March 24, 1931. J. L. SCHULTZ 1,798,000

ROTARY CRUSHER

Filed Dec. 8. 1926

Fig. 1.

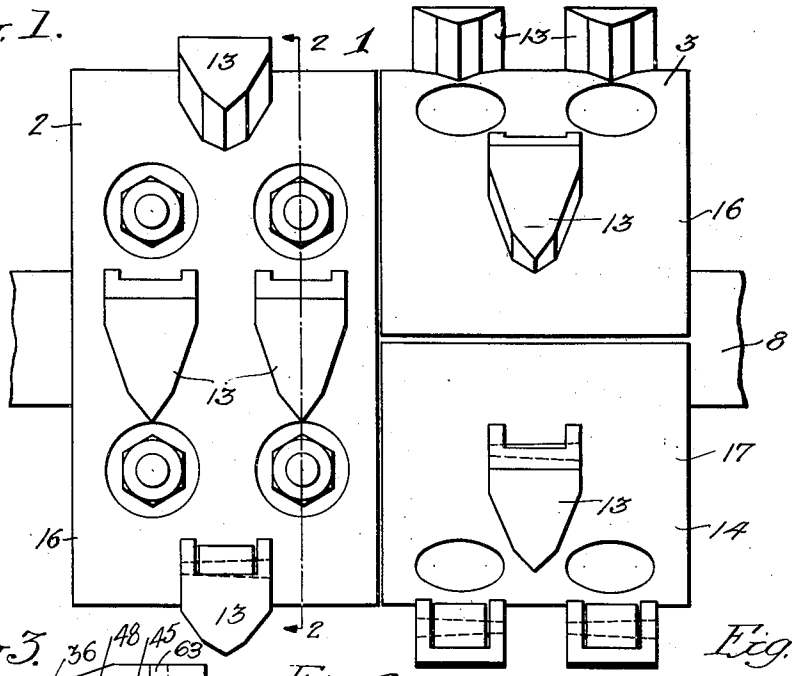


Fig. 3.

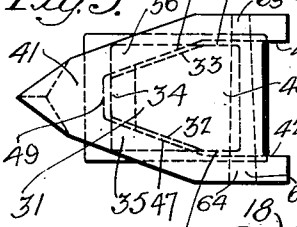
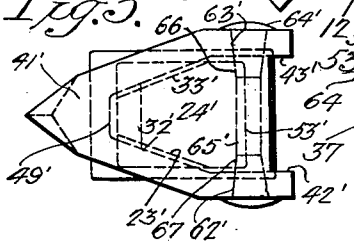


Fig. 2.

Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE

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ROTARY CRUSHER

Application filed December 8, 1926. Serial No. 153,315.

My invention relates to crushers, having particular relation to rotary crushers applicable, for example, to furnace installations.

One object of my invention is to provide a crusher construction wherein a tooth is provided with a removable wearing head part, so that the damaged working portion of the tooth may be easily and quickly removed without disturbing the remaining portion of the tooth and associated crusher parts.

Another object of my invention is to provide a two-part tooth, of which one part is provided with a wedge portion and the other a co-acting recessed portion, together with a pin for removably securing said portions in interlocked relation.

A further object of my invention is to provide a tooth construction wherein a working part is riveted to a root part.

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

Fig. 1 is a top plan view of a crusher roll embodying my invention;

Fig. 2 is a transverse sectional view on the line 2—2 Fig. 1;

Fig. 3 is a slightly enlarged top plan view of one of the teeth apart from the crusher roll;

Fig. 4 is an end elevational view of the structure of Fig. 3, looking from the right; and

Fig. 5 is a view similar to Fig. 3 but showing a modification.

Referring to the drawing, a crusher roll 1 comprises at least a pair of sections 2 and 3, the number of sections depending upon the desired length of the crusher. Fig. 2 shows in detail the structure of each of the sections 2, 3, the sectional plane, however, being on the line 2—2 passing through the crusher roll section 2. This section will be described in detail only, inasmuch as the section 2 is substantially identical therewith.

The section 2 comprises an inner elongated shell 4 having one or more inwardly extending ribs 5 formed to abut against the flat sides 6 of a rectangular portion 7 of a shaft 8 running lengthwise of the crusher roll 1. The shell 4 may comprise at least two sections 9 and 11 for convenience in assembling on the shaft 8. The shell 4 is also provided with a plurality of axially elongated flat sides 12 which serve to support one or more teeth 13.

The teeth 13 may be secured in position by means of an outer cylindrical clamping shell 14 provided with one or more inwardly extending supporting ribs 15 adapted to engage the several outer sides 12 of the inner shell 4. The outer shell 14 preferably comprises sections 16 and 17 which are releasably clamped together on opposite sides by pairs of bolts 18 and 19, respectively. The pairs of bolts 18 and 19 also extend through opposite pairs of recesses 21 and 22 in the inner shell 4, whereby relative longitudinal movement between the shells 4 and 14 may be substantially prevented and the whole securely locked in position.

According to my invention, each of the teeth 13, of which Fig. 2 illustrates one in vertical cross section, comprises a root part 23 and a removable wearing head part 24, the two parts being mechanically interlocked, so that in the event of the damaging of the head 24, it may be readily removed without disturbing the root part 23 and associated sections 16 and 17 of the outer shell 13, all as will presently appear in greater detail. The root part 23 is provided with an enlarged base portion 25 which abuts against shoulders 26 formed in a socket or coring 27 in the outer shell 14, whereby a movement of the root part 23 outwardly of the shell 14 may be prevented.

The root part 23 is provided with a head portion 28 which extends outwardly of the socket 27 beyond a working or outer surface 29 of the shell section 14. The head portion 28 is provided with a leading portion 31 of wedge shape having angled sides 32 and 33 terminating in a substantially vertical front end wall 34. The angled sides 32 and 33 form substantially horizontal shoulders 35 and 36 which are preferably positioned below the outer working surface 29 of the shell 14 for reasons as will presently appear.

The removable working part or cap 24 of

each of the teeth 13 is provided with a recess 37 of triangular form on an underside 38 thereof. The recess 37 extends from a rear or lagging end portion 39 forwardly in the direction of a leading end portion 41. The recess 37 comprises substantially parallel side wall portions 42 and 43 which are respectively positioned adjacent to flat side wall portions 44 and 45 of a lagging portion 46 of the root head portion 28. The recess 37 also includes angled side wall portions 47 and 48 extending inwardly toward the leading end portion 41 and terminating in an end wall 49, as in the case of the corresponding walls 32, 33 and 34 of the wedge portion 31 of the root part 23. A top wall 50 of the recess 37 is extended rearwardly to provide an end portion 52 which overhangs a rear side wall 53 of the lagging portion 46 of the root head portion 28.

The underside 38 of the side walls 47, 48 and the leading end portion 41 of the tooth part 24 is formed complementarily to the adjacent working surface 29 of the crusher roll 1 and it may be secured in engagement therewith by means of a wedge portion 54 extending rearwardly from the wall 49 into a recess 55 formed in the adjacent end wall 34 of the root head portion 28. The wedge portion 54 may comprise a downwardly inclined wall 56, which is spaced from the upper wall 50 of the recess 37 by a wall section 57, and an upwardly inclined wall 58 extending from the under side 38 of the end portion 41, the walls 56 and 58 having a meeting edge 59. The shoulder formed by the wall 56 in co-operation with the adjacent side of the recess 55 tends to prevent a radially outward movement of the wearing part 24 during periods of operation. Similarly, the shoulder formed by the wall 50 in connection with the adjacent side of the recess 55, causes a clamping engagement to obtain between the underside 38 of the working part 24 and the working surface 29 of the roll 1. The seated or interlocking relation of the wedge portion 54 and the recess 55 may be effected by moving the head part 24 circularly in a clockwise direction over the outer surfaces 29 of the roll 1.

My invention further contemplates means, whereby the seated relation between the wedge portion 54 and the recess 55, as well as the under side 38 and the adjacent roll surface 29 may be maintained until it is desirable to remove the head part 24. To this end, I extend the side wall portions 42 and 43 rearwardly of the lagging side 53 of the root head portion 28, and provide these extensions with aligned tapered apertures 62 and 63 for the removable reception of a tapered pin 64. An adjacent portion of the rear side wall 53 is also provided with a tapered recess 65 which engages substantially one-half only of the circumference of the removable wedging pin 64. Thus, not only is the lagging end portion of the wearing part 24 locked against radial movement, but a reverse or counterclockwise movement of the head part 24, as occurs when this part is to be replaced, is prevented. In addition, it is also noted that the wedging action of the pin 64, as it is being forced into abutting relation with the adjacent side 53 of the tooth head 28, causes the locking of the wedge 54 in the recess 55 and the clamping of the underside 53 of the removable head part 24 against the outer part 29 of the roll 1.

In the event of the damaging of the tooth 13, the pin 64 is forced transversely thereof out of wedging engagement with the side wall apertures 62 and 63 and the semi-circular recess 65, permitting a counterclockwise circular movement of the removable tooth part 24 over the surface 29 of the roll 1 and the consequent removal of the wedge portion 54 from the recess 55. The tooth part 24 may now be lifted vertically from the roll 1 and replaced by a new wearing tooth part which is clamped in position by moving the wedge portion 54 thereof into engagement with the recess 55 of the original tooth part and clamping the whole together by the same wedging pin 64.

An alternative method of securing the head part 24 in position is shown in Fig. 5, wherein side wall extensions 42′ and 43′ of a head part 24′ are provided with oppositely flared aligned apertures 62′ and 63′ for the reception of a rivet 64′. An adjacent portion of a rear side wall 53′ of the root part 23′ is provided with a semi-circular recess 65′ having tapered end portions 66 and 67 respectively adjacent to the apertures 62′ and 63′. When the tooth parts 23′ and 24′ are to be secured together, the rivet 64′ is positioned in the recess 65′ with its ends extending through the side wall apertures 62′ and 63′. The rivet 64′ is then upset so that it assumes the form in Fig. 5 and rigidly locks the tooth parts 23′ and 24′ together. In the event of the damaging of the head part 24′, it is broken so that it may be removed and a new head part riveted in position.

While I have shown only two embodiments of my invention, for the purpose of describing the same and illustrating their principles of construction and operation, it is apparent that various changes and modifications may be made therein without departing from the spirit of my invention, and 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 two-part tooth, of which one part is provided with a recess and the other a portion extending into said recess, one of said parts having a wedge portion and the other a co-acting recess portion, said wedge and recessed portions being positioned in said

first-mentioned recess, and a movable wedging element positioned in at least one of said recesses so as to secure said portions in seated relation.

2. A crusher roll having a socket, a tooth having a body part adapted to be positioned in said socket, and a removable head part, said parts having portions movable into seated relation upon a substantially circular movement of one of said parts, and means whereby a reverse circular movement may be prevented other than when said last-mentioned part is to be removed from the other part.

3. A crusher roll having a two-part tooth, said parts having interlocking portions movable into seated relation upon a substantially circular movement of one part about said roll, said interlocking portions preventing a radial movement between the two parts of said tooth, and means including a rivet for preventing a relative circular movement of said parts tending to unseat said interlocking portions.

4. A crusher roll having a two-part tooth, of which a leading portion of one part is provided with a recess and the other part a co-acting shoulder, said shoulder being movable into interlocking relation with said recess upon a circular movement of one of said parts about the periphery of said roll, and means in abutting relation to a lagging portion of one of said parts serving to prevent a reverse circular movement of said last-mentioned part, whereby said shoulder and said recess may be removably locked in position.

5. A tooth comprising a root part and a removable head part, one of said parts having a recessed portion adapted to receive a portion of the other part, one of said portions having a wedge and the other a co-acting recess, whereby relative radial movement between said parts may be prevented, and a locking element extending across said recessed portion and positioned in abutting relation to an adjacent portion of the other part.

6. A crusher having a two-part tooth, of which one part is mounted in said roll and provided with a section extending beyond the periphery thereof, the other part of said tooth being formed to constitute a cap for said extended section, leading portions of said parts being so formed as to establish an interlocked relation therebetween, and means in interlocked relation to lagging portions of said tooth parts for securing said cap part in position.

7. A crusher tooth comprising a base part and a removable wearing part constituting a cap therefor, leading portions of said cap and base parts being in interlocked relation, and a wedging pin carried by a lagging portion of said cap positioned in abutting relation to a lagging portion of the other tooth part.

8. A two-part tooth comprising a root part and a removable head part having a recess adapted to receive one end of said root part, said recess having side and end walls, said end wall being provided with a wedge and the adjacent portion of said root part having a complementary recess, and means extending between said side walls for removably securing said wedge in seated relation to said complementary recess.

9. A two-part crusher tooth, one part of which is provided with a recess having side end and top walls, said side walls being inclined inwardly towards said end wall, the latter having a wedge portion extending toward the lagging end of said tooth.

10. A rotary crusher having a two-part tooth, a root part of which is mounted in said rotary crusher and provided with a portion extended beyond the periphery thereof, the other part constituting a removable cap for said extended portion and provided with a recess extending toward the leading end thereof and terminating in an oppositely extending shoulder portion, and removable locking means extending through said recess in operative relation to a lagging portion of said root part, whereby said second-mentioned part may be removably secured in position.

11. A roll, a two-part tooth therefor, a base part of said tooth being seated in said roll, a wearing part being removably mounted on an outer end of said base part, said wearing part having a recess of wedge shape extending toward the leading end of the tooth and terminating in an oppositely extending wedge portion, and a wedging element operatively associating said parts.

12. A two-part tooth comprising a base part having a head portion formed to constitute a wedge, the other part having a complementarily recessed portion for said wedge portion, one of said parts having a wedge portion and the other a complementary recessed portion, and a locking pin removably carried by at least one of said parts positioned in abutting relation to the other.

13. A crusher roll having a two-part tooth, one part being positioned within said roll and having a head portion extending therebeyond, said portion being of wedge shape and having a recess on a lagging portion thereof, the other part of said tooth being formed to constitute a cap for said wedge portion and movable into operative relation upon a circular movement about the priphery of said roll, said tooth parts having portions movable into interlocking relation upon said circular movement serving to prevent a radial movement of said cap part, and means removably mounted on said cap part and positioned in said lagging recess portion where-

by a reverse circular movement may be prevented.

14. A wearing tooth part provided with a recess extending toward the leading end thereof and terminating in an oppositely extending wedge portion defining at least two locking shoulders, and a pin extending through said recess and supported by said tooth part.

15. In a crusher, a two-part tooth, of which one part is provided with a wedge portion and the other part a co-acting recess portion, and means for removably locking said portions in position comprising a pin extending from one of said parts, the other of said parts having a recess for engaging substantially one-half the circumference of said pin.

16. A crusher roll having a tooth, one part of which is positioned within said roll and provided with a head portion extending therebeyond, a leading portion of said head portion having a recess forming a locking shoulder, and a locking pin, a lagging portion of said head portion having a recess in cooperative relation to said pin and of a depth substantially equal to the radius of said pin.

17. A two-part tooth, of which one part is provided with a recess and the other a portion extending into said recess, one of said parts having a wedge portion and the other a co-acting recess portion, said wedge and recess portions being positioned in said first-mentioned recess, and means for securing said wedge and recess portions in seated relation.

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