed with an oblique portion 16 having a plurality of steps indicated generally at 18 which are offset from one another both horizontally and vertically. This member is also formed at one end with a series of steps 20 offset vertically from one another. The steps 18 and 20 form seats for the skew bricks 19 that terminate the successive courses at the right side of both roof portion 10 which is inclined upwardly and portion 12 which is inclined inwardly as well as upwardly. The left side of the roof portion 12 rests on the horizontal part 22 of the arch support C. This support C is also provided with a plurality of vertically offset steps 24 directly opposite the steps 20 of the arch support D to support the left side of roof portion 10. The stepped construction of the arch supports C and D is so arranged that the skew bricks terminating the successive courses 28 of brickwork each have a square bearing or seat on the support so that the vertical and horizontal components of the thrust exerted by the weight of the arch react against respective bearing surfaces which are normal to the direction in which such force is exerted.

As best shown in Figs. 7 and 8, each stepped seat is provided with horizontal bearing surfaces 30, 32 which receive the vertical components of the thrust of the arch, said steps also having surfaces 34, 36 which receive the horizontal component of the arch thrust. The skew brick 19 of each course of the arch is shaped at its outer lower corner as indicated at 40 so as to conform substantially with the contour of the supporting surfaces 30, 32, 34 and 36. Regardless of whether the arch follows a straight line at its outer edges as in the part 10 of the constant span, or whether it follows an inclined line as in the part 12 of the varying span, it is clear that my improved stepped arch supports provide square bearings for each successive course of brickwork. The bearing or contact faces as shown may be stepped up and down vertically or in and out transversely or both up and down and in and out to suit the design of any irregular arch. As clearly shown in the drawings, the vertical load on the several courses of brick making up the arch is carried by the furnace walls A and B and because of the horizontal stepped surfaces provided on the arch supports C and D, this load is uniformly distributed. Likewise, the horizontal component of the arch thrust is uniformly distributed throughout the length of the arch supports C and D, these supports transmitting the loads to the staunch buck-stays E. The design of arch supports is such that the

roof can be readily erected without the necessity of chipping away the brickwork to fit the inclined I-beams such as heretofore used for supporting the skew bricks and because of the uniform normal bearing surfaces provided and the efficient distribution of both the horizontal and vertical components of the thrust of the arch, the furnace roof will have increased life.

When it is necessary to make repairs the same can be readily accomplished because of the square bearing surfaces provided.

It has been the general practice heretofore in constructing roofs for furnaces of the type described, to position the skewbacks against longitudinally sloping channels or similar flanged structural sections to maintain the refractory skewbacks in position and to receive the thrust exerted by the arch.

The type of skewback support as heretofore used with a straight lower flange when placed in an inclined position for supporting a sloping roof, requires the skewback bricks to be cut or chipped away to match the angle of inclination of the skewback support, resulting in a poor bearing surface for the skewback at the point of support and produces a longitudinal thrust of the roof due to the weight of the roof being supported on an inclined surface. When making repairs to, or replacing a section of the sloping roof, the remaining portion of the sloping roof is liable to slip out of position and fall due to its weight being supported on an inclined surface.

From the foregoing it is clear that I provide a skewback support of improved construction having novel means whereby each successive course of brick of the sloping roof is maintained in position against the skewback supports and whereby the transverse thrust and weight exerted on the skewback by the roof arch is transferred to and carried by the skewback support at angles normal to the direction of such forces, and whereby the skewback support is so shaped that no cutting or shaping of the skewback is required, and whereby time and labor are conserved in the erection of such skewbacks, and whereby the liability of damage of the roof by reason of disarrangement of the skewbacks relative to the skewback supports is avoided and overcome, and the life of the furnace roof is greatly lengthened. The stepped supporting member above referred to is not necessarily limited to use in connection with brick arranged in separate offset courses, but is also adapted for use in a roof made by ramming or molding plastic cementitious material into place. In short the stepped support can also be used to advantage in combination with roof structures of monolithic construction.

While I have described quite specifically the embodiment of the invention illustrated, it is not to be construed that I am limited thereto since various equivalents may be substituted without departure from the invention as defined in the appended claims.

What I claim is:—

1. A furnace arch structure including bricks arranged in courses offset horizontally and vertically to form an inclined roof, and an arch supporting member having a series of adjacent bearing portions offset vertically and horizontally from one another.

2. A furnace arch structure including bricks arranged in courses offset vertically and horizontally from one another to form an arched roof, a metallic arch supporting member having separate stepped bearings offset vertically and horizontally from one another and shaped to squarely oppose both the vertical and horizontal components of the thrust of each course of brick.

3. A furnace arch structure including bricks arranged in courses offset vertically and horizontally from one another to form an inclined roof, and a longitudinally inclined metallic arch support having an individual horizontal bearing portion for each different course of brick.

4. A furnace arch structure including bricks arranged in offset courses to form an inclined roof, each course terminating with a skew brick, and a longitudinally inclined arch supporting member having a series of longitudinally progressing steps offset vertically and horizontally from one another and forming individual horizontal seats for the skew bricks.

5. In a furnace arch supporting structure, a side wall having along its length a series of horizontal bearing portions arranged in vertical offset stepped relation, and a similarly stepped metallic arch support seated at a plurality of different horizontal planes upon said bearing portions, an arched roof formed of separate offset courses, said metallic arch support having a series of upper horizontally offset arch supporting seats whereby the vertical component of the arch thrust of each of said courses is transmitted directly through said seats to said horizontal bearing portions.

In witness whereof, I have hereunto signed my name.

ROBERT PALM.