

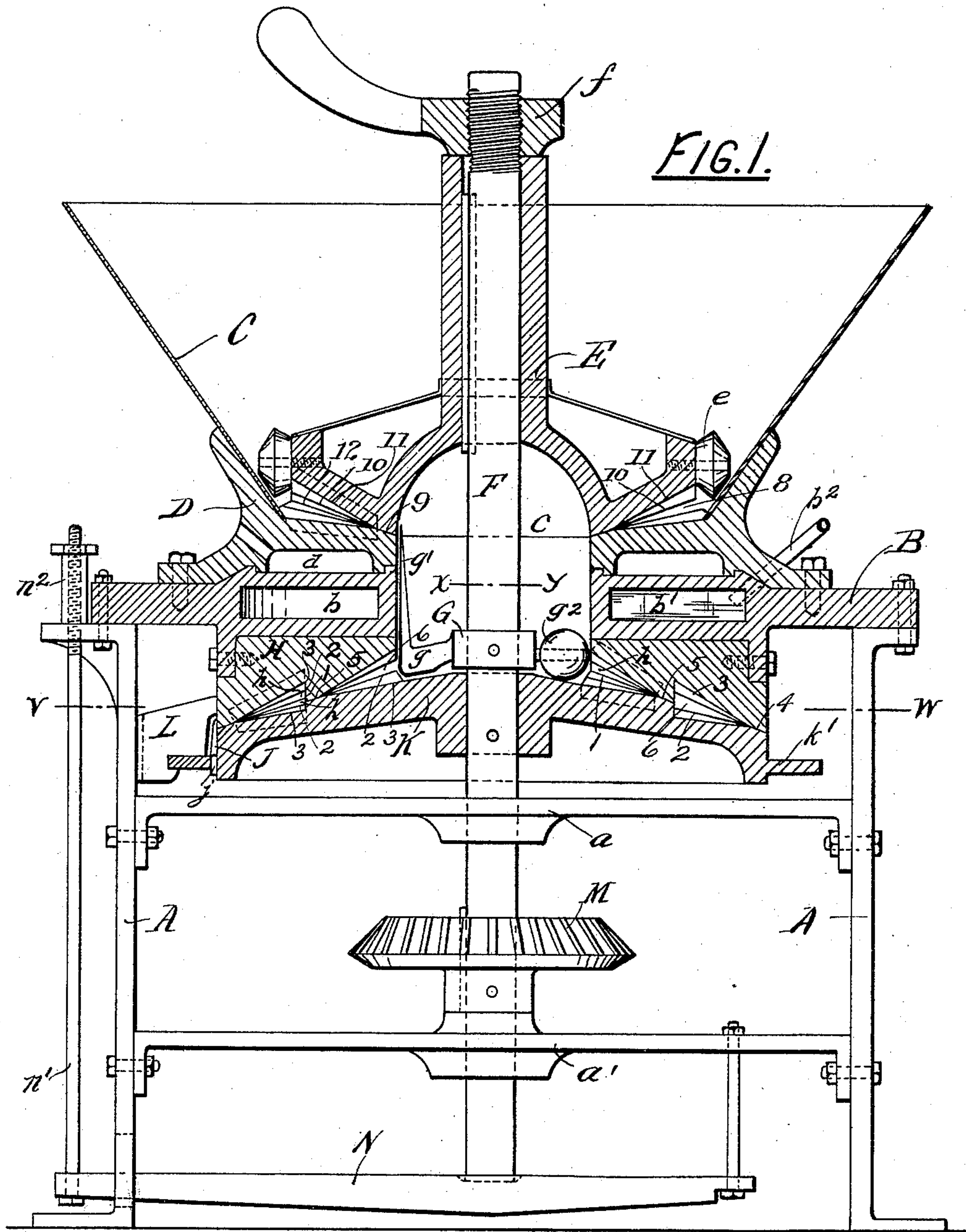
(No Model.)

2 Sheets—Sheet 1.

T. H. MORGAN.
PAINT MILL.

No. 436,370.

Patented Sept. 16, 1890.



Witnesses

G. A. Kelly
 J. K. Lichtenthal.

Thomas A. Morgan Inventor

By his Attorney J. Stewart

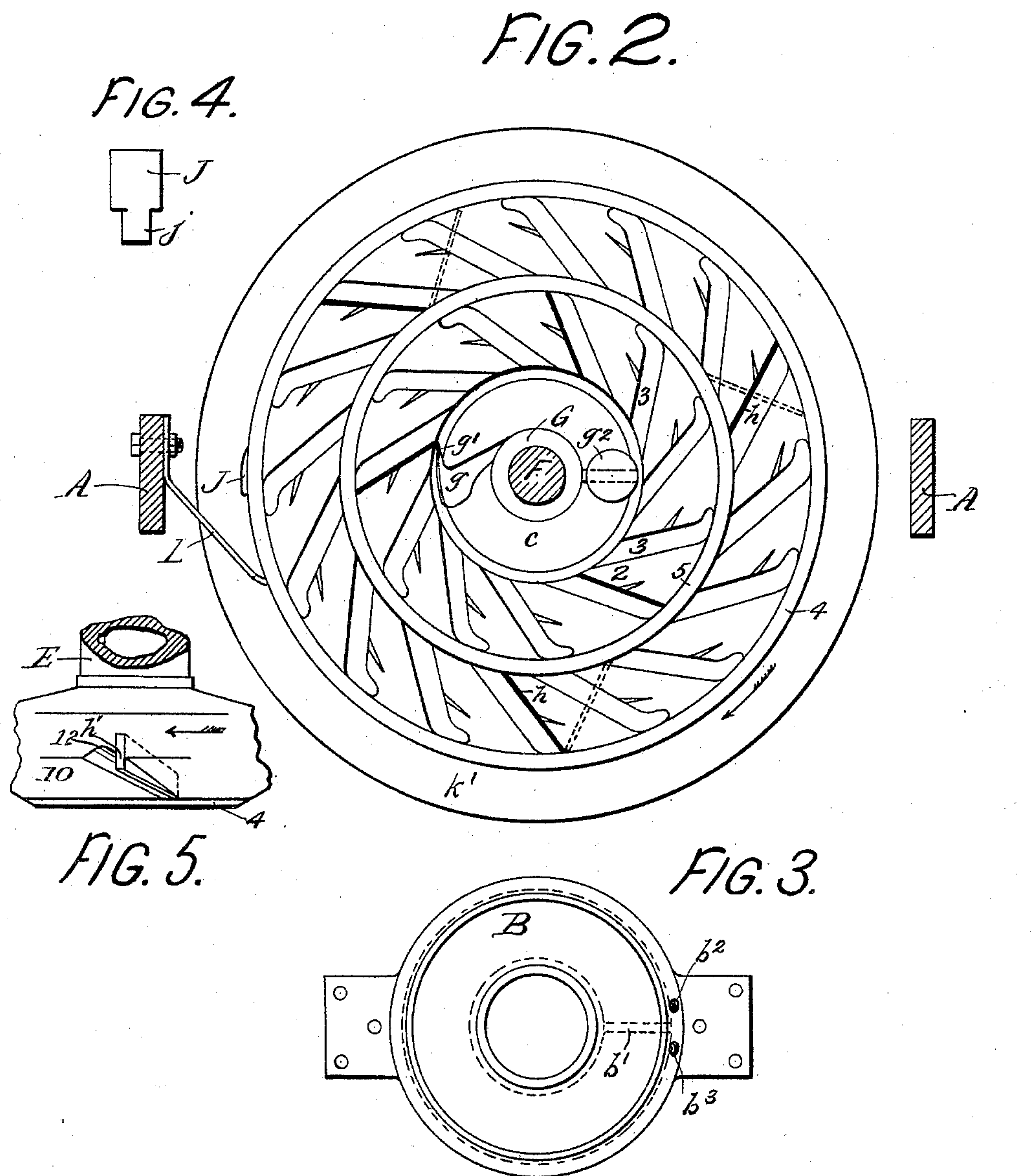
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UNITED STATES PATENT OFFICE.

THOMAS H. MORGAN, OF READING, PENNSYLVANIA.

PAINT-MILL.

SPECIFICATION forming part of Letters Patent No. 436,370, dated September 16, 1890.

Application filed February 21, 1890. Serial No. 341,251. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. MORGAN, a citizen of the United States, residing at Reading, in the county of Berks, State of Pennsylvania, have invented certain Improvements in Paint-Mills, of which the following is a specification.

The object of my invention is to provide a paint-mill which will overcome objections and disadvantages of those heretofore in use. Among these may be mentioned, first, the difficulty due to excessive heat caused by friction in grinding, which heat greatly injures the quality of the product; second, the friction produced on some other part of the machine by the grinding-pressure, which causes considerable wear, heat, and loss of power; third, the loss and trouble caused by the material being thrown away from the machine by centrifugal force as it comes through the grinding-surface; fourth, the danger of choking, close attention being required to insure proper feeding, and avoid the consequent injury of both the material and the mill; fifth, the necessity for a separate feed-mixing apparatus, which is ordinarily required to feed the mill regularly; sixth, the frequent necessity for regrinding, instead of completing the operation in one passage through the mill. To obviate some of these objections, paint-mills have been heretofore employed having one grinding-surface above another; but my construction is essentially different from these, as will be seen by referring to the accompanying drawings and the following description thereof.

The features of the invention are specifically pointed out in the claims.

Figure 1 is a vertical section of a machine involving the features of my invention. Fig. 2 is a plan view of the lower runner, showing the shaft in section through X Y and the frame-standards through V W of Fig. 1. Fig. 3 is a plan view of the frame or bed piece separate, on a smaller scale. Fig. 4 is a separate view of the peripheral cutter or scraper J. Fig. 5 is a partial elevation of the upper cutter, showing one of the feed-cutters and furrows.

The main frame or bed B is supported upon standards A, to which are also secured bearings a and a' for the central vertical shaft F,

to which motion is transmitted through a toothed wheel M, feathered thereto. The frame B has a central opening considerably larger than the diameter of the shaft F, and is formed with an annular water-space or chamber b , having inlet and outlet openings b^2 and b^3 on either side of a partition b' , said openings being connected, respectively, with an inlet-pipe, as from a city water-main, and an outlet-pipe, whereby a rapid circulation of water through said water-space may be maintained.

To the top of the frame B is removably secured an upper grinding-bed D, which carries a hopper C, and which practically forms, when in position, a part of the main frame B. An upper runner E within the hopper is feathered to the upper portion of the shaft F and rests upon the bed D. In connection with the openings through the frame B and bed D it forms an inner chamber c around the shaft F, which chamber serves as a supplemental or secondary hopper, as will be hereinafter explained.

To the under side of the frame B is secured a shoe H, which forms a lower grinding-bed and is also practically part of the frame, though made removable therefrom for convenience in repairing and handling. The lower runner K is fixed to the shaft F, and its upward pressure against the grinding-bed H may be regulated by adjusting the step N, which is fulcrumed to the frame, by means of a nut n^2 and a rod n' . The pressure of the upper runner E upon the bed D may then be regulated by means of a nut f upon the screw-threaded top of the shaft F. The latter, it will be noticed, may be lifted clear of its step-bearing N and the pressures regulated entirely by the nut f , the downward pressure upon the upper runner E thus balancing the upward pressure upon the lower runner K, and there being no end pressure whatever and consequently no useless friction and loss of power.

Having thus described the general construction of my machine I will proceed to explain some of the important details.

In Fig. 2 is shown the upper surface of lower runner K. It is very similar to the lower surface of upper runner, and a description of one will apply largely to the other, important points of difference being that the

lower runner is formed with two concentric banks or grinding-surfaces instead of one, as in the upper, and that the upper is arranged to feed toward the center of the shaft into the chamber *c*, while the lower is arranged to feed from said chamber toward the periphery. The general slope of the grinding-surfaces of the runner *K* is downward and outward, while that of the upper is downward and inward.

In the former one grinding-surface proper (marked 4) is at the largest diameter, while the other (marked 5) is about midway between the periphery and the chamber *c*. At these points the surfaces of the runner and bed are in unbroken contact, but extending toward the center from them they are cut down to the lines marked 2, thus leaving a gradually-increasing space 6 between the two grinding-surfaces 4 and 5 and between the latter and the chamber *c*, affording an opportunity for the paint to expand and keep cool. This space is increased at points by the diagonal or angular furrows or grooves 3, the depths of which are shown in Fig. 1, which view, however, represents them as though they were arranged radially instead of diagonally, as shown in Fig. 2. The upper furrows open into the central chamber *c*, and gradually reduce in depth to nothing at the grinding-surface 5. The lower furrows extend in a similar way from the grinding-surface 5 to the outer surface 4. The directions of the furrows on the runner and bed are such that they cross each other at an angle, as is commonly the case in paint-mills.

In order to prevent choking and produce a positive feed from one bank to the other through the grinding-surfaces, I provide a series of cutters or wipers *h*, which are preferably plates of hardened steel, one-quarter of an inch thick, more or less, set into the faces of the runner and bed, as indicated by dotted lines in Fig. 1, and reaching upward and downward, respectively, to the line of contact 1, of their outer edges, which slide over each other in passing in the manner indicated in Fig. 2, where the dotted lines in the outer bank represent one of the upper cutters in several positions with respect to the lower cutters which it assumes as the runner rotates in the direction of the arrow. In Fig. 1 it will be noticed that the contact-line of the outer cutters on the lower runner is above the grinding-surface 5. The effect of this arrangement is that as the material issues from the grinding-surface 5 the projecting upper ends of the lower cutters scrape it off. The dotted lines in Fig. 2 represent the cutter in three different positions, that being the number of cutters shown, though a greater number may be used, if desired. The edges first come in contact at the upper ends and pass each other with a scissors-like motion, but maintaining a constant angle, the point of contact moving downward until they leave each other at the lower end. The effect of this action is that the material is positively pressed out-

ward to and through the outer grinding-surface 4. The action of the inner series of cutters on the lower run is exactly similar, but those of the upper run, as already stated, are arranged to feed inward instead of outward, the cutters first meeting at the outer ends and leaving at the inner ends. Fig. 5 shows one of the grooves and cutters of the upper runner, the motion being in the direction of the arrow. In the upper runner, 8 indicates the gradual widening space above the single inner grinding-surface 9, which space is formed by cutting the surface back to the lines 10, and 11 the diagonal furrows. The cutters *h'*, which are set into the faces of the runner and bed in the same manner as in the lower run, have their sliding point of contact at the line 12.

The upper runner carries on its periphery one or more feed-rollers *e*, which are adapted to press the material in the hopper between the runner and its bed, where it is fed inward, as already described, toward the chamber *c*. Within this chamber a feeding device *G* is secured to the shaft *F*. It consists, preferably, of a blade *g*, having a cutter or scraper extension *g'*. The latter scrapes off the material as it escapes from the upper runner, and the blade *g* assists in feeding it between the lower runner and its bed. A ball or roller *g²* may be employed for the same purpose, and they may evidently be fixed to the frame *B* instead of the shaft, if preferred. Having been positively fed through both banks of the lower run, as already described, the finished product issues from the grinding-surface 4 at the periphery of the runner.

In order to catch any material that may be thrown off, a circular shelf *k'* extends around the runner, and a knife or cutter *J*, which is secured thereto by a shank *j*, prevents any accumulation dropping it onto the shelf, while a fixed scraper *L* wipes it off into a receptacle.

By means of my machine the material may be placed directly in the hopper without being fed thereto from a separate mixer and positively fed downward without danger of choking. As it gets into the inner chamber, it has ample room to expand and cool, the rapid circulation of water through the water-chamber *b* assisting greatly by preventing the main portion of the machine from becoming heated. It is then passed automatically onward through the lower grinding-surfaces, between which it has ample room to expand, and which may be further cooled by forming a water-chamber in the lower runner somewhat similar to the chamber *b*, if desired. It finally emerges and is delivered without loss or injury, in a finished state, in one operation with very little care or attention, and with a minimum of wear upon the machine and a minimum loss of power. The upper runner may be readily removed and cleaned, and the lower run may be used alone, if desired. The upper bed *D* may also be removed without

interfering with the operation of the lower run and without opening the water-chamber *b*, a circulation of cool air being maintained through the space *d* to assist in keeping the upper run cool.

It is evident that two or more banks may be used in both the upper and lower run, if desired, and that the construction may be in other respects considerably modified without at all departing from the spirit of my invention, and I do not, therefore, limit myself to the exact construction shown; but

What I claim is—

1. In a paint-mill, a bed or frame having an upper and lower grinding-surface and formed with an annular water-chamber with water inlet and outlet, in combination with upper and lower runners bearing on said grinding-surfaces, substantially as set forth.

2. In a paint-mill, the combination, with a bed or frame, the hopper, and the runner located in said hopper, of a peripheral feed roller or rollers, as *e*, carried by said runner, substantially as and for the purpose set forth.

3. In a paint-mill, the combination, with a bed or frame having an upper and lower grinding surface or surfaces, of an upper runner adapted to discharge into an inner closed chamber, and a lower runner, also communicating with said closed chamber, formed by said bed and runner and adapted to discharge at the periphery, substantially as set forth.

4. In a paint-mill, the combination, with the bed or frame having an upper and lower grinding surface or surfaces, of an upper runner adapted to discharge into an inner chamber, a lower runner also communicating with said chamber and adapted to discharge at the periphery, and a feeding device located in said chamber, all substantially as set forth.

5. In a paint-mill, the combination, with a bed or frame having an upper and lower grinding surface or surfaces, of an upper run-

ner adapted to discharge into an inner chamber, a lower runner also communicating with said chamber and adapted to discharge at the periphery, and a feeding device *g* and cutter *g'*, located in said chamber and adapted to operate substantially as set forth.

6. In a paint-mill, the combination of a bed or frame, shaft carrying upper and lower runners bearing thereon, a communicating-chamber between said runners, a feeding device in said chamber, a delivery mechanism at the periphery of lower runner, and means for rotating said shaft, all substantially as set forth.

7. In a paint-mill, the combination, with a runner, of peripheral cutters or wipers *J*, a circular shelf *k'* carried thereby, and a fixed scraper *L*, all adapted to operate substantially as set forth.

8. In a paint-mill, the combination of a frame or bed, and a corresponding runner, forming two or more concentric grinding-surfaces and spaces alternately arranged, said bed and runner being each provided with a series of cutters projecting into said space and adapted to pass each other with a shifting point of contact, substantially as and for the purpose set forth.

9. In a paint-mill having a bed and runner forming two or more concentric grinding-surfaces and spaces alternately arranged, the outer cutters projecting downwardly and upwardly into said space and having their line of contact above the adjoining grinding-surfaces, thereby serving as scrapers therefor, substantially as set forth.

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

THOMAS H. MORGAN.

Witnesses:

W. G. STEWART,
ED. A. KELLY.