No. 639,558. Patented Dec. 19, 1899.

E. E. HANNA & T. W. CAPEN.

ROCK AND ORE BREAKER.

(Application filed Dec. 28, 1896.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

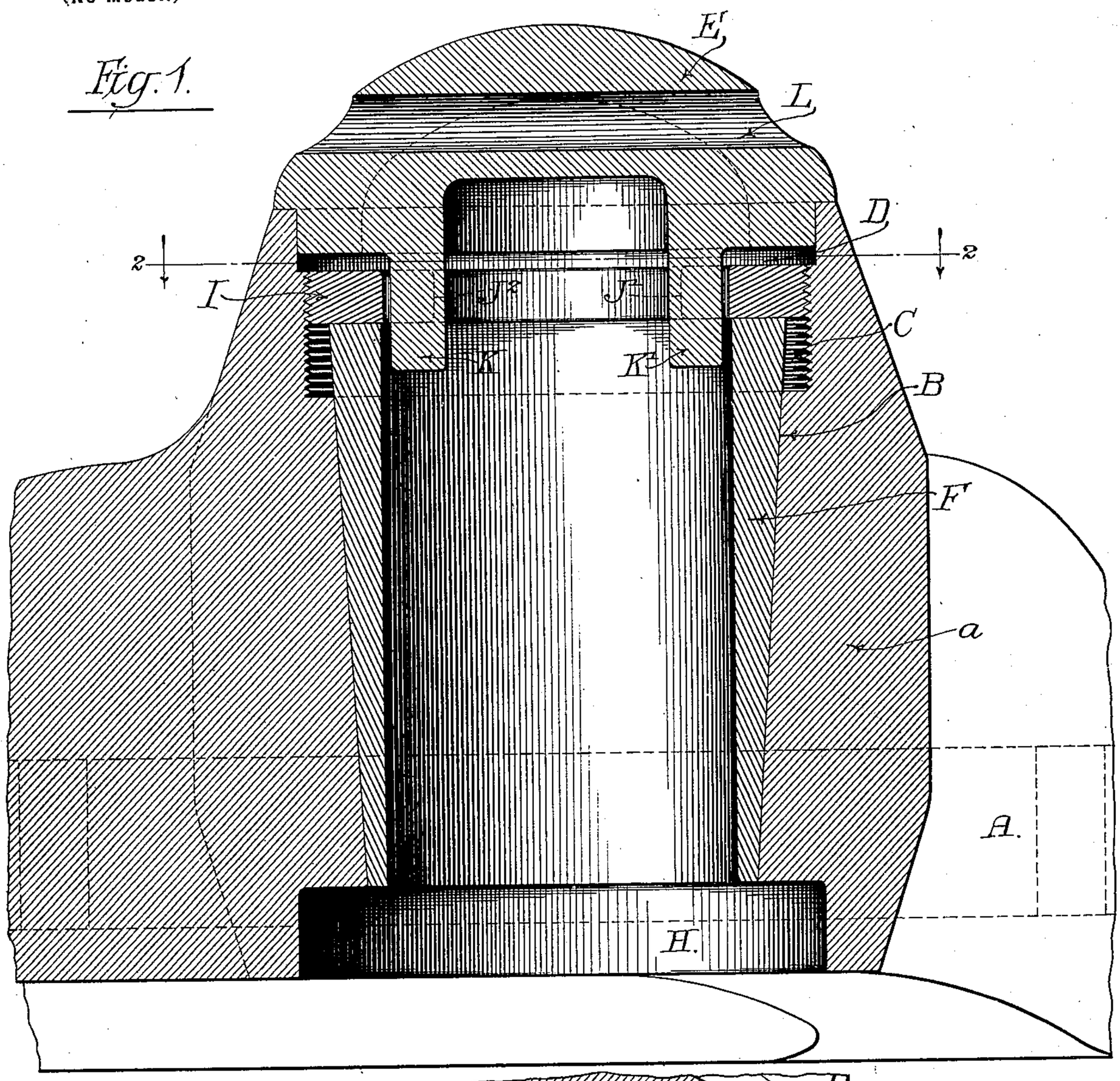

Fig. 2.

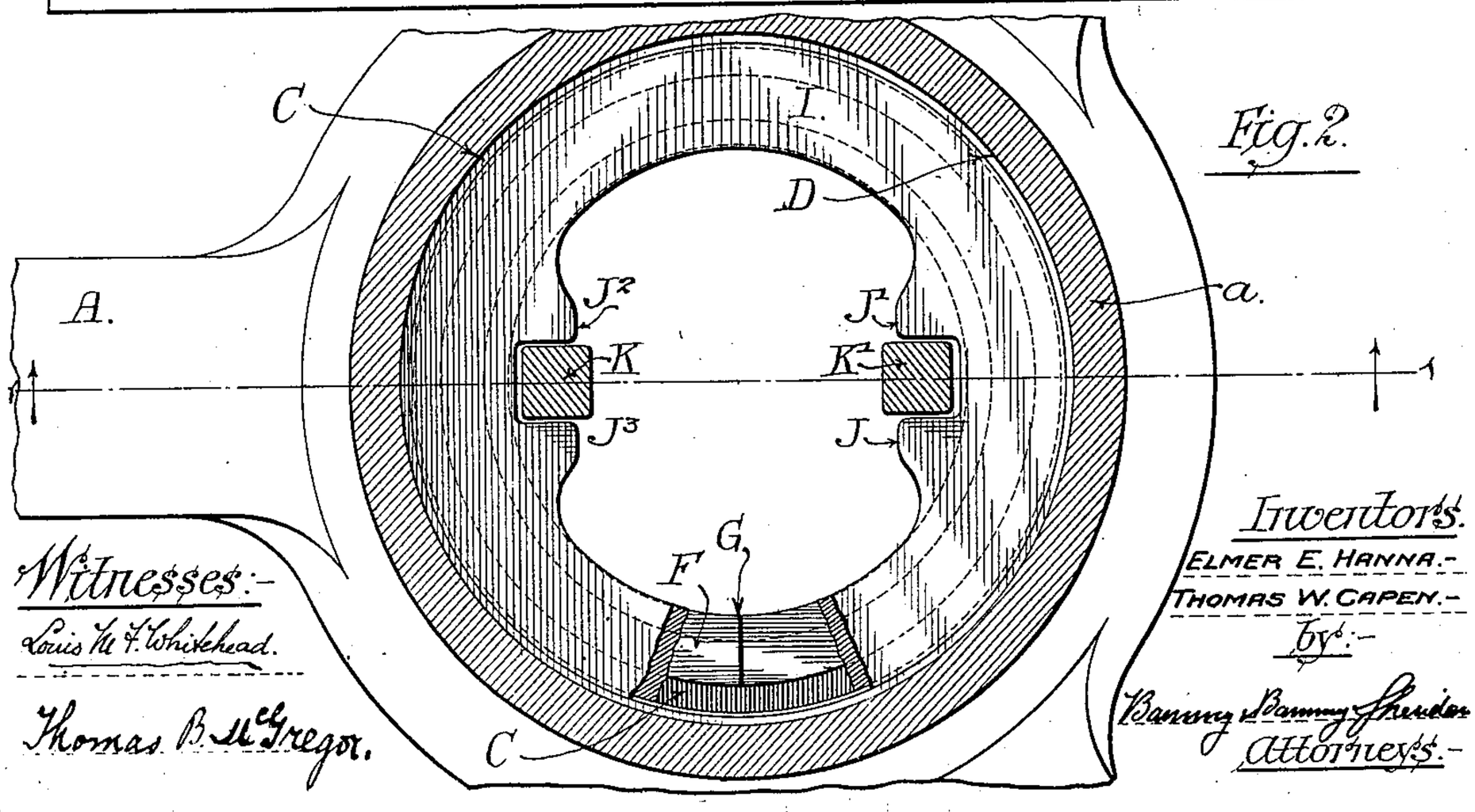

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Fig. 4.

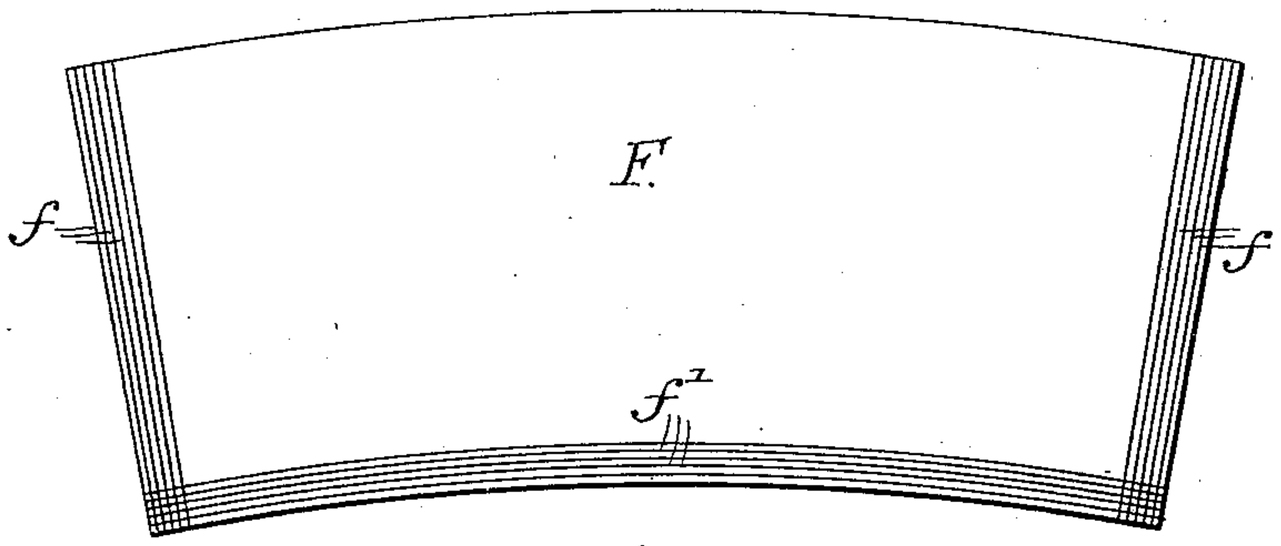
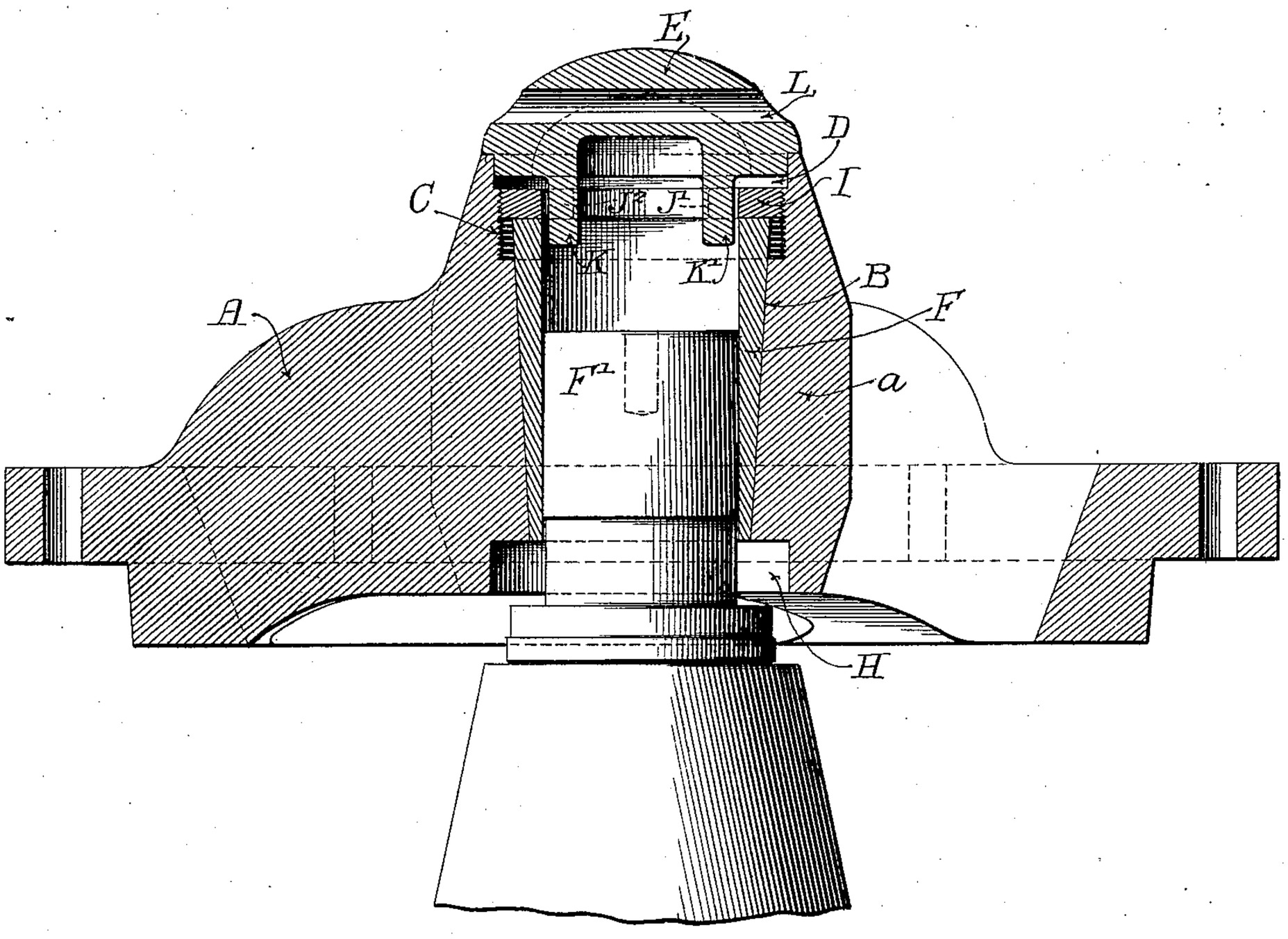


Fig. 3.



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UNITED STATES PATENT OFFICE.

ELMER E. HANNA AND THOMAS W. CAPEN, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE GATES IRON WORKS, OF SAME PLACE.

ROCK AND ORE BREAKER.

SPECIFICATION forming part of Letters Patent No. 639,558, dated December 19, 1899.

Application filed December 28, 1896. Serial No. 617,150. (No model.)

To all whom it may concern:

Be it known that we, ELMER E. HANNA and THOMAS W. CAPEN, citizens of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Rock and Ore Breakers, of which the following is a specification.

Our invention relates to that class of rock and ore breakers known in the art as "gyratory" or the "Gates" type, and has particular reference to that portion of the mechanism in which the gyratory crushing-shaft is journaled.

The object of our invention is to provide a gyratory rock-breaker with simple, economical, and efficient mechanism for taking up or compensating for the wear in the portion in which the gyratory shaft is journaled; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a vertical sectional elevation of the shaft-journal, taken on line 1 of Fig. 2; Fig. 2, a plan sectional view taken on line 2 of Fig. 1; Fig. 3, a vertical sectional elevation of the spider with its journal and a portion of the crushing-shaft; and Fig. 4, a view of the tapered bushing shown in a flat plane, as more fully hereinafter described.

In the art to which this invention relates it is well known that owing to the immense strains on the top or head of the gyratory shaft where it is journaled in the spider—due to the crushing of the rock—the wear on the spider is very rapid; further, that whenever the journal in the spider is worn to any appreciable extent the lost motion entailed thereby neutralizes the motion at the top of the head, and as a consequence curtails the capacity of the machine. Our invention, therefore, is intended, primarily, to obviate these objections and provide means by which this wear can be taken up in a predetermined manner, as will be more fully hereinafter described, and definitely pointed out in the claims.

In illustrating and describing our improvements we will only illustrate and describe that portion of the mechanism which we consider to be new in connection with so much that is old as to properly disclose the invention and enable those skilled in the art to practice the same, leaving out of consideration the other and well-known mechanism, so as to avoid confusion and ambiguity.

In constructing a crusher and fitting it with our improvements we provide a spider portion A and bore out the hub *a*, so as to provide a tapered axial opening B therein, with the largest diameter of the opening arranged at the top. The upper portion of this opening is provided with a threaded portion C, and above this threaded portion the opening is bored out parallel, as at D.

In order to provide a suitable bushing and means for taking up the wear or compensating therefor, we provide a bushing F, tapered on its outer surface to fit the tapered opening of the spider and bored cylindrically on the interior, so as to furnish a fulcrum-point for the shaft F′. This bushing is split longitudinally from end to end, as shown at G in Fig. 2, and is of such a diameter that when it is forced into the position shown in Figs. 1 and 3 by means of the ring-nut I the lower edge of the bushing is brought flush with a counterbore H of the spider and the lateral free edges of the bushing that form the split G are forced into contact with each other. This construction and arrangement are such that the bushing is to all intents and purposes an integral portion of the spider, and further motion downward of the bushing cannot be obtained. The advantage of this arrangement is such that there is no play between the bushing and the spider to cause disruption of the parts or wear in the bore of the spider, and thereby interfere with the economical operation of the machine. We further provide the ring-nut I with lugs J, J′, J^2, and J^3, so as to form recesses in which projections K and K′ on the cap E may be inserted. This cap is fitted in the parallel bore of the spider and is provided with a horizontal opening L. It not only acts as a dust-cap, but may be used as a wrench to tighten or loosen the ring-nut I, and as a consequence forces the bushing into place or allows it to be removed therefrom.

In order to facilitate the adjustment of the bushing to its proper position after wear has

taken place, we provide such bushing with longitudinal lines *f* and lateral lines *f'*, the longitudinal lines being arranged near the free edges of the bushing, where it is split, and the lateral lines at the bottom portion thereof. These lines are so arranged that the removal of the material from the bushing by filing or otherwise to the first longitudinal line adjacent to the free edges thereof and to the first lateral line from the lower edge will allow the diameter of the bushing to be contracted to such an extent that when forced down, so that the free edges are again in contact, the lower edge of the bushing will not project below the counterbore in the spider. These lines enable the user of the machine to remove the correct amount of material at the longitudinal free and lower lateral edges of the bushing in order to force the bushing into rigid engagement with the spider, take up the wear, and at the same time prevent any projection of the bushing at the lower end thereof.

In operation when the bushing has become worn—say the fiftieth of an inch—the parts are removed and material filed or removed from one of the longitudinal edges of the bushing up to the first line and also removed from the lower lateral edge of the bushing to the first line. The bushing is then forced into its position until the longitudinal edges come together, and a rigid engagement is formed between the bushing and the spider when the machine is ready for use. It will thus be seen that the bushing cannot have any movement in its seat in the spider to cause loss of bearing to the bushing and render it liable to be broken on account of the great pressure at the journal of the shaft.

We claim—

1. In rock and ore breakers, the combination of a gyratory shaft, a spider portion in which the upper end of the shaft is journaled, a tapered bushing split longitudinally in the spider portion and provided with longitudinal and lateral lines on its outer surface, substantially as described.

2. In rock and ore breakers, the combination of a gyratory shaft, a spider portion having a tapered opening with the largest diameter at the upper portion thereof, a portion of such opening being counterbored and threaded, a longitudinal split tapered bushing in the tapered portion of such opening having its longitudinal edges in rigid engagement with each other to form a bearing for the shaft, an adjusting-ring nut in the threaded opening of the spider arranged in contact with the tapered bushing to adjust the same and hold its longitudinal edges in rigid engagement with each other and the bushing in rigid engagement with the spider, substantially as described.

3. In rock and ore breakers, the combination of a gyratory shaft, a spider portion provided with a central hub having a tapered axial opening, a portion of such opening being counterbored and threaded and the upper portion being bored to form a true concentric cylindrical surface, a longitudinal split tapered bushing in the tapered portion of the spider-opening with its longitudinal edges in rigid engagement with each other, a ring-nut in the threaded opening for adjustably holding the longitudinal edges of the tapered bushing in rigid contact with each other and the bushing in rigid engagement with the spider, and a cap in the upper smooth bore of the spider-opening engaging with the ring-nut to operate the same, substantially as described.

4. In rock and ore breakers, the combination of a gyratory shaft, a spider portion provided with a tapered opening the upper portion being counterbored and threaded and the extreme upper portion being bored to form a true concentric cylindrical surface, a longitudinal split tapered bushing in the tapered portion of the spider-opening with its longitudinal edges in rigid contact with each other, such bushings being provided with longitudinal lines adjacent to the free edges thereof, a ring-nut for adjustably holding the tapered bushing in rigid engagement with the spider and its longitudinal edges in contact with each other, and a dust-cap inserted in the smooth upper portion of the spider-opening and engaging with the ring-nut, substantially as described.

5. In rock and ore breakers, the combination of a gyratory shaft, a spider portion provided with a tapered opening the lower portion of such opening being counterbored the upper portion being counterbored and threaded and the extreme upper portion being bored to form a true concentric cylindrical surface, a longitudinal split tapered bushing in the tapered portion of the spider-opening with its longitudinal edges in rigid contact with each other and the lower edge flush with the upper wall of the lower counterbore, such bushing being provided with longitudinal lines adjacent to the free edges thereof and lateral lines adjacent to the lower edge of the bushing, a ring-nut for adjustably holding the tapered bushing in rigid engagement with the spider and its longitudinal edges in contact with each other, and a dust-cap inserted in the smooth upper portion of the spider-opening and engaging with the ring-nut, substantially as described.

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