

frame A, as shown clearly in Figures 1 and 2. The operation of my magnetic ore-separator is as follows: The ground ore to be separated is conducted from the supply-hopper B into the uppermost hopper C, and from the same on to the deflecting-plate E, which is of magnetic material, and to some extent under the magnetic influence of the upper series of magnets. From the deflecting-plate E the ground ore passes over the edge of the supporting-box D¹ on to the upper pole ends of the upper series of magnets. While the mass of ground ore passes over the deflecting-plate E, the magnetic ore-particles are brought within the influence of the magnets, and are slightly retarded in their motion, while the non-magnetic particles continue in their motion. The influence of the pole ends on the magnetic particles, and consequently the retardation of the latter, increases as they approach the upper pole ends of the upper series of magnets, while the non-magnetic particles, being not subject to magnetic attraction, are thrown forward with considerable velocity, so as to fall beyond the chute F and drop into the hopper C of the second gang of magnets. The magnetic ore-particles accumulate on the upper pole ends of the upper series of magnets, pass gradually from the same to the lower pole ends of the upper series, and from the same to the upper pole ends of the lower series of magnets, and then to the lower pole ends of the same. The magnetic particles accumulate gradually to such an extent as to form a continuous web or fleece-like body, which gradually permits the outermost particles to become loose, and move down by friction over the web or fleece until they are dropped on the chute F, and passed over the same into the collecting receptacle.

The particles taken up by the hopper C contain still a small quantity of magnetic particles. They are passed successively in the same manner over the pole ends of the lower gang until the entire separation of the magnetic particles from the non-magnetic is accomplished. In Figures 3 and 4 the motion of the magnetic ore-particles from pole end to pole end is represented, the magnetic ore-particles being attracted around the pole ends until a sufficient quantity is accumulated, and the magnetic influence of the pole end overcome, so that they slide downwards towards the next lower pole end, where they again accumulate, filling up the space between the pole ends and passing on to the next pole end, and so on, until they are dropped on to the chute, and conducted off. The action of the pole ends of the magnets of the lower gang on the magnetic particles that are delivered by the hopper of the second, third, &c., gang, is the same as in the first gang, all the magnets being charged, so to say, with an armature of accumulated ore-particles, whereby the remnant magnetism of the same is retained, and the very effective separation of the ore from the gauge produced without any change in the trajectory of the falling material, which continues to drop according to the law of gravity.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The combination, with a supply-hopper, of a series of permanent magnets, the pole ends of which are located below the hopper, and an adjustable deflecting-plate located above and at a short distance back of the pole ends of said magnets, and in the path of the falling material, substantially as set forth.

2. In a magnetic ore-separator, the combination of a supply-hopper, a series of magnets having the extreme attractive or active surfaces of their uppermost poles directly in the path of discharge of the ore-particles and the attractive or active surfaces of the poles beneath out of said path, but directly in the path of that portion of the magnetic material that has been separated by said uppermost poles, and an inclined magnetic deflecting-plate located below the mouth of the hopper, and arranged above but out of contact with the attractive or active surfaces of said uppermost poles, substantially as set forth.

3. In a magnetic ore-separator, the combination of a supply-hopper for the ore-particles, two series of magnets placed one beneath the other and having the extreme attractive or active surfaces of the poles of the upper series of magnets directly in the path of discharge of the ore-particles from the supply-hopper, so as to be in direct contact with the ore-particles to be treated, and having the attractive or active surfaces of the poles of the lower series of magnets at some distance back from and out of the path of the ore-particles to be separated, but directly in the path of and in direct contact with that portion of the magnetic material that has been separated by the poles of the upper series, and an inclined magnetic deflecting-plate located below the mouth of the hopper, and arranged above and out of contact with the poles of the upper series of magnets, substantially as set forth.

4. In a magnetic ore-separator, the combination, with a supply-hopper, of a series of permanent magnets located below the hopper, a box for supporting said magnets, a pivoted frame for guiding said box, means for adjusting the box on said frame, and means for adjusting the inclination of said frame, substantially as set forth.

Dated this 22nd day of May, 1896.

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Agent for the Applicant.

AN IMPROVED MACHINE FOR BREAKING OR CRUSHING ORE, ROCK, AND THE LIKE.

I, William Ernest Hughes, of 42, Lambton Quay, Wellington, New Zealand, registered patent agent, do hereby declare the nature of my invention for "An Improved Machine for Breaking or Crushing Ore, Rock, and the like," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a machine for breaking or crushing ore, rock, and the like, and to that class of such machine in which an oscillating jaw is employed, the object of my said invention being to construct the machine in such a manner that a continuous or constant crushing shall take place, and to improve the construction of the machine so as to permit of the wearing-parts being readily replaced.