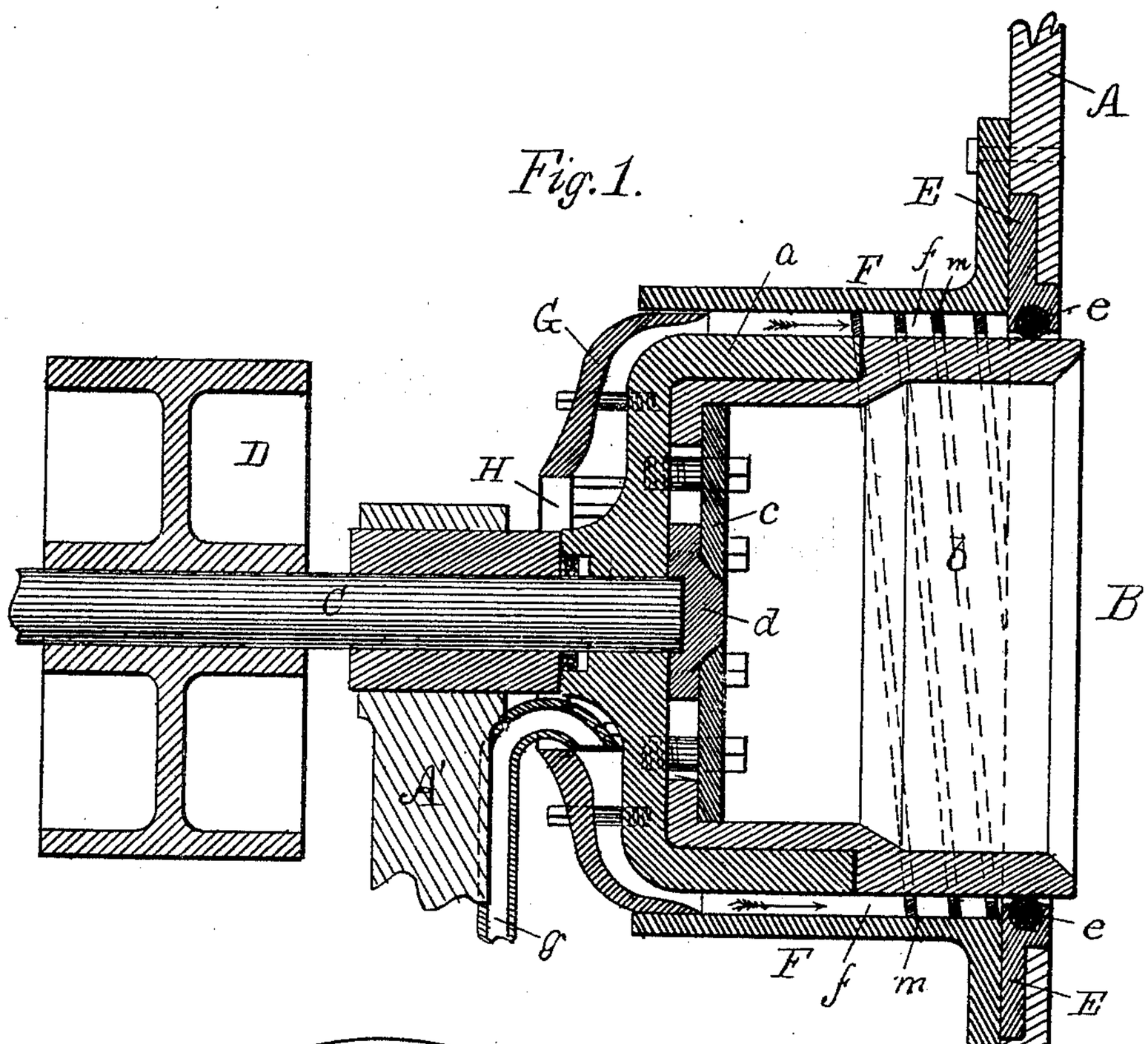
(No Model.)

T. L. STURTEVANT.

WET GRINDING MILL.

No. 327,501. Patented Sept. 29, 1885.

Fig. 1.



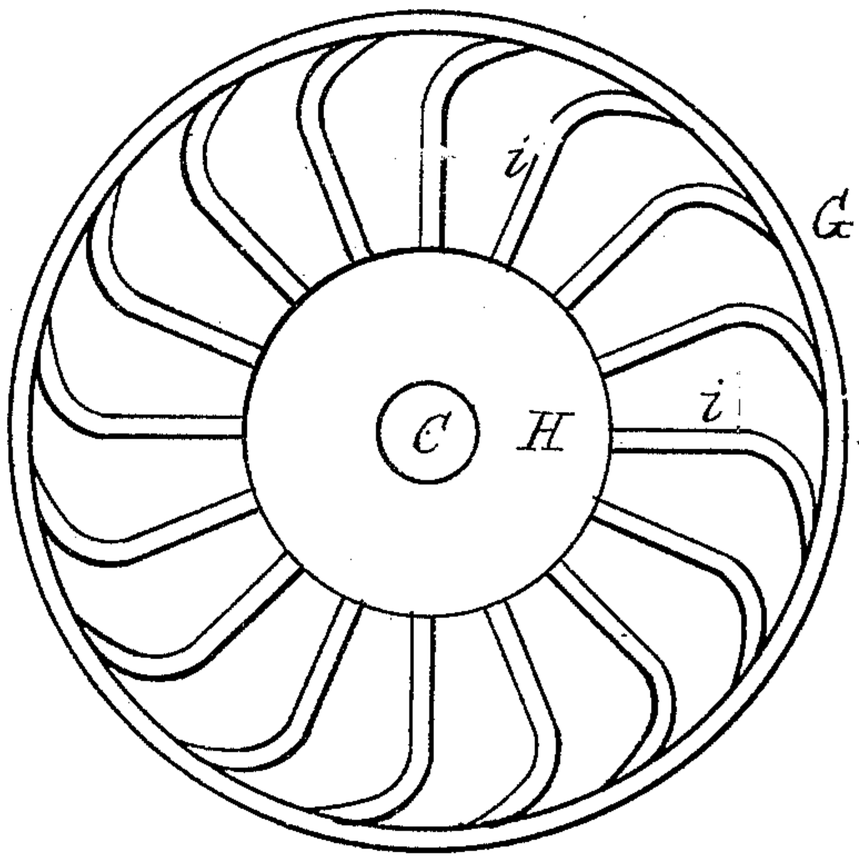


Fig. 2.

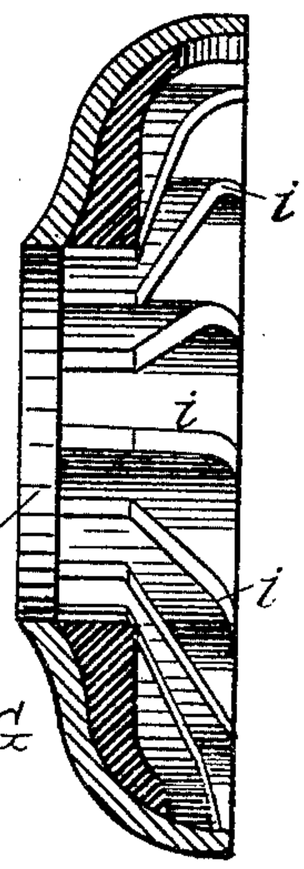


Fig. 3.

Witnesses.
H. E. Lodge
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UNITED STATES PATENT OFFICE.

THOMAS LEGGETT STURTEVANT, OF FRAMINGHAM, ASSIGNOR TO THE STURTEVANT MILL COMPANY, OF BOSTON, MASSACHUSETTS.

WET-GRINDING MILL.

SPECIFICATION forming part of Letters Patent No. 327,501, dated September 29, 1885.

Application filed April 16, 1885. (No model.)

To all whom it may concern:

Be it known that I, THOMAS LEGGETT STURTEVANT, a citizen of the United States, residing at Framingham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Wet-Grinding Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, 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, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to grinding-mills, especially that class termed "wet mills," in which a fluid, generally water, is employed. Moreover, this fluid is employed simply to obviate the necessity of thoroughly drying the material before pulverizing, since in case the particles contain moisture they are formed, during the process of reduction, into a sticky, pasty mass, which would clog and obstruct the apparatus unless a sufficient quantity of liquid were employed to prevent the particles from so adhering together. Thus the fluid-supply is employed to continually remove the particles as they are reduced and convey them away to the proper receptacle.

My improvements consist in the combination of the rotary head or heads employed in pulverizing the material with a boss and a water-jacket, which latter in general shape conforms to that of the rotary head, which it partially incloses, and by which it is carried. Furthermore, I have sometimes provided the interior of such jacket with a series of radially-disposed ribs, so constructed that upon rotation of the head and its jacket the liquid supplied through a pipe connected with said jacket shall be forced into said mill between the packing and the periphery of the bushing which forms part of the rotary head. Thus all escape of the finely-ground particles or flour of the material from the mill is prevented, while at the same time the entrance of the liquid within the mill permeates the material.

The arrangement, construction, and combinations of the various parts will be more fully hereinafter shown, described, and claimed.

In the drawings accompanying this specification, Figure 1 represents a central vertical longitudinal section of a portion of a grinding-mill embodying my improvements. Fig. 2 is a plan, and Fig. 3 a central vertical section, of the water-jacket.

This invention relates to a certain class of attrition-mills in which two oppositely-disposed heads containing the material are rotated in contrary directions, and thus the particles or masses composing the material are brought in frictional contact with each other and reduced to powder.

In the drawings I have represented only one-half of a mill of the class above premised, in which A represents a portion of the interior casing of the mill, and is to be attached in any suitable manner to the standard or housing thereof. (Not here shown.) This casing A is laterally bored to admit of the introduction of the rotary head B. The other rotary head is not shown, but is oppositely disposed. Furthermore, this head B is rigidly attached to its shaft C, suitably mounted at A′, and oppositely rotated from that carrying the other head, which is not shown in the drawings.

The head B is composed of the circular hollow head *a*, in which is fitted a bushing or ring, *b*, formed of some hard metallic substance, and secured to the hub by the clamping plate or ring *c* by suitable bolts. Furthermore, since the material in process of grinding is contained within the bushing or ring *b*, I find it necessary to protect the end of the shaft D, and consequently have covered it with a cap or plate, *d*, which is likewise maintained in position upon the shaft and rigidly secured thereto by the plate or ring *c*, before mentioned. The cap, clamping-plate, bushing, and head are shown, described, and claimed in my application No. 162,453, filed April 16, 1885.

To prevent the fine material from escaping around the exterior periphery of the head B and its bushing *b*, I have disposed a packing-ring, E, upon the exterior casing A of the mill, and affixed thereto packing *e*, which is not intended to inclose the bushing *b* snugly.

Since the peculiar and essential feature in my invention is to obtain a supply of liquid in the process of wet grinding, and at the same

time to prevent escape of the flour or fine particles of the material in process of reduction, I have secured laterally of the casing an open tubular boss, F, of an internal diameter somewhat larger than the exterior diameter of the rotary head. I also form an annular opening or duct, *f*, by which the fluid is admitted under pressure into the mill.

The device by which the fluid employed in moistening the material in process of reduction is conveyed into the interior of the mill is shown at G as a jacket composed of a hemispherical or flattened dome-shaped hollow cylinder, or otherwise approximating to the shape of the head-casting, encompassing the driving-shaft and inclosing a part of the exterior of the rear portion of the head-casting of the rotary head B, which fits within it. The exterior portion of the jacket, or that in proximity to the shaft, is bored at H somewhat larger than the shaft in order to admit of a stationary feed-pipe for liquid. Moreover, since this pipe is fixed, while the jacket is bolted to and revolves with the rotary head carried by the shaft, I have so bored the jacket that the annular space H between said jacket and the shaft shall be greater than the diameter of the feed-pipe. The interior portion of said jacket extends over and about the exterior rear part of the head B, passing between the latter and the tubular boss F, against which it snugly fits.

In order to induce the fluid discharged from the pipe or pipes *g* between the jacket and the head B along the annular passage or duct *f* to enter the mill under pressure, I have arranged in the jacket a series of interior radial partitions, *i i*, &c. These partitions or ribs are constructed of the most approved form generally adopted by those conversant with hydraulics, and as such ribs approach the interior edge or rim of the jacket they change their direction and terminate in a curve more or less backward, or the reverse from the direction of rotation of the jacket. This is not always necessary, but I prefer it; hence the resultant of the centrifugal motion of the rotary head and its jacket tends to throw and force the fluid from the central inlet in the direction of the arrows, as shown in Fig. 1.

Since I do not maintain a tight joint between the packing *e* and the bushing *b*, I find that sufficient liquid is forced between such bushing and its packing to sufficiently wet the material within the mill.

The amount of fluid required is very easily ascertained, and the supply forced through the feed-pipe regulated accordingly; hence the action of the partitions or blades of the jacket drives the liquid up through the space between the jacket and the head, and thence through the space *f*, and through the space left between the bushing and its packing-ring into the mill, whence it passes out through the screen with the ground or broken rock.

In order to increase and add to the movement of the liquid induced by the centrifugal force generated by the rotations of the head B, I have provided the boss F with a continuous rib, *m*, disposed spirally about a portion of its interior periphery, in order that the liquid leaving the jacket G and passing through the annular space *f* shall be still further acted upon and carried forcibly along and compelled to enter within the mill. This spiral rib is disposed upon the inner portion of the boss in order that it shall not interfere with the advance of the jacket G with the head B, which has to be done at times, owing to the gradual wear of that part of the bushing which is maintained within the casing of the mill.

I claim—

1. In a wet-grinding mill, the combination, with the mill-casing, the boss, and rotary head, of the jacket secured to and partially inclosing the latter and constructed to force liquid within the mill, substantially as herein described.

2. The combination, with the rotary head B, casing A, and boss F, of a jacket, G, provided with the interior peripherally-disposed ribs *i i*, substantially for purposes herein specified.

3. In a wet-grinding mill, the combination, with the rotary head and boss, of the jacket, the rotary action of the jacket and head supplying liquid to the mill, substantially as described.

4. In a wet-grinding mill, the combination, with a mill-casing, a rotary head, and its jacket secured to and partially inclosing said head, of means for supplying liquid and the boss F, provided with the continuous spiral rib *m*, whereby liquid is forced within the mill, as herein described.

5. The combination of the head B, means for supplying liquid, and boss F, interiorly provided with a continuous spiral rib, *m*, adapted to inclose the head B, revolving therein, and thus effect a continuous forced supply of liquid within the mill through the annular space *f*, all operating for the purpose herein described.

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

THOMAS LEGGETT STURTEVANT.

Witnesses:

H. E. LODGE,

A. F. HAYDEN.