J. G. KIRKSEY.

MULTIPLE COMPARTMENT ROCK CRUSHER.

APPLICATION FILED APR. 10, 1911.

1,096,307.

Patented May 12, 1914.

3 SHEETS—SHEET 1.

Fig. 4.

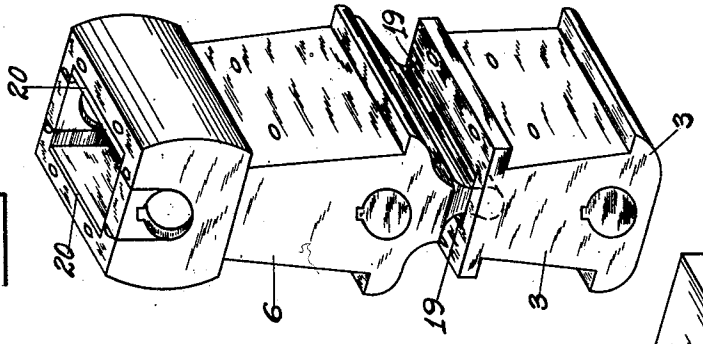
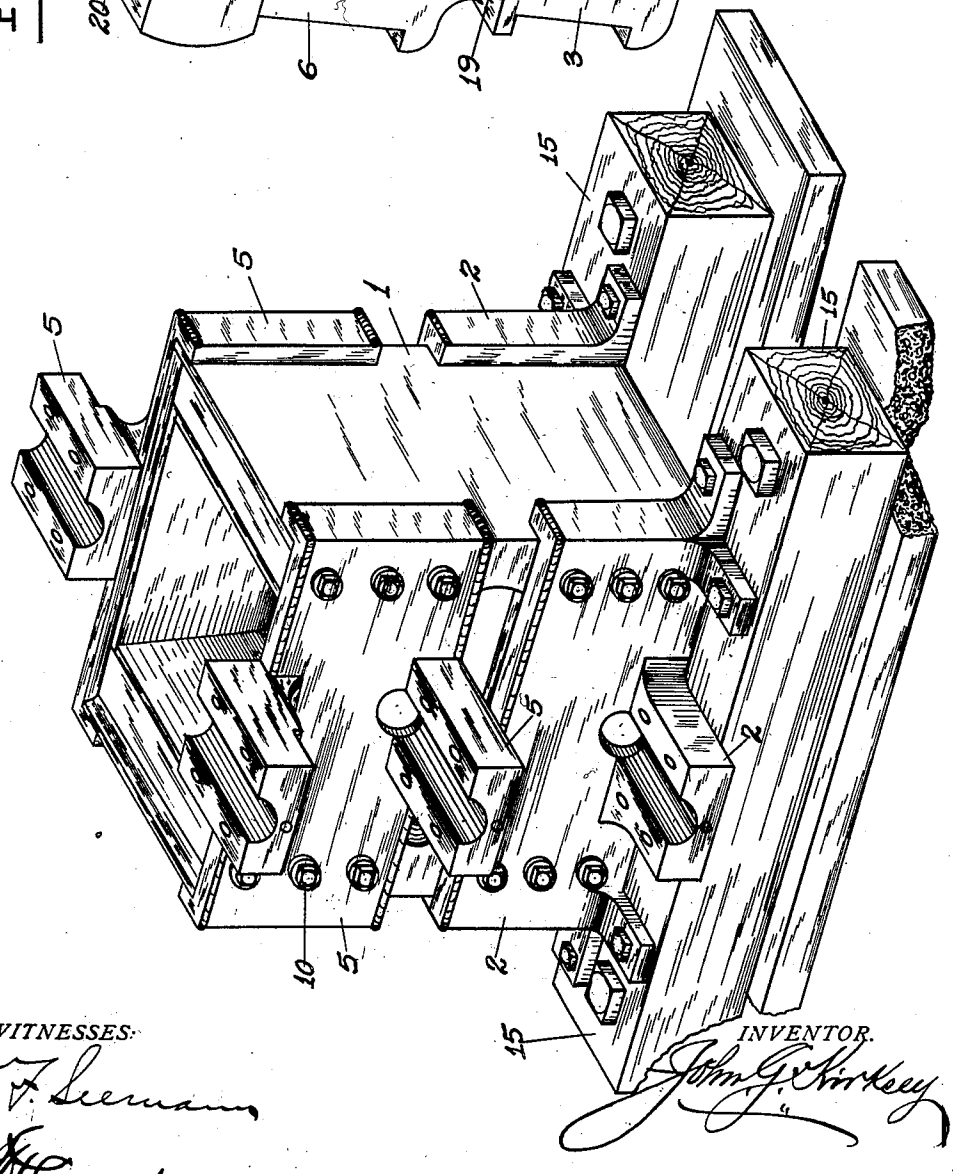


Fig. 1.



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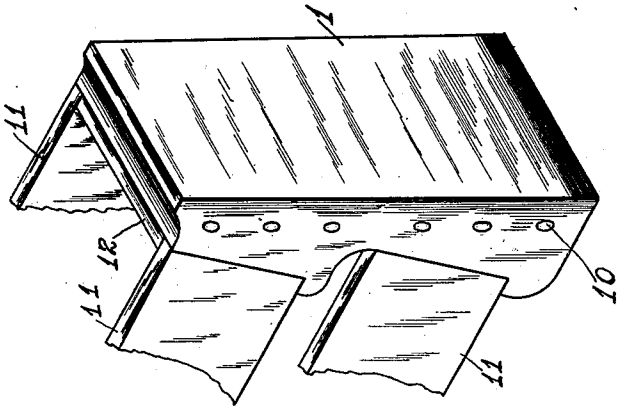


Fig. 9.

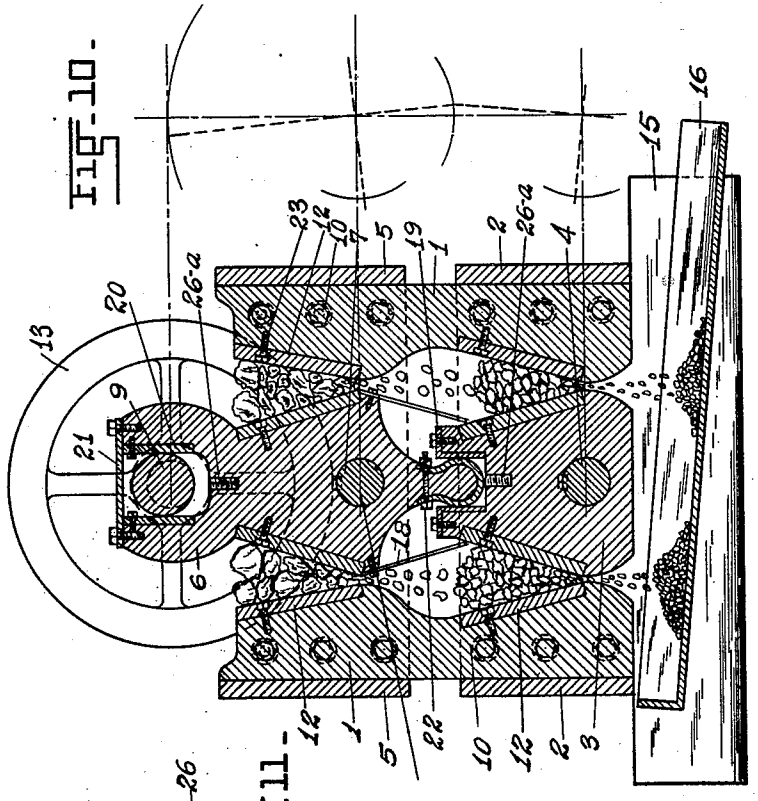


Fig. 10.

Fig. 2.

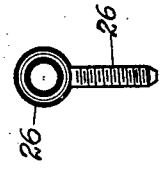


Fig. 11.

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3 SHEETS—SHEET 3.

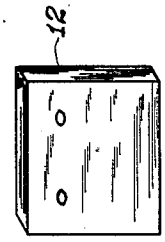


Fig. 5.

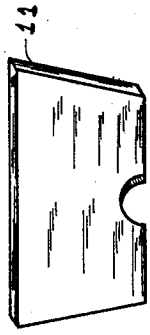


Fig. 8.

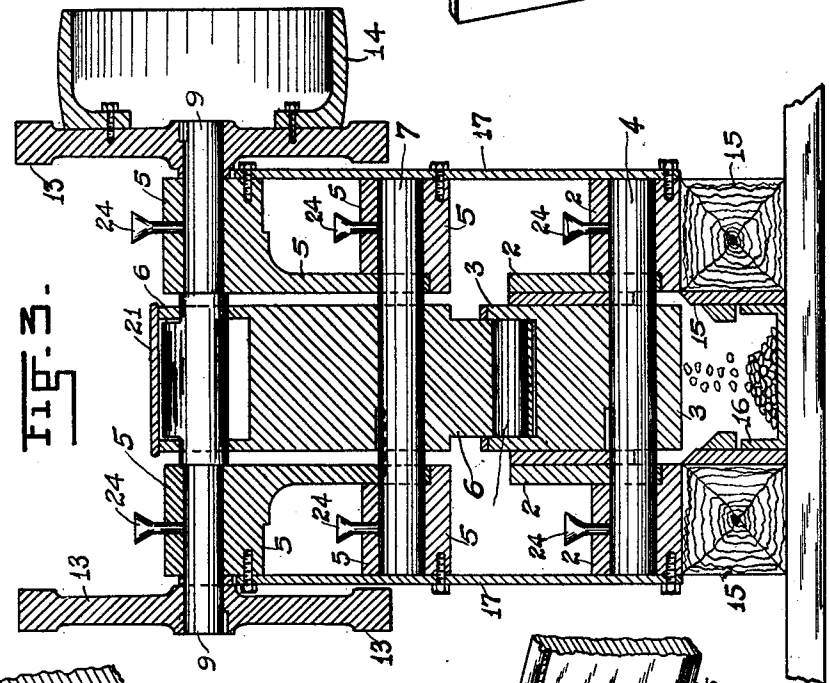


Fig. 3.

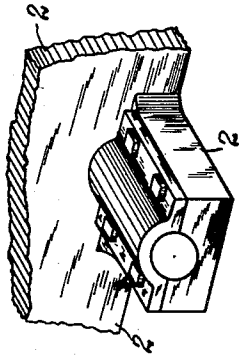


Fig. 6.

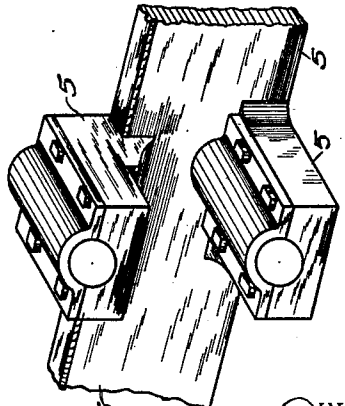


Fig. 7.

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JOHN GIDEON KIRKSEY, OF DENVER, COLORADO.

MULTIPLE-COMPARTMENT ROCK-CRUSHER.

1,096,307. Specification of Letters Patent. Patented May 12, 1914.

Application filed April 10, 1911. Serial No. 620,226.

To all whom it may concern:

Be it known that I, JOHN GIDEON KIRKSEY, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented a new and useful Multiple-Compartment Rock-Crusher, of which the following is a specification.

This invention is an improved multiple compartment rock crusher, especially designed to handle a large daily tonnage, with a minimum of power and to break the rock, by progressive steps, to a fine mesh or size.

In the milling of most sulfid ores, the first distinctive step is to break the material to a maximum size necessary to free, practically all of, the ore from the rock and the usual practice is to employ a jaw crusher adapted to break the rock to only about 1½ inch maximum size and from this crusher it goes to compression spring rolls and from these rolls to a trommel screen, having ¼″ or ⅜″ mesh and the oversize from this screen is returned again and again to the rolls for finer grinding. Such a system clearly presents great cost of installation, of operation and for repairs; so the purpose of this crusher is to supplant such systems.

Other objects and advantages, presented in this improvement, will be made manifest in considering the following details of construction, in connection with the accompanying drawings.

Figure 1, is a perspective view of the frame of the machine. Fig. 2, is a vertical longitudinal sectional view. Fig. 3, is a vertical cross sectional view. Fig. 4, is a perspective view of the integrally formed oscillatory crushing members. Fig. 5, is a perspective view of one of the removable crushing jaws 12. Fig. 6, is a perspective view of one of the two lower sides, partly broken away. Fig. 7, is a perspective view of one of the two upper sides, partly broken away. Fig. 8, is a perspective view of one of the two removable side plates 11. Fig. 9, is a perspective view of one of the end members of the frame and also parts of the side plates 11 and jaws 12. Fig. 10, is a diagrammatic view, showing the relative vertical and horizontal travel of the upper and lower oscillated crushing jaws. Fig. 11, is a perspective view of a removable eye bolt used in handling the heavy parts of the machine.

Referring to the drawings, 1, represents the end members of the frame, carrying thereon the stationary jaws of the upper and lower crushing compartments; 2, the two lower sides of the frame with flanged ends and integrally formed shaft boxes; 3, the lower crushing member, mounted for oscillation on shaft 4, the upper end of this crushing member being apertured to receive the lower end of crushing member 6, this opening 8, adapted also to receive and retain oil for constant lubrication of the parts; 5, are the two upper sides of the frame with flanged ends and mounted shaft boxes; 6, is the upper crushing member, mounted for oscillation on shaft 7, the lower portion of this crushing member adapted to fit integrally with and to coöperatively work the lower crushing member 3, the upper portion of this member 6, being recessed to receive the mounted eccentric shaft 9, which works therein and gives to this member 6, an oscillating movement and which oscillating movement is alternately imparted to the lower crushing member 3, as plainly shown; the upper end of this member 6, being so recessed or apertured as to form also an oil carrying box for the constant lubrication of the eccentric and wear plates therein; 10, are heavy bolts with nuts extending through the side and end members and adapted to rigidly hold together this frame; 11, are removable side plates of the upper and lower crushing compartments; 12, are removable hardened crushing jaws, held in place by bolts 23, these jaws being adapted to be turned over or readjusted for further wear; 13, are heavy balance wheels, one on each side and mounted on the drive eccentric shaft 9, and to one of these balance wheels is bolted the drive pulley 14; 15, are the heavy foundation timbers carrying this machine, resting preferably on a concrete foundation; 16, is a launder box adapted to receive and carry away the crushed material and water from the machine; 17, the plates of steel bolted to the ends of the shaft boxes on each side and adapted to prevent the lateral play of the shafts 4—7 and to more rigidly support said shaft boxes; 18, are sheet iron plates bolted to the upper crushing member, the lower end working freely, to more effectively direct the material and water from the upper to the lower crushing compartments and to

also prevent any of the material getting into the oil box of member 3; 19 and 20 are removable wear plates; 21, is a removable cap or cover of box on member 6; 22, is a removable wear member bolted on the drive end of 6; 24, are oil cups for shaft bearings or boxes; 55, are the bearing boxes, preferably attached or made a part of sides 2 and 5; 26, is a removable eye screw bolt adapted to be screwed as in threaded holes 26, for the better handling of the heavy parts.

The assembling or putting together of this machine is too plain and simple to require further explanation.

To be especially noted is that in a machine of this type, which is adapted to crush hundreds of tons of hard rock per day to a maximum size suitable to be handled with jigs, the machine, as a whole, being altogether of iron, is necessarily very heavy and instead of having the frame of a single piece, after the type of most jaw crushers, I prefer to make this frame of several parts or pieces and in such a manner as to make it strong and rigid when put together, and thereby securing the great advantage of the easier handling and transportation of its individual parts and in case of a breakage, so often occurring to the frame of jaw crushers, it would not apply perhaps to more than one of these parts. It will be observed that, as between the upper and lower side plates on each side and which sides with the end pieces form the frame, there is left an open space, for the better viewing of the workings of the lower crushing compartments as well as for oiling the contact parts of the oscillating members. It will also be observed that I combine four crushing compartments in one machine, which occupies but little floor space, and the height of which is practically the same as its width and length, this making it steady in operation. Clearly only the upper crusher could be made and used by leaving out the lower movable crushing member.

From the diagrammatic view Fig. 10, it will be observed, that in operation, these novel shaped crushing members, having a fulcrum point in a line practically horizontal to the point of discharge of each crushing compartment, and said fulcrum point being distanced or having a long radius from said discharge point, there is produced, practically, a vertical movement along the face of the movable crushing members and at these discharge openings, while along the face part of these movable jaws, there is given, practically, a gradually downwardly decreasing simultaneous horizontal movement and my practice has suggested that this vertical movement should be about two-thirds of the horizontal movement at the top of the movable jaws. By thus combining these two simultaneous, properly proportioned, movements, for each crushing compartment, there is produced a twisting or torsional effect on the rock, with results both new and beneficial, besides requiring far less horse power to do a given work, and under this combined movement, there is practically no increase or decrease in the size or area of the discharge openings, also a feature novel and highly beneficial. It will be further observed that the discharge openings of the upper crushing compartments are of greater area than those of the lower compartments, thus giving a step reduction of the rock, an advantage clearly patent, also the crushing compartments of each side being directly one above the other, the material passes by gravity from the upper to the lower, also that while, on one side, the upper compartment jaw is contacting with the rock, the lower compartment jaw is receding, in other words an alternate simultaneous movement is given the upper and lower oscillating crushing members.

In operation the rock and a good supply of water is fed into the upper crushing compartment, on one or both sides, where it is crushed to say $\frac{3}{4}$ inch maximum size and by gravity it goes to the lower compartment to be reduced to say one-fourth inch maximum size, and from thence to other machines of a different nature. It might be noted that the upper crusher in breaking to say $\frac{3}{4}$ inch reduces a very large percent. to fines, which is simply washed through the lower crusher, hence the lower crusher has far less work to do and less power expended. This step reduction of the ore might be extended to cover the four crushing compartments, by adjusting the discharge opening of the upper compartment, on one side, to say $1\frac{1}{2}$ inch, the corresponding lower set to 1 inch and with a short elevator carry the material up and into the opposite upper compartment, which is set to $\frac{1}{2}$ inch and the corresponding lower to say $\frac{1}{4}$ or $\frac{1}{8}$ inch. The advantages of this gradually reducing, step by step, the material to a fine mesh, with one machine, are manifold and manifest.

Changes coming within the scope of the appended claims might be suggested.

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

1. A crusher, comprising relatively fixed upper and lower crushing members, each member having oppositely disposed crushing faces, upper and lower movable crushing members, each having upper and lower oppositely disposed crushing faces disposed between and coöperating with the corresponding faces of said fixed crushing members, and operative connection between said upper and lower movable crushing members and upper and lower shafts upon which said upper and lower movable crushing

members are separately mounted for oscillation relatively to said fixed crushing members.

2. A crusher, comprising relatively fixed upper and lower crushing members, each member having oppositely disposed crushing faces, upper and lower movable crushing members, each having upper and lower oppositely disposed crushing faces disposed between and coöperating with the corresponding faces of said fixed crushing members, and operative connection between said upper and lower movable crushing members and upper and lower shafts upon which said upper and lower movable crushing members are separately mounted for oscillation relatively to said fixed crushing members, said shafts being centrally and horizontally located or fulcrumed relative to the lowermost part of the crushing faces of said movable members, as to maintain, in operation, practically the same size discharge openings between the said fixed and the said movable crushing members, substantially as described.

In testimony whereof, I hereunto subscribe my name in the presence of the two witnesses hereto.

JOHN GIDEON KIRKSEY.

Witnesses:
J. C. HOUSTON,
D. J. GOURLEY.