Sept. 22, 1931. J. P. McLIMANS 1,824,222

METHOD OF REPAIRING FURNACE ROOFS

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Fig. 1

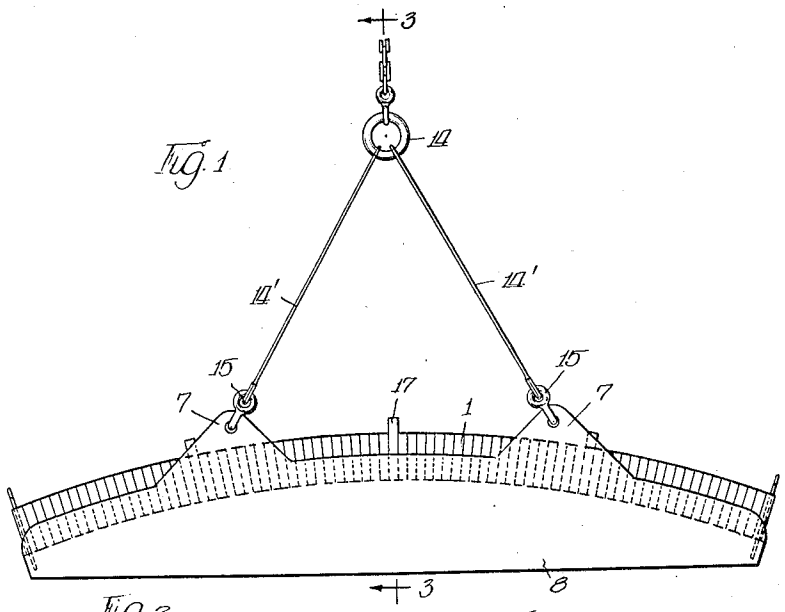


Fig. 2

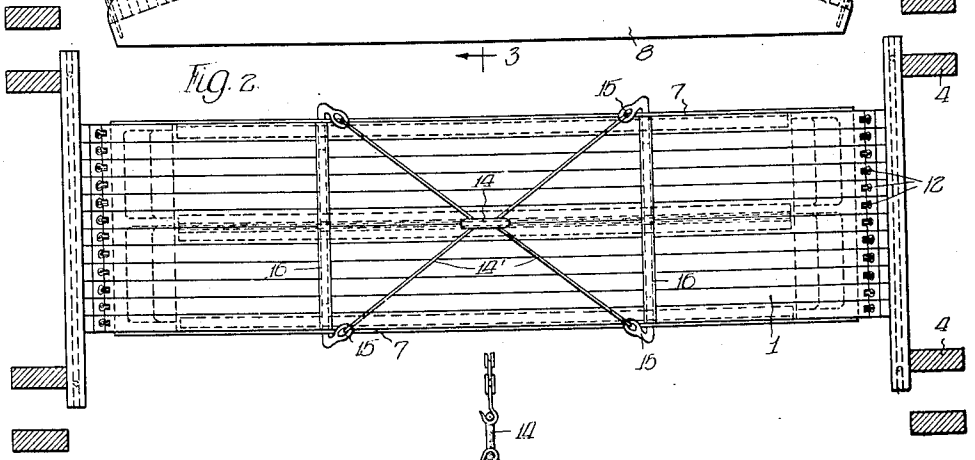
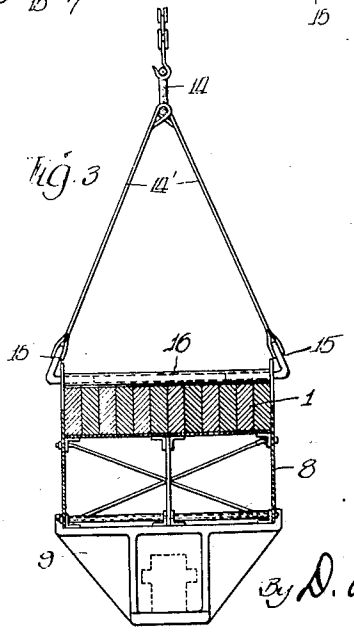


Fig. 3



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Fig. 4

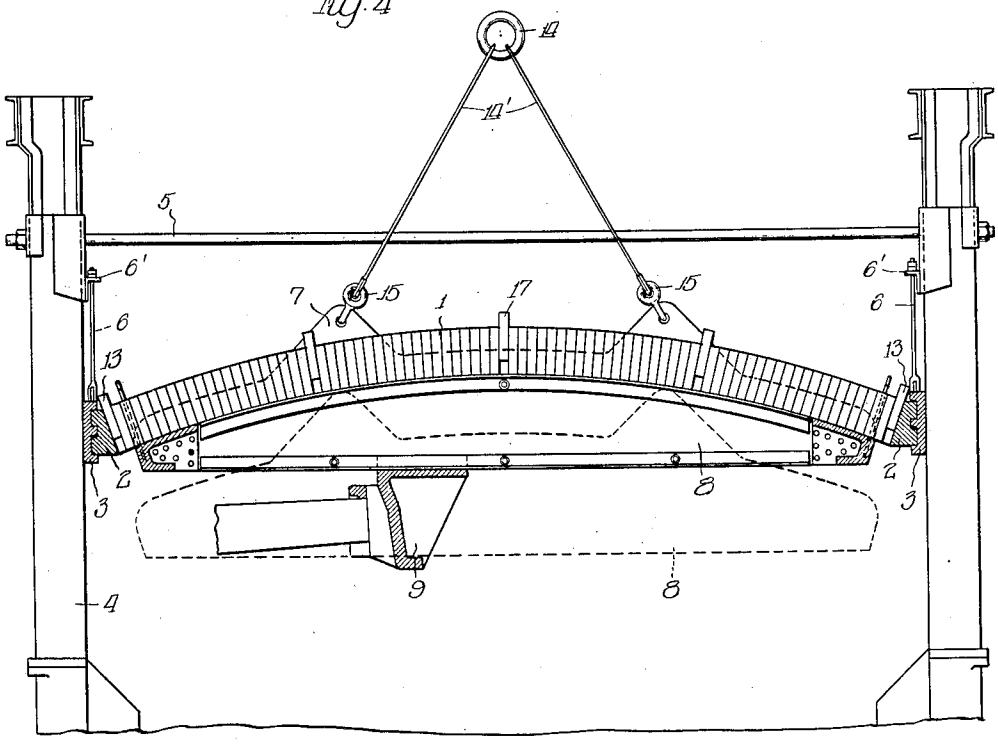


Fig. 5

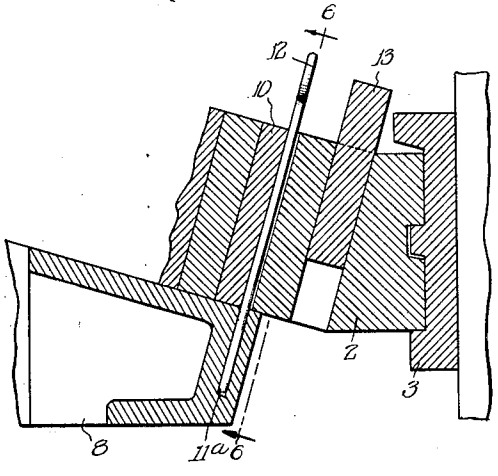
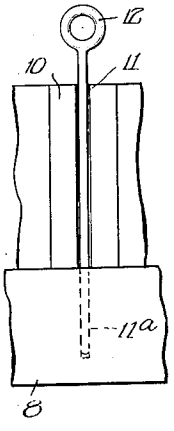


Fig. 6



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Fig. 7.

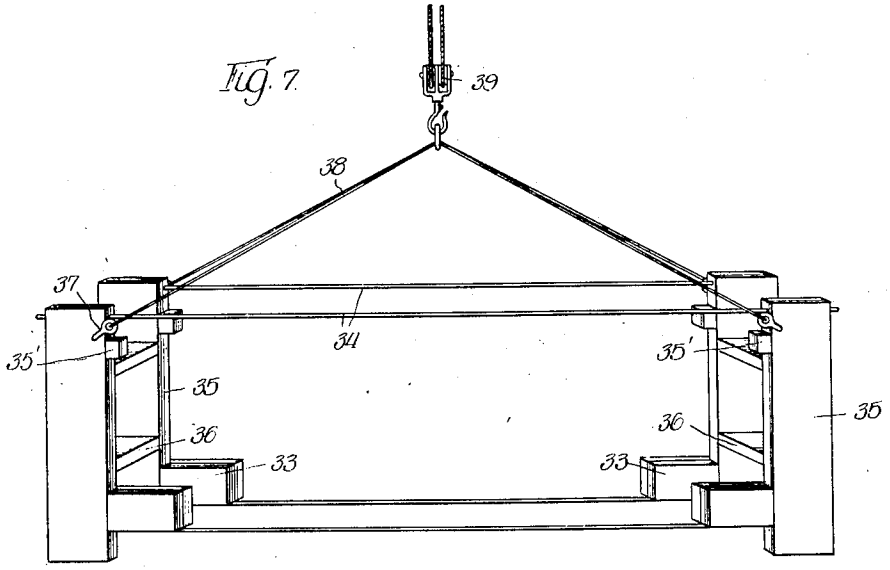
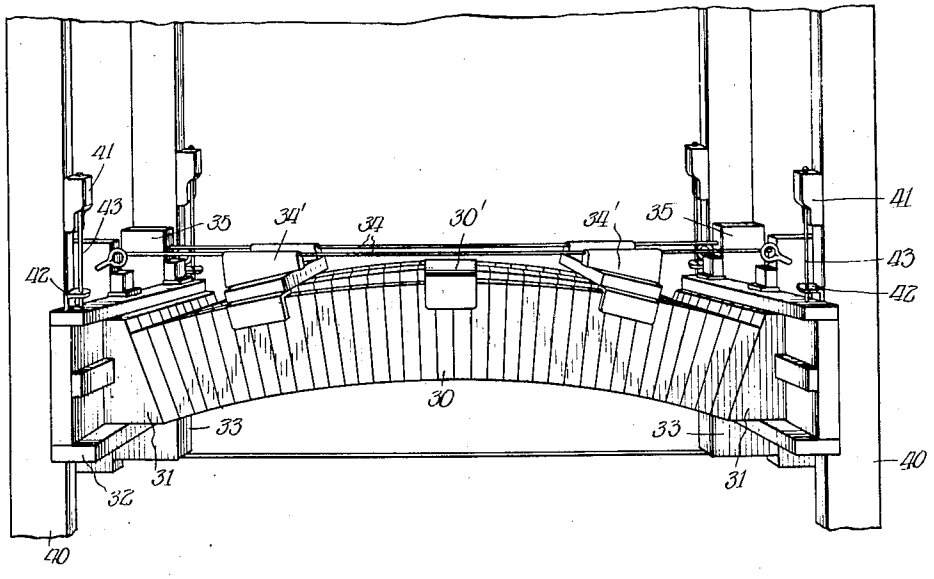


Fig. 8.



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UNITED STATES PATENT OFFICE

JOHN P. McLIMANS, OF DULUTH, MINNESOTA

METHOD OF REPAIRING FURNACE ROOFS

Application filed June 25, 1927. Serial No. 201,486.

The invention pertains to furnace construction and repair, and particularly to the repair of the roof structure of furnaces of the open hearth type.

It is an object of this invention to provide a novel method for repairing sections of a furnace roof wherein a whole section may be positioned in a unit.

Another object is to provide a method for repairing furnace roofs wherein the roof may be wholly repaired from the outside of the furnace and without necessarily completely cooling said furnace.

Still another object is to provide a method of repairing sections of a furnace roof regardless of the length of said sections to be repaired.

A further object is to provide readily releasable means adapted to be used to support a furnace roof unit in place, and which means may be as readily removed after the section is secured in position.

Other and more specific objects will readily occur from the detailed description, claims and drawings appended hereto.

In the drawings, which represent preferred embodiments of the invention—

Figure 1 is a side elevation of the cradle and the assembled roof section, particularly for sections which are of less length than the distance between adjacent side wall buckstays of an open hearth furnace;

Figure 2 is a plan view of Figure 1;

Figure 3 is a section taken substantially on the plane as indicated by the line 3—3 of Figure 1;

Figure 4 is a view similar to Figure 1, showing the relation of the section to the various parts of the furnace when said section is being positioned in the furnace, and the dotted lines show the cradle in lowered position preparatory to withdrawing said cradle;

Figure 5 is a detail on an enlarged scale of the bricks at one end of the cradle and their relation to their cradle holding means, the skewbricks, and the skewbacks;

Figure 6 is an end elevation taken substantially on the plane as indicated by the line 6—6 of Figure 5;

Figure 7 is a perspective view of the cradle used preferably in repairing the roof of a furnace wherein the section to be repaired is equal to the distance between the center lines of adjacent buckstays; and

Figure 8 is a perspective view showing the arch in place and its relation to the various parts of the furnace wherein the arch section is equal to the distance between the center lines of adjacent buckstays.

Referring particularly to the modification shown in Figures 1 to 6 inclusive, i. e. where the section to be repaired is less than the distance between adjacent wall buckstays, it will be seen that the bricks 1 to make up the arch of the section to be repaired are positioned on an arched cradle 8 provided with ears 7 having apertures for the reception of the hooks 15 cooperating with the spacers 16 and the chain fall and connecting members 14 and 14′ respectively, all providing means for readily positioning the section. The bricks are held in place on the cradle by means of the holding rods 12 positioned in slots 11^a in the cradle and disposed in way of each row of bricks in a slot 11 formed in the adjacent brick.

The usual buckstays 4 are shown supporting the skewbacks 3, which are preferably substantially E-shaped and cooperate with the skewbricks 2 for holding the arch in position. Between opposite buckstays, tie rods 5 are provided for preventing spreading of said buckstays, and each buckstay preferably is provided with an adjustable stay 6 disposed between the bracket 6′ on the buckstay and the skewback. A charging peel 9 is shown in Figure 4 as contacting with the cradle 8 and it will be understood that this peel may be readily moved to lower the cradle and lift said cradle out of the furnace. Key-bricks 13 and 17 are shown cooperating with the arch to provide a positive wedging means for insuring a fixed relation between the repaired section and the rest of the roof.

Referring now to the modification shown in Figures 7 and 8, wherein the section to be repaired is equal to the distance between adjacent buckstays, the bricks 30 making up the arch are adapted to be built up between

the skewbricks and skewbacks 31 and 32 respectively, all positioned on projecting members 33 disposed on the vertical members 35 of the cradle. The members 35 are spaced by suitable cross members or stays 36 which, it will be understood, are of less length than the length between adjacent buckstays 40. The vertical members 35 are also provided with projections or lugs 35′ for cooperating with the top leg of the skewback to hold said skewback firmly in position. The vertical cradle members are also provided with eyes or hooks 37 adapted to cooperate with hoisting members 38 cooperating with the chain fall as indicated at 39. The buckstays 40 are provided with lugs or brackets 41 provided with an adjustable stay 43 which in turn cooperates with a lug 42 fastened to or integral with the top leg of the skewback 32. Adjustable stays 34 are provided between the vertical members 35 of the cradle and it will be understood that stays similar to the stays 5 are provided between the opposite buckstays. Top positioning members are provided for the arch, which members may cooperate with the stays 34 as shown at 34′ or may simply cooperate with the arch as shown at 30′.

In the operation of repairing a furnace wherein the section to be repaired is of less distance than the distance between center lines of adjacent buckstays, (Figures 1 to 6 inclusive), it will be readily appreciated that the bricks to form the arch are built up on the cradle 8, an end brick 10 being provided for each row, said brick having a slot 11 into which and into the slot 11* in the cradle extends the holding rods 12. The chain fall 14 is then attached to the ears 7 of the cradle through the connecting members 14′ and the hooks 15, and the arch is positioned in the furnace. The bricks 13 are then wedged into place between the skewbricks and the bricks forming the arch, which bricks will remove the stress from the holding rods and transfer it to the skewbacks. The holding rods 12 are then removed and the keybricks 17 are driven into place to firmly hold and to complete the construction of the arch. The hooks 15 and spacers 16 may then be removed and the cradle 8 may be lowered and removed by means of the charging peel 9. It will be appreciated of course that any vertical movement of the section may be readily accomplished by means of the stays 6.

In the operation for renewing a roof section wherein the section to be repaired is equal to the distance between center lines of adjacent buckstays, (Figures 7 and 8), the skewbacks 32 are supported on the frame of the cradle shown in Figure 7, the upright members 35 performing the function of dummy buckstays which, as already pointed out, are spaced less than the distance between adjacent buckstays of the furnace. The arch is built up between these skewbacks and is supported in a suitable cradle, the arch being firmly held in position by means of the crossstays 34 cooperating with the dummy buckstays 35. The cradle is then lowered into place as shown in Figure 8 so that the skewbacks 32 set in a proper relation to the furnace buckstays 40. It will then be understood that lug 42 is practically beneath the lug 41, and the adjustable stays 43 are fastened to both of said lugs, which performs the function of suspending the skewbacks, and by simply adjusting these stays, the arch may be raised or lowered. The stays 44 of the furnace are tightened which will have a tendency to slacken the stays 34 which may then be readily loosened and removed, allowing the cradle to be removed from the arch.

It will be readily understood that if the width of the section to be repaired is greater than the distance between center lines of adjacent buckstays, practically the same principle is used as that described wherein the distance is equal to the distance between center lines of adjacent buckstays. The only change which may take place is that a supporting bracket or lug is provided on members 40 beneath the skewbacks 32, and the section is warped into place and supported between the buckstays.

The present method has been found especially desirable as it is not necessary in making a repair in a furance to wholly cool off the furnace as all the repair work takes place from the outside. Formerly, as is well known, the furnace had to be cooled so that carpenters could enter the furnace and construct a false wooden arch within the furnace to support the part to be replaced. The present method has done away with all this preparation and complicated work and it is now not necessary to lose so much time with the attendant loss of money in repairing a furnace. It will also be understood that this method may just as readily be used in construction as in repair.

I do not wish to be limited by the embodiment shown as other and various embodiments will be apparent to those skilled in the art.

I claim:

1. The method of repairing a furnace which consists of building a roof structure in a cradle, and disposing means for holding the roof structure on the cradle at the end of said cradle, resting the structure in place, and removing the holding means.

2. The method of repairing a furnace which consists of building a roof structure in a cradle, and disposing means for holding the roof structure on the cradle at the end of said cradle, resting the structure in place, removing the holding means, suitably disposing keybricks for tightly maintaining the

structure in position, and removing the cradle.

3. The method of repairing a furnace which consists of assembling the parts in a cradle in the form to complete the repair, holding said parts in position by removable means on said cradle, positioning the parts as a unit, and removing said removable means and cradle.

4. The method of repairing a furnace which consists of building a roof structure in a holding means and lowering said structure in place, securing said structure, and removing the holding means.

5. The method of repairing a furnace which consists of assembling parts to be used in repair on a cradle shaped to correspond to the adjacent structure of the furnace, said parts being held in place by removable means on the cradle cooperating with ends of said parts whereby the means is flush with the end surfaces, moving said cradle so that the parts are in repair position in the furnace, wedging said parts by key means at either end in way of the supports, removing the removable means, and removing the cradle.

Signed at Duluth, Minnesota, this 20 day of June, 1927.

JOHN P. McLIMANS.