Nov. 19, 1929. G. W. WILMOT 1,736,563

TOOTH FOR CRUSHING ROLLS

Filed March 26, 1927

Fig. 1.

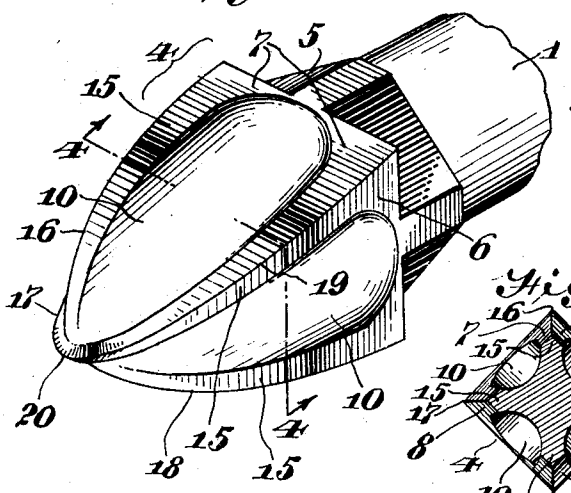


Fig. 2.

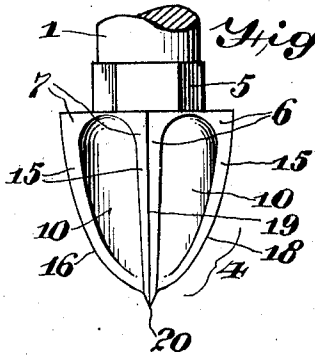


Fig. 4.

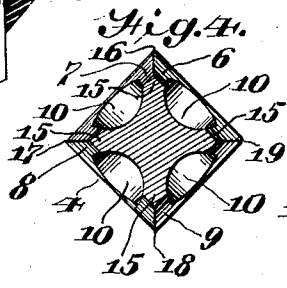


Fig. 3.

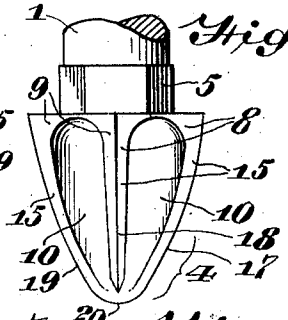


Fig. 5.

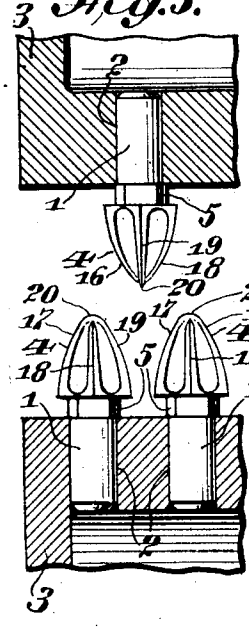


Fig. 6.

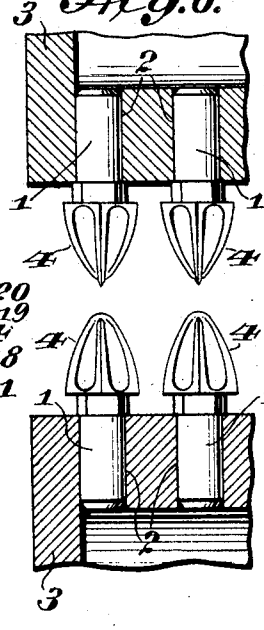


Fig. 7.

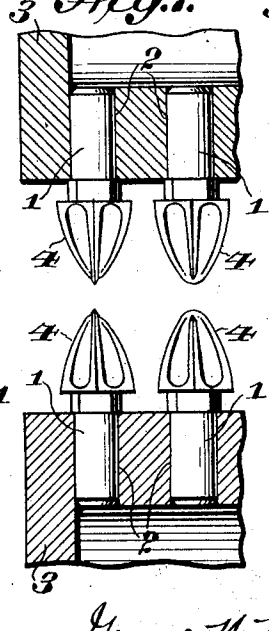
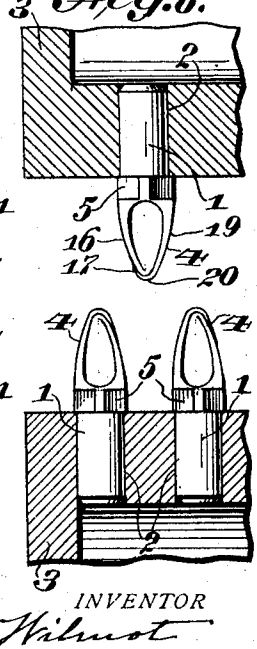


Fig. 8.



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UNITED STATES PATENT OFFICE

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TOOTH FOR CRUSHING ROLLS

Application filed March 26, 1927. Serial No. 178,555.

My invention relates to teeth which are adapted to be mounted upon rolls employed in crushing and grinding machinery, particularly the rolls of machinery employed in the crushing and breaking of coal into commercial sizes.

When coal is taken from the mine it usually is in lumps which are too large for use in furnaces, stoves and the like; hence it is necessary, before the coal is placed upon the market, that it be broken to reduce the same to sizes required such as are known in commerce as "stove", "egg", "chestnut", etc. The breaking of coal to produce the commercial sizes required and desired should be accomplished with the production of as small a percentage of dust and fine particles as practically may be possible. The dust and fine particles which may be produced are not suitable for use in furnaces for heating houses, stoves and the like, and if used or usable for any purpose must be sold at a smaller price than that which may be obtained for the coal of commercial sizes above referred to. Such dust and fine particles, therefore, are in the nature of wastage and production thereof should be avoided if possible.

It therefore is the general object of my invention to provide a tooth of novel construction which is adapted to be embodied in the construction of breaking or crushing rolls and which, when such rolls are employed in the breaking of coal, effect the breaking thereof with a minimum production of dust and relatively small particles.

Also it is an object of the invention to provide a tooth of the character indicated having converging, tapering sides with interposed cutting corners or edges, one of the said corners or edges being continuous and having an apical portion which constitutes the cutting or penetrating point of the tooth while the other corners or edges at their outer or forward ends terminate on opposite sides of the said apical portion of the continuous corner or cutting edge.

A further object of the invention is to provide a tooth of the character indicated consisting of a body portion having converging, tapering and concave sides, the corners between the adjoining sides constituting cutting edges and two of the diametrically opposed edges tapering more rapidly toward the outer pointed end of the tooth than the two other diametrically opposed edges whereby the outer apical cutting and penetrating edge portion of the latter is of greater height than the outer end portions of the former and continues around and constitutes the point of the tooth and extends between the outer ends of the first named diametrically opposed cutting edges.

Other objects and advantages of the invention will be pointed out in the detailed description thereof which follows or will be apparent from such description.

In order that the invention may be readily understood and its practical advantages fully appreciated reference should be had to the accompanying drawing in which I have illustrated one convenient embodiment of the said invention.

It must be understood, however, that the invention is susceptible of embodiment in other forms of construction than that shown and that changes in the details of construction may be made within the scope of the claims without departing from the principle of the said invention.

In the drawing

Fig. 1 is a view in perspective of a tooth embodying the invention;

Fig. 2 is a view in elevation thereof with a tooth occupying one selected position;

Fig. 3 is a similar view with a tooth occupying a position at right angles to the position in which it is shown in Fig. 2;

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 1; and

Figs. 5, 6, 7 and 8 are views showing fragmentary portions of opposed rolls in longitudinal section upon which teeth embodying the invention are mounted, the teeth in each figure being shown as located in different relative positions with respect to each other from those in which they are shown in every other of said figures.

In the drawing I have shown a tooth, which is of suitable metal, provided with a shank

portion 1 which is adapted to be mounted in a hole 2 within a roll 3.

The cutting portion 4 of the tooth preferably is integral with the shank portion 1. If desired the cutting portion 4 of the tooth may be separated from but connected with the shank 1 by means of a portion 5 of polygonal shape in cross section.

The cutting portion 4 of the tooth is generally of pyramidal shape and is provided with four tapered sides 6, 7, 8 and 9 each of which is rendered concave by the presence therein of an oval recess 10 which tapers from the inner end portion of the tooth toward the outer penetrating end thereof as is shown quite clearly in the drawing. The presence of the recesses 10 results in the formation of relatively narrow knife or chisel-like portions 15 at the four corners of the tooth 4. The lines of intersection of the adjoining sides of the cutting portion 4 of the tooth constitute cutting edges as indicated at 16, 17, 18 and 19.

The cutting portion 4 of the tooth is so shaped and formed that the edges 16 and 18 thereof toward their outer ends are curved and tapered inwardly or toward each other more rapidly than the corresponding portions of the edges 17 and 19. The edges 17 and 19 merge into each other and the outer merging portions thereof constitute an apical curved cutting portion 20. This portion is located intermediate the adjoining opposed outer ends of the cutting edges 16 and 18. This relationship is clearly shown in the drawing.

As has already been suggested the outer end portions of the cutting edges 16 and 18 are tapered more rapidly than the corresponding portions of the cutting edges 17 and 19. The result of this more rapid tapering is that these portions of the edges 16 and 18 are located nearer to the longitudinal axis of the tooth than are the corresponding portions of the cutting edges 17 and 19. As a result of the relationship between the outer portions of the cutting edges thus produced it will be apparent that in the use of teeth embodying the invention the apical portion 20 will first contact with the object, such as a lump of coal, to be broken, and will enter the same and will effect cleavage thereof in a plane at right angles to the plane of the cutting edges 16 and 18. Thereafter the latter cutting edges operating or cutting independently will operate or tend to penetrate and subdivide each of the lumps produced by the first cleavage into two lumps, and thereby subdivide the original lump into four lumps or pieces. The average size of these subdivided lumps will depend upon the proximity of the teeth to each other in the cooperating crushing or breaking rolls.

The teeth may be positioned upon the rolls in an infinite number of ways and relations to each other. In Figs. 5 to 8 inclusive, I have shown fragmentary portions of rolls located in opposed relation to each other and bearing or supporting groups of teeth, the teeth of each group being related to each other in a manner different from that in which the teeth of each other group are related to each other.

In Fig. 5 I have shown the teeth so mounted upon the rolls that the cutting edges 16 and 18 of the teeth on one roll are located in planes at right angles to the planes of the corresponding cutting edges of the teeth in the opposing roll. The teeth, as shown in the construction illustrated in this figure of the drawing, upon one roll are located in alternate or staggered relation with respect to those on the other roll.

In Fig. 6 I have shown the teeth so mounted that when in opposed relation to each other as shown they are in axial alinement; and they are also shown as being so mounted that the planes of the respective couples of cutting edges 16 and 18 and 17 and 19 of one tooth are arranged at right angles to the planes of the corresponding couples of the cutting edges of the tooth in opposing relation thereto.

In Fig. 7 the teeth are so mounted upon the rolls that when in opposed relation to each other as shown they are in axial alinement, as in Fig. 6, but they have each been rotated about their respective axes so that the planes of the respective couples of cutting edges of the teeth upon one roll are in the same planes as the corresponding couples of cutting edges of the teeth upon the other roll.

In Fig. 8 the teeth upon opposing rolls are shown in alternate or staggered relation with respect to each other as shown in Fig. 5 but they have been so rotated about their respective axes that the planes of the respective couples of cutting edges thereof occupy different relations with respect to each other from what is shown in Fig. 5.

As already indicated an infinite number of variations in the relationship of the teeth upon opposing rolls with respect to each other may be made without departing from the spirit and scope of the invention.

It may be found that upon operating upon objects of one class or character to subdivide lumps of one size into smaller sizes better results may be obtained if the teeth are mounted in one relation to each other than if mounted in another.

It has been found that by the employment of teeth having the construction as illustrated and as described above the production of dust and small particles is decreased and even though that decrease may be of a small percentage less than heretofore has been the case, yet in the aggregate such decrease would result in a saving greatly worth while.

Having thus described my invention what I claim and desire to secure by Letters Patent is,

1. A tooth for a crushing roll comprising a body portion having four sides which converge to form the penetrating portion of the tooth, the edges between adjoining sides thereof constituting cutting edges, the outer end portions of two of which edges which occupy positions in opposed relation to each other being more sharply tapered toward the axis of the tooth than the corresponding portions of the other two oppositely disposed edges, which latter edges merge into each other at their outer ends at a point which is further from the base of the tooth than the point at which the former of said edges merge with the said tooth and constitute an advanced penetrating portion of the tooth.

2. A tooth for a crushing roll having tapered convergent sides, the intersection of adjoining sides forming cutting edges which edges converge toward the longitudinal axis of the tooth and are curved inwardly toward the said axis, the outer ends of two of the said cutting edges located in opposed relation to each other terminating inwardly of and closer to the base portion of the tooth than the merged outer end portions of the other opposed cutting edges of the said tooth, the latter constituting an advanced penetrating portion of the tooth.

3. A tooth for a crushing roll comprising a shank and a body portion, the latter being of generally pyramidal shape, the intersections of adjoining sides forming cutting edges which cutting edges taper from the inner toward the outer penetrating end of the tooth, the tapering of the outer end portions of two of the said cutting edges which are in opposed relation to each other being more gradual than that of the other cutting edges of the tooth whereby the former merge into each other at the outer end of the tooth at a point further from the base of the tooth than the point at which the latter merge with the said tooth and form an advanced penetrating portion thereof.

4. A tooth for a crushing roll, which tooth is provided with a plurality of sides which taper toward the penetrating point thereof, the intersections of adjoining sides of the said tooth forming cutting edges which edges taper from the inner end toward the outer penetrating end of the tooth, two of the opposing cutting edges which lie in the same plane tapering toward the outer tapering end of the tooth more gradually than the other cutting edges of said tooth and meeting at their outer ends at a point further from the base of the said tooth than the point at which the other cutting edges merge with the said tooth, and constituting an advanced penetrating portion thereof.

5. A tooth for a crushing roll comprising a shank and a body portion having converging, tapering sides, which sides are provided with recesses therein whereby the said sides are rendered concave and the intersections of the said sides forming cutting edges which taper from the inner toward the outer penetrating end of the tooth, two of the cutting edges which occupy the same plane tapering more gradually than the other cutting edges of the tooth, and the first named edges merging at their outer ends at a point further from the base of the said tooth than the point at which the other edges merge with the said tooth to form an advanced cutting edge portion in a plane common to that of the remaining portions thereof, which portion is interposed between the outer ends of the remaining cutting edges of the tooth.

6. A tooth for a crushing roll having converging tapering sides, the intersections of the surfaces of adjoining sides forming cutting edges which taper from the inner toward the outer penetrating end of the tooth, two of the cutting edges which occupy the same plane tapering more gradually than the other cutting edge of the tooth, and the said two cutting edges merging at their outer ends at a point further from the base of the tooth than the point at which the other edge portions merge with the said tooth to form an advanced penetrating edge portion in a plane common to that of the remaining portions of said edges, which portion is interposed between the outer ends of the remaining cutting edges of the tooth.

7. A tooth for a crushing roll, comprising a body portion which is formed with pairs of opposing sides which converge toward the end of the tooth, the sides of each pair of opposing sides converging at equal angles and the intersections of adjoining sides defining cutting edges, the edges of one pair of oppositely disposed edges converging toward the axis of the tooth more sharply than another pair of oppositely disposed edges, whereby they terminate inwardly of the outer ends of the said last mentioned pair of oppositely disposed edges.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 17th day of March A. D. 1927.

GEORGE W. WILMOT.