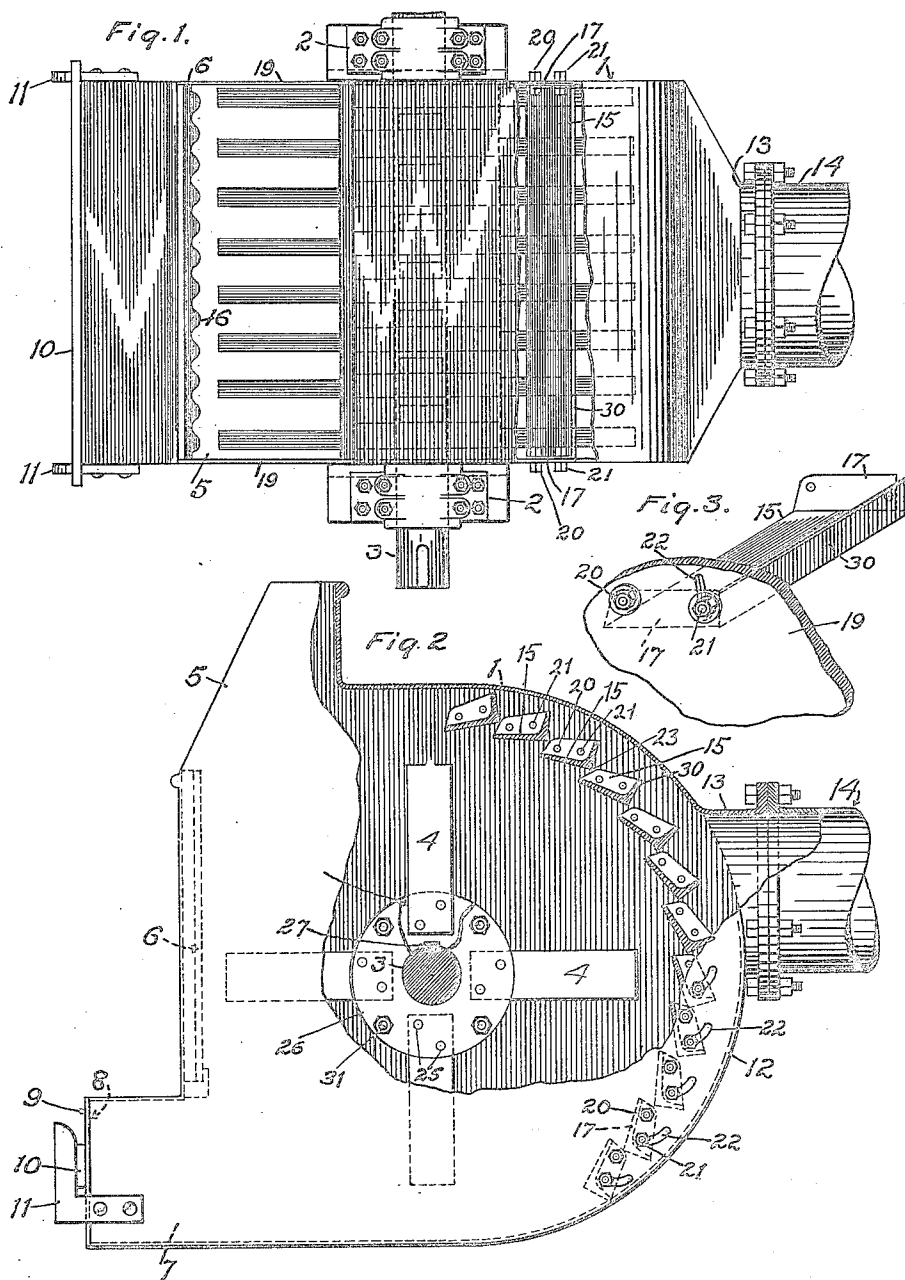


Feb. 20, 1923.

E. B. STARR ET AL.
DISINTEGRATOR.
FILED JULY 25, 1921.

1,446,221.

2 SHEETS—SHEET 1.



INVENTOR.
Edward B. Starr.
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2 SHEETS—SHEET 2.

Fig. 4.

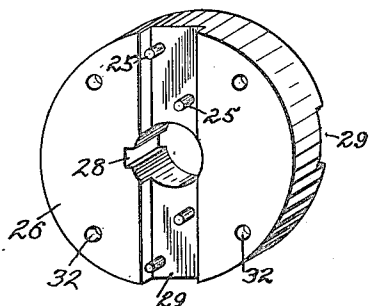


Fig. 5.

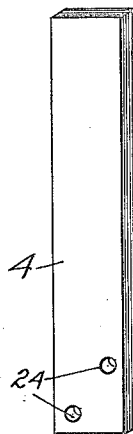


Fig. 6.

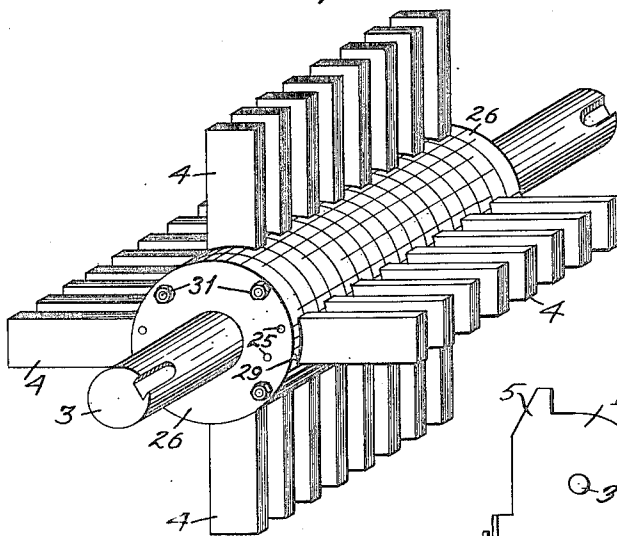
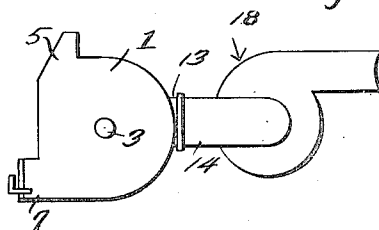


Fig. 7.



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UNITED STATES PATENT OFFICE.

EDWARD B. STARR AND McKINLEY STOCKTON, OF LOMPOC, CALIFORNIA.

DISINTEGRATOR.

Application filed July 25, 1921. Serial No. 487,347.

To all whom it may concern:

Be it known that we, EDWARD B. STARR and McKINLEY STOCKTON, citizens of the United States, residing at Lompoc, in the county of Santa Barbara and State of California, have invented a new and useful Disintegrator, of which the following is a specification.

This invention relates to machines for disintegrating, or reducing rock, or other material, to a finely divided condition. The machine is especially adapted to disintegrating materials of cellular construction and of exceptional lightness in weight, such material being adapted to be removed from the machine by a blower, or like device.

The main object of the invention is to provide a disintegrator of simple construction which will be effective in reducing such rock, or other material, to a granular or finely divided condition without destroying the cellular or porous structure of such material.

A further object of the invention is to provide means for adjusting or controlling the operation of the machine in breaking up the material and in removing the fines therefrom.

Another object of the invention is to provide means for trapping and removing flint, metal, or other hard and heavy material which may enter the machine.

The accompanying drawings illustrate an embodiment of our invention, and referring thereto:

Fig. 1 is a plan view of the machine partly broken away to show the interior construction;

Fig. 2 is a partly broken side elevation thereof;

Fig. 3 is a perspective view of one of the impact plates, showing the means for adjustment thereof;

Fig. 4 is a perspective of one of the clamping disks for the breaker arms;

Fig. 5 is a perspective of one of the breaker arms;

Fig. 6 is a perspective of the rotor or rotary member of the machine.

Fig. 7 is a side elevation of the disintegrator, and of a suction fan connected thereto.

The machine comprises a casing 1 of

metal, or other suitable material, provided with bearings 2 in which is rotatably mounted a shaft 3, which is connected to or provided with suitable driving means for rotating the same at high velocity, said shaft 3 carrying a plurality of breaker arms 4, preferably extending radially with respect to the shaft. The casing 1 is provided with a mouth or feed opening 5 in the upper portion thereof and to one side of the axis of the shaft 3, said feed opening being permanently open or unobstructed, so as to permit the material to be fed freely into the machine. Below said opening the casing is provided with a vertical impact plate 6 of suitable hard metal extending in the path of the material as it is projected or thrown by the operation of the breaker arms, as hereinafter described. Said impact plate is preferably corrugated as shown at 16. The bottom portion of the casing, below said feed opening and below the plate 6, is flat and extends horizontally from the lower end of the curved portion of the casing hereinafter referred to, and directly adjacent to this bottom portion the casing is provided with a lateral extension to form a trap or pocket 7 for receiving flint, metal, or other hard material, said pocket having a lateral opening 8 normally closed by a plate 9 which may be retained in place by a bar 10 supported by hooks 11. The side of the casing 1 opposite to the impact plate 6 is preferably curved, for example, concentrically with the shaft 3, as indicated at 12, and is provided with an outlet opening 13 communicating with an exhaust pipe 14, which leads to any suitable blower or exhaust device, indicated at 18 in Fig. 7 for producing sufficient suction at the outlet opening 13 to draw off the fines or disintegrated material. The outlet opening 13 extends transversely to the direction of circumferential motion of the rotor, for example, as shown, the said outlet may extend horizontally outward from the circumferential portion of the casing and may be located somewhat above the axis of the rotor so that the material thrown off by the rotor in a tangential direction with reference to the motion of the rotor is caused to escape from the casing in a direction which has a component transverse to the circum-

ferential direction of rotation and a component reverse to such direction of rotation. In the portion of the casing adjacent to the outlet opening and between the path of the outer ends of the breaker arms and the outlet opening, so as to be in the path of the material projected by the breaker arms are arranged a plurality of impact and deflector plates, vanes, or baffles 15, each consisting of a plate of suitable metal, or other material, extending from side to side of the casing and provided with end flanges 17 bolted to the vertical sides 19 of the casing. In order to enable angular adjustment of these vanes 15 they may be arranged to pivot on bolts 20 and be fastened in any desired angular position by bolts 21 engaging in slots 22 in the sides 19 of the casing. The vanes 15 are preferably arranged in a circular arc so as to form discharge slots 23 between successive vanes; and the width of these slots, as well as the angle of presentation of the vanes, may be determined by adjustment of the fastening means 21 aforesaid. These plates or vanes are so positioned that in all adjustments of same they extend obliquely outward in a rearward direction, with reference to the circumferential motion of the outer ends of the breaker arms, so that the currents of air passing in contact with the plates are deflected rearwardly as they pass between the plates to the outlet, with the result that only the finer and lighter material is drawn with the air currents to the outlet, and the coarser material, impinging on the plates, is carried forward by the momentum thereof and is retained within the machine for further disintegration. Vanes or plates 15 may have stiffening or reinforcing flanges 30.

The rotor or rotary member is preferably constructed in such manner that the breaker arms 4 are removably secured thereto. Each breaker arm 4 may consist of a bar of steel, or other suitable material, having perforations 24 to engage with dowel pins 25 on clamping disks 26 which are strung on the shaft 3 and are connected thereto by a key 27 engaging in a keyway 28 in each of the disks 26. Each disk 26 has diametrical grooves 29 on opposite sides thereof and transverse or angularly disposed relatively to each other, the dowel pins 25 aforesaid projecting from the bottom of these grooves in such manner that when the parts are assembled each breaker arm 4 will enter and be held in opposing grooves 29 of adjacent disks 26 and alternate breaker arms will extend transversely or at right angles to one another by reason of the transverse arrangement of the grooves 29 on opposite sides of the disks 26. It will be understood that any desired number of such breaker arms may be used, and they may be disposed in any angular positions with respect to one another and to the

shaft 3, and may be either radial to shaft 3, or otherwise arranged. The disks 26 are held in assembled relation by bolts 37 passing through perforations 32 in said disks. By loosening said bolts any two adjacent disks may be separated sufficiently to enable an intervening breaker arm 4 to be slipped out and replaced by another arm, without disturbing the other parts.

The operation is as follows:

The rock, or other material to be disintegrated, for example, diatomaceous earth, is introduced into the feed opening 5 by any suitable feeding means, and, the shaft 3 being operated so as to be rotated rapidly in the direction of the arrow in Fig. 2, the breaker arms 4 strike the material as it is descending in the casing 1 and also continues to strike and beat the material as it accumulates in the bottom of the casing, so as to throw or project the material circumferentially in the direction of motion of the arms 4, and to cause such material to impinge on the impact plate 6 and on the vanes 15, whereby the material is broken up or disintegrated by impact of the arms 4 and by impact of the material on the stationary members 6 and 15. At the same time a draft or current of air is maintained through the casing 1 from the feed opening 5 to the outlet 13, by suitable suction means connected to outlet pipe 14, so that the fine disintegrated material is drawn through passages 23 between the vanes 15 and out at said outlet opening. By means of the change in direction of the material in escaping at said outlet openings from a forward circumferential direction to a rearward or reverse direction, with reference to the direction of rotation, we ensure that only the finer particles will so escape, the coarser or heavier pieces, by means of the tangential momentum imparted to them by the rotary breaker means, being carried past the outlet opening without being drawn out by the suction. The material is fed into the casing in a direction tangential to the movement of the breaker arms 4, so as to fall directly into the path of such arms and to readily take up the circumferential motion. The angle at which the material projected by the breaker arms strikes the vanes 15 and the effect of the resulting impact may be varied by adjusting said vanes as above described, and such adjustment also provides for varying the exhaust or discharge openings 23 between the vanes.

In the above described operation only the finer material is drawn off by the suction at the outlet opening 13, and the heavier or undisintegrated material remains in the casing for further operation of the disintegrating means. Any hard and difficultly breakable bodies, such as pieces of flint, or of metal, will fall, or be thrown directly into the

pocket 7 and remain out of the path of the breaker arms and may be removed from time to time by removing the plate 9.

What we claim is:

5 1. A disintegrator comprising a casing provided with a feed opening in its top, and with an outlet opening extending outwardly from a circumferential portion of the casing, a shaft mounted to rotate within the casing
10 and provided with breaker arms, suction means connected to said outlet to draw air from the casing through the outlet, an impact plate within the casing and below said opening, and a plurality of impact and deflector plates mounted within the casing and
15 between the path of the outer ends of the breaker arms and the outlet, said plates being inclined rearwardly and outwardly with reference to the circumferential motion of
20 the outer ends of the breaker arms, so as to deflect rearwardly the currents of air passing in contact with and between said plates to said outlet, whereby only the finer material is carried with such air to said outlet
25 and the coarser material is retained within the casing for further disintegration.

2. A construction as set forth in claim 1, in which said plates are angularly adjustable, to vary the angle of impact and the size of the openings between them.

30 3. A disintegrator comprising a casing, a shaft mounted to rotate within said casing and provided with breaker arms, said casing having a feed opening in its top, a vertical portion below said feed opening, a portion
35 opposite said vertical portion, concentric with said shaft, an outlet extending from said concentric portion, a bottom portion extending horizontally from the lower end of said concentric portion, and a lateral ex-
40 tension of such horizontal bottom portion forming a trap for hard material, a vertical impact plate on said vertical portion of the casing, and deflector plates extending with-
45 in the casing between the path of movement of the outer ends of the breaker arms and said outlet.

In testimony whereof we have hereunto subscribed our names this 14th day of July, 1921.

EDWARD B. STARR.
McKINLEY STOCKTON.