(No Model.)

P. W. GATES.

STONE BREAKER AND CRUSHER.

No. 265,957. Patented Oct. 17, 1882.

Fig. 1.

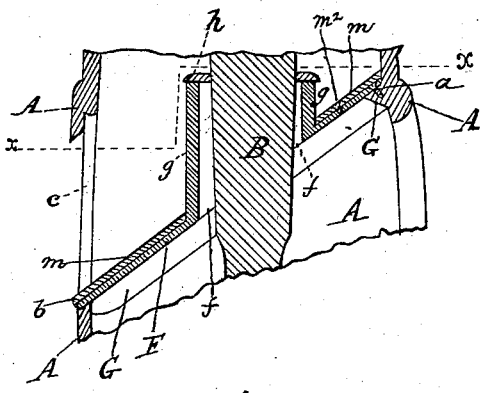


Fig. 2.

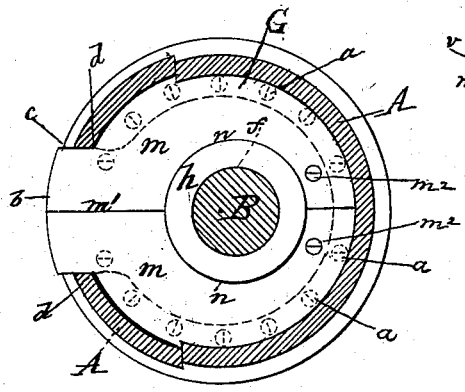


Fig. 4.

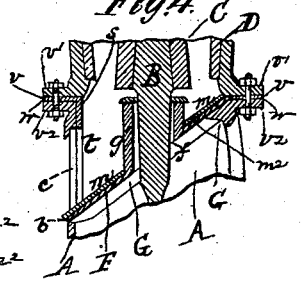
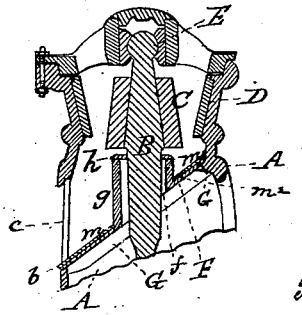


Fig. 3.



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UNITED STATES PATENT OFFICE.

PHILETUS W. GATES, OF CHICAGO, ILLINOIS.

STONE BREAKER AND CRUSHER.

SPECIFICATION forming part of Letters Patent No. 265,957, dated October 17, 1882.

Application filed August 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, PHILETUS W. GATES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Stone Breakers and Crushers, of which the following is a specification.

My invention relates, first, to an improved removable inclined diaphragm-chute applied transversely in the outer framing or case of the crusher at a point between the crusher-head and its concave, and the gearing and step-box of the gyrating shaft carrying the crusher-head; second, to a means whereby the diaphragm-chute may be constructed partly of common cast-iron and partly of hard white or chilled iron or steel, and thus a durable wearing-surface be secured at moderate cost, this part of my improvement being applicable to the diaphragm-chute whether it is made separate from the outer framing or case or is cast integral with said framing or case of the machine.

In the P. W. Gates patented stone breakers or crushers, as heretofore constructed, it has been found inconvenient in some instances to grind off the bearing upon which the loose dust-excluding collar rests on account of the inclined diaphragm-chute being formed by casting it integral with the cylindrical case or framing of the machine; and it has also been found that the diaphragm-chute wears away on its upper side to such an extent as to render renewal thereof necessary, or, what is more expensive, to substitute a new casting with chute in it for the one with worn-out diaphragm.

To overcome these difficulties is the object of my invention, and I effect the same by the means shown in the accompanying drawings and hereinafter described and claimed.

Figure 1 of the drawings is a broken vertical section of a portion of the machine patented heretofore by me (Patent No. 243,345) and my improvements applied thereto. Fig. 2 is a horizontal section of the same in the line *x x* of Fig. 1. Fig. 3 is a similar section to Fig. 1, but on a smaller scale, and showing more of the upper parts of the machine. Fig. 4 is also a similar section to Fig. 1, but showing a modified plan of my invention.

A in the drawings designates the intermediate portion of the cylindrical case or framing, B the gyrating crusher-shaft, C the crusher-head, D the flaring concave with hard-metal lining, and E the ball-bearing, of a "Gates" stone breaker or crusher.

The inclined diaphragm-chute F of the machine represented has heretofore been cast integral with the portion A of the cylindrical case or framing of the machine; but I now construct it separate from said portion A and provide a strong inclined rib or bed-flange, G, upon the inner surface of the portion A, for supporting and fastening the said chute in place. This rib may extend all around, or, as shown, only to the discharge-opening *c*; and it may be formed of separated projecting portions or be continuous, as shown. It projects inwardly from the inner surface of the portion A a suitable distance, being formed with a beveled upper surface corresponding in its inclination with the inclination given to the diaphragm-chute, as shown. In the rib screw-threaded holes are formed, into which screw-bolts *a* are passed, said bolts passing through the diaphragm-chute near its margin and serving to fasten the same firmly in position, while they admit of the diaphragm being removed when necessary. The rib G serves for strengthening the cylindrical case or framing, while its main function is to sustain the diaphragm-chute in position within said case or framing. The discharging end *b* of the diaphragm-chute extends through the lower portion of the usual discharge-opening, *c*, of the said case or framing, and the shoulders *d*, formed by the contraction of the width of the chute at said opening *c*, abut against the case or framing, and thus relieve the chute and its fastenings from strain in a direction toward the said opening *c*. The chute, as usual, has an opening, *f*, through its center for the passage of the shaft B through it, and this opening has, as usual, a tubular flange, *g*, surrounding it, and extending up to form a seat or rest for the horizontal loose collar *h*, which is employed for excluding dust from gearing below, as shown. The chute is cast with its flange *g* upon it, and in order to secure a nice fit between the flange and the loose collar it is necessary to plane off or true

the upper edge of said flange, which truing or planing operation can be performed in a lathe or otherwise much more conveniently when the chute is out instead of within the case or framing.

My mode of constructing and applying the diaphragm-chute enables me to turn off the end of the flange *g* in a lathe or otherwise while the chute is out of the cylindrical case; and by having the diaphragm-chute made separately from the case or framing and fastened in position by means of the rib G and screws *a* facilities for removing it when worn away and for substituting a new one therefor are afforded, and thus great loss and expense, as well as inconvenience, will be avoided.

To render the diaphragm-chute durable and its entire removal unnecessary, except when breakage occurs, I in some cases construct the diaphragm proper, F, with a removable hard or chilled metal or steel upper surface portion, *m*, which corresponds in form with the diaphragm-chute proper, except that a flange, *g*, on this portion *m* may be omitted around the passage through which the shaft B passes. This hard-metal portion I divide into two equal parts vertically, as indicated by the dividing-line *m'* in Fig. 2, and apply the two halves upon the top of the diaphragm proper, F, as shown. The respective halves are formed with an abutting shoulder at *d*, and are confined in position upon the diaphragm-chute F by screws m^2, as shown. These half hard-metal portions are respectively fitted around the flange *g* by means of semicircular notches *n*, formed in them during the casting or finishing operation.

The hard-metal portion *m* may consist of either white-metal or chilled iron or steel, and when applied it will render the diaphragm proper, F, very enduring and capable of withstanding a long time the effect of the immense wearing friction it is subjected to by the crushed stone falling upon and sliding off it. These notched and shouldered hard-metal facing portions *m* can be applied to stone-breakers having diaphragm-chutes which are cast integral with the case or framing, and my invention is intended to embrace such use of the same.

As a modification of the plan of construction shown in Figs. 1, 2, and 3, the diaphragm-chute may have a cylindrical upwardly-extended portion, *s*, with a discharge-aperture, *t*, through it, corresponding to the aperture *c* in the case or framing, and this cylindrical extension may be terminated with a horizontal flange, *v*, as shown in Fig. 4. When the chute is constructed as in Fig. 4 the case or framing of the machine will be divided horizontally, as at *w*, and the concave portion D and the intermediate portion, A, will be provided respectively with a flange, as indicated at v' and v^2, and the flange *v* of the chute F will occupy a place between the flanges v' v^2 and all be bolted together by the same bolts. Under this construction the supporting-rib G will sustain the diaphragm-chute against downward strain; but it will not be necessary to bolt the chute to the rib, and the chute and its fastening-bolts will be relieved of transverse strain in the direction of the discharge-openings *c t* by the shoulders abutting at *d* against the case or framing. This construction also admits of a chute of either ordinary cast metal throughout or with hard-metal surface *m* being adopted, the same as the plan of construction shown in Figs. 1, 2, and 3.

I am aware that a horizontal cylindrical gathering and conducting gutter with a discharge-chute at one point of its periphery has heretofore been devised in a bark-mill; but this would not answer for a stone-breaker such as I have herein described and shown; also, that the cylindrical case or framing of this mill for supporting said gutter in position has been made with a horizontal division at *w* between a flanged concave and the flanged section below the same, in which the gutter is located and all fastened together by the same bolts; but I am not aware that an inclined diaphragm-chute extending on an inclined plane entirely across the cylindrical portion A of the case or framing, and its whole surface forming and serving as a chute, has ever been constructed and applied in the manner and for the purpose described and shown.

My chute might be in form of a conic frustum and be bolted to a projecting rib, G, of the case or framing without departing from my invention essentially.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the crusher cylinder or case, of the inclined diaphragm-chute, constructed separately and united to the crusher cylinder or case, substantially as and for the purpose herein described.

2. The inclined diaphragm-chute formed of a base portion, F, and a removable wearing portion, *m*, substantially as and for the purpose described.

3. The removable diaphragm-chute made of hard-surfaced metal, substantially as and for the purpose described.

PHILETUS W. GATES.

Witnesses:
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