

J. F. PHARO.
ORE BREAKER.

APPLICATION FILED DEC. 16, 1910.

1,058,789.

Patented Apr. 15, 1913.

2 SHEETS—SHEET 1.

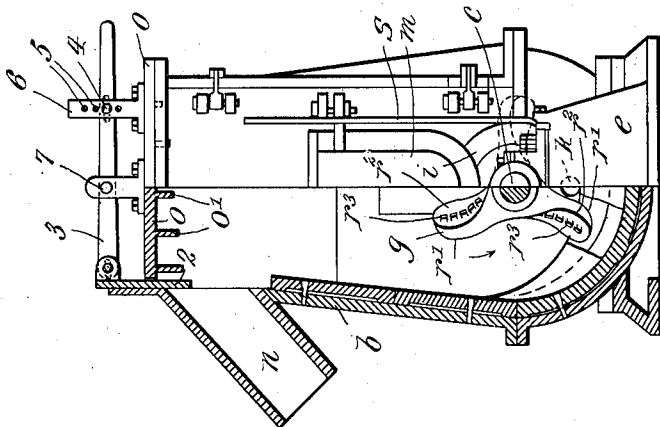


Fig. 2.

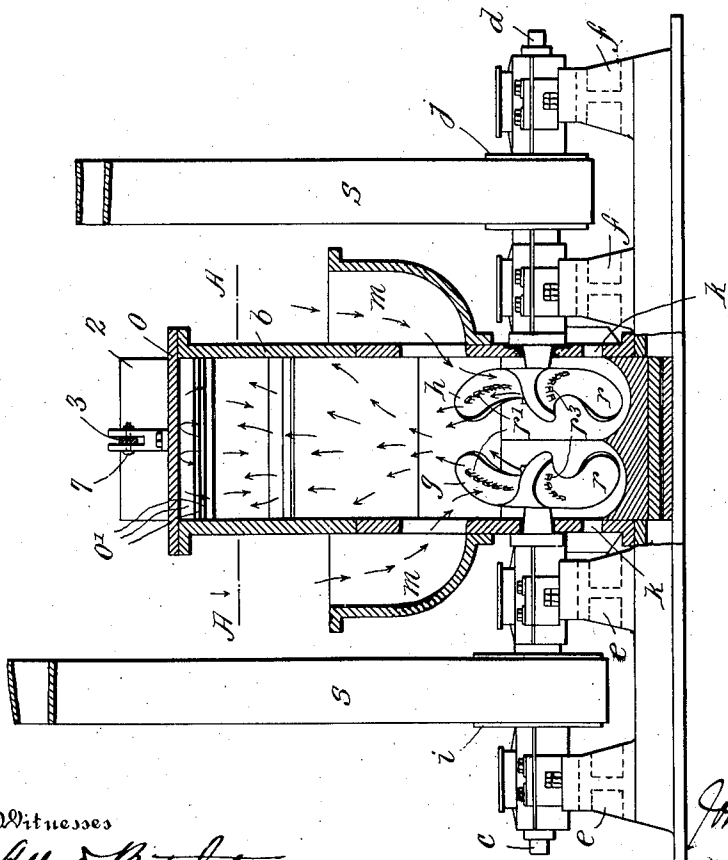


Fig. 1.

Witnesses

Albert Hatcher
Ed. Stark

John F. Pharo
Inventor
By Attorney *Wm. H. Mann*

J. F. PHARO.
ORE BREAKER.
APPLICATION FILED DEC. 16, 1910.

1,058,789.

Patented Apr. 15, 1913.

2 SHEETS—SHEET 2.

Fig. 3.

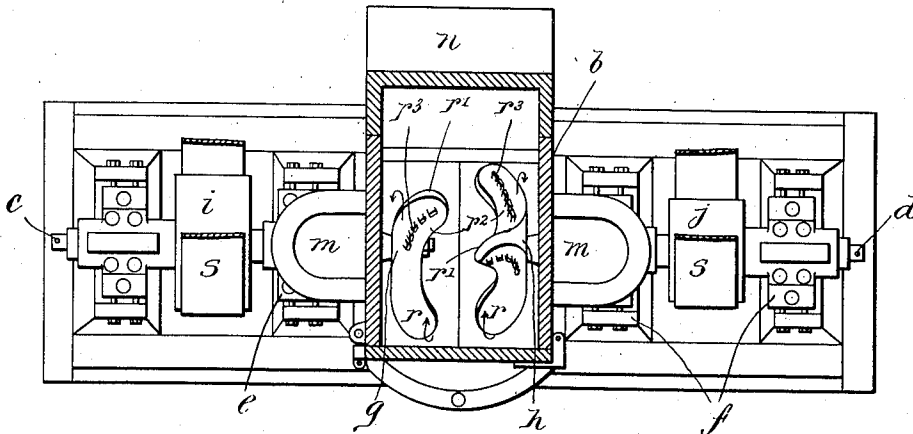


Fig. 4.

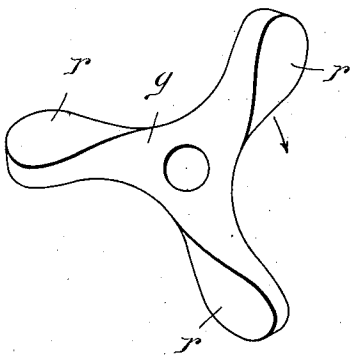
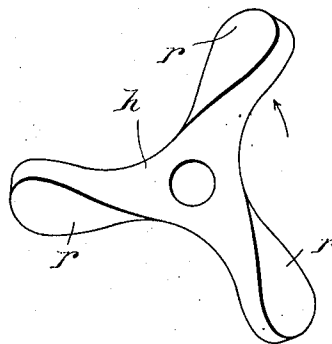


Fig. 5.



Witnesses

Albion B. Batcher
Edw. B. Batcher

Inventor

By Attorney

John F. Pharo
John N. Pharo

UNITED STATES PATENT OFFICE.

JOHN FRANKLIN PHARO, OF THETFORD MINES, QUEBEC, CANADA.

ORE-BREAKER.

1,058,789.

Specification of Letters Patent.

Patented Apr. 15, 1913.

Application filed December 16, 1910. Serial No. 597,713.

To all whom it may concern:

Be it known that I, JOHN FRANKLIN PHARO, of Thetford Mines, Province of Quebec, Canada, have invented certain new and useful Improvements in Ore-Breakers; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates particularly to ore breakers of the type which break up the ore by impact, in contradistinction to ore crushers; and it has for its object to provide a breaker of this type capable of hurling the pieces of ore in criss-cross directions, thus causing them to strike against one another, moving parts of the breakers, or an abutment plate contiguous to the discharge opening of the machine.

The invention may be said to consist of the construction, combination and particular arrangement of parts hereinafter described and pointed out in the claims.

For full comprehension, however of my invention reference must be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate the same parts and wherein—

Figure 1 is a side elevation of my improved machine with the shell or casing in vertical sectional view; Fig. 2 is an end elevation partly in transverse vertical sectional view; Fig. 3 is a sectional view taken on line A A, Fig. 1; and Figs. 4 and 5 are detail elevations of the left and right beaters.

The shell or casing *b* is of rectangular cross-section vertically disposed, and a pair of alined shafts *c* and *d* are supported in two pairs of bearings *e e* and *f f*, with their adjacent ends projecting through the lower portion of the shell or casing, and having oppositely acting beaters, *g* and *h*, respectively, mounted thereon; while rotation in the same direction but at different speeds is imparted to the shafts by pulleys *i* and *j* of preferably slightly different diameter.

The shell or casing has diametrically opposite air intake ports *k k* in two of its sides below the shafts, feed chutes *m m*, in the same sides with their discharge ports approximately on a level with the tops of the beaters, and a delivery chute *n* in one of the other sides and communicating with the top of the shell, which is covered by an impact plate *o*, presenting downwardly ex-

tending ribs *o'* of gradually decreasing depth from the delivery chute *n*. These ribs break up the ore as it is hurled against them, the discharge of large pieces being prevented by the greater depth of the ribs near the discharge chute.

A vertically adjustable gate or baffle plate 2 is inserted preferably between the plate *o* and the casing and is adapted to be moved to reduce the discharge opening by a lever 3 fulcrumed at 7 and loosely connected to the upper end of the plate 2, the lever being held against movement after the plate has been adjusted to the desired position by means of a bolt 4 carried by the lever, such bolt successively engaging a series of vertically arranged holes 5 in a standard 6.

If the ore breaker is running light the plate 2 is lowered thus preventing large pieces of ore from escaping but if there is a heavy charge in the breaker the said plate is raised because in the latter case the pieces of ore being confined are hurled against one another and so are broken up before they reach the delivery chute.

The beaters (see Figs. 4 and 5) are of peculiar construction each arm being of substantially plate form and turned to an angle of about forty-five degrees and has its end curved slightly backward relatively to their direction of movement, the arms or vanes of one beater lying at an opposite angle to the arms or vanes of the other beater, and the arms of each beater presenting toward the other beater surfaces *r* of compound curve form with slightly convexed ends *r'* disposed to face diagonally forward relatively to the direction of rotation of the other beater, and from which the centrifugal lines intersect similar lines projected from the surfaces of the arms of the other beater so that the ore acted upon by one beater intersects the path of the ore acted upon by the other beater, the two bodies of ore colliding within the casing at a point just above and midway between the beaters, the ore being further broken up by impact with the sides of the casing at this point. These beaters are preferably cast in steel or chilled iron and the backs *r''* of the blades have a series of lugs *r'''* cast thereon and so formed that they can be broken off as desired to balance the beaters. The planes of the beating faces of one beater intersect the planes of any juxtaposed beating faces of the other beater. *s s* indicate the driving belts.

Operation: The operation of my improved ore breaker is as follows: The beaters rotate in the same direction but not quite in unison the difference in diameter of the pulleys causing one to exceed the speed of the other to a small extent. The effect is that, the pieces of ore fed through the chutes *m m* are caught by the arms of each beater and by the centrifugal force due to the rotation of the latter, hurled therefrom at a tangent in a direction over the other beater and toward the upper portion of that side of the shell. As the ore pieces leave the arms of one beater they either strike the pieces hurled by the arms of the other beater, and the impact fiberizes them sufficiently to follow the draft caused by the beaters and be discharged through the delivery chute; or they impinge upon the upper portions of the sides of the shell or upon the blades of the other beater, and are fiberized and discharged. Pieces not fiberized sufficiently by impact with each other come into violent contact with the impact plates and are fiberized or if not they fall back upon the beaters and are again hurled either against other pieces, against one of the beaters, or the side walls of the shell until thoroughly fiberized.

Although I have described the beaters as being driven at different speeds by pulleys of different diameters, the effect can, in a measure, be obtained by using pulleys of the same diameter and making one belt tighter than the other, without departing from the spirit of my invention.

What I claim is as follows:—

1. An asbestos ore breaker including a casing having a feed chute and a discharge, a shaft extending to the interior of the casing from one side thereof, a beater on the inner end of the said shaft and having radial arms presenting beating faces, a second shaft extending to the interior of the casing from the opposite side thereof, a beater on the inner end of the second shaft and having radial arms presenting beating faces, the planes of which intersect the planes of any juxtaposed beating faces of the other beater, and means for rotating both shafts in one direction.

2. An asbestos ore breaker including a casing having a feed chute and a discharge, a shaft extending to the interior of the cas-

ing from one side thereof, a beater on the inner end of the said shaft and having radial arms presenting beating surfaces inclined to face inwardly toward the center of the casing; a second shaft extending to the interior of the casing from the opposite side thereof, a beater on the inner end of the second shaft and having radial arms presenting beating surfaces inclined to face inwardly toward the center of the casing in a diagonally opposite direction to those of the other beater, the inclined beating surfaces of both beaters facing in the same circumferential direction relatively to the beaters.

3. The combination with a vertical shell having intake and discharge ports of an impact plate extending across and closing the upper end of such shell; downwardly extending ribs presented by the impact plate and decreasing in depth away from the discharge port; beaters within the shell; and means for operating the beaters.

4. The combination with a shell or casing having an impact plate closing its top and having air intake ports, feed chutes and a delivery chute, alined shafts, downwardly extending ribs presented by the impact plate and decreasing in depth away from the delivery chute, means for driving the shafts in the same direction, oppositely acting beaters, the arms whereof have reversed curved surfaces, the surfaces of the arms of each beater being disposed to face diagonally forward relatively to the direction of rotation of the other beater.

5. The combination with a shell or casing having an impact plate closing its top and having air intake ports, feed chutes and a delivery chute, alined shafts, means for driving the shafts in the same direction at different speeds, oppositely acting beaters the arms whereof have spiral surfaces with concave ends, the surfaces of the arms of each beater being disposed to face diagonally forward relatively to the direction of rotation of the other beater.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN FRANKLIN PHARO.

Witnesses:

OWEN N. EVANS,

JOHN A. O'KEEFE.