

No. 760,174.

PATENTED MAY 17, 1904.

M. BENJAMIN.
PULVERIZING MILL.

APPLICATION FILED SEPT. 12, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

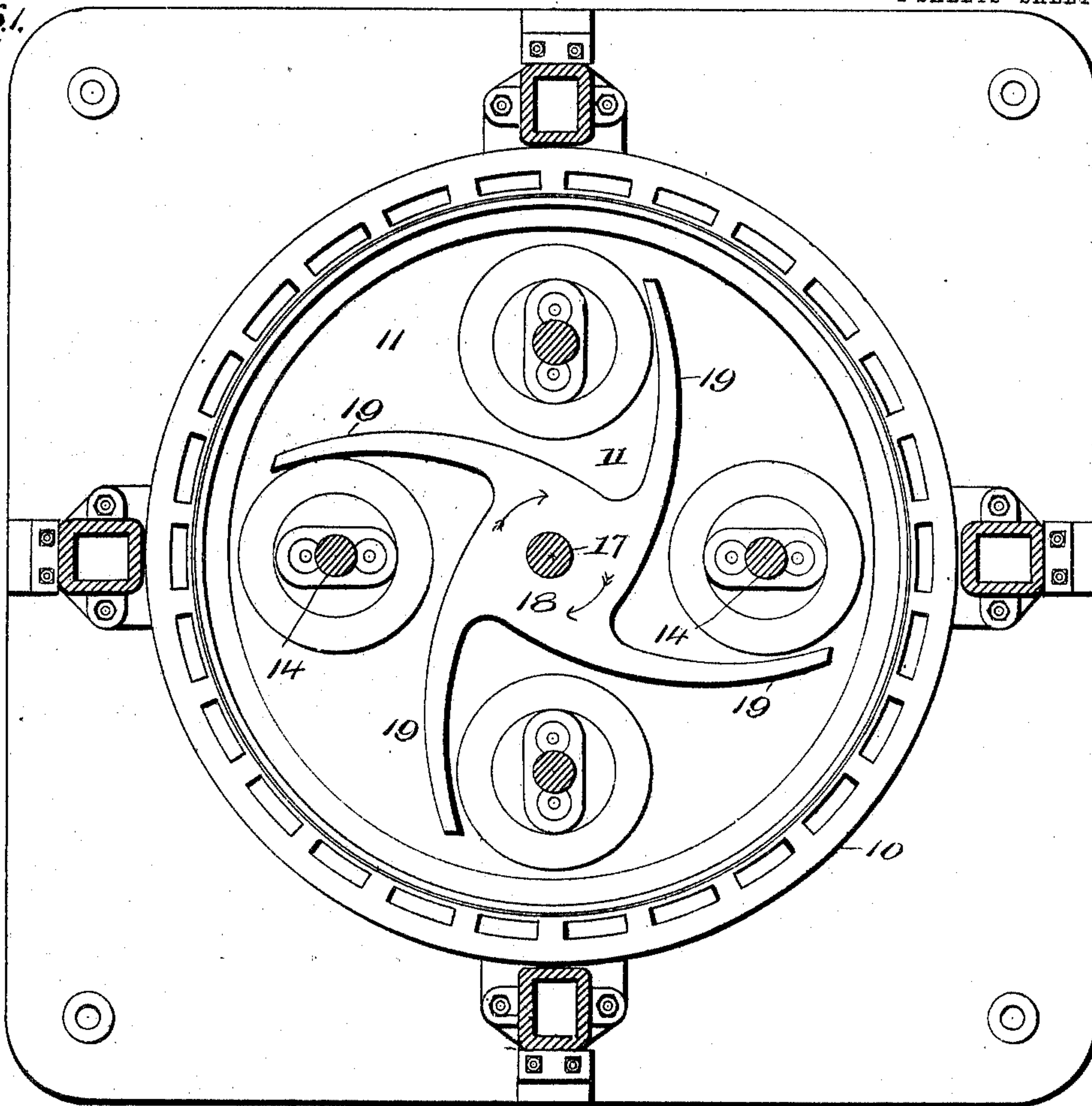
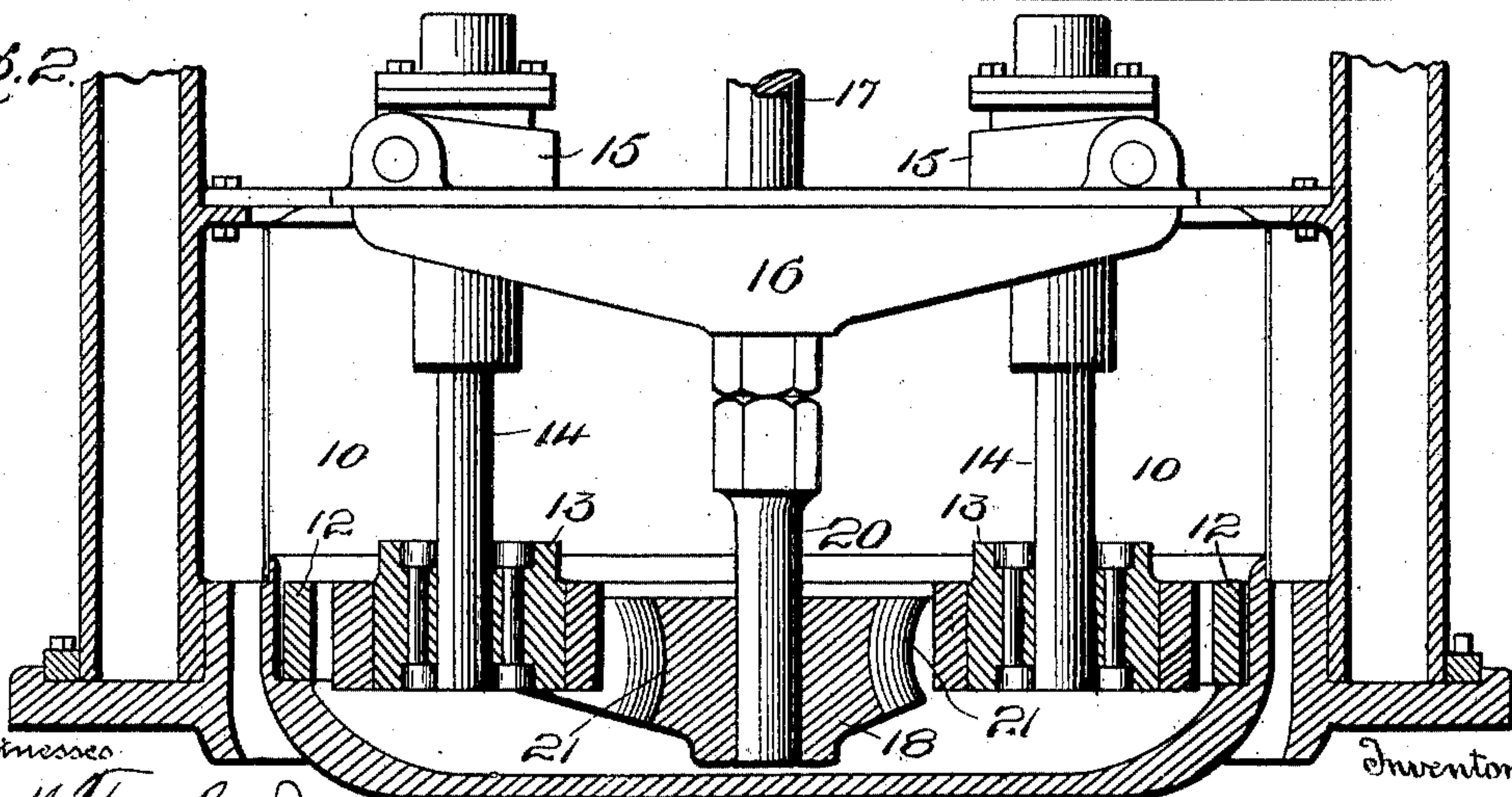


Fig. 2.



Witnesses

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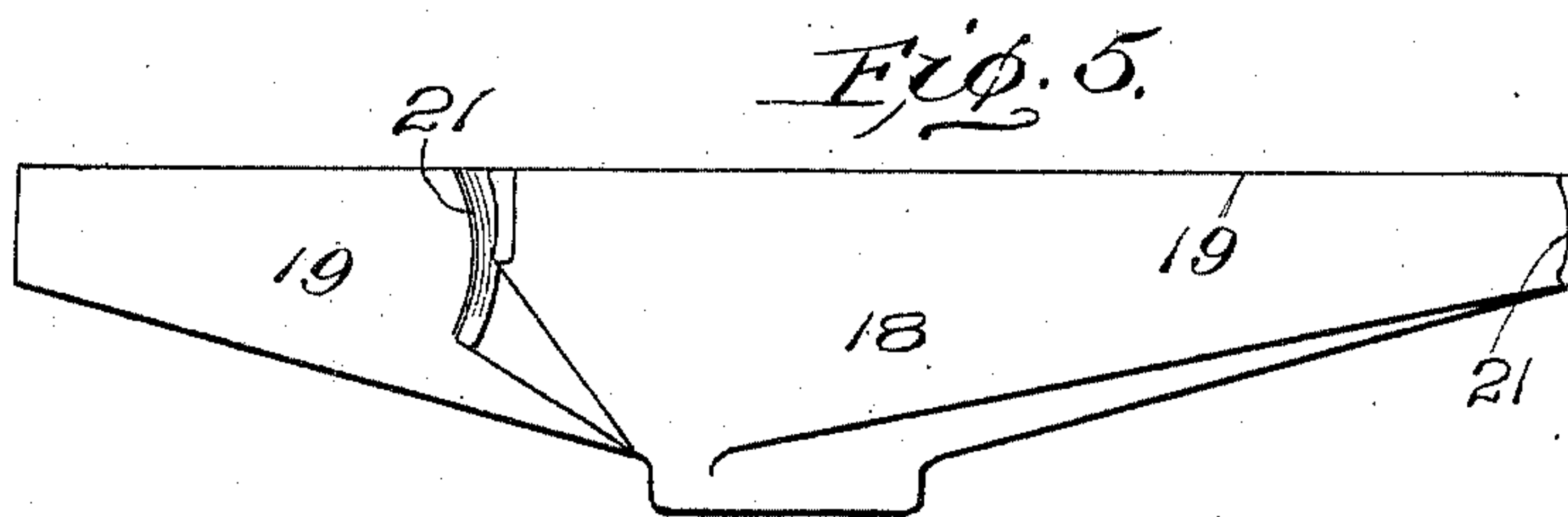
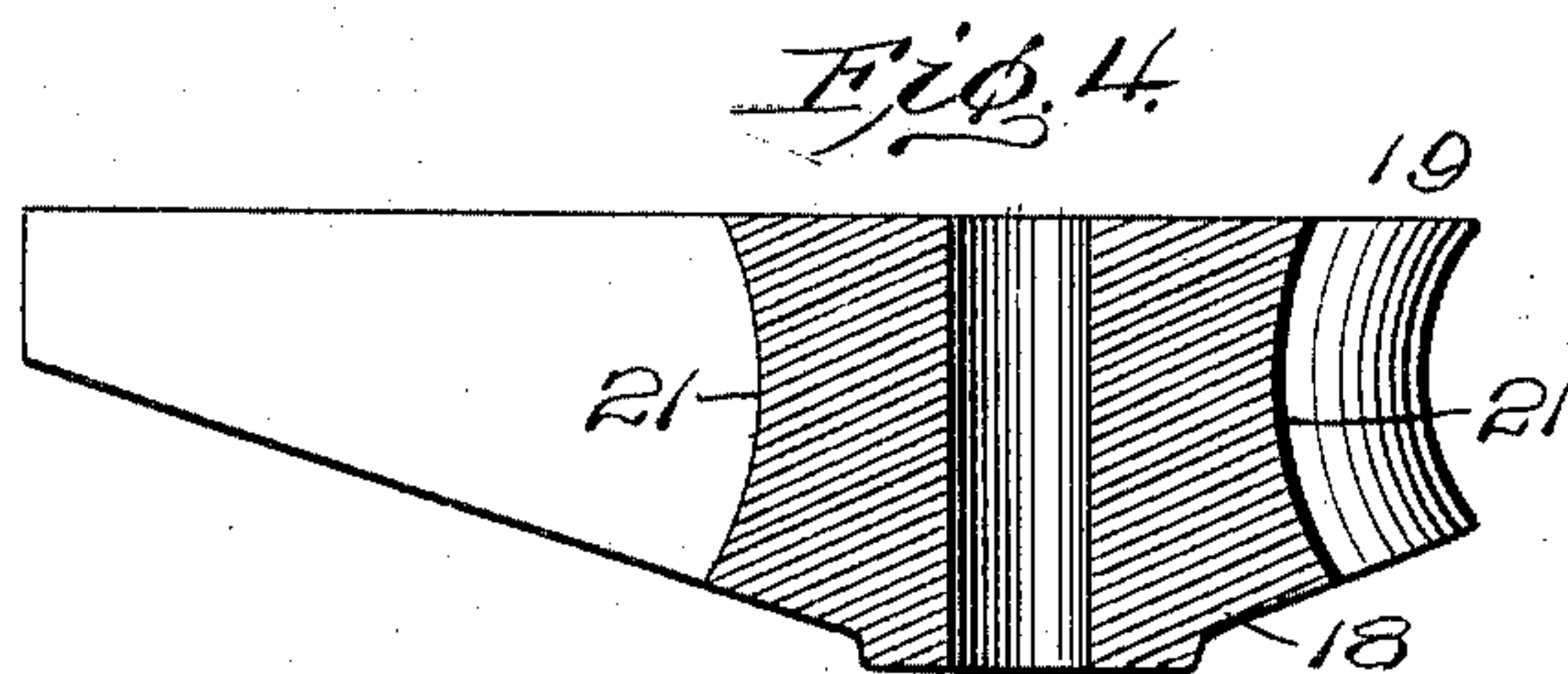
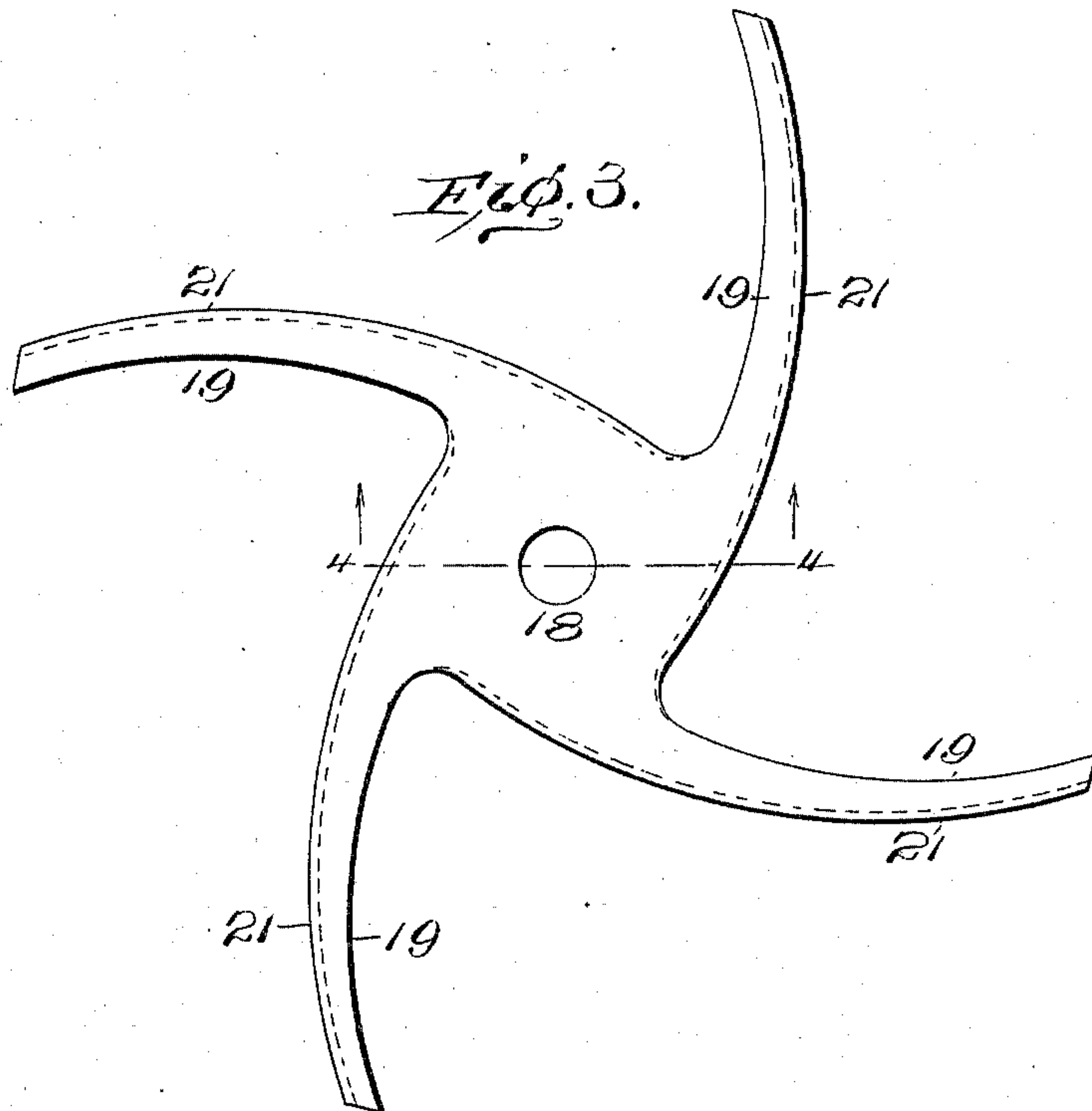
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Witnesses

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UNITED STATES PATENT OFFICE.

MORRIS BENJAMIN, OF ATLANTA, GEORGIA.

PULVERIZING-MILL.

SPECIFICATION forming part of Letters Patent No. 760,174, dated May 17, 1904.

Application filed September 12, 1902. Serial No. 123,096. (No model.)

To all whom it may concern:

Be it known that I, MORRIS BENJAMIN, a citizen of the United States, and a resident of Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Pulverizing-Mills, of which the following is a full, clear, and exact description, such as will enable those skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The invention relates to improvements in pulverizing-mills of that class in which grinding-rolls are suspended in the mortar by spindles journaled in bearings hinged to a rotatable carrier and in which the rolls are forced centrifugally by the rotation of the carrier against an annular die mounted in the mortar, the grinding being done by introducing the material being treated between the engaging faces of the rolls and the die.

It relates more particularly to the mechanism for introducing the material between the grinding-surfaces.

The mills of this class in general use to operate them to their maximum capacity the pans of the mortars are kept constantly filled with the material being treated. When this is done, the rolls as they move in the mortar must plow through or move a great amount of material without accomplishing anything in so far as grinding is concerned. This not only consumes and wastes considerable power, but it also strains and injures the operative parts of the mills, particularly the hinged bearings, in which are journaled the spindles carrying the rolls. Furthermore, if the pans are not kept filled to avoid this loss of power and strain there will be undue wear of the grinding-faces, owing to the absence of material to keep them employed, and also the mills will not be operated to their full capacity.

The invention in this instance has for its object the provision of a conveyer whereby the necessity is avoided of keeping the pan filled with material in order to secure the maximum output and which will keep the grinding-surfaces sufficiently supplied with

material to operate them to their full capacity and at the same time only require a comparatively small quantity of material in the pan, such as will not interfere with the movement of the rolls.

The invention consists, primarily, of a conveyer mounted in the mortar for carrying the material from the lower part of the pan beneath the rolls and discharging it by centrifugal force against the grinding-face of the annular die immediately in advance of the rolls, so that the latter will catch the material before it drops back into the pan. By means of such a device the pan need not be filled to such an extent as to interfere with the movement of the rolls, and thereby the loss of power and undue strain are avoided. The conveyer consists, essentially, of an arm rotatable in advance of the grinding-roll and having its advancing face concave in a substantially vertical direction and adapted to pick up and propel the material centrifugally against the annular die in the path of advance of the roll.

The invention further consists in the novel construction, combination, and arrangement of parts, such as will be hereinafter fully described, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the drawings, in which similar reference characters designate corresponding parts, Figure 1 is a horizontal sectional view, the conveyer being shown in plan, of a mill embodying the invention. Fig. 2 is a vertical sectional view partly in elevation. In this view the front and rear hinged bearings, spindles, and rolls are omitted for the sake of clearness. Fig. 3 is a plan view of the conveyer. Fig. 4 is a sectional view on the line 4 4 of Fig. 3. Fig. 5 is an elevation of the same.

The grinding mechanism is like that in common use, and only so much of it is shown and will be described as is necessary to illustrate the invention and its operation. As shown, the mortar 10 is supported in any suitable manner and has seated above its pan 11 the annular die 12. Suspended in the mortar are the grinding-rolls 13, adapted to cooperate with the annular die. The rolls are mounted

on the lower ends of the spindles 14, journaled at their upper ends in the bearings 15, hinged to the head 16. The latter is rotated by the shaft 17, driven by any suitable mechanism. When the head 16 is rotated, the grinding-rolls 13 swing outwardly by centrifugal force and bear against the annular die 12 to perform the grinding function.

The conveyer consists of the body or hub 18 and the arms 19, projecting from the said body. It is located in the pan of the mortar intermediate of the grinding-rolls and is carried and rotated by the shaft 20, forming a continuation of the shaft 17. The arms project from the body between the grinding-rolls toward the annular die. There is an arm for each grinding-roll, and the relative positions of the two are such that when they are revolved the arm travels slightly in advance of the roll. The advancing or throwing face of each arm is concave, as at 21, in a substantially vertical direction, and is convex in a substantially horizontal direction. The concavity extends from the inner end of the arm below the path of travel of the grinding-rolls and tapers toward the outer extremity of the arm. It also extends both at the bottom and at the top forward of the perpendicular, so that the lower part of the throwing-face serves to scoop up or elevate the material within range of the roll, while the outward flare of the upper portion of the throwing-face restrains the material from being thrown too high. The arm extends into the throat between its roll and the annular die, so that the concavity in its advancing or throwing face, by reason of its convexity horizontally, will project the material directly in the path of advance of the roll.

The operation of the device is as follows: The mill is put in motion and the material to be treated is fed into the same in the usual manner. However, only so much of the material is fed as will fill the pan up to, but not above, the path of travel of the lower ends of the grinding-rolls. As the conveyer is rotated in the same direction as the rolls travel, as indicated by the arrows in Fig. 1, and as the concavities 21 in the advancing faces of the arms extend below the grinding-rolls into the material, the arms will engage with the material in the pan and force it outwardly and impel it by centrifugal force against the face of the annular die directly in advance of the rolls. As the latter travel quite rapidly, substantially all of the material will be caught before it falls and will be ground between the grinding-surfaces. The ground material

is withdrawn from the mortar in the usual manner.

While the hereinbefore-described machine is the preferred embodiment of the invention, yet it can be departed from to a considerable extent without departing from the spirit of the invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a grinding-mill of a pan, an annular die, a grinding-roll cooperating with said die, and an arm rotatable in advance of said roll and having an advancing face concave in a substantially vertical direction and adapted to pick up and propel the material centrifugally against the die in the path of advance of the roll.

2. The combination in a grinding-mill of a pan, an annular die, a grinding-roll cooperating with said die, and an arm rotatable in advance of said roll and having an advancing face concave in a substantially vertical direction and convex in a substantially horizontal direction and extending into the throat between the roll and die and adapted to pick up and propel the material centrifugally against the die in the path of advance of the roll.

3. The combination in a grinding-mill of a pan, an annular die, a grinding-roll cooperating with said die, and an arm rotatable in advance of said roll and having an advancing face concave in a substantially vertical direction and with the concavity extending from the inner end of the arm below the path of travel of the roll and adapted to pick up and propel the material centrifugally against the die in the path of advance of the roll.

4. The combination in a grinding-mill of a pan, an annular die, a grinding-roll cooperating with said die, and an arm rotatable in advance of said roll and having an advancing face concave in a substantially vertical direction and convex in a substantially horizontal direction and extending into the throat between the roll and die and with the concavity extending from the inner end of the arm below the path of travel of the roll and adapted to pick up and propel the material centrifugally against the die in the path of advance of the roll.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

MORRIS BENJAMIN.

Witnesses:

HENRY WELLHOUSE,
J. E. PRICE.