

No. 730,503.

PATENTED JUNE 9, 1903.

M. J. WILLIAMS.
CRUSHER AND PULVERIZER.
APPLICATION FILED SEPT. 17, 1900.

NO MODEL.

Fig. 1

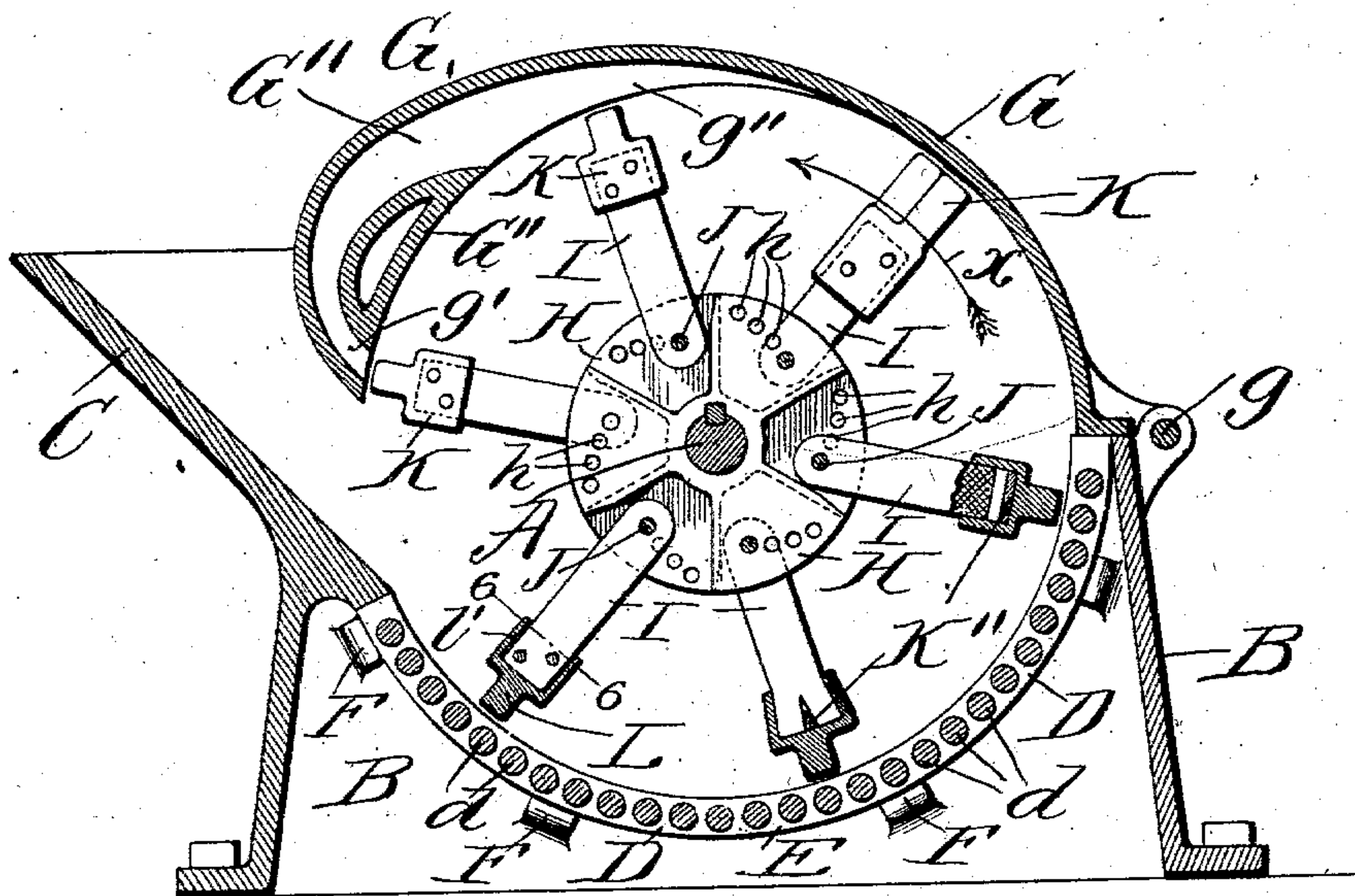


Fig. 4.

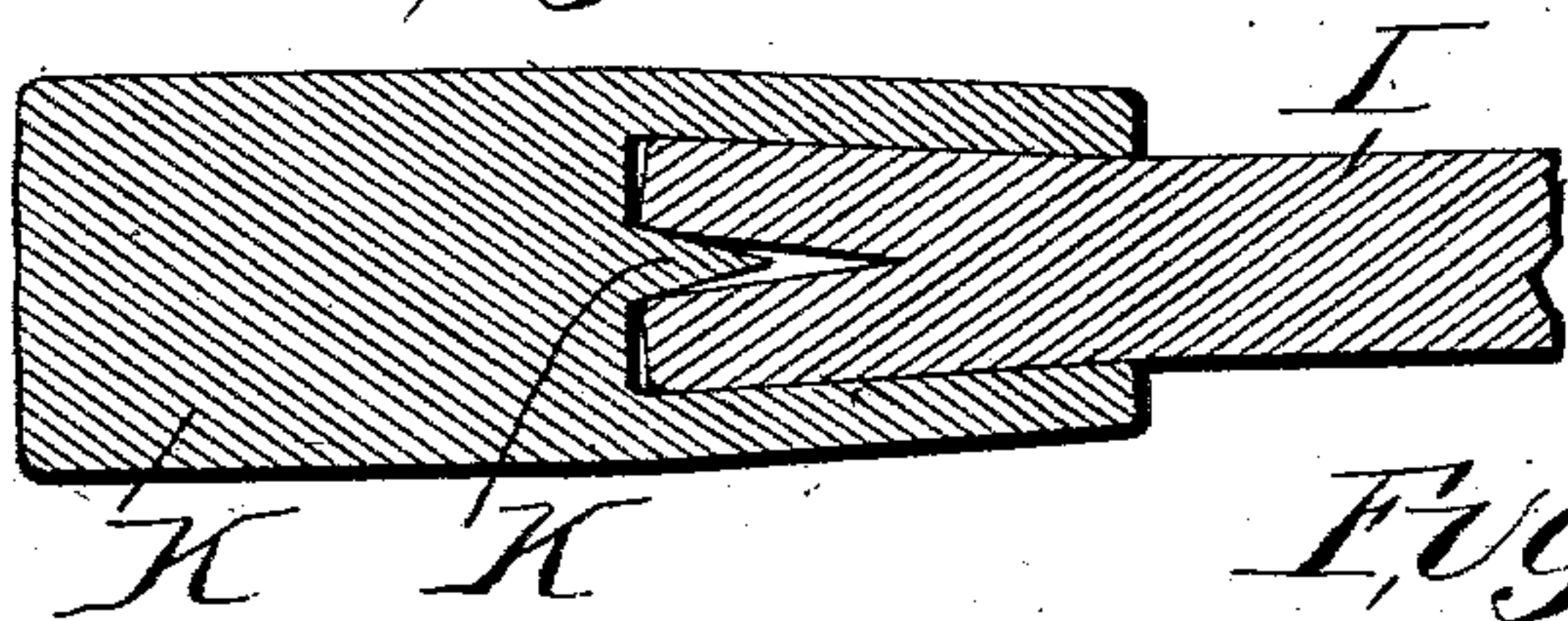


Fig. 5.

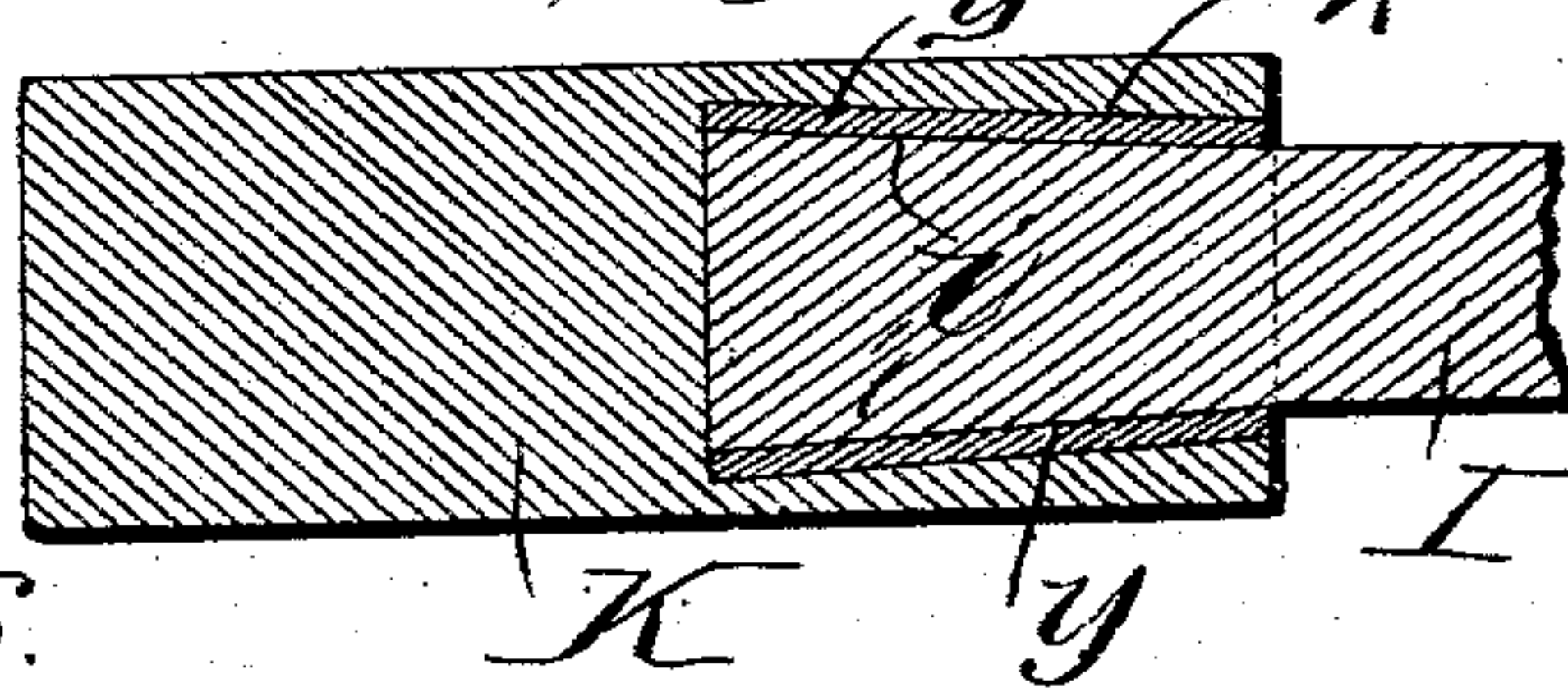


Fig. 6.

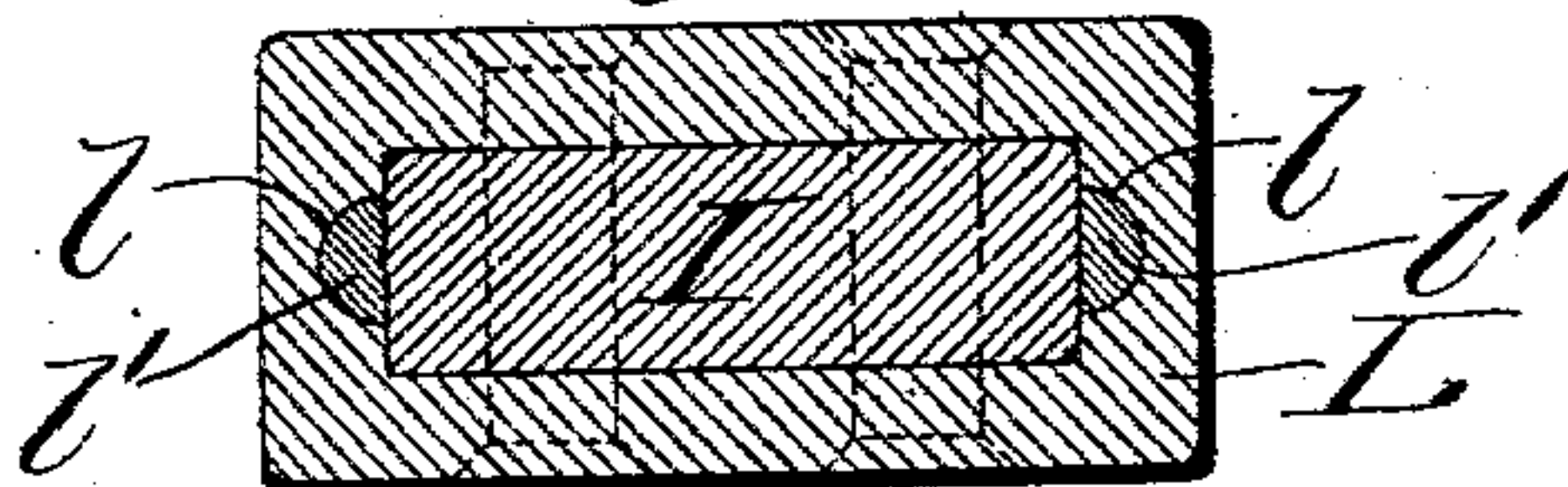


Fig. 2.

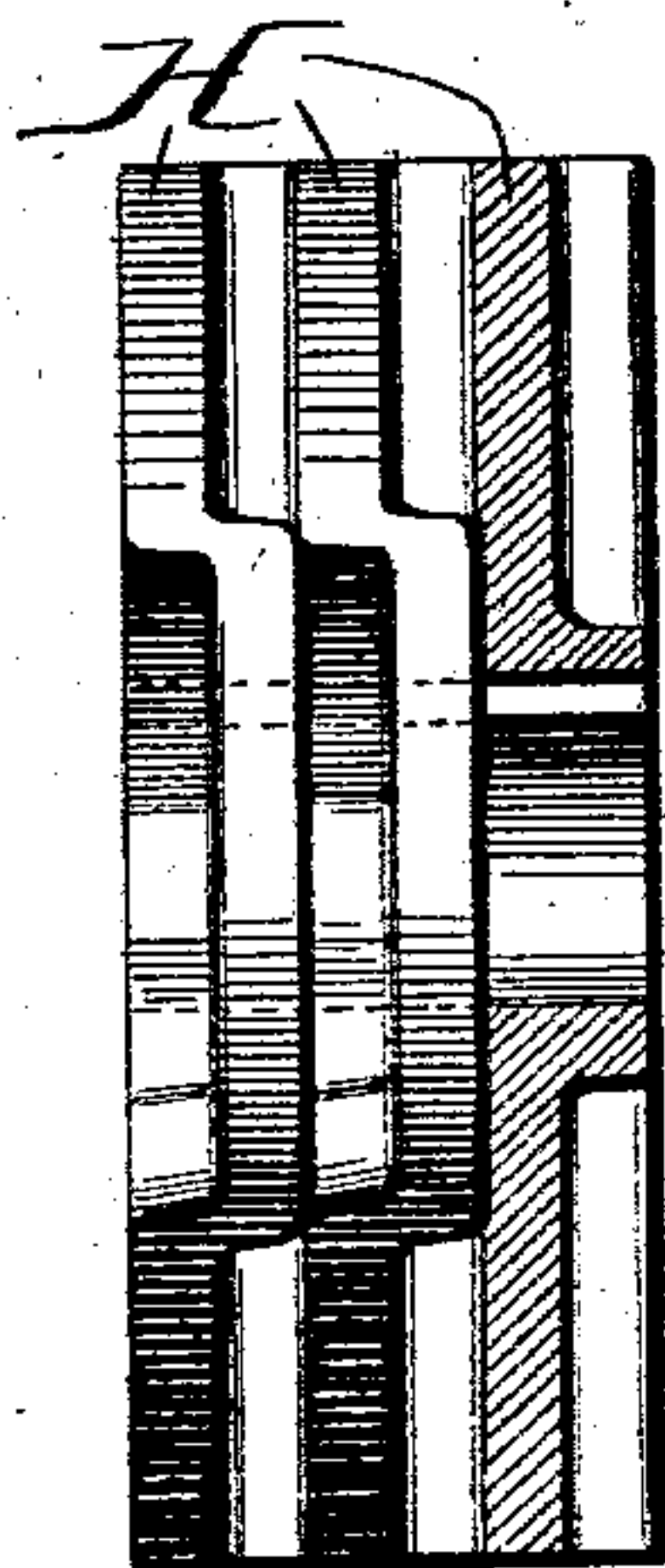
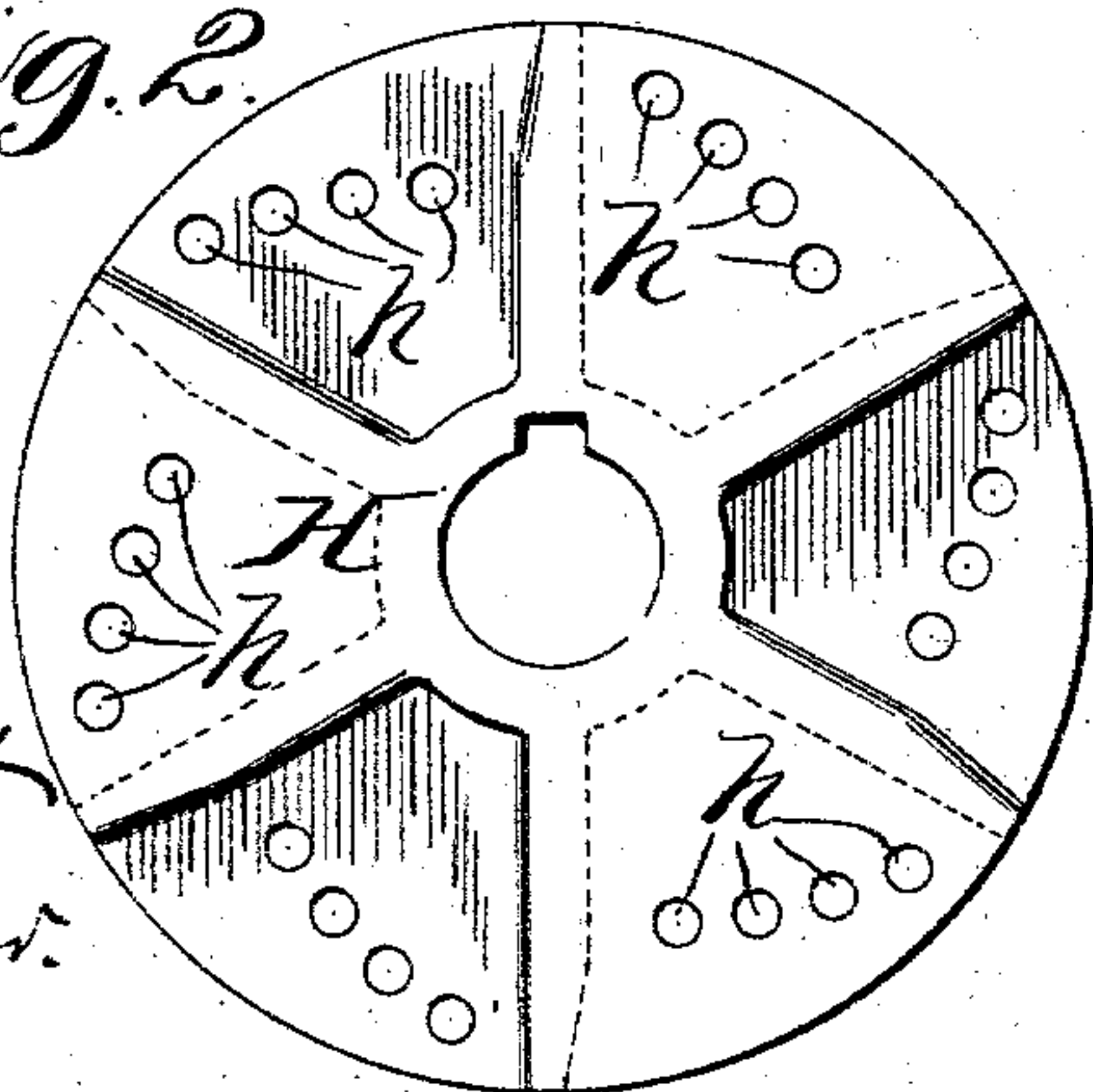


Fig. 3.

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UNITED STATES PATENT OFFICE.

MILTON J. WILLIAMS, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE WILLIAMS PATENT CRUSHER & PULVERIZER COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

CRUSHER AND PULVERIZER.

SPECIFICATION forming part of Letters Patent No. 730,503, dated June 9, 1903.

Application filed September 17, 1900. Serial No. 30,298. (No model.)

To all whom it may concern:

Be it known that I, MILTON J. WILLIAMS, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Crushers and Pulverizers, of which the following is a full, clear and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical sectional view through my improved crusher and pulverizer transversely to the shaft. Fig. 2 is a detail face view of the hammer-disk. Fig. 3 is a side elevational view of a plurality of hammer-disks, one of the disks being shown in section. Fig. 4 is a sectional view of one of the hammer-heads and a portion of its supporting-shank. Fig. 5 is a sectional view of another form of hammer-head and its supporting-shank, and Fig. 6 is a cross-sectional view of still another form of hammer-head and its supporting-shank.

This invention relates to a new and useful improvement in crushers and pulverizers, the object being to construct a machine of the character described in such manner that dust will not be blown out through the feed-opening.

Other objects are to simplify the construction of the machine, so that when parts are worn they can be adjusted or replaced with comparatively little trouble or expense.

With these objects in view the invention consists in the construction, arrangement, and combination of the several parts, all as will hereinafter be described and afterward pointed out in the claims.

Similar characters designate similar parts throughout the several views.

In the drawings, A indicates a shaft suitably mounted in the casing B, which casing has a hopper C at its feed end, through which material to be crushed is introduced.

D indicates a cage which consists of bars *d*, mounted parallel to shaft A in side rims E concentric with shaft A and supported on lugs or shoulders F, projecting from the sides of the casing B or otherwise.

G indicates the hood or cover of the machine, which is concentric for a portion of its length with the shaft A and is hinged to the casing B at *g*. This cover is provided with a cored passage-way or by-pass G', which extends practically the width of the machine and is so formed that it presents two openings to the interior of the machine. These openings are lettered *g'* and *g''*, the former of which, which is the contracted one, is arranged in juxtaposition to the feed-opening of the hopper C, while the latter is much larger and is arranged some distance away from said opening. By an examination of Fig. 1 of the drawings it will be seen that the larger opening *g''* of this cored passage starts at about the upper portion of the hood G and extends eccentrically and outwardly from the shaft A toward the hopper C for a suitable distance. Thence it makes a partial return-bend, gradually decreasing in width, and finally opens into the interior of the machine at *g'*, said return-bend being so shaped that the air entering the opening *g''* through the instrumentality of the revolving hammers in the direction indicated by the arrow *x* is given such a direction that when it passes from the opening *g'* it is practically parallel to the current of air which enters the machine through the hopper with the material to be crushed.

While I have described and illustrated the cored passage or by-pass as being formed in an integral casting, it is obvious that it may as well be formed of two or more parts—as, for instance, the part which I will now term a “skimmer” and which is lettered G' may be a separate piece, suitably secured in its correct position by bolts, &c.

I do not wish to be understood as limiting myself to the gradually-contracted by-pass shown in the drawings, as the same may be of the same area throughout. The purpose of this by-pass is primarily to divert the circulating air and relieve the pressure in the machine at or in advance of the point where the hammers pass beyond the forward edge of the top of the casing. By forming this by-pass with a return-bend it is obvious that the circulating air passing therethrough will

issue therefrom in the direction last given by the by-pass, which is inwardly and downwardly, so that the blast of air so returned tends to carry the material into the machine.

5 It is obvious that this return-blast can be so directed as to sweep inwardly over the breaker-plate, and so force the fine particles of material which would otherwise lodge thereon into the machine.

10 H indicates a plurality of disks, which are strung on and keyed or otherwise secured to the shaft A, said disks being formed with a plurality of alternately sunken and raised panels and are each provided with a series
15 of perforations *h*, preferably arranged eccentrically to the shaft A and also preferably, but not necessarily, equidistant apart. In other words, these perforations *h* of each series are arranged on the panels at unequal
20 distances from the axis of the disk—that is, the radius from the axis of the disk to the innermost perforation is shorter than the radius upon which the next succeeding perforation of the series is formed, which radius gradually increases throughout the series.

I indicates the hammer-shanks, which are pivotally secured to the disks H by through-bolts J, which pass through a perforation formed in one end of shank I and through
30 one of the perforations of the series *h* of each of said disks. These hammer-shanks are arranged in the sunken portions or panels of disks H, and when said disks are in proper relation to each other, as is illustrated in Fig. 3, pockets are formed by the meeting of one face of the raised panel with the next adjacent sunken panel, and in which pocket one end of the hammer-shank is housed and guided in its movement.

40 In the patent granted to E. H. Frickey, No. 646,278, dated March 27, 1900, there are shown a plurality of hammer supports or disks arranged upon a shaft and provided with a series of perforations of gradually-increasing distances from the axis of the shaft. In this construction it will be observed that all of the hammer-shanks of one radial series are in
45 alinement, each one following in the path of the next preceding one, by which construction particles may pass between the shanks and not be pulverized. My present invention contemplates obviating this objection by forming a staggered series of radial shanks, whereby only every other shank passes in the path of
50 the next preceding one, each alternate shank passing in the space not traversed by the first-mentioned staggered series, and thus all particles in the machine will be struck by some one of the shanks and thoroughly pulverized.
55 When the hammers become worn by usage, and consequently shorter, and no longer act efficiently upon the material to be pulverized, the pivot-bolt of that hammer is removed and inserted in a perforation located at a greater
60 distance from the axis of revolution.

K indicates the hammer-heads, which are secured to the outer ends of the shanks I and

are the part of the machine which receives the most wear and which necessarily must be made quite heavy and so fastened to the shanks that they may be easily replaced. In the drawings I have illustrated several ways of securing the hammers to their shanks, one being to simply recess the head to receive one end of the shank and then riveting said head and shank together, another being to form the head with a dovetail recess *k* and the shank with a dovetail tenon *i* on its end, the largest dimension of said dovetail tenon being somewhat smaller than the smallest dimension of the dovetail recess, which allows of said tenon being slipped into said recess, after which molten metal *y*, such as lead, is poured between the tenon and the dovetail recess (see Fig. 5) and allowed to harden.

In Fig. 4 I have made use of a head having a dovetail recess, and projecting from the inner wall or base of said dovetail recess is a wedge or V-shaped projection *K'*. The end of the hammer-shank is provided with a saw kerf or slot, and when the end of said shank is introduced into said dovetail recess and driven home the wedge enters said saw-kerf and forces the metal on each side thereof laterally, giving to the end of the shank a tenon effect and firmly holding the parts together. If desired, this wedge or V-shaped projection can be a separate part and simply started in the saw-kerf, after which the shank may be driven home into the socket, as is obvious. (See *K''*, Fig. 1.)

The hammer-head illustrated in Fig. 4 can be removed from its shank by breaking or cutting the head, which is also true of the hammer-head illustrated in Fig. 5, although in this latter construction the shank and head can be separated by melting the metal *y*, as is obvious.

It is desirable to have all of the hammers of the same weight in a machine of this character, and as it is impossible to always make the hammers uniform I have devised a simple way of attaining this end, the same being illustrated by the hammer marked L in Fig. 1 and the detail view Fig. 6, wherein it will be seen that I have arranged grooves *l*, opening into the recessed portion of the hammer-head and into which molten metal *l'*, such as lead, may be poured until the desired weight of the hammer is attained and the shaft balanced.

I am aware that minor changes in the construction, arrangement, and combination of the several parts of my machine can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

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

1. In a crushing and pulverizing machine, the combination with a casing, of disintegrating means therein including a plurality of pivoted beaters and operating means therefor, each beater comprising a shank, a head

formed with a socket to receive the end of said shank and oppositely-disposed pockets opening into said socket, and means in said pockets for securing the head to the shank
5 and for regulating the weight of said head without changing the position of the head on the shank.

2. In a crushing and pulverizing machine, the combination with a casing, of disintegrating means therein including a plurality of
10 pivoted beaters and operating means therefor, each beater comprising a shank, a head, and instrumentalities for securing the head to the shank and for regulating the weight of
15 said head without changing the position of the head on the shank.

3. In combination with a support comprising a plate each face of which is formed with a continuous series of separated radially-disposed raised panels, a plurality of pivoted
20 beaters one beater being pivoted in each space between each pair of raised panels, the edges of the raised panels being arranged to limit the swinging movement of the beaters.

25 4. In an apparatus of the character described the combination with an approximately annular casing vertically disposed and provided with a hopper projecting outwardly from and discharging through the periphery thereof into a disintegrating-chamber
30 therein, of rotary disintegrating means in said chamber the top of the upper portion of the casing having formed therein a by-pass continuous from end to end communicating
35 at both ends directly with said disintegrating-

chamber, said by-pass being disposed in the direction of rotation of the disintegrating means and the discharge end of the by-pass being arranged to discharge directly into the disintegrating-chamber at a point immediately above and adjacent to the inner edge of the hopper and in the direction of the line of feed from the hopper. 40

5. In an apparatus of the character described, the combination with an approximately annular casing vertically disposed and provided with a hopper projecting outwardly from and discharging through the periphery thereof into a disintegrating-chamber therein, of rotary disintegrating means in
45 said chamber the top of the upper portion of the casing having formed therein a by-pass continuous from end to end communicating at both ends directly with said disintegrating-chamber, said by-pass being disposed in the direction of rotation of the disintegrating means and the discharge end of the by-pass being contracted and arranged to discharge directly into the disintegrating-chamber at a point immediately above and adjacent to the inner edge of the hopper and in the direction of the line of feed from the hopper. 55 60

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 7th day of September, 1900.

MILTON J. WILLIAMS.

Witnesses:

WM. H. SCOTT,

A. S. GRAY.