

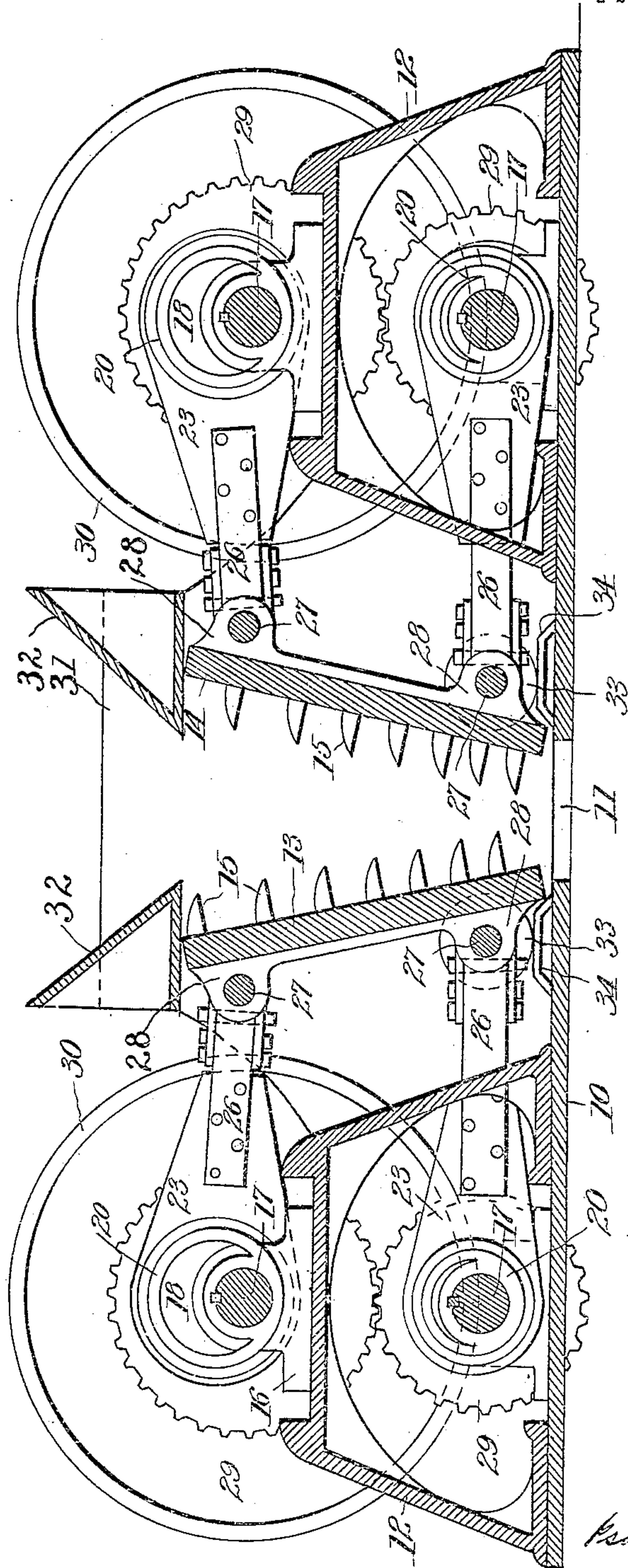
I. & H. K. CHRIST.
 ORE, MINERAL, AND COAL BREAKER.
 APPLICATION FILED JULY 8, 1907. RENEWED MAR. 10, 1910.

962,998.

Patented June 28, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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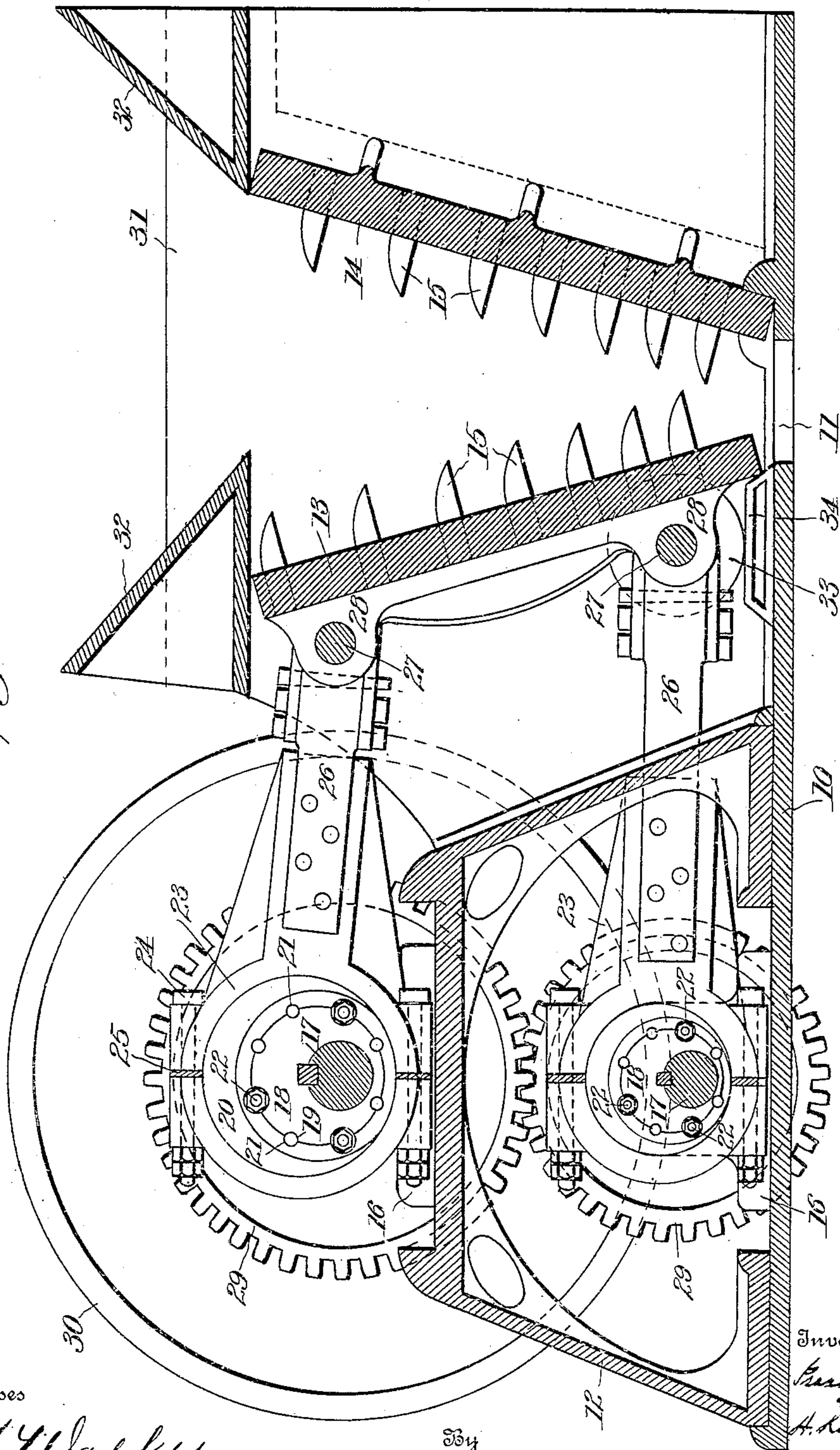
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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ORE, MINERAL, AND COAL BREAKER.

962,998.

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To all whom it may concern:

Be it known that we, ISAAC CHRIST and HENRY K. CHRIST, citizens of the United States, residing, respectively, at Tamaqua and Mahanoy City, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Ore, Mineral, and Coal Breakers, of which the following is a specification.

This invention relates to machines for breaking, crushing and piercing coal or other minerals, of the type in which the breaking, crushing or piercing is performed by the reciprocations of toothed, corrugated or plain jaws or plates.

One of the objects of our invention is to provide a machine of this character that will take large lumps and break them to any size in one operation with a minimum percentage of waste.

Another object of the invention is to provide a machine of this character having means for imparting different speeds of reciprocation to different portions of the breaking plates or jaws, whereby the operation of crushing, piercing or breaking will be facilitated as hereinafter described.

Another object of the invention is to provide a machine of this character having means whereby the relationship and the amount of throw or reciprocations of the breaking jaw or jaws may be adjusted.

Another object of the invention is to reduce to the minimum the friction of the breaking jaw or jaws on their supports.

Other objects of this invention will appear during the course of the following description.

To these ends, our invention consists in the construction and combination of parts substantially as hereinafter described and claimed.

Of the accompanying drawings:—Figure 1 is a side elevation, partly in section, of one embodiment of our invention, the same having both of the breaking, crushing or piercing plates or jaws mounted to reciprocate. Fig. 2 is a similar view, on a larger scale, but showing one of the breaking, crushing or piercing plates or jaws stationary.

Similar reference characters indicate the same or similar parts in both of the views.

A suitable base plate 10 is shown as provided with a discharge opening 11 for the crushed or broken coal or other mineral.

With the exception that in one machine both breaking plates or jaws reciprocate, and in the other only one breaking plate or jaw reciprocates, the construction is practically identical in both of the figures of the drawings.

Referring principally to Fig. 2, it will be seen that a frame 12 is mounted upon the base 10, said frame being for the purpose of supporting the upper shaft which actuates the upper portion of the breaking plate or jaw. In said Fig. 2 the breaking jaws or plates are indicated at 13 and 14, the latter being rigidly or immovably supported, and both of the plates or jaws being provided with teeth 15 which are inserted in the plates or jaws and which may be of any suitable length and shape. We do not limit ourselves to plates having teeth, as said plates may be provided with corrugated or plain surfaces of any well-known or preferred form, in order that either coal, or stone, or any other material, may be broken, crushed or pierced.

Mounted upon the base 10 and upon the upper platform of the frame 12 are bearings 16 for shafts 17. Keyed to each of the shafts 17 is an eccentric 18 which is formed with peripheral notches 19. Mounted upon the eccentric 18 are outer eccentrics 20 having notches 21 spaced equally with the notches 19 of the inner eccentric and adapted to cooperate therewith in the adjustment rotatively of the outer eccentrics upon the inner eccentrics. As shown in the drawings there are eight notches 19 and eight notches 21, but the invention is not limited to the particular number of cooperating notches formed in the eccentrics. To hold the outer eccentrics in their rotative adjustment on the inner eccentrics we employ a plurality of bolts 22 (three as illustrated), said bolts being contained half in the notches 19 and half in the notches 21, thereby locking the outer eccentrics in their adjusted positions relatively to the inner eccentrics. By removing the bolts, and rotating the outer eccentric upon the inner one, one-eighth of a revolution, and then re-inserting the bolts the throw of said eccentric will be adjusted one-eighth relatively to the shaft 17 which actuates it. And, of course, by further adjustment the relationship of the throw of the eccentric may be varied to any desired extent relatively to the rotation of the shaft

17. It will now be understood that, by the adjustments of the two eccentrics, they may be caused to actuate the breaker plate or jaw 13 in any desired manner as to the timing of the reciprocations of the upper part of said plate relatively to the reciprocations of its lower part. The operative connections between the eccentrics and the plate or jaw 13 comprise divided eccentric straps 23, the divisions of which are united by connecting bolts 24, and the desired adjustment being retained by means of suitable gibs or washers 25, links 26 connecting said eccentric straps with pivots or axles 27 mounted in bearings 28 at the back of plate 13. Said bearings 28 may be formed in a frame to which the plate 13 may be removably secured in any ordinary or well-known manner.

20 Rigidly secured upon the shafts 17 are gears 29 which mesh with each other, one of said shafts having also a belt and momentum wheel 30 rigidly secured thereto. As shown in the drawings, the lower gear is smaller than the upper one. With an upper gear having more teeth than the lower gear, the lower portion of the plate 13 will reciprocate faster than the upper portion of said plate. By suitable adjustment of the eccentrics, the lower portion of the plate may be made to advance in unison with each advance of the upper portion of the plate and also be given one advance just as the upper portion is receding. By this construction and operation we are enabled to perform more crushing or breaking operations upon the smaller lumps that pass to the bottom of the space between the two jaws, and owing to the slower reciprocations of the upper portion, give more time for the settlement of the large lumps to a position where they will be properly operated upon by the teeth, corrugations or body of the jaws. We therefore cause the smaller lumps to move out of the way of the larger lumps more rapidly than is the case where the reciprocations of all portions of the jaw are uniform.

Suitable side plates to confine the mineral between the jaws are indicated at 31, and guide or hopper walls at 32.

Mounted upon the lower shafts or axles 27 are supporting wheels 33 which travel on tracks 34 carried by the base 10, this structure providing practically a non-friction bearing for the breaker plates or jaws.

It will be readily understood that by adjustment of the eccentrics the amount of reciprocation which they impart to their respective portions of the breaker plates or jaws may be varied to almost any desired extent. And also, by means of the adjustable eccentrics, the movements imparted through the upper and lower links may be made to follow each other slightly instead

of being exactly together in unison when the upper links act.

As has been stated, the machine shown in Fig. 1 is practically the same as that in Fig. 2, except that both of the breaking plates or jaws are reciprocated. In said Fig. 1 the structure is such that the two breaking plates or jaws approach and recede from each other in unison, or they may be adjusted so that one follows the other.

It is to be understood that we do not confine ourselves to the precise structure and arrangement illustrated, since the details thereof may be variously modified within the limits of mechanical skill.

Having now described our invention, what we claim is:—

1. A breaking, crushing or piercing machine comprising in its construction a reciprocatory mounted jaw, and means for actuating different portions of said jaw at different speeds of reciprocation.

2. A breaking, crushing or piercing machine comprising in its construction a reciprocatory mounted jaw, means for actuating the upper and lower portions of said jaw at different speeds of reciprocation, and means for adjusting the extent of said reciprocation.

3. A breaking, crushing or piercing machine, comprising in its construction a reciprocatory mounted jaw, means for actuating the upper and lower portions of said jaw at different speeds of reciprocation, and means for adjusting the extent and the timing of said reciprocations.

4. A breaking, crushing or piercing machine comprising in its construction a reciprocatory mounted jaw, two shafts having eccentrics, operative connections between said eccentrics and the upper and lower portions of said jaw, and means for actuating said shafts at different speeds of reciprocation.

5. A breaking, crushing or piercing machine comprising in its construction a reciprocatory mounted jaw, two shafts having adjustable eccentrics, operative connections between said eccentrics and the upper and lower portions of said jaw, and means for actuating the said shafts at different speeds of reciprocation.

6. A breaking, crushing or piercing machine comprising in its construction a reciprocatory mounted jaw, two shafts having eccentrics and intermeshing gears, said gears being of different sizes, and operative connections between said eccentrics and the upper and lower portions of said jaws.

In testimony whereof we affix our signatures, in presence of two witnesses.

ISAAC CHRIST.

HENRY K. CHRIST.

Witnesses:

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