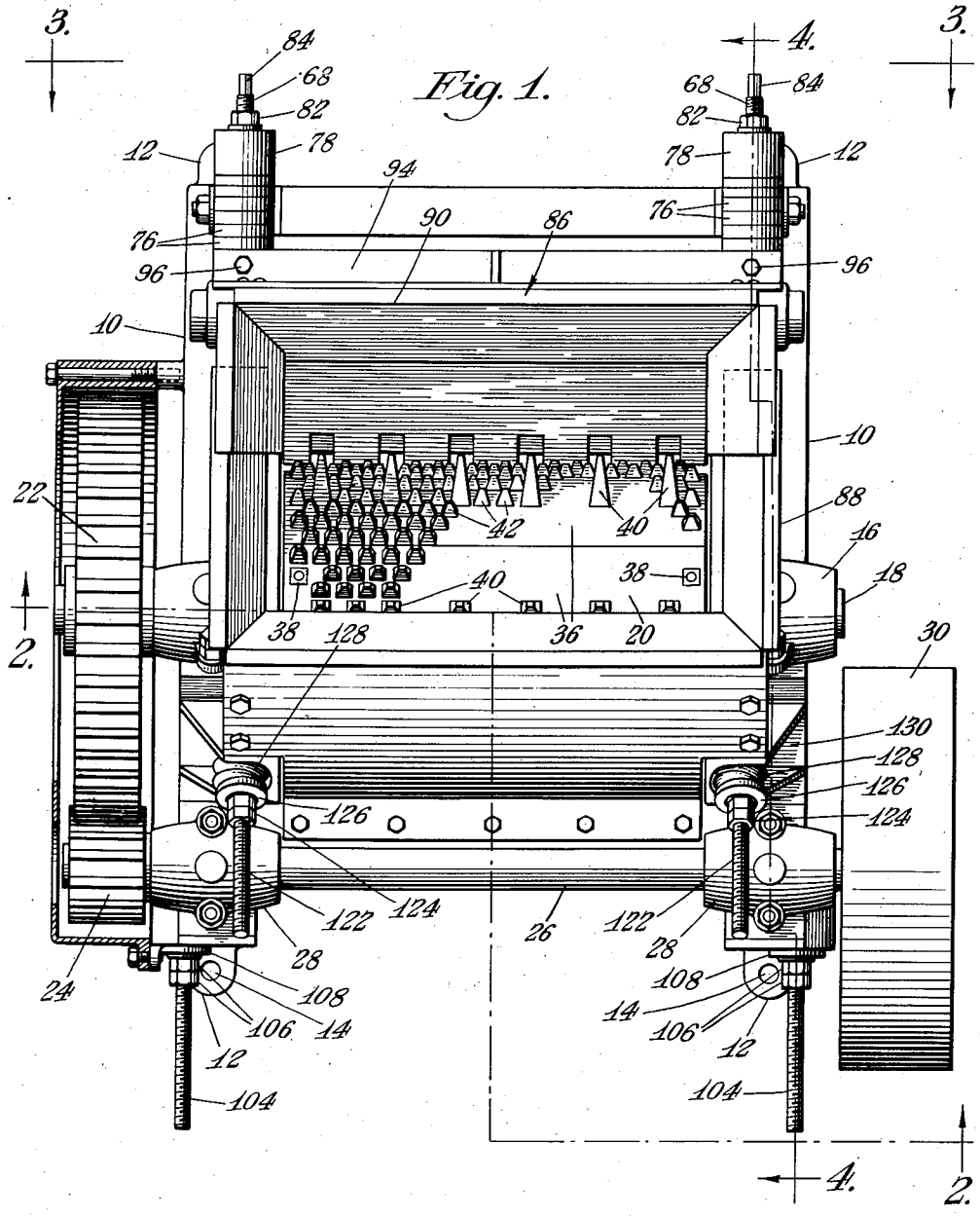
Dec. 8, 1936. H. W. RILEY 2,063,829

CRUSHER

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Fig. 1.



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CRUSHER

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Fig. 2.

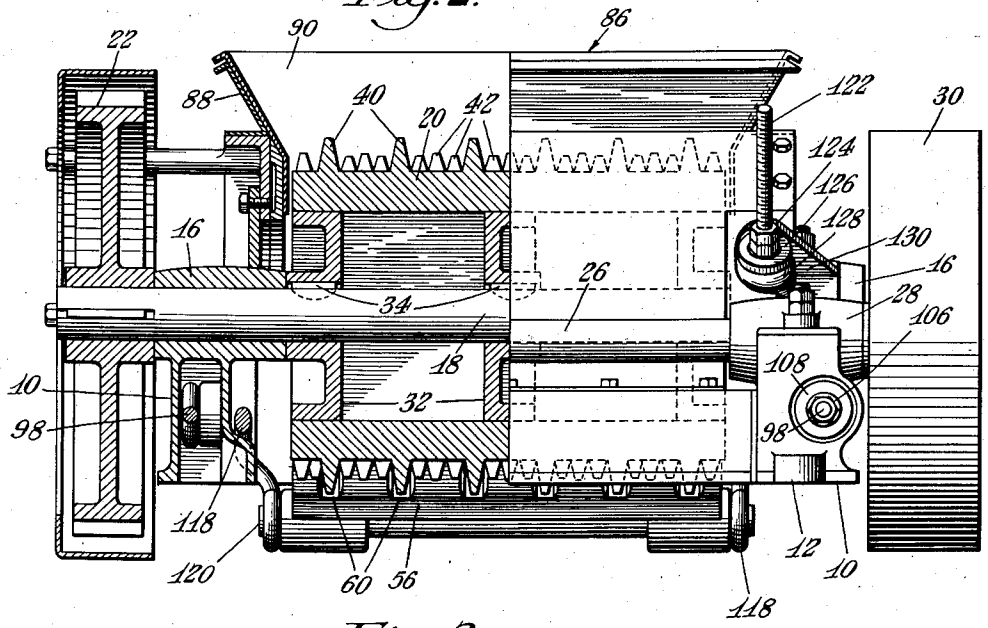
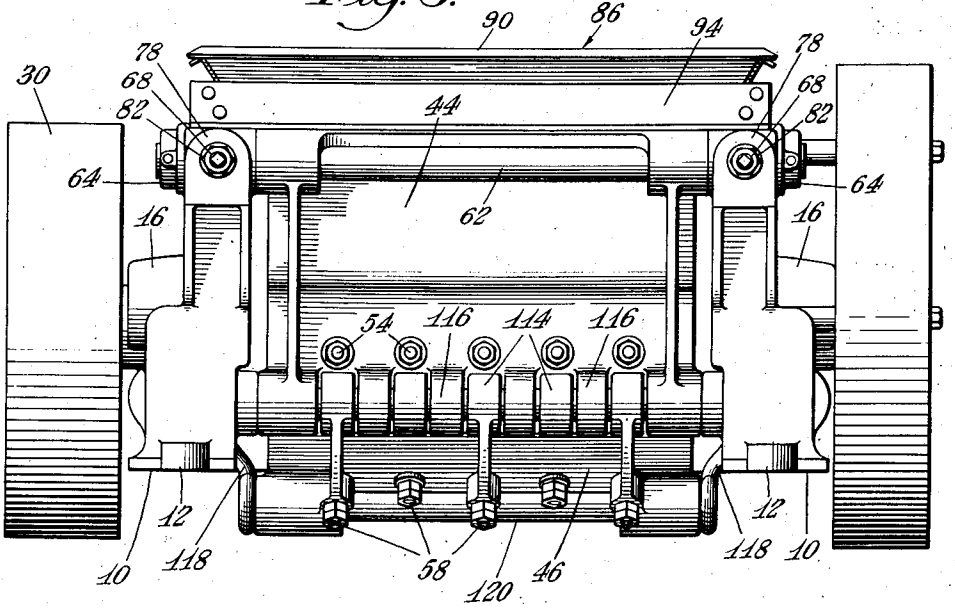


Fig. 3.



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Fig. 4.

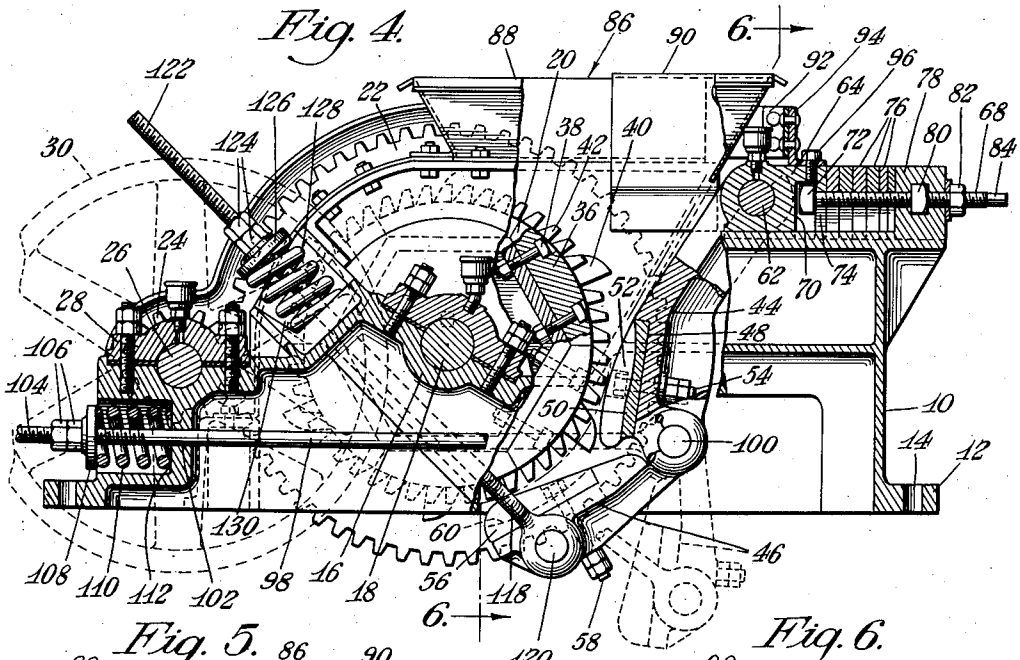


Fig. 5.

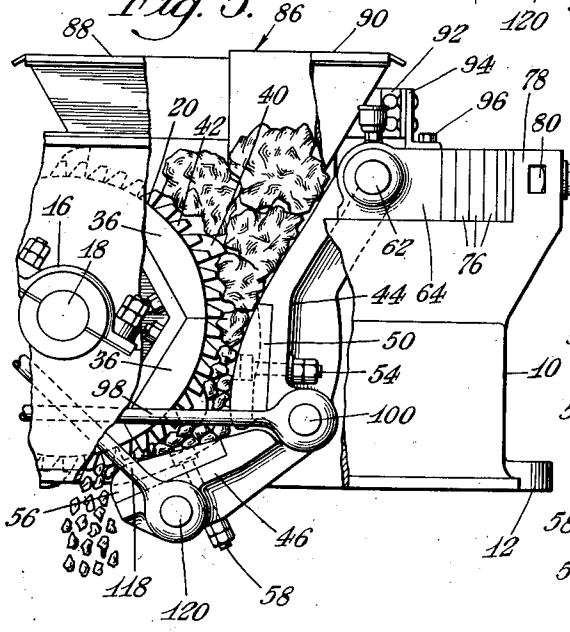
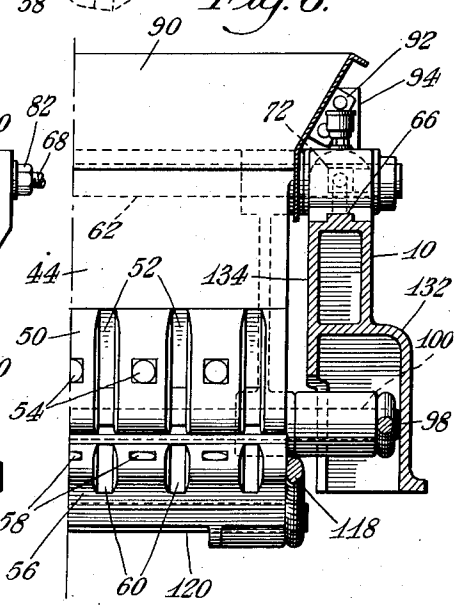


Fig. 6.



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Patented Dec. 8, 1936 2,063,829

UNITED STATES PATENT OFFICE

2,063,829

CRUSHER

Homer W. Riley, Pittsburg, Kans., assignor to The McNally-Pittsburg Mfg. Corp., Pittsburg, Kans., a corporation of Kansas

Application March 14, 1934, Serial No. 715,549

4 Claims. (Cl. 83—14)

My invention relates to coal reduction machinery, and has among its objects and advantages the provision of an improved single roll coal crusher.

In the past coal crushers of the single roll type have been provided with a single breaker plate arranged in operative relation with the roll for crushing the material passing between the roll and the breaker plate. Such breaker plates must of necessity be yieldingly mounted with respect to the roll, to compensate for large pieces of non-breakable material in the nature of rocks, tramp iron, etc.; otherwise, the passage of the non-breakable material through the crusher would break the machinery. Thus, the passage of non-breakable material through crushing machinery embodying a single roll and one breaker plate causes large quantities of uncrushed coal to pass through the machinery with the non-breakable material, thereby preventing complete uniformity to be attained.

An object of my invention is to associate a second breaker plate with the usual single breaker plate in such a manner as to attain a series of crushing actions at different points around the roll. Both breaker plates are yieldingly mounted with respect to the roll, but the arrangement is such that the movement of the first breaker plate away from the roll when non-breakable material passes through the machine causes the second breaker plate to be shifted to a position closer to the roll, thereby effectively crushing the otherwise unbroken coal. The second breaker plate is also mounted in such a manner that it may be moved away from the crusher roll, as when non-breakable material is passing between the roll and the second breaker plate, without materially shifting the position of the first breaker plate with respect to the crusher roll.

Another object is to yieldingly support the two breaker plates in operative relation with the crusher roll by adjustable spring tension rods radially arranged with respect to the crusher roll, thereby providing a maximum crushing action between the breaker plates and the roll.

A further object is to provide novel adjustment means for the first breaker plate for adjusting the width of the throat, to accommodate cubes of different size. I also provide an adjustable hopper operatively connected with said means, to be simultaneously adjusted with the adjustment of the breaker plate.

In the accompanying drawings:

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

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is an end view taken from the position indicated by line 3—3 in Fig. 1;

Fig. 4 is a sectional view taken substantially along the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary sectional view illustrating the operation of the breaker plates when non-breakable material is passing through the crusher; and

Fig. 6 is a sectional view taken substantially along the line 6—6 of Fig. 4.

In the embodiment selected to illustrate my invention, I make use of a frame 10 having flanges 12 provided with openings 14 to permit the base of the frame to be bolted to a suitable supporting structure. This frame is provided with two bearings 16 supporting a shaft 18 upon which a crusher roll 20 is mounted. Referring to Fig. 1, the shaft 18 is provided with a gear 22 arranged in mesh with a pinion 24 mounted upon a shaft 26 carried by bearings 28 associated with the frame 10 in the same way as the bearings 16. A drive pulley 30 is connected with the shaft 26 for connection with a suitable source of power, to operate the crusher roll 20.

Referring to Figs. 2 and 4, the crusher roll 20 comprises disc portions 32 keyed to the shaft 18, as at 34. These discs are hexagonal when viewed from the end of the roll, see Fig. 4, and have segments 36 bolted thereto through the medium of bolts 38. Each segment is provided with a plurality of large teeth 40 and a plurality of smaller teeth 42, both of which are arranged in operative relation with a pair of breaker plates 44 and 46.

In Figs. 4 and 6, I illustrate the breaker plate 44 as being cut away at 48 to receive a shoe 50 having slots 52 in its face adjacent the crusher roll 20, to accommodate the large teeth 40. I fasten the shoe 50 to the plate 44 by means of bolts 54. Thus, the shoe may be replaced for repair purposes. Similarly, the plate 46 is provided with a shoe 56 fastened in place by bolts 58 and grooved at 60 in the same way as the shoes 50.

The breaker plate 44 is pivotally mounted upon a shaft 62 having its ends journaled in blocks 64 riding upon rails 66, see Fig. 6. Means for adjusting the shaft 62 toward and away from the crusher roll 20, to change the position and/or angularity of the crusher plate 44 with respect to the crusher roll, comprises a screw 68 associated with each of the two blocks 64. Referring to Fig. 4, the block 64 is cutaway at 70 to receive the head 72 of the screw 68 and is slotted at 74 for accommodating the screw proper. I place a plu-

rality of slotted washers 76 between the block 64 and an abutment 78, which washers determine the position of the shaft 62.

Each screw 68 is provided with a nut 80 housed within its respective abutment 78, a lock nut 82, and a squared end 84 for the reception of a wrench. In adjusting the shaft 62, the lock nuts 82 are loosened and washers 76 removed or added. The screws 68 are then tightened for clamping the washers between the blocks 64 and abutments 78, and the lock nuts 82 screwed down.

The hopper 86, for conveying coal to be crushed to the crusher roll and its associated breaker plates, is made in two parts 88 and 90. The part 88 is bolted to the frame 10, while the part 90 is made adjustable with respect to the other part. Referring to Figs. 1 and 4, the part 90 of the hopper is provided with a plurality of extensions 92 riveted to an angle iron 94, which in turn is bolted to the blocks 64 through the medium of bolts 96. Thus, the part 90 is automatically adjusted with the adjustment of the shaft 62 for varying the width of the throat, to accommodate the machine to coal made up of larger or smaller pieces.

Means for yieldingly holding the breaker plate 44 in operative relation with the crusher roll 20 comprises rods 98 mounted upon a shaft 100 projecting beyond each lower side of the breaker plate. In Fig. 4, the rod 98 passes through an opening 102 in the frame 10 and is provided with a threaded end 104 having lock nuts 106 and a disc 108 pressing a coil spring 110 against the bottom of a bore 112 housing the spring. Both rods 98 are similarly constructed.

Thus, the breaker plate 44 can move away from the crusher roll during operation by a pivotal action about the shaft 62, as when non-breakable material is passing through the crusher. It is important that either the breaker plate or the crusher roll be yieldingly mounted to accommodate non-breakable material; otherwise, such material would break the crusher. However, displacement of the breaker plate 44 during operation of the crusher permits large lumps of coal to pass through the crusher during the period of displacement.

To crush the large pieces of coal passing the crusher roll 20 during the forced displacement of the breaker plate 44, I provide the second breaker plate 46. In Fig. 3, I illustrate the breaker plate 46 as being provided with aligned enlargements 114 alternately positioned between similar enlargements 116 formed integrally with the breaker plate 44. Both the enlargements 114 and 116 have aligned bores to receive the shaft 100. Thus, the breaker plate 46 is pivotally connected with the shaft 100.

Means for yieldingly holding the crusher plate 46 in yielding relation with the crusher roll 20 comprises a pair of rods 118 pivotally connected with a shaft 120 carried by the lower end of the breaker plate and passing upwardly at an angle. Each rod is threaded at 122 and is provided with lock nuts 124 and a disc 126 arranged to press against a coil spring 128 in the same way as the disc 108.

In Figs. 1 and 4, I illustrate the springs 128 as lying within pockets 130 comprising a part of the frame structure 10. Referring to Fig. 4, it will be noted that both sets of rods are arranged substantially radially with respect to the crusher roll 20, or substantially at right angles to the crushing surface of their respective breaker plates, so that direct crushing action is attained between the breaker plates and the crusher rolls.

In operation, the large pieces of coal escaping between the roll 20 and the breaker plate 44, during forced displacement of the latter, are thoroughly crushed by the breaker plate 46. It will be noted, in referring to Figs. 4 and 5, that a pivotal movement of the breaker plate 44 away from the crusher roll 20 causes an endwise movement of the breaker plate 46 in the same direction, namely, away from the crusher roll. The angularity of the rods 118 is such that it tends to move the lower end of the breaker plate 46 closer to the crusher roll 20, when the breaker plate 44 is moved away from the crusher roll. Thus, it will be seen that the crushing action between the breaker plate 46 and the crusher roll is increased when the crushing action depends upon a single breaker plate, in addition to providing a construction in which a series of crushing actions is attained about a single roll during normal operation. Further, the rods 98 hold the breaker plate 44 in normal relation with the crusher roll during the passage of the non-breakable material between the breaker plate 46 and the crusher roll. Thus, I have provided a construction in which practically all the lump coal passing through the crusher is reduced to a uniform size, which size may be determined by adjusting the breaker plates with respect to the crusher roll.

Should it be desired to operate my device with a single breaker plate only, the breaker plate 46 may be positioned according to the dotted line illustration in Fig. 4 by moving the lock nuts 124 back upon the threaded portion of the rods 118.

It will be noted in referring to Figs. 2, 4, and 6, that the frame 10 comprises in part a double wall 132 and 134. I position the rods 98 between the two walls and the rods 118 adjacent the inner wall. The arrangement is such that the walls 132 hold the looped ends of the rods 98 upon the shaft 100, while portions of the walls 134 hold the looped ends of the rods 118 upon the shaft 120.

Without further elaboration the foregoing will so fully explain my invention that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. The combination with a frame having a crusher roll supported thereby, of a breaker plate arranged in operative relation with the crusher roll, bearing means for pivotally connecting the breaker plate with said frame, a pair of tension rods connected with the frame and said breaker plate to yieldingly hold the latter in operative relation with the crusher roll, a second breaker plate pivotally connected with said first-named breaker plate, and tension rods connected with said frame and said second breaker plate, to yieldingly hold the latter in operative relation with the crusher roll.

2. The combination with a frame having a crusher roll supported thereby, of a breaker plate arranged in operative relation with the crusher roll, bearing means for pivotally connecting the breaker plate with said frame, a pair of tension rods connected with the frame and said breaker plate to yieldingly hold the latter in operative relation with the crusher roll, a second breaker plate pivotally connected with said first-named breaker plate, tension rods connected with said frame and said second breaker plate, to yieldingly hold the latter in operative relation with the crusher roll, said bearing means being adjustable for changing the position of the first-named breaker plate with respect to the crusher roll,

and an adjustable hopper having a part connected with said bearing means, to be adjusted by shifting of the bearing means for varying the capacity of the hopper.

3. The combination of a frame, a crusher roll mounted thereon, a first breaker plate pivotally connected with said frame, means for yieldingly holding the breaker plate in operative relation with the crusher roll, a second breaker plate, a pivotal connection between the first breaker plate and the second breaker plate, and means for yieldingly holding the second breaker plate in operative relation with said crusher roll, said last-named means being so constructed and arranged as to move the second breaker plate closer to the crusher roll when the first breaker plate is forced away from the crusher roll by the passage of non-breakable material through the crusher.

4. The combination of a frame supported crusher roll, a first breaker plate, an adjustable pivotal connection between said frame and the breaker plate, means for yieldingly holding the first breaker plate in operative relation with the crusher roll, a second breaker plate, a pivotal connection between the first breaker plate and the second breaker plate, means for yieldingly holding the second breaker plate in operative relation with said crusher roll, said last-named means being so constructed and arranged as to move the second breaker plate closer to the crusher roll when the first breaker plate is forced away from the crusher roll by the passage of non-breakable material through the crusher, and an adjustable hopper connected with said adjustable pivotal connection for adjustment therewith.

HOMER W. RILEY.