April 24, 1934. H. E. PRESTON 1,955,932

CRUSHER PIT

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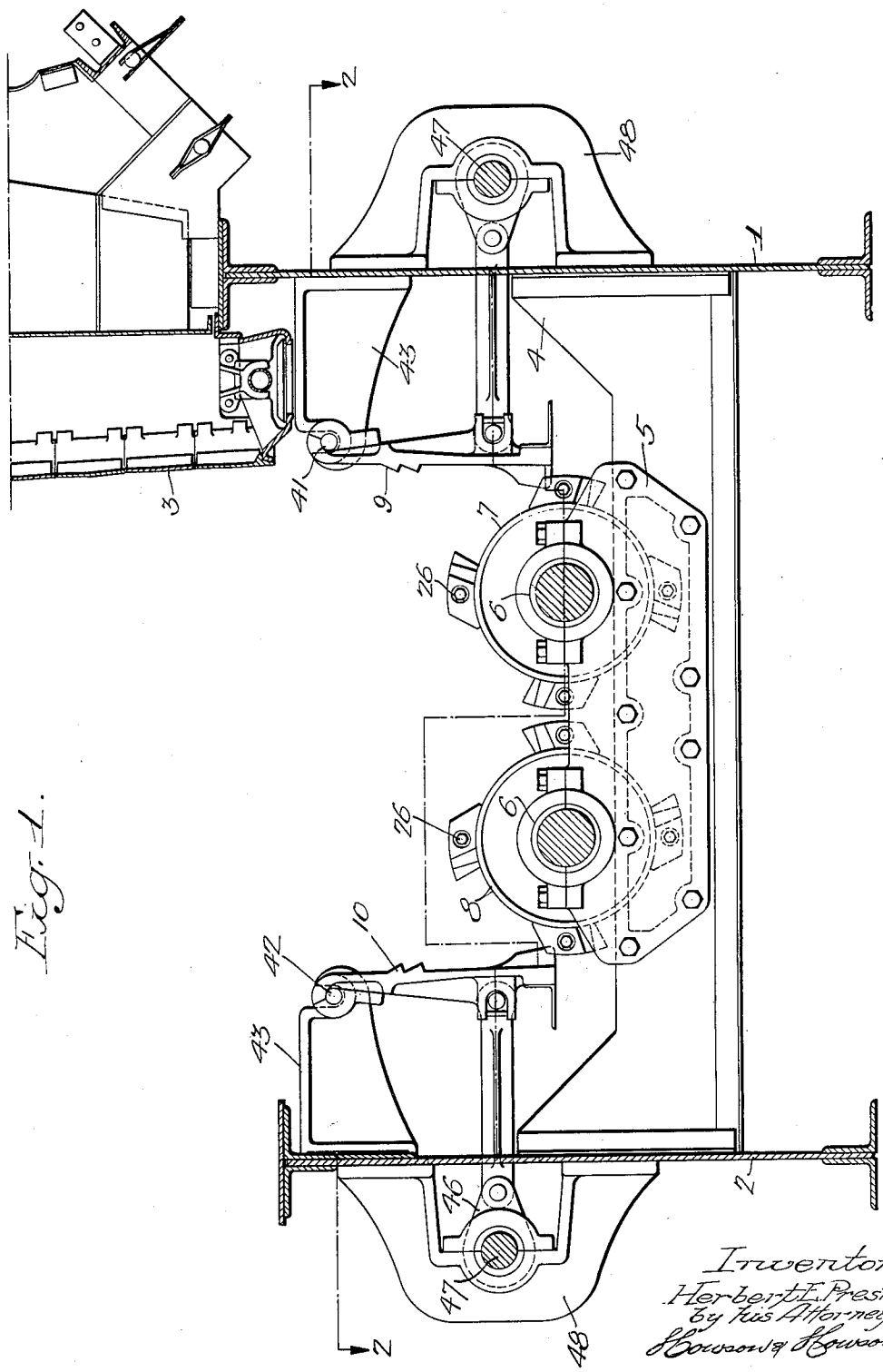


Fig. 1.

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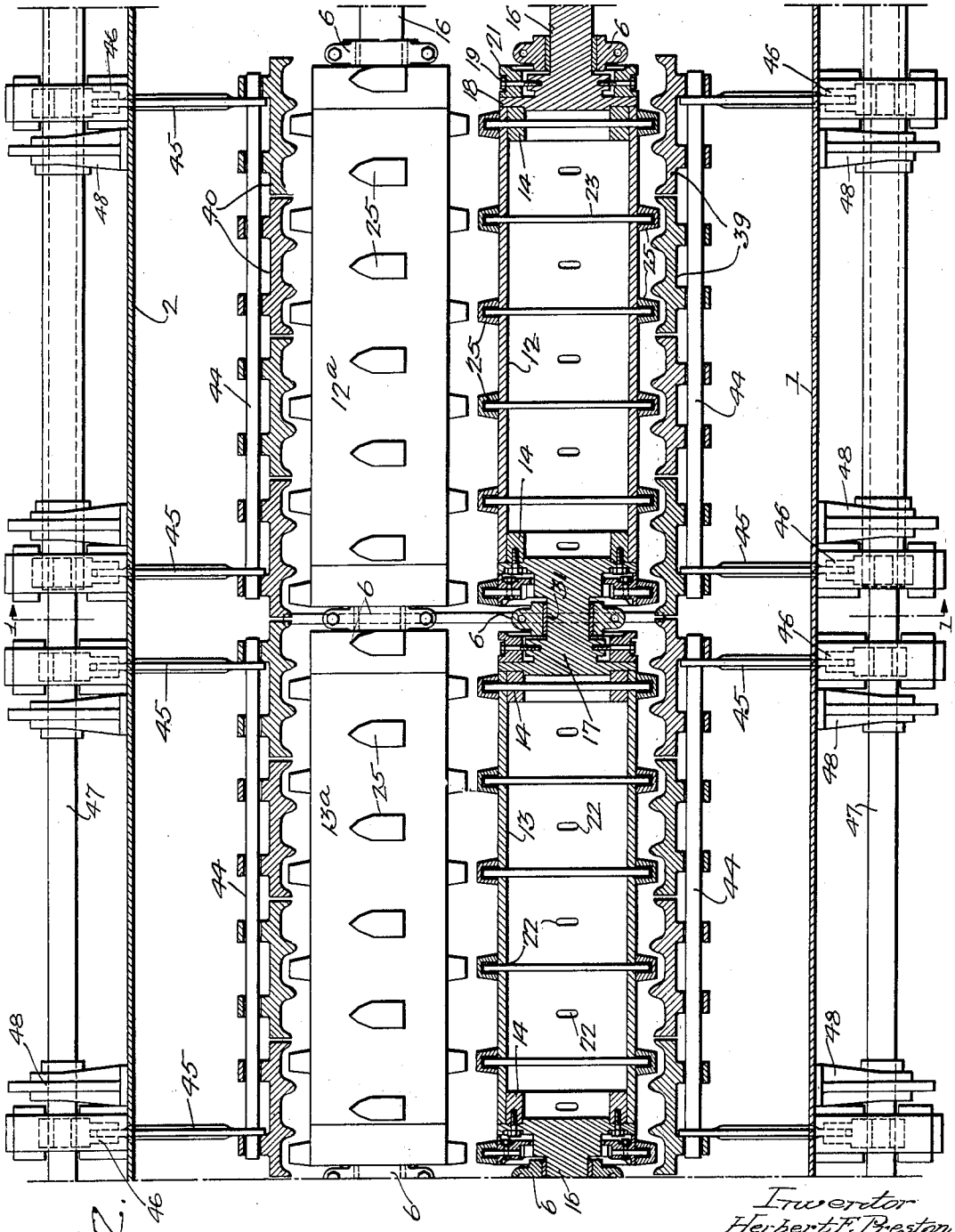


Fig. 2.

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Fig. 3.

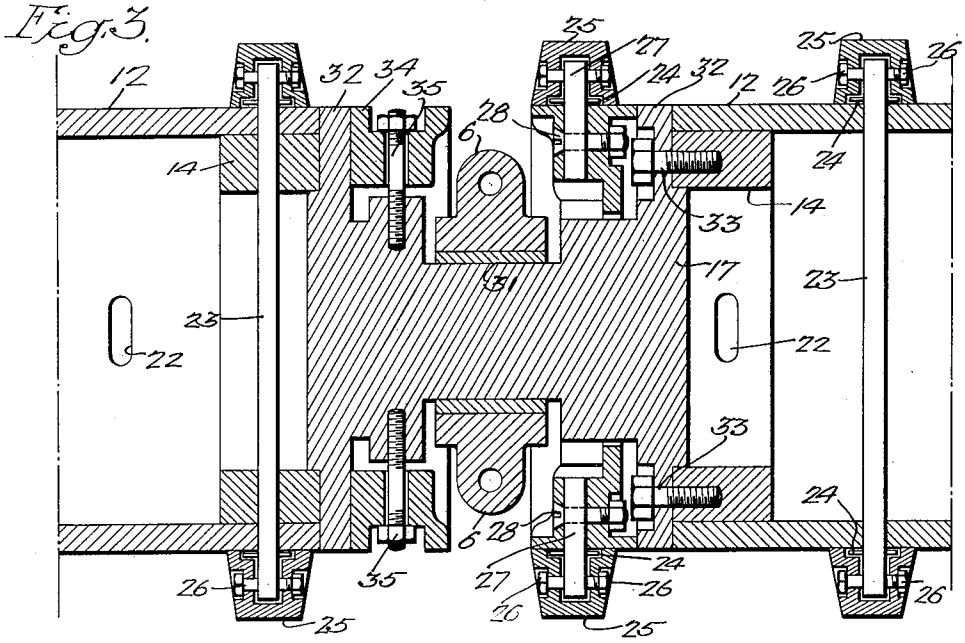


Fig. 4.

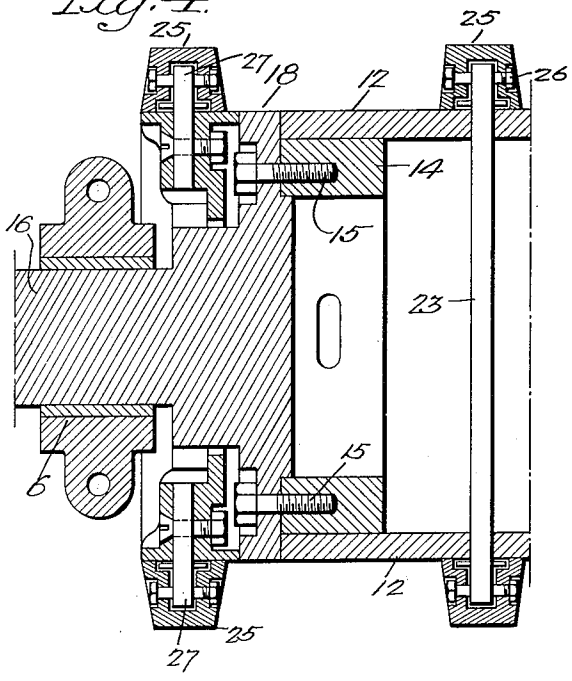
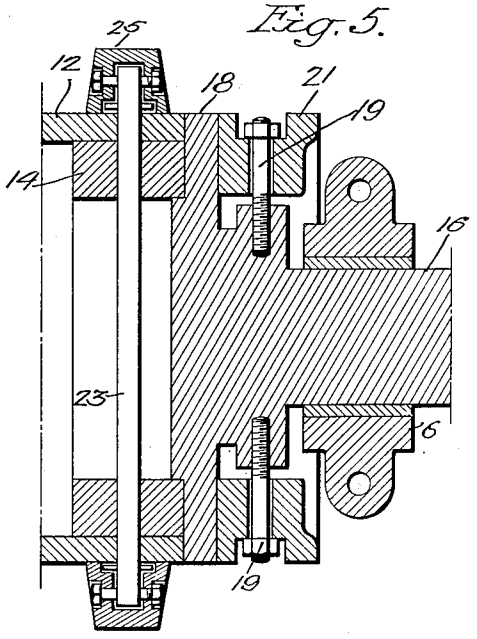


Fig. 5.



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UNITED STATES PATENT OFFICE

1,955,932

CRUSHER PIT

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Application May 15, 1931, Serial No. 537,705

11 Claims. (Cl. 83—52)

This invention relates to improvements in crusher pits of a type adapted primarily for reception of the ash residue from mechanical stokers.

One object of my invention is to provide a novel crusher roll construction that shall be characterized by relative simplicity of construction and lightness of weight, combined with the necessary ruggedness and durability.

Another object of the invention is to provide a novel and improved crusher roll construction that permits reduction of the number of supporting bearings to a minimum, thereby affording a minimum of obstruction to the passage of ashes through the pit, and reducing the number of points at which accumulations of the ash may form.

Still another object is to provide a novel construction obviating the prior requirement for a solid roll-supporting shaft.

A further object of the invention is to provide in a sectional roll construction novel means affording a substantially uniform distribution of teeth from one end of the roll to the other.

Still another object of the invention is to provide a novel crusher plate construction which cooperates with the crusher rolls to effect a superior and more uniform reduction of the ash particles, facilitating their elimination by sluicing, or similar operation.

The invention further resides in certain novel and improved structural details hereinafter set forth and illustrated in the attached drawings, in which

Figure 1 is a transverse sectional view on the line 1—1 of Fig. 2, through a crusher pit made in accordance with my invention;

Fig. 2 is a fragmentary sectional view on the line 2—2 of Fig. 1; and

Figs. 3, 4 and 5 are respectively fragmentary sectional views illustrating the details of the crusher roll construction.

With reference to the drawings a crusher pit made in accordance with my invention may comprise front and rear walls, 1 and 2 respectively, the front wall 1 in the present instance constituting a support for the lower end of a mechanical stoker, the terminal end of the lower grate of which is indicated at 3. Extending transversely between the walls 1 and 2 is a series of beams 4, to each of which is bolted a saddle 5, made preferably of structural steel, comprising bearings 6 for crusher rolls 7 and 8. These rolls are of sufficient length to span the corresponding dimension of the ash pit, and together embrace the space between front and rear crusher plates 9 and 10 respectively, as illustrated in Fig. 1. The construction and function of the crusher plates 9 and 10 will be described hereinafter.

As illustrated in Figs. 2 to 5 inclusive, each of the crusher rolls is composed in the present instance of a plurality of longitudinal sections, adjacent corresponding sections of the rolls being designated in Fig. 2 by the reference numerals 12 and 13 and 12a, 13a. As therein illustrated, each of these sections consists of a relatively large hollow cylinder, preferably of steel, and each is provided at each end with a terminal ring 14, which are secured to the inside of the cylinder, preferably by welding. To each of these rings is secured, by means of bolts 15, a stub shaft, the stub shafts at the extremities of the rolls being shown at 16; while the shafts secured to the adjacent ends of adjoining sections are designated by the reference numeral 17.

The stub shafts 16 are best illustrated in Figs. 4 and 5. These shafts comprise a solid flange 18, through which the bolts 15 extend and which form in effect closure plates for the ends of the cylindrical sections 12. The shafts further comprise the journal sections which in the present instance are shown supported in the bearings 6 of the saddles 5, previously described. To each of the stub shafts 16 is secured, by bolts 19, a cover ring 21, these rings being secured against the outer faces of the flanges 18, and constitute in effect extensions of the cylinders 12.

Each of the cylinders 12 is provided with a plurality of slotted openings 22 for reception of the end portions of steel or other suitable bars 23, which are secured in position in the cylinders with their ends projecting beyond the outer surface thereof by means of pins 24 passed through openings in the bar immediately adjacent the outer faces of the cylinders. To the projecting ends of the bars 23 are secured teeth 25, these teeth as illustrated, embracing the ends of the bars and being secured thereto by bolts 26 which pass through the sides of the teeth and into the sides of the said bars. The slotted openings 22, as clearly illustrated, are in effect staggered, the openings of the adjacent pairs being separated by an angle of ninety degrees, so that the teeth 25 are positioned in correspondingly staggered relation on the surface of the cylinder. Each of the cover rings is also provided with slots for reception of short bars 27 which are secured in the slots by means of bolts 28, and which project beyond the peripheral surfaces of the said rings to provide means for attaching thereto a pair of

the teeth 25, these teeth being secured to the bars by bolts 26, as previously described. Pins 24 are also provided in the projecting ends of the bars 27 and immediately adjacent the outer peripheral surface of the rings. The teeth 25 of the cover rings preferably bear a normal relation as to arrangement and spacing to the other teeth of the series.

The stub shafts 17 are best illustrated in Fig. 3, and in effect are a double-ended replica of the stub shafts 16 described above. Each of the stub shafts 17 comprises an intermediate journal portion 31 which are supported in bearings 6 in the saddles 5. At each side of the journal 31 is a flange 32 corresponding to the flange 18 of the stub shafts 16, and through which pass the bolts 33 which secure the stub shaft to the ends of the adjoining cylinders 12, these bolts entering the rings 14, as illustrated. The flanges 32 of the stub shafts 17 are solid, and in effect constitute closures for the ends of the cylinders 12. Against the outer face of each of the flanges 32 is secured an extension ring 34, bolts 35 securing these rings in position, and means is provided, as previously described in connection with the rings 21, for securing thereto teeth 25, the corresponding elements of the attaching means being designated by the same reference numerals as previously used in connection with the said rings 21. It will be noted that the rings 34 constitute in effect extensions of the adjacent ends of the adjoining cylinders 12 and provide for a uniform distribution of the teeth 25 over the entire effective length of the crusher rolls, even in those areas which are supported in the bearing 6.

As illustrated in Fig. 2, the crusher plates 9 and 10 are composed of a plurality of vertical sections 39 and 40 respectively, arranged side by side and supported upon rods 41 and 42 respectively, these rods in turn being supported in brackets 43 extending inwardly from the walls 1 and 2 of the pit. The face of each of the sections 39 and 40 is formed with a plurality of vertical corrugations, which in effect mesh with the teeth 25 of the crusher rolls. The lower ends of each set of the crusher plate sections associated with an individual section of the crusher roll are collectively united through the medium of a rod 44. Each of these rods is connected by a pair of suitable connecting rods 45 with cranks 46 on a shaft 47 journaled in brackets 48 secured to the outside of the walls 1 and 2. Angular adjustment of the shafts 47 results, therefore, in an adjustment of the positions of the lower ends of the crusher plates with respect to the rolls 7 and 8.

It will be noted that with the aforedescribed construction, the bodies of the crusher rolls are constituted by simple hollow steel cylinders, 12; that the teeth 25 may be readily attached and detached without necessity for dismantling any other portion of the roll structure; and that by reason of the simplified construction of the roll eliminating necessity for a solid supporting shaft and the use of steel in all structural elements, with the exception of the teeth, which preferably are of cast iron, the weight of the roll assembly has been reduced to a minimum with no sacrifice of strength; and that it is accordingly practicable to reduce to a relatively few the number of the bearing saddles 5 and the transverse supporting means 4. Also, by the intermeshing construction of crusher plate and crusher roll, the reduction of the ash to small sizes is insured, and the crusher roll herein illustrated is, therefore, well adapted for use with sluices or similar means for disposing of the ash deposited in the ash pit. The crusher pit as a whole is both structurally and operatively economical and constitutes a material improvement in the art.

I claim:

1. A crusher roll, comprising an integral hollow cylindrical body member, a plurality of projections extending outwardly from said body member, a plurality of crusher teeth, one for each of said projections, said teeth having an extended recess provided therein for receiving the associated projection, and means extending through each tooth and engaging the associated projection for securing said tooth against the outer surface of said roll.

2. A crusher roll, comprising aligned hollow cylindrical sections having crusher teeth distributed over the length thereof, a connecting member having enlarged terminal portions secured to and closing the adjacent ends of said sections and an intermediate journal portion, an extension secured to said member adjacent to each of the enlarged terminal portions thereof and in axial alignment with said sections and forming a continuation of the latter, and crusher teeth provided on said extensions so arranged with respect to the teeth on said sections proper that the teeth are in substantially uniform distribution over the entire length of the roll.

3. A crusher roll comprising a cylindrical body member having a plurality of sets of oppositely arranged openings therein, rods extending transversely through said cylinder and projecting through said openings beyond the peripheral surface of the cylinder, and teeth detachably secured to the projecting ends of said rods.

4. A crusher roll comprising a hollow cylindrical body member having a plurality of sets of oppositely arranged openings, rods extending from the interior of the cylinder through said openings and beyond the peripheral surface thereof, means for retaining said rods in the cylinders, and teeth detachably secured to the outer projecting ends of said rods.

5. A crusher roll, comprising a cylindrical body member, a journal member at one end of said body member, and an annular member secured to said journal member in axial alignment with said cylindrical body member, and constituting in effect an extension of the cylindrical body of the crusher roll, and teeth secured to the outer periphery of said annular member.

6. A crusher roll comprising a cylindrical body member, a journal member at the end of said body member, an annular member secured to said journal member and constituting in effect an extension of the cylindrical body of the crusher roll, and teeth secured against the peripheral surfaces both of the body cylinder and of said annulus.

7. In a crusher roll, the combination with a cylindrical body portion, of journal members secured at the ends of said body cylinder, extension rings secured to said journal members, in effect constituting extensions of the body cylinder, both the cylinder and the said rings having openings, rods extending through said opening and projecting beyond the peripheral surfaces of the body cylinders and the rings, and teeth secured to the projecting ends of said rods.

8. A crusher roll comprising a hollow cylindrical body having apertures, elements extending through said apertures from the interior of the cylinder and beyond the peripheral surface thereof, means for detachably retaining said elements

in position, and teeth detachably secured to the outer projecting ends of said elements.

9. A crusher roll comprising a hollow cylindrical body having apertures, elements extending from the interior of the cylinder through said apertures and beyond the peripheral surface of the cylinder, means engaging the projecting ends of said elements for detachably retaining them in position, and teeth detachably secured to the projecting ends of said elements and confining said element-retaining means.

10. A crusher roll comprising axially aligned sections, a journal member connecting the adjoining ends of said sections, said journal member having portions constituting in effect extensions of said sections, and teeth secured both to said sections and to the extension portions of said journal member, said extension elements affording a substantially uniform distribution of the teeth over the entire length of said roll.

11. A crusher roll comprising a plurality of axially aligned cylindrical sections, a bearing member connecting the adjoining ends of said sections and having cylindrical portions corresponding in their peripheral diameters to the latter, and teeth carried by and projecting from the cylindrical surfaces both of said sections and said bearing member.

HERBERT E. PRESTON.