

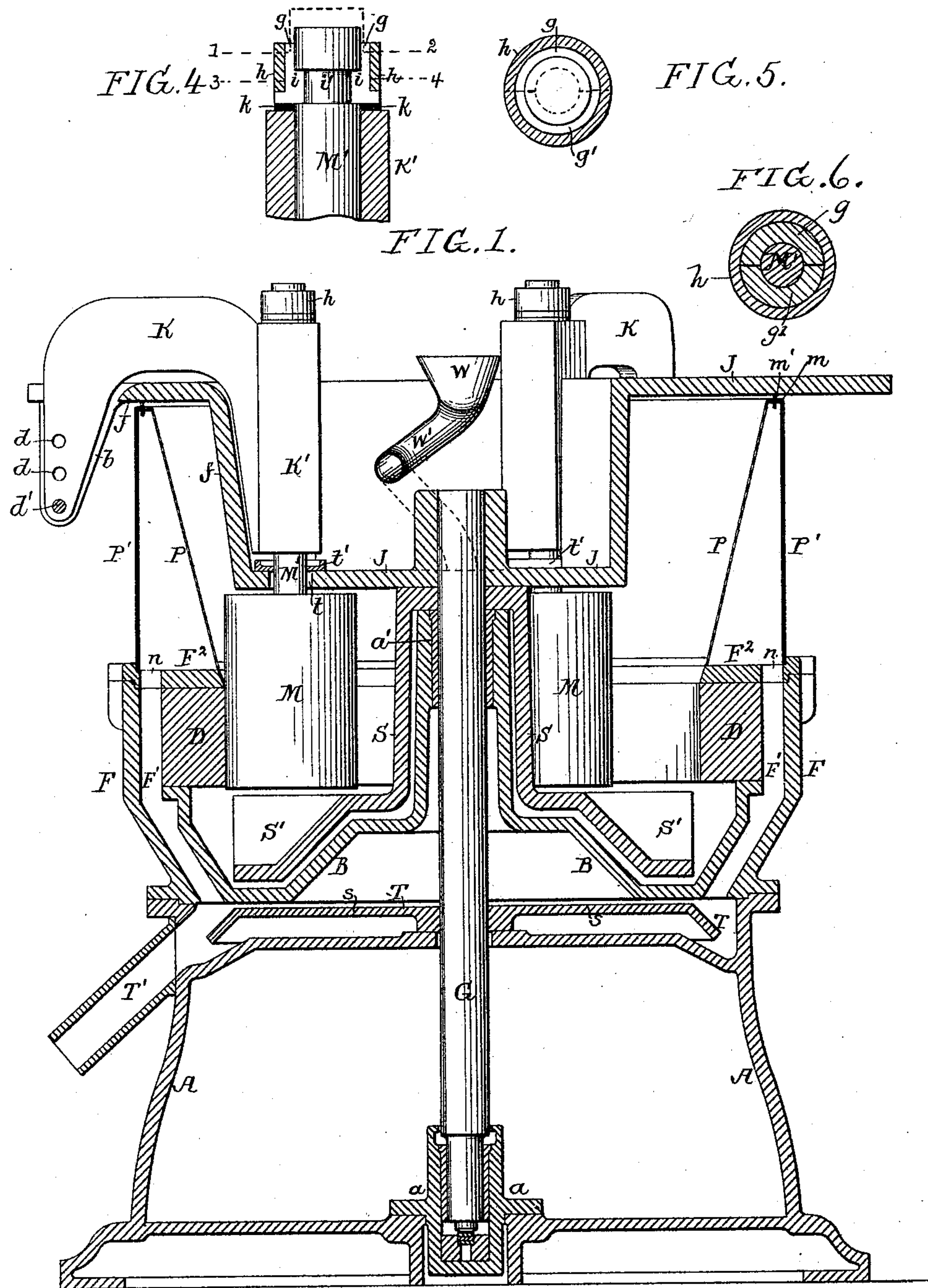
(No Model.)

2 Sheets—Sheet 1.

J. HUNT.  
GRINDING OR PULVERIZING MILL.

No. 493,164.

Patented Mar. 7, 1893.



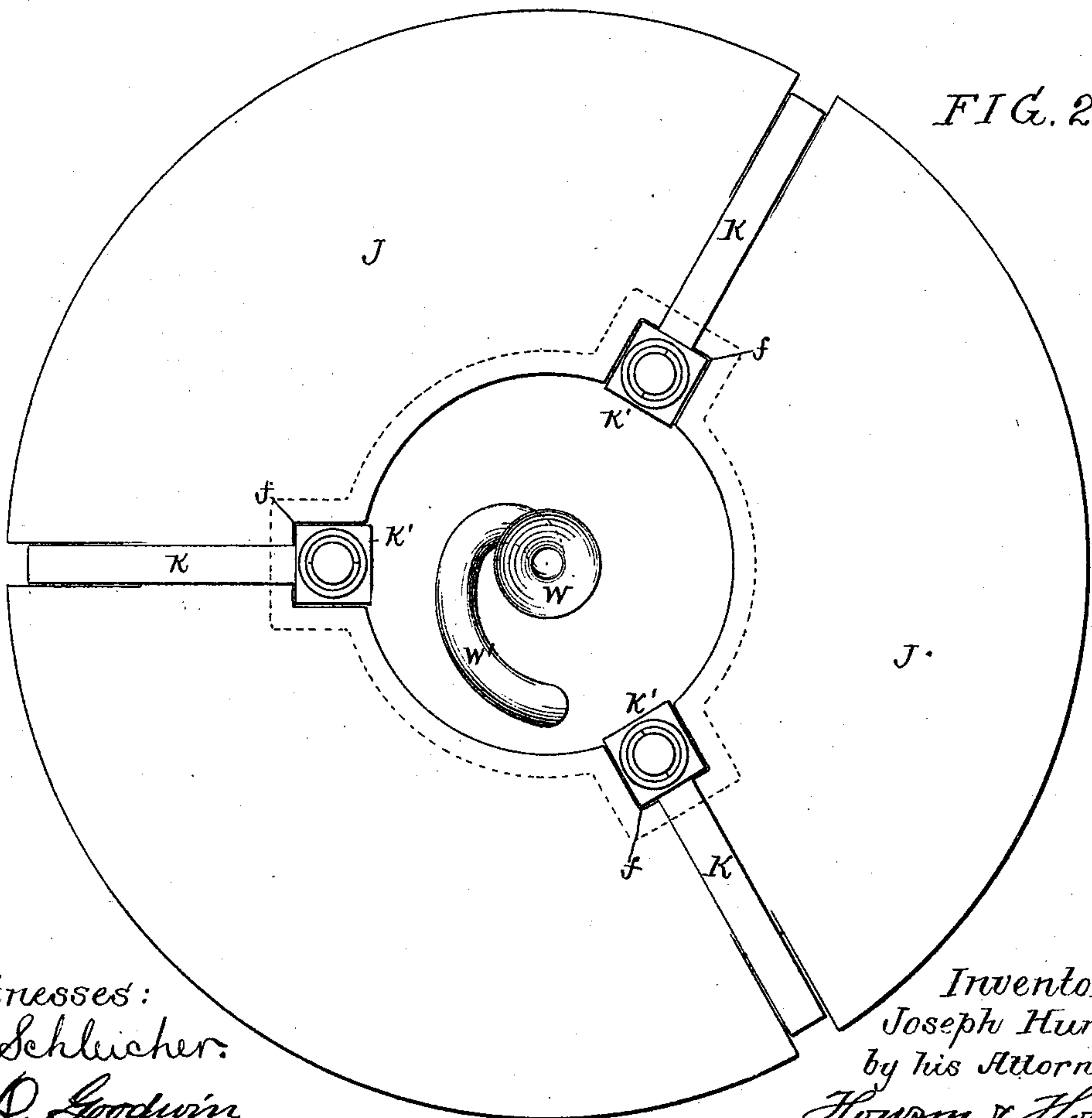
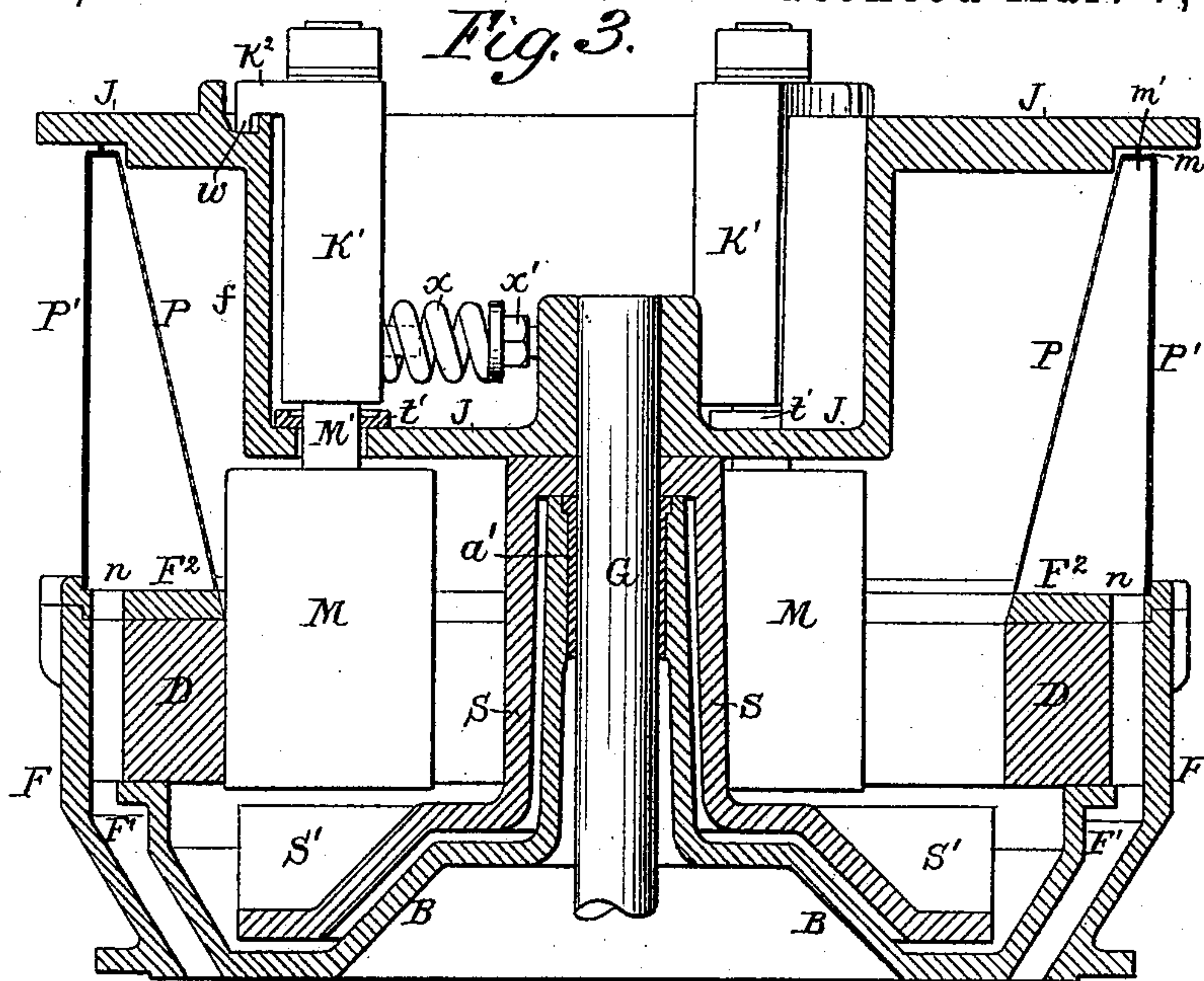
Witnesses:  
R. Schleicher  
J. D. Goodwin

Inventor:  
Joseph Hunt  
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# UNITED STATES PATENT OFFICE.

JOSEPH HUNT, OF ALLENTOWN, PENNSYLVANIA.

## GRINDING OR PULVERIZING MILL.

SPECIFICATION forming part of Letters Patent No. 493,164, dated March 7, 1893.

Application filed April 6, 1892. Serial No. 428,020. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH HUNT, a citizen of the United States, and a resident of Allentown, Pennsylvania, have invented certain  
5 Improvements in Grinding or Pulverizing Mills, of which the following is a specification.

My invention relates to that class of grinding or pulverizing mills in which the material  
10 to be ground is in a dry state and in which the grinding or pulverizing action is effected by rolls running against the inner face of a fixed ring, the objects of my invention being to so construct a grinding or pulverizing mill  
15 of this class as to insure the effective contact of the grinding rolls with the inner face of the ring, whether the mill is run fast or slow, to effectually prevent the escape of the finely ground or pulverized material from the mill  
20 casing, or its access to the roll bearings, to provide for the ready feeding of the mill, and to so hang the grinding rolls as to permit of the ready application or removal of the same when desired, and lessen the friction due to  
25 the rotation of the same on their axes.

In the accompanying drawings:—Figure 1, is a vertical section of a grinding mill constructed in accordance with my invention. Fig. 2, is a plan view of the same. Fig. 3, is  
30 a sectional view illustrating a modification of the invention; and Fig. 4, is a view partly in longitudinal section and partly in elevation illustrating the method of supporting the roll shafts in their bearings. Fig. 5, is a sectional  
35 plan view on the line 1—2, Fig. 4; and Fig. 6, is a sectional plan view on the line 3—4, Fig. 4.

A represents the base or foundation of the mill upon which is mounted an annular trough-  
40 like structure B supporting a ring D, an outer casing F surrounding said ring D and structure B, and said outer casing F having at the top an inwardly projecting ring F<sup>2</sup> which overlaps the ring D.

45 The base structure A of the mill has a step bearing *a* for the lower end of a central vertical shaft G which passes through a bearing *a'* at the top of an upwardly projecting central portion or hub formed upon the trough  
50 structure B, and upon the upper end of said shaft is mounted a dished plate J constitut-

ing a roll carrier, to which are pivoted the swinging hangers K for the shafts of the grinding rolls M, three of these being employed in the present instance, although any  
55 desired number of equi-distantly arranged rolls may be employed as desired.

The top flange of the roll carrier J is slotted for the reception of the outer portions of the swinging hangers K and has depending pairs  
60 of lugs *b* to which said outer ends of the hangers are pivoted, each hanger and each pair of lugs having by preference a series of openings *d* to either of which the pivot *d'* can be adapted so as to shift the fulcrum of the  
65 hanger as desired. Each hanger K terminates at the inner end in an enlargement K' forming a bearing for the shaft M' of the grinding roll, and said enlarged inner portion of each hanger is adapted to a radial recess or pocket  
70 *f* formed in the dished portion of the roll carrier J, as shown in Fig. 2, so that as said carrier is rotated, the hangers K and the rolls M will be caused to rotate therewith, the rear wall of each pocket bearing against the ad-  
75 jacent face of the bearing K' so as to cause the said bearings and their shafts to rotate around the axis of the shaft G thereby relieving the pivot pins *d'* for the hangers K of all or a large portion of the strain caused by the  
80 performance of this duty. Each roll M is supported vertically in its hanger K by means of a collar secured to the upper end of the shaft M' and bearing upon the top of the enlarged  
85 inner end K' of said hanger, said collar being preferably formed as shown in Figs. 4 and 5, that is to say, by means of two half collars *g*, *g'*, each having a flange *i* adapted to an annular groove *i'* formed in the shaft some distance below the top of the same, these half  
90 collars being held together by an encircling ring *h* resting upon external shoulders *h'* formed on the half collars as shown in Fig. 4. Between the bottoms of the collars and the top of the hanger K' are interposed one or  
95 more washers *k*, preferably of antifriction metal. A collar of this sort can be readily applied or removed and is therefore preferable to a single collar secured in place by a transverse pin or equivalent means.

Extending from the top of the cap ring F<sup>2</sup>  
100 to a point close to the bottom of the top flange



of the roll carrier J are two annular screens P, P', the inner screen being perforated and the outer screen being imperforate and having also at the top an imperforate ring *m* with packing strip *m'* bearing against the under-  
 5 side of the flange of the carrier J, the space between the two screens being in communication with the annular space F' between the ring D and casing F through openings *n*  
 10 formed in the ring F<sup>2</sup>.

From the bottom of the roll carrier J depends an annular frame S which is substantially similar in contour to the trough structure B and is adapted to run close to the bot-  
 15 tom of the latter, said frame being provided with the usual inclined blades or plows S' which, as the frame is rotated, lift the material from the trough and throw it up in front of the rolls M and onto the internal screen P,  
 20 which is, by preference, inclined outward from bottom to top so that the particles projected onto said screen will roll down the same and thus provide for a more effective sifting of the fine particles from the coarse particles than  
 25 would be effected by a vertical screen or by a screen inclined inward from bottom to top. The screening of the fine particles from the coarse particles is also materially facilitated by the fan-like action of the projections or pock-  
 30 ets *f* formed upon the roll carrier J, the use of a special fan for the purpose being dispensed with. The particles caught between the rolls M and the ring D are crushed thereby, it being understood that the rolls M are pressed  
 35 firmly against the ring D by reason of the centrifugal force due to the rotation of the series of rolls around the common axis supplied by the shaft G, each roll being also caused to rotate upon its own axis by reason  
 40 of such intimate contact with the ring D. It will be observed that the pivot of each roll hanger K is outward beyond the axis of the roll, so that there is a natural tendency of the roll to bear against the ring D independently  
 45 of the centrifugal force, hence mills, especially those having heavy rolls, can be run with good effect at low speed as is desirable in some cases. The fine particles passing through the meshes of the internal screen P are discharged  
 50 from the space between the two screens through the openings *n* and passage F' into a receiving chamber T beneath the trough structure B from which they are in turn discharged through the spout T' by means of  
 55 a rotating carrying plate *s* carried by the shaft G.

The roll carrier J has elongated openings *t* to permit the slight vibrating movement of the shafts M' which results in the operation  
 60 of the mill, and in order to prevent the escape of the finely powdered material through these openings each of them is covered by a plate *t'* which fits snugly to the shaft M' and is free to move to and fro with the same. The escape  
 65 of finely powdered particles from the top of the mill is effectually prevented by the packing strip *m'* which bears against the under-

side of the top flange of the roll carrier, so that the mill is practically dust tight, an im-  
 70 portant consideration in dry grinding mills of the character to which my invention relates. It will be noted, moreover, that the bearings for the roll shafts are entirely outside of what may be termed the casing of the mill, so that  
 75 the access of dust to these bearings, and the attendant wear and inconvenience are effectually prevented.

In order to provide for the ready feeding of the mill, I employ an axial hopper W with  
 80 spout leading outward from the bottom of the same and passing through the bottom of the roll carrier J at a point between the central hub of the same and the wall of the dished portion, preferably as close to the latter as  
 85 possible, so that the centrifugal action aids the flow of the material from the hopper through the spout, the feeding device, of course, rotating with the roll carrier, but the  
 90 hopper, occupying an axial position, so that the material can be readily fed into the same while the mill is running.

In practice I prefer to make the feed spout W' in spiral form, as shown, although a straight spout may be used if desired.

In Fig. 3, I have shown a modification of my  
 95 invention in which the inner portions K' of the roll hangers have short arms K<sup>2</sup> with lugs *w* bearing in a groove formed in the top of the carrier J so that the fulcrum of each  
 100 hanger is closer to the axis of the roll shaft than in the construction shown in Fig. 1, and said roll swings outward almost in a direct line against the grinding ring. In this case  
 105 also I have shown springs *x* interposed between the hangers K' and adjustable studs *x'* on the hub of the roll carrier so that the action of said spring supplements the centrifugal action or the outward swing of the rolls in  
 110 pressing said rolls against the grinding ring.

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

1. The combination in a grinding or pulverizing mill, of the grinding ring, a series of rolls in contact with the inner face of said  
 120 grinding ring, and having a central vertical portion with radial recesses or pockets therein and hangers for the shafts of the grinding rolls, said hangers being pivoted to said carrier and adapted to the pockets therein, so as  
 125 to have a driving contact with the walls of said pockets, substantially as specified.

2. The combination in a grinding or pulverizing mill, of the grinding ring, a series of rolls in contact therewith, a dust-proof casing  
 130 for the said grinding ring and rolls and a rotating roll-carrying structure having roll bearings wholly outside of the casing of said dust-proof mill, whereby dust is prevented  
 135 from gaining access to said bearings, substantially as specified.

3. The combination of the grinding ring, the grinding rolls running in contact with the inner face of the same, and hangers for said



rolls pivoted at points outward beyond the axial line of the rolls, whereby the latter normally swing into contact with the ring, substantially as specified.

5 4. The combination of the grinding ring, the series of rolls in contact with the inner face of said ring, a rotating roll carrier located above the ring, an internal perforated and external imperforate screen mounted  
10 above the grinding ring and a packing ring carried by said screen structure and bearing against the roll carrier, so as to form a dust-proof joint therewith, substantially as specified.

15 5. The combination of the grinding ring, the grinding rolls, the screen above the ring, and a rotating roll carrier having projecting pockets which serve as vanes to direct a cur-

rent of air through the screen, substantially as specified.

20 6. The combination in a grinding or pulverizing mill, of the grinding ring, the grinding rolls rotating in contact with the inner face of said ring, the pivoted hangers for the shafts of the rolls, and a roll carrier having  
25 on its outer portion depending arms in which are mounted the pivot pins for the roll shaft hangers, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two  
30 subscribing witnesses.

JOSEPH HUNT.

Witnesses:

WINSLOW WOOD,  
CHAS. F. BALLIET.