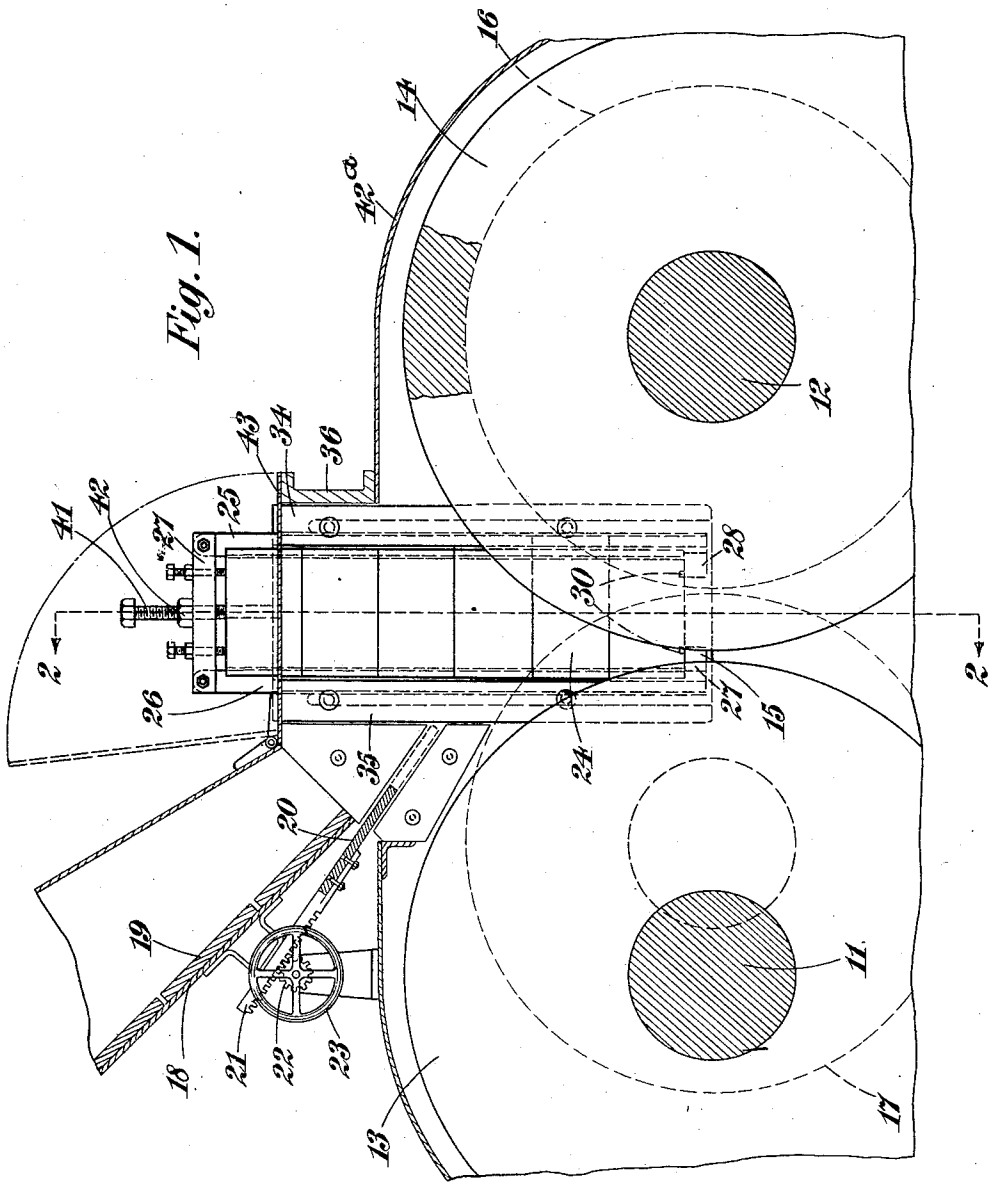
March 10, 1931. A. G. McGREGOR 1,795,663

CRUSHING ROLL

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Fig. 1.



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Fig. 3.

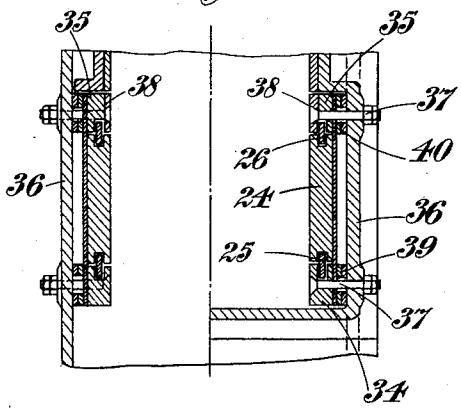


Fig. 2.

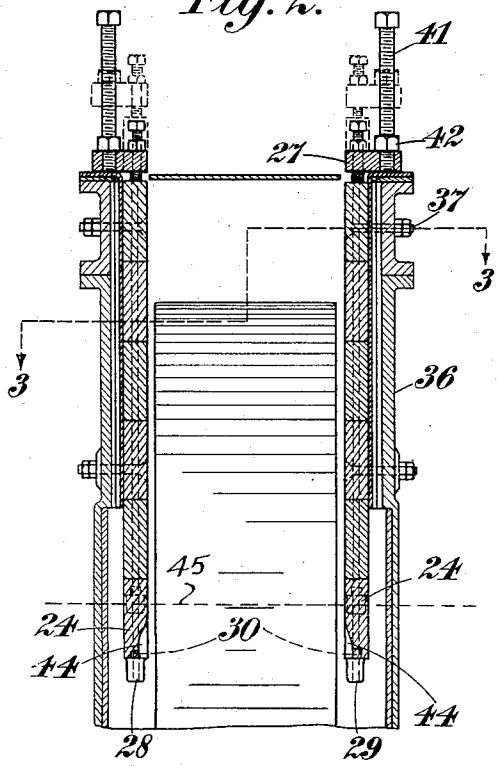
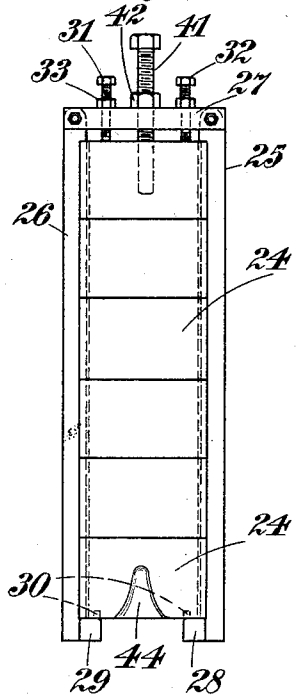


Fig. 4.



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UNITED STATES PATENT OFFICE

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CRUSHING ROLL

Application filed April 2, 1928. Serial No. 266,716.

This invention relates to improvements in crushing rolls and the like. Such machinery is ordinarily employed for crushing rock or ore and consists of two rolls mounted on parallel horizontal axes so that their peripheries nearly touch one another, forming a "throat" and rotated so that their upper surfaces move toward the throat and crush material fed into the throat as it is passing between them. In such machines the material is confined within the throat by means of side cheeks of hard material for example chilled cast iron or manganese steel.

It is an object of the invention to provide an improved apparatus of this character capable of producing a uniform product over extended periods of use and in which the effects of wear are, as far as possible, counteracted by the design.

It is usual to mount one of the rolls in bearings which can be moved laterally toward the other roll so that the effect of wear on the periphery of the rolls may be taken up. In many cases the roll shells wear so much as to require renewal after only one or two months' service while there is a tendency for the wear not to take place equally over the whole cylindrical periphery of the rolls but to produce grooves, or very often flanges toward the side edges which lie against the cheeks. Wear also takes place on the cheeks themselves and such wear is particularly pronounced at the portion of the cheek which lies opposite the throat so that the cheeks are frequently worn away at this point to such an extent as to interfere with the operation of the rolls and to allow the passage of oversize material past the edges of the rolls before the cheeks elsewhere are seriously worn.

The present invention provides in rock crushing rolls the combination of a pair of co-operating rolls, a cheek-plate at the side of the rolls adjacent to the throat thereof and means for adjusting the cheek-plate in a plane parallel to the end faces of the rolls. The effect of such an adjustment is that different portions of the cheek-plate can be brought opposite the throat and the wear over those portions thus equalized.

Furthermore the invention provides in crushing rolls the combination of a pair of co-operating rolls, a cheek-plate at the side of the rolls adjacent to the throat thereof and means for adjusting the lower edge of the cheek-plate nearer to or further from the throat. It has been found that in this way the amount of material crowding through the space beneath the lower edge of the cheek-plate instead of passing directly through the rolls may be varied at will and the formation of flanges on the rolls thereby avoided. Moreover, the effect of wear on the cheek-plate in allowing the passage of oversize material can be regulated. Conveniently the adjustment of the cheek-plate nearer to or further from the throat takes place in a plane parallel to the end faces of the rolls and thus the two adjustments already described are combined in one.

The cheek-plate may be mounted in a slide and adjustment effected by adjusting the slide, for example by an adjusting screw. Preferably the cheek-plate is removably mounted in the slide in such manner that it may be reversed when desired so as to expose a fresh wearing surface, either by turning it upside down or front for back. The cheek-plates are preferably divided into sections so that only the section actually opposite the working throat needs to be renewed when worn out.

In the accompanying drawings:—

Figure 1 is a side elevation partly in section with one side of the machine removed to show the rolls in relation to the cheek-plates;

Figure 2 is a cross-section on the line 2, 2 of Figure 1;

Figure 3 is a horizontal section along the line 3, 3 of Figure 2, and

Figure 4 is a detail of the cheek-plates assembled in a slide.

In the drawings, Figure 1 shows two roll shafts 11, 12 carrying rolls 13, 14. The outer peripheries of the rolls when new are shown in full lines the throat between them being located at 15. The roll shells wear quite rapidly with service and are often renewed every month or two. In order to maintain the throat 15 at the correct width the shaft 11 is mounted in known manner so

as to be adjustable toward and from the shaft 12 and the dotted lines 16, 17 indicate the position of the rolls when worn. It will be observed that the throat 15 moves gradually towards the right in the figure. The shaft 11 is often adjusted each day for the wear of the rolls 13, 14 during the previous day.

A chute 18, serves to deliver ore to the space between the rolls and this is lined along the bottom with plates 19. At the bottom of the chute there is a sliding plate 20 connected to a rack 21. The rack 21 is operated by a pinion 22 and hand wheel 23 so that the delivery-plate 20 may be adjusted so as to project more or less below the bottom of the chute 18. By adjusting the plate 20 the ore may be caused to drop exactly into the throat 15. The importance of this is that as the shells are worn the position of the throat 15 moves and ore issuing from the chute may strike one of the roll shells. These shells revolve at a peripheral velocity of about 2,000 feet per minute and on striking the shell the ore causes a grinding action thereon and moreover is caused to bound about in the crotch above the throat before it is nipped by the rolls. This results in increased wear of the roll shells and the roll shell 13 which tends more and more as it is moved over to take up wear to receive the first impact of the ore, is caused to wear faster than the roll 14. The result is a differential surface speed of the shell of the rolls which still further increases wear. By directing the ore accurately into the throat 15 the wear is found to be materially reduced and equalized.

On each side of the rolls 13, 14, cheek-plates 24 are provided. The cheek-plates 24 consist of a number of flat sections of similar size and shape with grooved edges which fit between longitudinal bars 25, 26. The bars 25, 26 are bolted together by cross-members 27 at the top. At their bottom end they carry inwardly turned lugs 28, 29 provided with dowel pins 30. The dowel pins 30 enter suitable recesses in the bottom of the lowermost cheek-plate section 24. In the cross member 27 are two clamp screws 31, 32 provided with lock nuts 33. The clamp screws force the sections 24 firmly downward on to one another and hold them all firmly against the lugs 28, 29 at the bottom of the bars 25, 26. The parts containing the cheek-plates constitute a frame or slide which is capable of moving up and down in a slideway formed by grooves in slide blocks 34, 35 bolted to the frame 36 of the rolls by bolts 37. The slide blocks 35 have removable cover strips 38 overlying the bar 26 and the cover strips are held down by the bolts 37 so that on slacking off the bolts it is easy to remove the slide with its cheek-plate sections. Lateral adjustment towards and from the rolls is provided by shims 39, 40 which lie between the slide blocks 34, 35 and the frame 36. The cross bar 27 has an ear on its outer side through which passes an adjusting screw 41 provided with a lock nut 42. Screwing the adjusting screw 41 downwards serves to raise the cheek-plates. If desired, matters can be arranged so that upon slacking off the bolts 37 in the slide bar 35 the slide becomes free and can be adjusted, while by tightening up the bolts the cover-strip 38 is drawn so firmly against the slide-bar 26 as to lock the parts in adjusted position.

The rolls are enclosed by an iron cover 42ª and the crotch between the rolls lies below a hinged lid 43 to permit of inspection of the apparatus. The usual means for driving the rolls are provided.

In use, the delivery plate 20 is adjusted so that the entering rock to be crushed falls neatly into the throat between the rolls and thus wear is reduced to a minimum. The greatest wear on the cheek-plates 24 takes place at the point just above the throat where the rock is squeezed the hardest by the rolls. The shape of the cheek-plate resulting from wear is indicated at 44 in Figures 2 and 4. In Figure 2 the cheek-plates are shown lowered so that the worn portion falls below the line 45 at which the principal wear takes place. This has the effect of presenting a different portion of the cheek-plates to the rock at the point of wear. A cheek-plate section may have a worn spot such as 44 at its middle portion if it has been operating at a time when the roll shells 13, 14 are about half worn out. Upon lowering, as shown in Figure 2, the same cheek-plate section 24 can still be employed. When the rolls 13, 14 are more nearly worn out the position of the throat 15 will have moved towards the right, as shown in dotted lines in Figure 1 and the same cheek-plate section will still be useful for another run in its original position. Again, the same section may be useful for another run with new roll shells 13, 14 when the throat 15 is at the left, as shown by the full lines in Figure 1. The section may furthermore be again utilized by inverting it in its position in the slide bars 25, 26 and when it is worn out in this position it can be still further used by reversing it so that the rear face becomes the front one. In this way, the metal comprising each cheek-plate section 24 can be practically all worn away before the section is entirely discarded. When the section is completely worn away, renewal does not involve replacement of the whole cheek-plate but only of the small worn section.

The present invention further provides means for correcting the tendency of the roll shells 13, 14 to wear unevenly across their faces. In some cases the shells have a tendency to wear more towards the centre and to form flanges towards their edges. By raising the cheek-plates by means of the screw

41 a regulated quantity of rock can be allowed to crowd in toward the edges of the rolls and underneath the bottom of the lowermost cheek-plate 24. This throws more work upon the flanged edges of the rolls and causes them to wear down. A somewhat similar effect can be obtained by adjusting the cheek-plates toward or from the faces of the rolls by altering the shims 39 behind the cheek-plates.

I claim:—

1. In crushing rolls, the combination of a pair of co-operating rolls, a slide for cheek-plates at the sides of the rolls, a plurality of substantially similar cheek-plate sections arranged end-to-end in the said slide, and means for adjusting the slide in a plane parallel to the end faces of the rolls to bring the cheek-plates into desired co-operative relation therewith.

2. In crushing rolls, the combination of a pair of co-operating rolls, a slide for cheek-plates at the side of the rolls, a plurality of substantially similar cheek-plate sections arranged end-to-end in said slide and in a plane parallel with the end faces of the rolls, and means for raising or lowering the slide to bring the cheek-plates into desired co-operative relation therewith.

3. In crushing rolls, the combination of a pair of co-operating rolls, a slide for cheek-plates at the side of the rolls, a plurality of substantially similar cheek-plate sections arranged end-to-end in said slide and in a plane parallel with the end faces of the rolls, and constructed to be reversible and interchangeable in said slide, and means for raising or lowering the slide to bring the cheek-plates into desired co-operative relation therewith.

4. In crushing rolls, the combination of a pair of co-operating rolls, a slide for cheek-plates at the side of the rolls a plurality of substantially similar cheek-plate sections arranged end-to-end in said slide and in a plane parallel with the end faces of the rolls, means for adjusting the slide toward and away from the end faces of the rolls, and means for raising and lowering the slide to compensate for wear.

5. In a crushing machine, the combination with a pair of crushing rolls and a chute for directing material to be crushed to the said rolls and adjacent to the throat thereof, sliding frames at the ends of said rolls, said frames being adjustable independently of said chute and in a plane parallel to the end faces of said rolls, and substantially similar cheek-plates mounted in said sliding frames and adjustable therewith, said cheek-plates being formed in removable and reversible sections.

6. In crushing rolls, the combination of a pair of co-operating rolls, a slide for cheek-plates in a plane close to but outside the plane of the rolls, a plurality of substantially similar cheek-plate sections arranged interchangeably and end-to-end in the said slide with the lower edge of the lowermost cheek-plate adjacent to the throat between the rolls, and means for raising and lowering the slide in a plane parallel with the end faces of the rolls for adjusting the position of the lower edge of the lowermost cheek-plate in relation to the throat.

In testimony whereof I affix my signature.

ALEXANDER GRANT McGREGOR.