Feb. 25, 1930. C. E. HARRISON 1,748,879

REENFORCED CRUSHER PLATE

Filed July 22, 1925 2 Sheets-Sheet 1

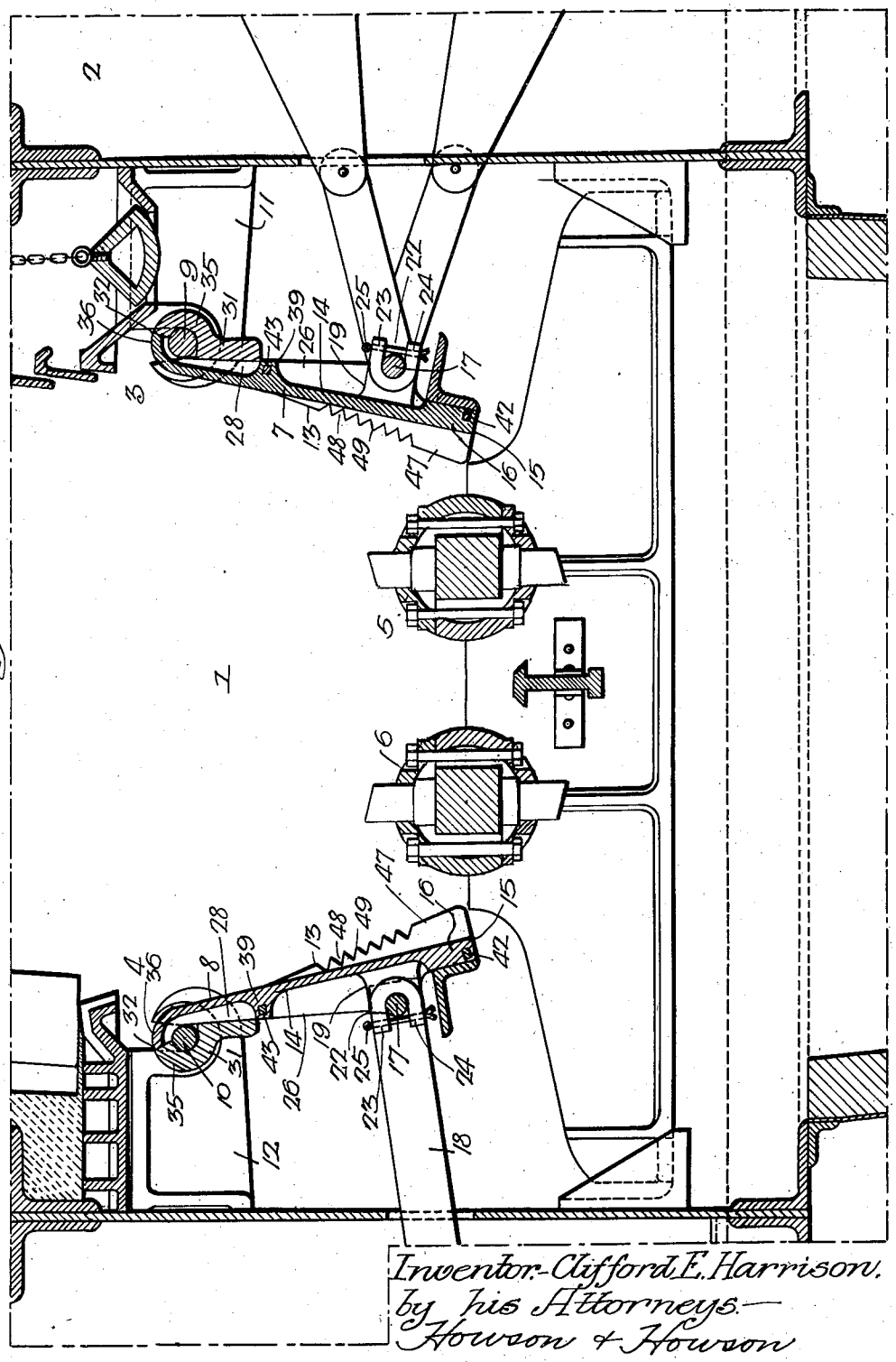


Fig. 1.

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by his Attorneys—
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Fig. 1.

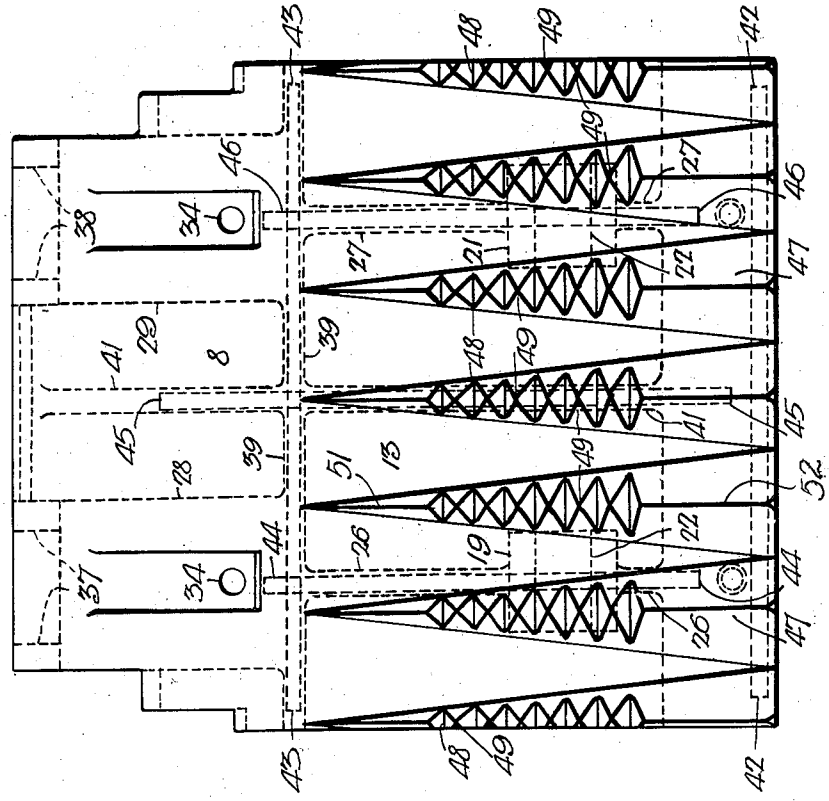
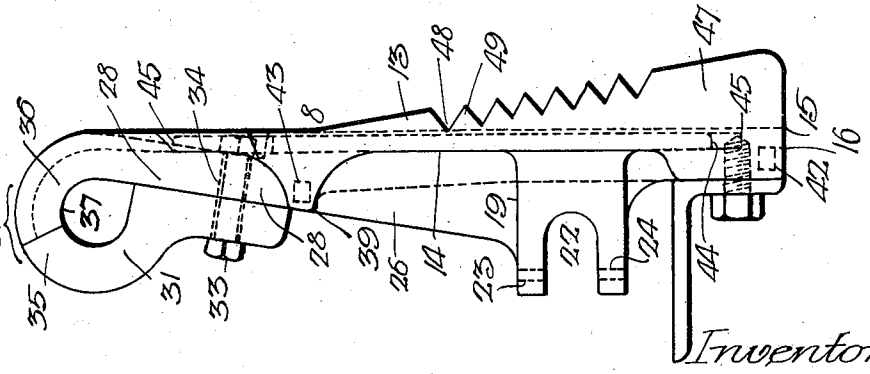


Fig. 2.



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UNITED STATES PATENT OFFICE

CLIFFORD EARL HARRISON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO AMERICAN ENGINEERING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

REENFORCED CRUSHER PLATE

Application filed July 22, 1925. Serial No. 45,331.

My invention relates to stokers, having particular relation to ash discharging means.

Heretofore, considerable difficulty has been experienced with crusher plates, inasmuch as they are continuously breaking under load conditions and also due to temperature changes incident to the cooling of clinker formations. As a result, frequent shut downs are necessary in order to replace the broken plates. An object of my invention, therefore, is to provide a crusher plate which shall avoid not only the above undesirable results but which shall be further characterized by increased strength and by continued usefulness after breaking or cracking.

Another object of my invention is to provide a crusher plate which shall in connection with the crusher rolls cause a maximum ripping and tearing of the ashes; and which shall prevent the clinkers from rolling around on top of the crusher rolls, by holding said clinkers firmly in position to be crushed, whereby complete and effective grinding of the clinkers and ashes under all conditions of operation may obtain.

With these and other objects and applications in mind, my invention further consists in the details of construction and operation and arrangement hereinafter described and claimed and illustrated in the accompanying drawings, wherein

Fig. 1, is a transverse sectional view of an ash pocket and associated crusher mechanism embodying my invention;

Figs. 2 and 3 are front and side elevational views respectively, of the crusher plate of Fig. 1;

Referring particularly to Fig. 1, an ash pocket 1 of a furnace construction 2 is provided with side walls 3 and 4 and a pair of rotary crushers 5 and 6, the latter being of usual design. The side walls 3 and 4 may include crusher plates 7 and 8 which are pivoted on shafts 9 and 10 carried by brackets 11 and 12 respectively. The crusher plates 7 and 8 are substantially identical, so that the latter only will be described in detail.

As illustrated in Figs. 2 and 3, inclusive, the crusher plate 8 may comprise a substantially flat elongated member having a front working face 13 and a rear face 14. An outer end 15 is provided with an enlarged portion 16, which extends across the width of the crusher plate 8. A rod 17, which is operatively secured to an operating link 18, may be supported in bearings 19 and 21 extending from the rear face 14 of the crusher plate 8. Each of said bearings is provided with a slotted end 22 adapted to receive the rod 17 and it is provided with aligned perforations 23 and 24 for the reception of a retaining cotter pin 25.

A pair of webs 26 and 27 extend upwardly from the bearings 19 and 21 and terminate in spaced sections 28 and 29 adapted to abut against a member 31 constituting one part of a two-part bearing 32, as will presently appear. The member 31 may be secured in position by bolts 33 extending therefrom through perforations 34 in the adjacent sections 28 and 29 of the crusher plate 8. The member 31 is provided with a curved portion 35 adapted to engage the periphery of the shaft 10. An upper end portion 36 of the crusher plate 8, constituting the other part of the two-part bearing 32, is so curved as to engage the remaining portion of the periphery of the pivot shaft 10. Friction between the shaft 10 and the curved end portion 36 of the crusher plate 8 is reduced to a minimum by recessing said curved end portion as shown in the drawing, so that the crusher plate 8 is supported on pairs of spaced flanges 37 and 38 only. The lower end portions of the sections 28 and 29 are interconnected by a transversely extending web 39 which is intersected by a central, vertically extending web 41.

As above noted, my invention contemplates means whereby the crusher plates 8 and 9

may be reenforced so that they will better withstand the relatively large strains produced during the crushing action. To this end, steel or iron rods 42 and 43 are so imbedded in the lower end portion 15 and the transverse web 39, respectively, as to extend across the width of the crusher plate 8. In addition, rods 44, 45 and 46 may be imbedded in the crusher plate 8 so as to be in direct alignment with the longitudinally extending webs 26, 41 and 27, respectively. Should an increase in strength and rigidity be required for the upper end of the crusher plate 8, the central rod 41 may be extended as illustrated in Fig. 2. The reenforcing rods may be coated with tin prior to the molding operation, so that a clean surface is presented to the metal.

Practical experience has shown that the effect of the several reenforcing bars is to more than double the strength of the crusher plate 8. Moreover, should the load on the crusher plate 8 increase until it fractures or should it crack during the chilling of the clinker formation the broken parts of the crusher plate would be rigidly held together by said reenforcing bars, with the result that an immediate shut down of the furnace is not necessary and the life of the crusher plate is lengthened accordingly.

My invention further contemplates a working face for the crusher plates 7 and 8 which shall secure complete and effective grinding of the ashes and clinkers. Heretofore, considerable difficulty has been experienced as a result of the tendency for the clinkers to roll around on the top of the crusher rolls 5 and 6, also the clinkers would tend to pass between a crusher roll and its adjacent plate without being completely crushed. Accordingly, I provide on the working face 13 of each of the crusher plates a plurality of vertically extending ribs 47 of triangular cross section. The ribs are of maximum cross section at the lower end 15 of the crusher plate and taper to an apex adjacent to the upper end 36 thereof. The gripping of the clinkers is facilitated by means of a plurality of transversely extending grooves 48 which form teeth 49. The teeth 49 may be positioned substantially centrally of each rib 47, having upper and lower non-serrated surfaces 51 and 52, respectively.

Under conditions of operation, the lower end portions 15, 15 of the crusher plates 7 and 8 are positioned immediately adjacent to the rotary crushers 5 and 6, respectively. When the latter are actuated, the clinkers and ashes are subjected to a ripping and tearing action which results from being forced against the adjacent toothed working faces of the crusher plates 7 and 8. The teeth 49 may be considered as functioning similar to a claw, since they hold the clinkers firmly in a position to be crushed by the rolls 5 and 6. Hence, there is no opportunity for the clinkers to move around freely on the upper side of the crusher rolls 5 and 6.

While I have shown only one embodiment of my invention, for the purpose of describing the same and illustrating its principles of construction and of operation, it is apparent that various modifications may be made therein without departing from the spirit of my invention. I desire, therefore, that only such limitations shall be imposed thereon as are indicated in the appended claims or as are demanded by the prior art.

I claim:

1. A crusher plate provided with a plurality of reenforcing webs on one side thereof, and a corresponding plurality of reenforcing elements imbedded in said plate in alignment with said webs, respectively.

2. In a device of the class described, a crusher plate having an enlarged outer end portion, a plurality of spaced webs extending therefrom toward the remaining end of said plate, a reenforcing element individual to each web and positioned in alignment therewith, a reenforcing element for said outer end portion, and a reenforcing element extending transversely of said web elements and positioned intermediate the ends thereof.

3. A swinging crusher plate having front and rear faces, longitudinally and transversely extending webs on the rear face of said plate, a reenforcing element imbedded in one of said webs, and a second reenforcing element positioned in alignment with the other of said webs.

4. A crusher plate having front and rear faces, angularly disposed webs on said rear face, a reenforcing element imbedded in one of said webs, and a second reenforcing element positioned in alignment with the other of said webs, said elements constituting a supporting frame-work tending to hold together the crusher plate upon the fracture thereof, the front face of said plate having a plurality of serrated ribs forming teeth.

5. A plate having an enlarged outer end portion, a plurality of spaced webs extending therefrom toward the other end of said plate, a reenforcing element individual to each web and positioned in alignment therewith, a reenforcing element for said outer end portion, and a reenforcing element extending transversely of said web elements positioned intermediate the ends thereof, said elements constituting a supporting framework for said plate holding together the same upon the fracture thereof, said plate also having a working face provided with a plurality of serrated ribs forming teeth.

6. A crusher plate having an enlarged outer end portion, a plurality of spaced webs extending therefrom toward the remaining end portion, a reenforcing element positioned in alignment with each web, a reenforcing

element for said outer end portion, a transversely extending web positioned intermediate the ends of said plate, a reenforcing element positioned in alignment with said last-mentioned web, said reenforcing elements constituting a supporting framework, and a plurality of ribs provided with grooves to form teeth.

7. A crusher plate having front and rear faces, angularly disposed webs extending from said rear face, a reenforcing element imbedded in one of said webs, a second reenforcing element positioned in alignment with the other of said webs but imbedded substantially in said crusher plate, and a serrated triangular rib extending from the front face of said crusher plate.

8. In combination, a crusher plate having front and rear faces, a pair of spaced webs terminating in enlarged spaced end sections, a web positioned intermediate said first-mentioned webs and extending between said spaced end sections, a reenforcing element positioned in alignment with each of said webs, a web extending transversely of said first-mentioned webs, and a reenforcing element positioned in alignment therewith, said elements constituting a supporting framework for holding together the crusher plate upon the fracture thereof, said front face being formed with a plurality of teeth.

9. A swinging crusher plate having an enlarged end portion, a pair of webs extending therefrom and terminating in enlarged sections adjacent to the other end of said plate, a web intermediate said first-mentioned webs and extending between said spaced end sections, a web extending transversely of said pair of webs, reenforcing elements positioned in substantial alignment of each of said webs, said elements constituting a supporting framework, and a plurality of ribs on said plate serrated to form teeth.

10. In combination, a crusher plate having front and rear faces, one end of said plate being enlarged, a pair of webs extending from said enlarged portion and terminating in enlarged end sections adjacent to the other end of said plate, an intermediate web positioned between said pair of webs and extending between said enlarged end sections, a fourth web extending transversely of said pair of webs, a reenforcing element imbedded in said fourth web, and reenforcing elements positioned in alignment with the other webs, said elements constituting a supporting framework, said pair of webs being formed to constitute elements of a bearing.

11. A crusher plate adapted to constitute at least a portion of one wall of an ash pocket, said crusher plate having a plurality of serrated ribs on the working face thereof, and sets of reenforcing elements imbedded in said plate in different planes, said elements constituting a supporting framework.

12. A crusher plate having front and rear faces and an enlarged end portion, a pair of webs extending from said enlarged end portion and terminating in enlarged end sections adjacent to the other end of said crusher plate, an intermediate web positioned between said pair of webs and extending between said enlarged end sections, and a fourth web extending transversely of said pair of webs, said pair of webs being formed to constitute elements of a bearing.

CLIFFORD EARL HARRISON.