

(No Model.)

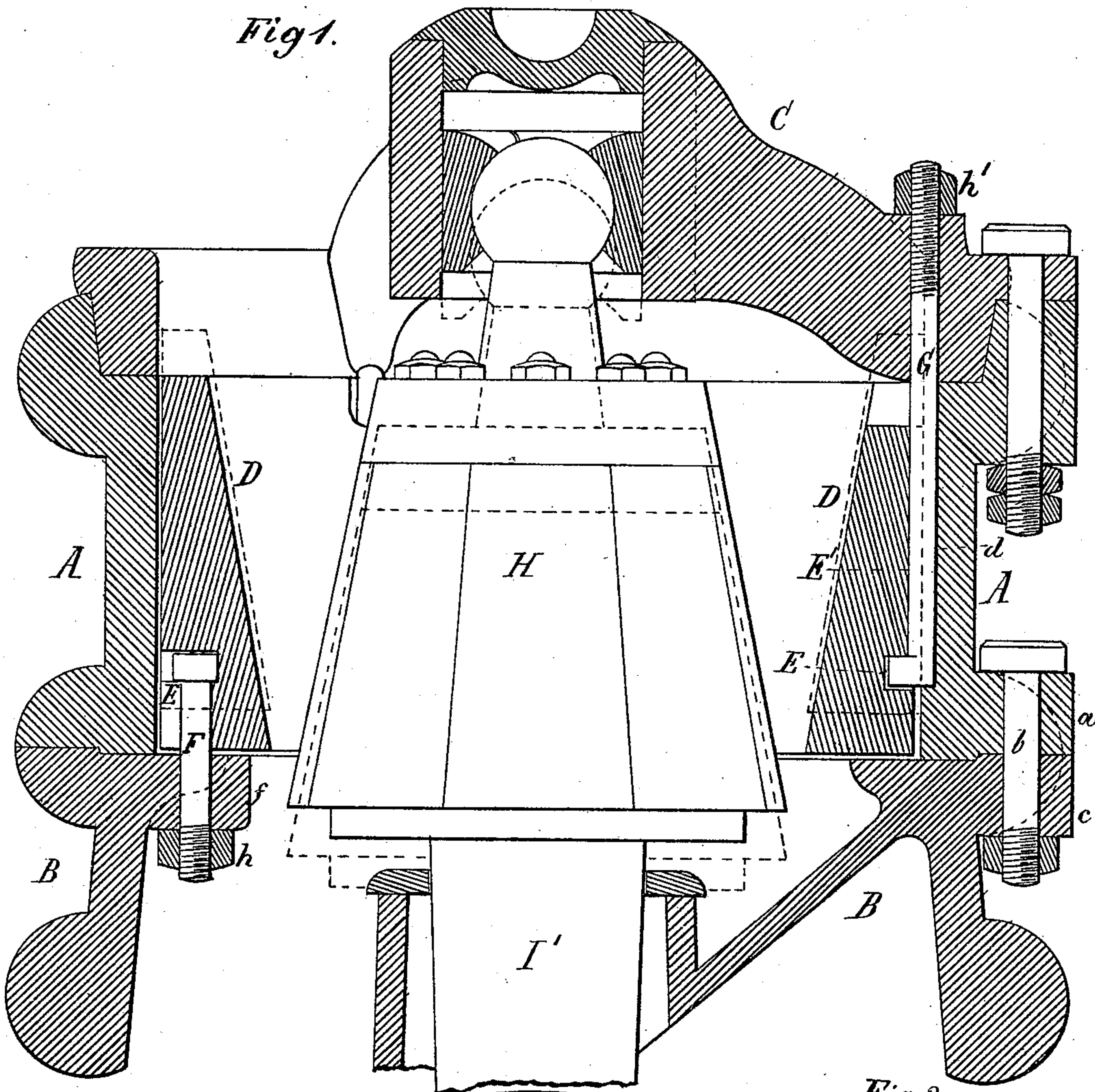
R. D. GATES.

STONE BREAKING AND ORE CRUSHING MACHINE.

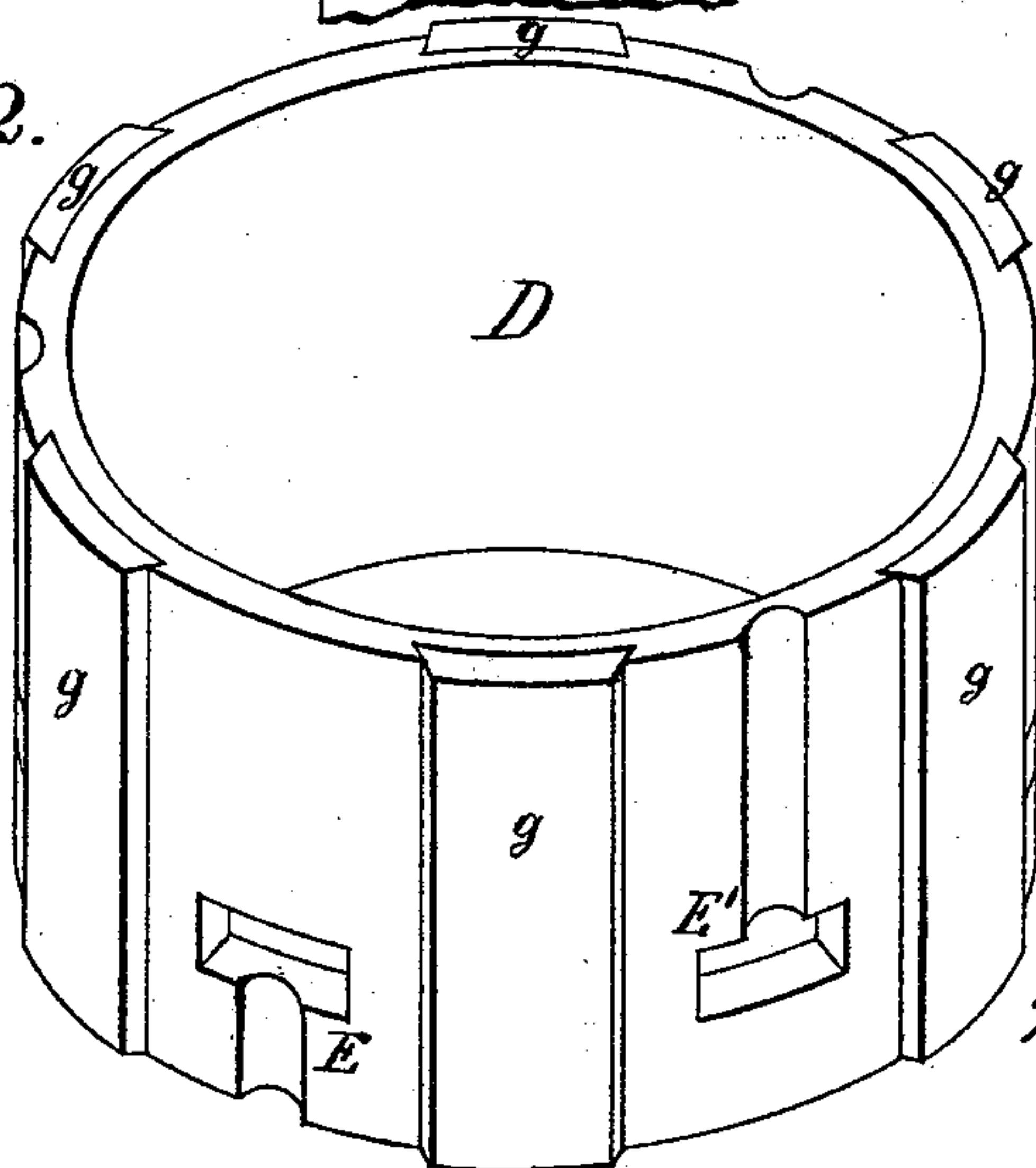
No. 251,039.

Patented Dec. 20, 1881.

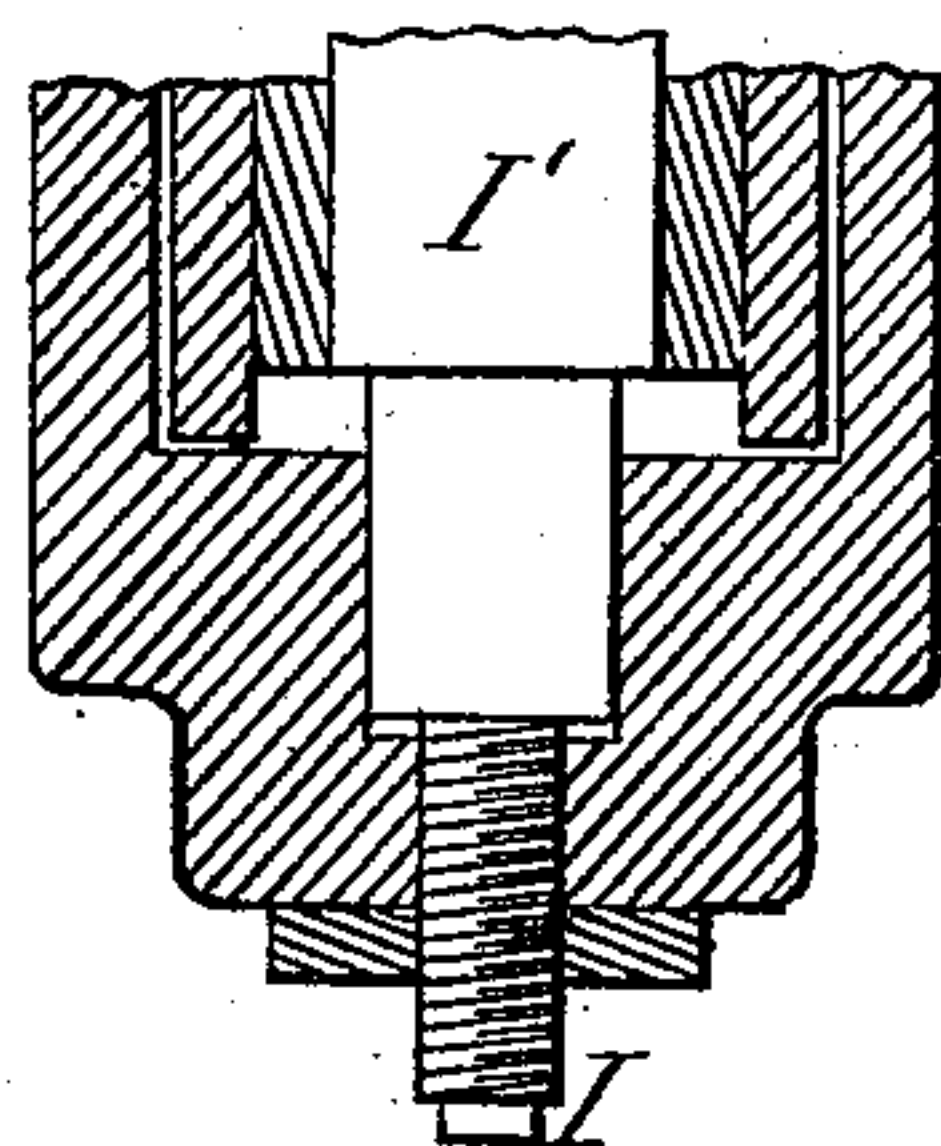
*Fig 1.*



*Fig 2.*



*Fig 3.*



*Witnesses:*

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*Inventor.*

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# UNITED STATES PATENT OFFICE.

RYERSON D. GATES, OF CHICAGO, ILLINOIS.

## STONE-BREAKING AND ORE-CRUSHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 251,039, dated December 20, 1881.

Application filed September 7, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, RYERSON D. 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-Breaking and Ore-Crushing Machines, of which the following is a specification.

My invention relates to an improved mode of constructing concaves with an adjustable hard-metal lining or working-face, whereby the size of the annular discharge-space between the crusher-head and the concave of a stone-breaker or ore-crusher can be varied from a narrow to a wide one or from a wide to a narrow one without adjusting the shaft and crusher-head, and without removing one concave and substituting another; and whereby, in connection with the upward adjustment of the crusher-head, in the usual manner, a very wide discharge-space may be secured; and whereby, also, the lining or working face of the concave may be readily constructed and applied within the outer shell which surrounds and sustains it; and whereby, also, the lining may be easily taken out and a new one substituted for the old worn-out one; and the nature of my invention consists in an annular hard or chilled metal lining having an outer cylindrical surface and an upward-flared inner surface, and provided on its outer surface with two series of recesses adapted respectively to accommodate a portion of the head and body of bolts, in combination with an outer sustaining cylindrical shell provided with recesses for accommodating the adjusting-bolts, and with the frame of the machine and two series of bolts, one series of which serves as a means for retaining the lining in position, and the other series as a means whereby the lining is kept in position and also adjusted so as to be adapted for crushing fine or coarse, as circumstances may require.

In the accompanying drawings, Figure 1 is a vertical central section of the upper portion of the frame and concave of a stone-breaker, showing, also, the crusher-head and parts of its shaft in elevation. Fig. 2 is a perspective view of the improved chilled lining for the concave. Fig. 3 is a detail section.

The sustaining shell or portion A of the concave is made of ordinary cast metal in cylindrical form on its inside and bored out true.

At its base a flange, *a*, is formed, and this is bolted, as at *b*, to an outer flange, *c*, of the frame B of the crushing-machine. On the inner surface of this shell vertical recesses *d*, of half-round form in horizontal section, are provided. To the upper edges of this shell the cap C of the frame B is bolted. The frame B is provided with a strong inner flange, *f*, through which bolt-holes are cut. The lining D, which is fitted within the shell A, is cast in one piece, of white or chilled metal. The inside surface of the lining is flared upward, while its outside surface is cylindrical. In casting the lining unchilled vertical metal strips *g* are cast upon its cylindrical surface by a well-known mode of casting chilled articles with unchilled portions thereon. These strips are turned off true, so as to fit exactly the truly-turned inside of the shell. Between the strips *g* recesses E E', of T shape, are formed on the lining in the casting process. The recesses E receive the head and a portion of the body of bolts F, which pass down through the inner flange, *f*, of the frame, and receive nuts *h* upon their screw-threaded ends, as shown, while the recesses E' receive the head and a portion of the body of bolts G, which pass up through the cap and receive nuts *h'* upon their screw-threaded ends. The screws F G hold the lining in place and sustain it. By loosening or turning back the nuts of the screws F and screwing up the nuts of screws G the lining of the concave proper will be raised by the screws G, as illustrated by the dotted lines in Fig. 1, and by turning back or loosening the nuts of screws G the concave will descend to a lower position or to its original position, (shown by full black lines in same figure.) In this latter adjustment the nuts of the screws F will require to be turned up or tightened after the adjustment is effected.

The crusher-head H, as shown in Fig. 1, occupies a position within the concave, and it, as usual, is adjustable up or down, as illustrated by dotted lines, by a step-screw, I, at the lower end of its shaft I'. Now, with my improved concave with an adjustable working face or lining the adjustment heretofore found practicable with the step set-screw I of the crusher-head shaft can be doubled without



moving the shaft twice as far as heretofore, and thus the opening between the concave and the crusher-head may be enlarged to almost any extent desired without lengthening the crusher-head and otherwise lengthening the machine. It will be readily seen that if the concave be elevated one inch and a quarter and the shaft lowered one inch and a quarter an adjustment of two and a half inches will be secured, whereas only an inch and a quarter would be secured by adjusting the shaft alone. My adjustable lining also enables the operator to obtain the least possible opening between the concave and crusher-head; or, in other words, the greatest as well as the least possible opening can at will be secured in a single machine of given size, and while this is so the concave is more durable, less expensive, and also more convenient in its management.

The construction of the crusher-head with segmental hard-metal working faces, as shown in the drawings, forms no part of my claim under this application, as the same constitutes the subject-matter of another patent applied for by me; and my invention as hereinafter claimed is not confined to the use of metal strips *g* on the periphery of the concave, as these strips might be dispensed with, and the concave fit the shell all around, without departing from my invention.

Prior to my invention adjustable-ring con-

caves have been suspended loosely within a cylindrical shell or backing-chamber, either by means of a lever-bail or by means of guiding-lugs and adjusting-screws; but I am not aware that such concaves have been constructed to have both a firm, close bearing-contact against the backing shell or case and be held down firmly by headed screw-bolts, and made adjustable by other headed screw-bolts, and when adjusted to any suitable altitude can be locked or bolted down so as to withstand the great strains experienced while the heavy operation of crushing stone or ore is being performed by the combined action of a crusher-head and the concave.

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

1. The combination of the holding-down screw-bolts *F* and the adjusting screw-bolts *G* with the concave *D*, provided with the recesses *E* and *E'*, and with the frame of the machine, substantially as and for the purpose described.
2. The combination, with a vertically-adjustable shaft, of the hard-metal-lined concave, the sustaining-shell, and means for both adjusting and firmly holding down said lining, substantially as and for the purpose described.

RYERSON D. GATES.

Witnesses:

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