March 18, 1930. F. PARDEE 1,750,941

COAL BREAKER

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Fig. 1.

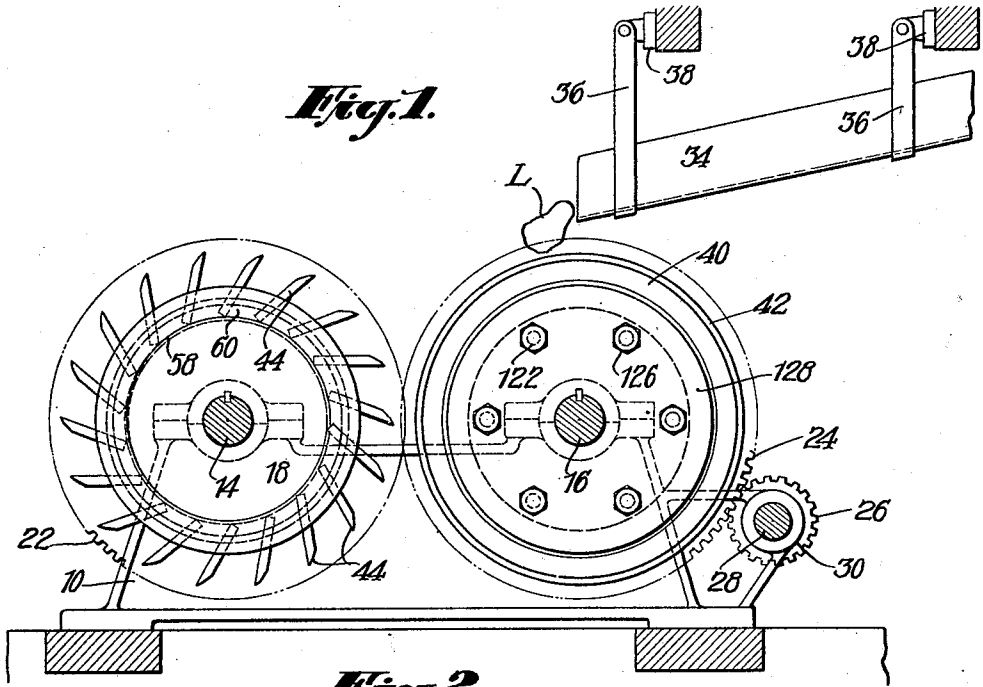
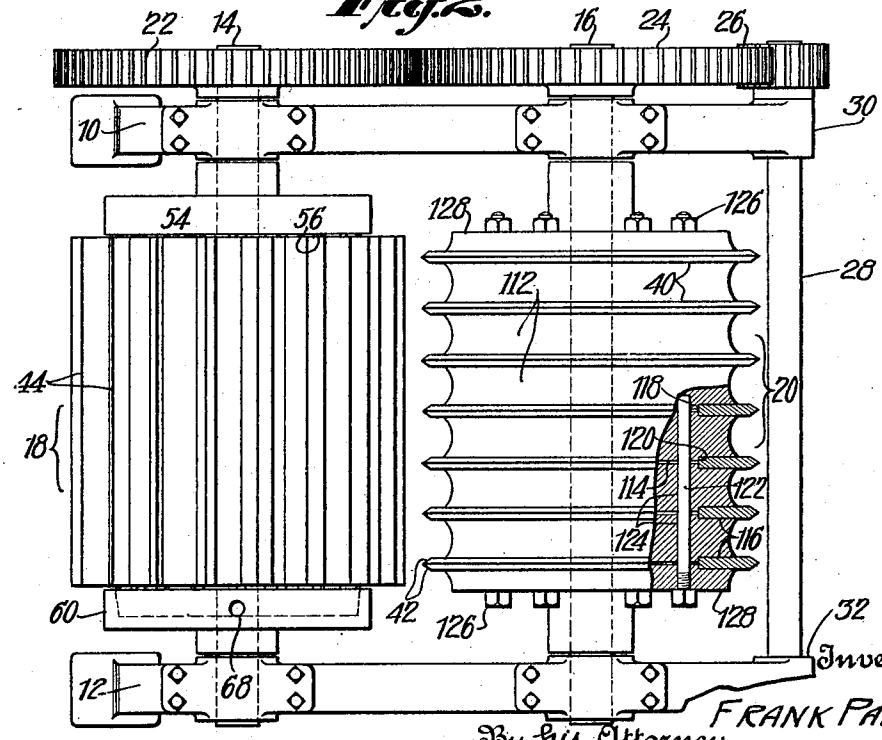


Fig. 2.



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Fig. 3.

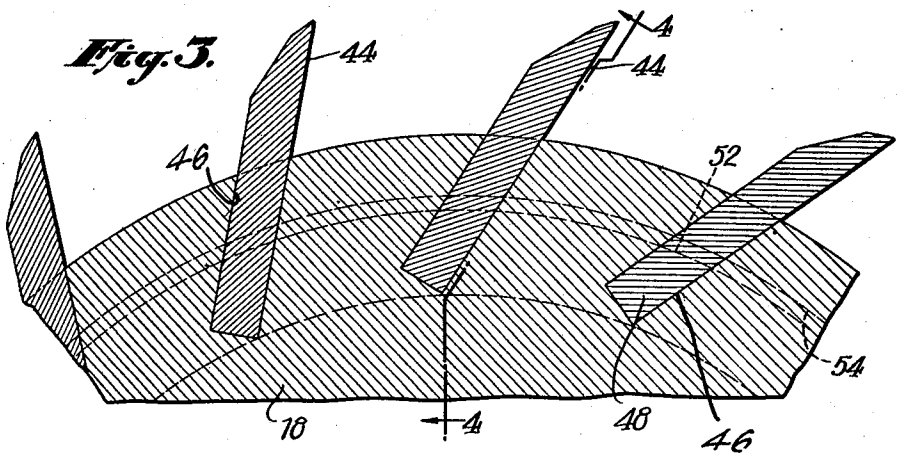


Fig. 4.

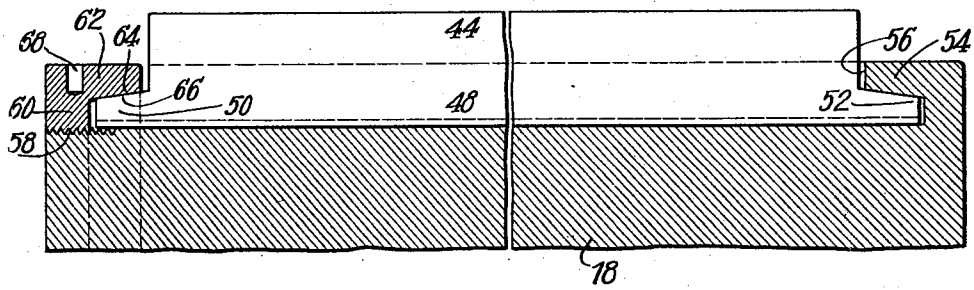


Fig. 5.

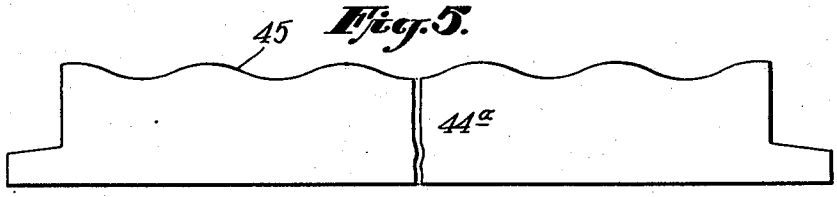
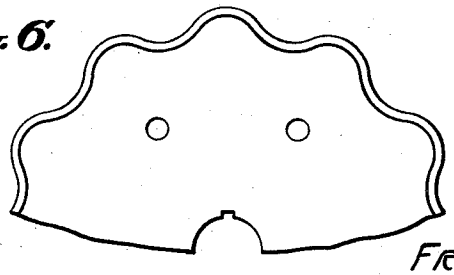


Fig. 6.



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Fig. 7.

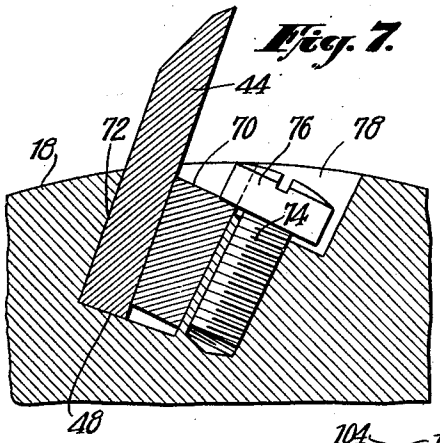


Fig. 8.

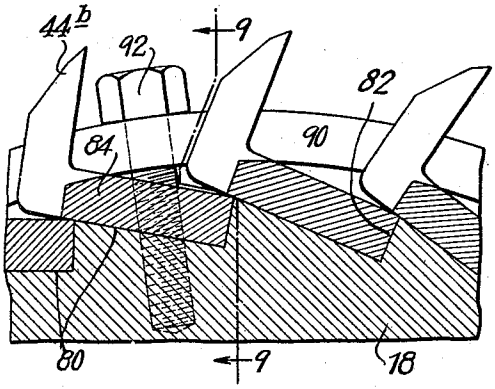


Fig. 10.

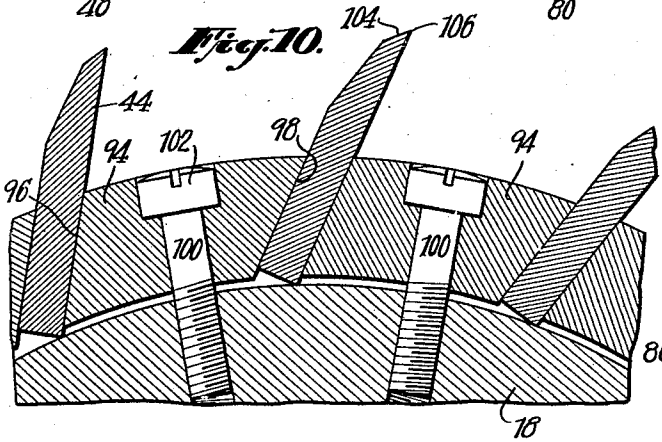


Fig. 9.

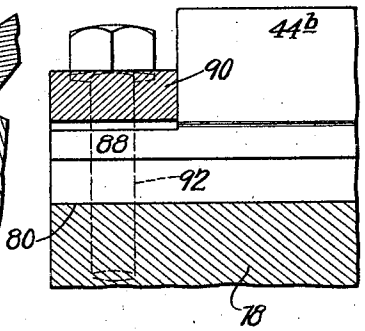
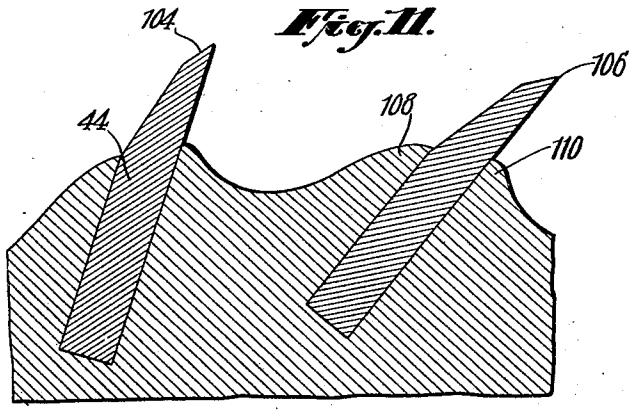


Fig. 11.



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Fig. 12.

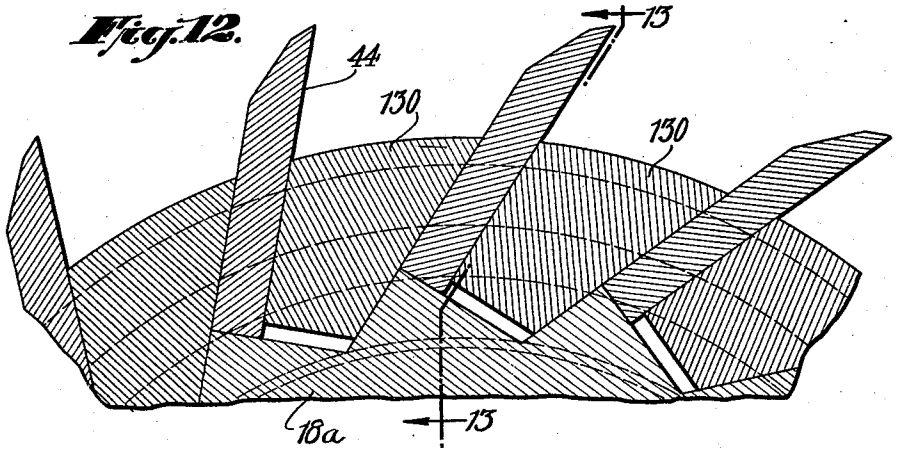


Fig. 13.

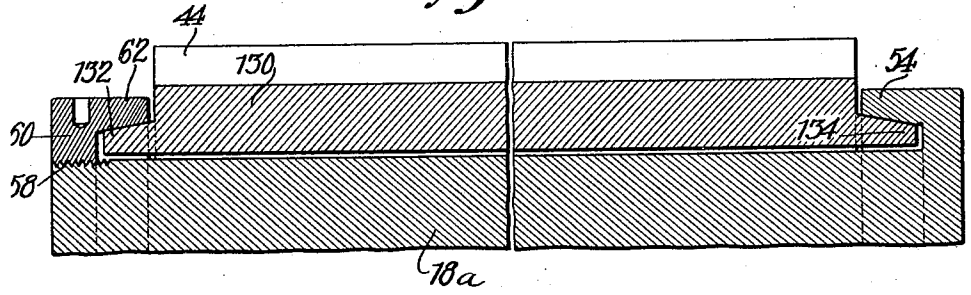


Fig. 14.

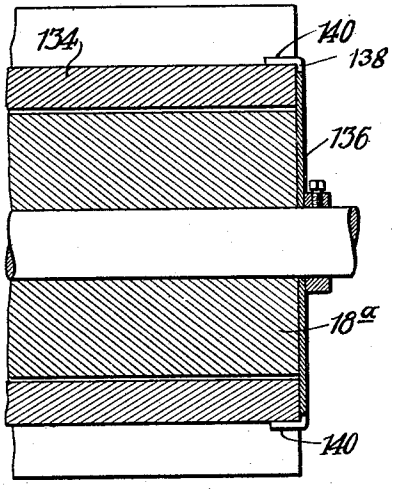
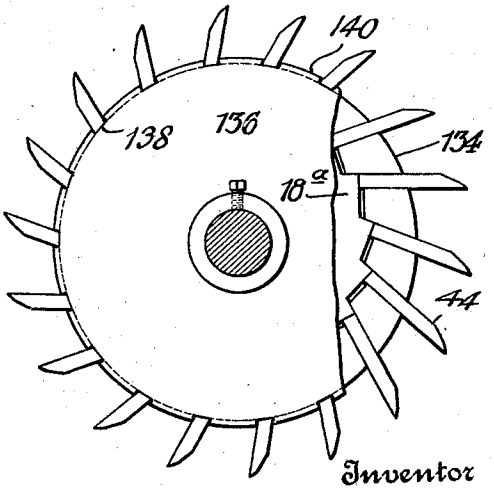


Fig. 15.



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Patented Mar. 18, 1930 1,750,941

UNITED STATES PATENT OFFICE

FRANK PARDEE, OF HAZLETON, PENNSYLVANIA

COAL BREAKER

Application filed July 7, 1925. Serial No. 41,907.

This invention relates to improvements in breakers adapted to cut or split lumps of coal along lines of cleavage substantially at right angles to one another. An embodiment of the invention is illustrated in the accompanying drawings in which—

Fig. 1 is a sectional elevation;

Fig. 2 is a top plan;

Fig. 3 is an enlarged detail view illustrating features of construction of one of the breaker rolls;

Fig. 4 is a longitudinal section on line 4—4 of Fig. 3;

Fig. 5 is an elevation of a modified form of cutter blade;

Fig. 6 is a detail of a modified form of cutter disc;

Fig. 7 is an enlarged detail cross-section illustrating means for securing a cutter blade to one of the breaker rolls;

Fig. 8 is a fragmentary portion of a breaker roll illustrating a modified form of cutter blade;

Fig. 9 is a sectional detail on line 9—9 of Fig. 8;

Fig. 10 is a fragmentary detail illustrating an alternative arrangement for holding the cutter blades firmly in engagement with the breaker roll;

Fig. 11 is a detail view showing a modified form of breaker roll.

Figs. 12 to 15 illustrate modifications, Fig. 13 being a section on line 13—13 of Fig. 12.

Referring in detail to the drawings, 10 and 12 represent suitable side frames which support cross shafts 14 and 16 which carry the breaker rolls indicated as a whole by numerals 18 and 20. The shafts 14 and 16 carry gears 22 and 24 which mesh with one another, the latter being driven by a pinion 26 carried on the main drive shaft 28 supported in suitable bearings 30 and 32 secured to the side frames 10 and 12. The coal or other material to be broken is preferably fed from a shaking chute 34 carried by suspension links 36 supported from overhead by suitable supports 38. The chute is preferably of approximately parabolic cross-section or it may be semi-circular. The chute discharges the lumps to be broken (L) on top of the cutter discs 40 which are arranged alongside of one another at spaced intervals and provided with bevelled edges 42.

The opposite breaker roll 18 carries a multiplicity of elongated bar like blades 44 which extend longitudinally of the breaker roll. These blades are detachably secured to the body of the breaker roll by novel means to be hereinafter described. The cutting edges of the disc like blades 40 carried by the one roll are substantially at right angles to the cutting edges of the bar like blades carried by the opposing roll. This arrangement is particularly adapted to split or cut the coal along their natural planes of cleavage which are perpendicular or substantially perpendicular to one another. There may be provided a great number of shaking chutes such as shown in Fig. 1 for depositing the lumps on the discs 40 throughout the length of the breaker roll, it being understood that as the roll 20 rotates the lumps will be carried down to the space between the two rolls whereupon the cutting edges of the discs 40 and the bar like members 44 will come into play thus cutting the lumps both horizontally and vertically. The cutting edges of the blades 44 it will be noted are practically continuous from one end of the roll 18 to the other so that no matter where the lump happens to fall it will be engaged at some point by the cutter blade.

In Figs. 1 to 4 of the drawings, the cutter discs are shown as truly circular and the cutter blades are shown with continuous straight edges extending from one end to the other thereof. It is to be understood that the discs 40 may be of non-circular form such as indicated in Fig. 6 where the periphery of the cutter disc is scolloped. Fig. 5 illustrates an alternative form of cutter blade 44^a in which the edge 45 instead of being a continuous straight one is of wave like form.

The cutter blades of the breaker roll 18 are preferably detachably secured in place. As best shown in Figs. 3 and 4, the body of the roll 18 is formed with a plurality of longitudinally extending seats 46 within which the heel portions 48 of the blades are located. At its ends each blade 44 is provided with

outwardly extending shanks 50 and 52, the shanks 52 projecting under an overhanging portion 54 of a ring 56 which is fixedly secured to the body of the roll 18. At its opposite end, the roll is screw threaded as indicated at 58 for engagement with a holding ring 60 which is similarly threaded and provided with an overhanging portion 62, the interior of which is tapered as indicated at 64 for engagement with the tapered upper portion 66 of the shanks 50. The ring 60 is provided with a suitable hole 68 for engagement with a spanner wrench by means of which the ring can be turned to firmly clamp or lock the blades 44 in place. With the arrangement described it is apparent that the single ring 60 secures all of the plates in position and because of the tapered or wedge-like construction, the plates are firmly held in their seats.

In Fig. 7, I have illustrated means for individually holding each blade 44 in its seat 48. In this arrangement, the seat is made wider as illustrated so as to accommodate an elongated wedge member 70 which is adapted to be tapped with a hammer so as to firmly press the blade 44 against the wall 72. For preventing dislodgement of the wedge member 70, I provide locking screws 74 whose heads 76 overlap the wedge member as shown, the breaker roll being counterbored as indicated at 78 to accommodate the screw heads 76.

In Figs. 8 and 9, I have illustrated a further modified construction wherein the roll 18 is formed with a number of flat seats 80 and radial shoulders 82. In this arrangement the blades 44^b are provided with angular base portions 84 which rest on the seats 80 and the rear edges of which abut the radial shoulders 82. At the ends these blades 44^b terminate in shanks 88 (Fig. 9) and a holding ring 90 is seated on the shanks and serves to hold all of the blades in place. The blades overlap one another as shown in Fig. 9 and suitable bolts 92 are provided at intervals to lock the ring 90 to the roll 18.

Fig. 10 illustrates a further detail construction of holding means adapted to secure the blades 44 to the roll 18. In this form wedge blocks 94 having converging faces 96 and 98 are provided for engagement with the adjacent faces of the neighboring blades and cap screws 100 are threaded into suitable holes in the roll, the wedge blocks 94 being counterbored to receive the heads 102 of the cap screws. The cutter-blades 44 are formed in most cases of elongated bar stock which is bevelled off as indicated at 104 to form the cutting edge 106.

As illustrated in Fig. 11, the contour of the roll 18 instead of being substantially cylindrical as indicated in the other figures may be extended downwardly as shown at 108 and 110 to form a heel-like support for the outer portion of the blades 44.

The breaker roll 20 is preferably formed of a plurality of members such as indicated at 112 in Fig. 2 arranged alongside one another. These members are separated by small spaces 114 which are formed with annular grooves 116 to form annular shoulders 118 against which the inner edges 120 of the ring-like cutter discs 40 are seated. Through bolts 122 extend through aligned apertures 124 formed in the several members 126 served to firmly clamp the members 112 against the side faces of the cutter discs 40 which may be said to be seated in grooves located between the members 112. At each end of the roll end members 128 are provided for pressing the cutter discs at the outer ends of the roll.

In Figs. 12 and 13, I have shown a slightly modified construction in which the blades 44 are substantially the same as those shown in Fig. 4 but with the tapered shanks 50 and 52 omitted. The blades of Figs. 12 and 13 are held securely in place in the roll 18 by wedges 130, the ends of which are formed with shanks 132 and 134, the latter engaging the overhanging portion 54 of the ring 56 and the shank 132 being held by the ring 60 which engages the threads 58 of the roll 18. This construction is similar to that described in connection with Fig. 4, the chief difference being that the shanks which engage the holding rings are on the wedges instead of on the blades.

Figs. 14 and 15 show a further modification in which the blades are held in the roll 18^a by wedges 134, the ends of the blades and wedge, respectively, being flush with the ends of the roll. The wedges are locked in position by a disc 136 which is kerfed several points. 138, to permit the flanges 140 to be hammered or bent over into locking engagement with the end of the wedge as shown in Fig. 14.

The breaker described can be inexpensively constructed and provides an improved type of breaker adapted to cut the coal along different lines of cleavage by the use of cooperating members having practically continuously extending cutting edges. The design is such that the cutting members can be readily removed for replacement, sharpening or repair. This is a feature of importance in machinery of this kind where frequently foreign matter such as pieces of hard unbreakable rock or even chunks of iron are inadvertently fed along with the coal with resulting damage to the breaker.

Though I have described with great particularity the details of construction of the various embodiments of the invention illustrated, it is not to be construed that I am limited thereto as changes in arrangement and substitution of equivalents may be made by those skilled in the art without departing from the invention as defined in the appended claims.

What I claim is:

1. A coal breaker comprising a pair of coacting rolls, one roll consisting of a member

having a multiplicity of longitudinally extending seats with bar like cutter-blades detachably secured therein, the other roll consisting of a multiplicity of members arranged alongside one another with individual disc-like cutter rings clamped between them.

2. A coal breaker of the character described adapted to break lumps of coal along cleavage planes at right angles to one another, comprising a pair of opposed rolls, one roll having a multiplicity of detachable blades whose cutting edges extend lengthwise thereof, said blades being spaced apart peripherally, the other roll having a multiplicity of separate cutting members arranged alongside of one another with spaces between them, said cutter members having cutting edges at right angles to the blades carried by the first named roll.

3. A coal breaker of the character described comprising a pair of coacting rolls adapted to break lumps of coal along cleavage planes substantially at right angles to one another, one roll having a plurality of cutter blades extending longitudinally thereof and detachably secured thereto, the other roll carrying a multiplicity of cutter members arranged alongside of one another with spaces between them, said cutter members being disposed at right angles to the blades and the first named roll.

4. A coal breaker of the character described adapted to cut lumps of coal along cleavage planes substantially at right angles to one another with a minimum production of fines, comprising a pair of cutting rolls one of which carries a multiplicity of longitudinally extending cutter blades spaced peripherally apart from one another a distance greater than the thickness of the blade, the other roll consisting of a multiplicity of disc-like cutters arranged alongside of one another with spaces between them.

5. A coal breaker roll having a built-up body consisting of a plurality of ring-like body members each having a pair of oppositely extending shouldered portions, and disc-like cutter rings supported jointly by the shouldered portions of adjacent ring-like body members, and means for clamping the parts together.

In witness whereof, I have hereunto signed my name.

FRANK PARDEE.