A. J. VANDEGRIFT.

Flour and Grist Mill.

No. 107,311. Patented Sept. 13, 1870.

Fig. 1.

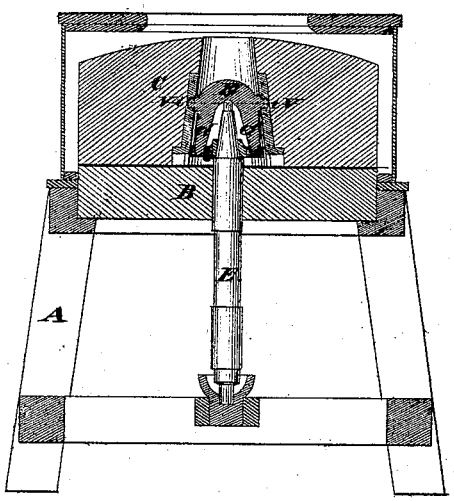


Fig. 3.

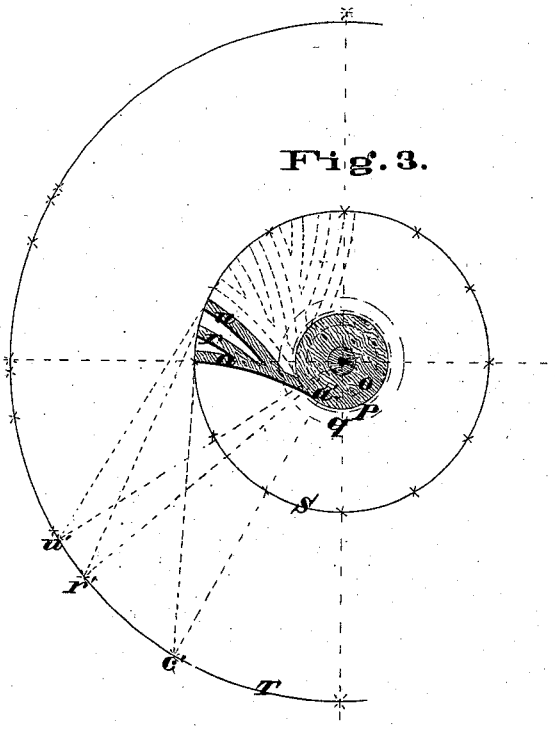


Fig. 2.

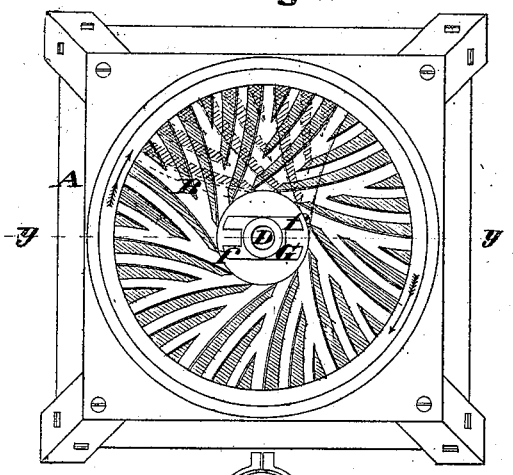


Fig. 4.

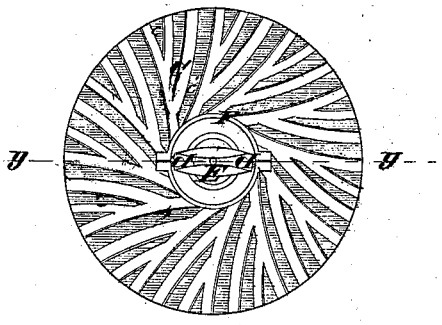


Fig. 5.

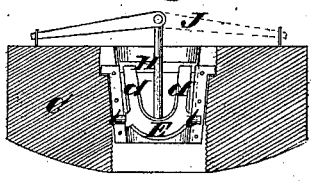


Fig. 6.

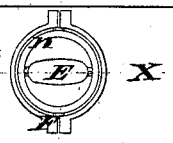
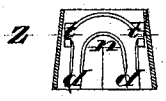


Fig. 7.



Attest.

Luther F. Potter

Thos Stafford

Inventor.

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ANDREW J. VANDEGRIFT, OF COVINGTON, KENTUCKY.

Letters Patent No. 107,311, *dated September* 13, 1870.

IMPROVEMENT IN FLOUR AND GRIST-MILLS.

Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ANDREW J. VANDEGRIFT, of the city of Covington, county of Kenton and State of Kentucky, have invented new and useful Improvements in Flour and Grist-Mills; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making a part of this specification, in which—

Figure 1 is a vertical section taken in lines *y y*, figs. 2 and 4.

Figure 2 is a top view of the husk-frame of the mill and the bed-stone, the upper stone or runner having been taken off.

Figure 3 is a view of the pattern for laying off the furrows in the stones, plainly exhibiting the form and mode of obtaining the same.

Figure 4 is a top view of the upper stone or runner inverted.

Figure 5 is a vertical section of the same, taken in lines *y y*.

Figure 6 is a top view of my improved irons for hanging and driving millstones, showing a form of construction differing somewhat from that which I have adopted.

Figure 7 is a vertical section of the same, taken in lines *x x*, fig. 6.

Similar letters of reference indicate corresponding parts wherever they occur in the several figures.

The nature of my invention consists:

First, in constructing the driving and hanging-irons of millstones, in such a manner that the bearing points will readily adjust themselves to each other without shifting or in any way disturbing the point of suspension, or causing a lateral strain on the pivot-point of the spindle; or, in other words, in providing millstones with perfect self-tramming irons, so that the power may be applied in driving them without interfering with their freedom of oscillation on the pivoted-point of the spindle.

Second, in providing millstones with an improved dress, by which the furrows are cut in such a form that the grinding surface and furrows are more uniformly proportioned to each other at all points, from the center to the circumference of the stone, and so that the draft of the furrows shall gradually decrease as the verge of the stone is approached, adverse to the increase of the centrifugal force generated by the rotary motion of the running stone, thus accelerating the passage of the meal outward, near the center, where the centrifugal force is weak, and gradually less, as the verge is approached, where the centrifugal force is greater.

To enable others skilled in the art to fully understand and construct my invention, I will proceed to describe its construction and operation, referring to the accompanying drawing and the letters marked thereon.

A, figs. 1 and 2, is the husk-frame of the mill.

B, figs. 1 and 2, is the bed-stone.

C, figs. 1, 4, and 5, is the upper stone or runner.

D, figs. 1 and 2, is the spindle, to which the driving power is applied, and upon the upper end of which the upper or running stone is pivoted.

In place of the bale or balance-iron commonly used in the eye of millstones for the purpose of pivoting the stone on the point of the spindle, I construct a cross-head, E, figs. 1, 4, and 5, which is suspended in the eye of the stone by lugs, *t t*, on either side, being fitted in a cast-iron shell, F, figs. 1, 4, and 5, which is constructed in two longitudinal sections, provided with suitable flanges, so that the cross-head may be fitted in, and the two sections bolted or riveted together, forming a substantial support for the cross-head as well as a lining for the eye of the stone.

In cross-head E I form a socket for the reception of the point of the spindle, which is properly fitted to form a perfect ball-and-socket joint, the center of which is exactly in line with the center of the lugs *t t*, as shown plainly by lines *v v*, fig. 1, drawn horizontally through them.

Cross-head E is provided with pendants, *d d*, figs. 1 and 4, which extend down to and fit loosely in suitable slots in the ends of a cross-driver, G, figs. 1 and 2, which is fitted firmly on the neck of the spindle D.

Now, when the spindle is made to rotate, it will be readily seen that the jaws *f f* of driver G, fig. 2, coming in contact with pendants *d d* of the cross-head, the motion is transmitted to the millstone, and as cross-head E is hinged by its lugs on a plane with the center of the pivot, which is the point of suspension, and the center of oscillation, the points of pendants *d d* can swing back and forth without disturbing the equipoise of the stone; and, as one jaw of the driver comes in contact with one of the pendants, the cross-head swings in the direction of the bearing, and the opposite pendant is, therefore, swung back in contact with the opposite jaw of the driver. The bearing is perfectly equalized on both ends of the driver without interfering with the center of gravity, or the freedom of oscillation on the point of suspension, so that a running stone provided with these irons may be truly said to be always in perfect tram with its spindle.

In setting these irons, it is not necessary to tram the spindle to the runner, as is the case with other irons in use, but it is desirable to have the eye in the center and straight through the stone.

To effect this, I have adopted a simple device for

tramming the shell F in the eye of the stone, as shown plainly in fig. 5, so that my irons may be equally applied to stones now in use, as well as new ones, by first preparing the eye of the stone by the removal of the old irons, and cutting the plaster away, so that shell F may be set in, as shown in fig. 5; then, by fitting a wooden head, H, in shell F, with suitable mortices cut in for the points of pendants *d d* to rest in, and with a small hole in the center for the reception of a small wooden tram-spindle, I, which is turned to fit the hole neatly, and also, its point being properly formed to fit in the socket in the cross-head, and having an arm, J, stiffly hinged at its upper end by a screw, the tramming device is complete, as shown plainly in fig. 5, so that any novice will be able to tram the shell in the center by wedging it in place, so that the tram-spindle shall stand in the center of the stone, and, so that, when arm J is swept around the quill-point in the end of the arm, shall touch the face of the stone at all points alike; which, being accomplished, the shell should be secured in its position by having plaster poured around it, and the eye should be properly plastered up where it has been cut away, and the stone is then ready to be put on its spindle for the purpose of truing up the back and eye, by turning with a chisel, preparatory to being put in proper running balance, which, being done, the job is completed.

I have thus described my improved irons, as applied to mills, in which the upper stone is the runner. They can be, with equal effect, applied to mills in which the under stone is the runner.

I have also described cross-head E as being hinged by its lugs in the shell of the eye.

This construction may be varied by the insertion of a ring, *n*, figs. 6 and 7, in the eye, between the cross-head and shell F, so that the cross-head shall be hinged in the ring by its lugs, and the ring, in turn, be hinged by similar lugs in the other two opposite quarters of the circle, in shell F, as shown plainly in figs. 6 and 7, the lugs of the ring, as well as those of the cross-head, being on a plane with the lines *z z*, fig. 7.

This mode of construction provides a perfect universal joint, independent of the pivoted point of the spindle. This is my original plan, but, on account of its being so cumbersome in the eye of the stone, particularly of the smaller size, I have adopted the form hereinbefore set forth and described, as being more substantial, and less complicated and cumbersome, more readily and cheaply applied, and fully accomplishing the object sought.

My improvement can be applied in various forms, but so long as an oscillating cross-head or a cross-head with oscillating pendants, is used, substantially as herein set forth and described, I shall consider it an infringement on my invention.

I have also invented an improved dress to millstones, plainly represented in figs. 2, 3, and 4, the object of which is to preserve a uniformity of proportion between the grinding surface and the furrows, at all points from the eye to the verge of the stone, and also to provide a uniformly decreasing draft as the verge is approached. This I accomplish by a dress consisting of a series of curved furrows, with the feather edge on the convex side. These furrows are each a segment of a circle. The leading furrows *a*, fig. 3, have but little draft at the verge of the stone. Each of the shorter furrows, *r* and *u*, fig. 3, which intersect the leading furrows, between the eye and the verge of the stone, are segments of smaller circles than that of which the leading furrows are segments, which is equal to the diameter of the stone represented by circle S, fig. 3, and the pitch-circle T, fig. 3, from which the furrows are described, is equal to twice the diameter of the millstone and the diameter of the draft-circle O, fig. 3, added together. This gives the furrows very little draft at the verge of the stone, though they have some draft at that point.

It is essential that pitch-circle T should be more than twice the diameter of the stone, as it is apparent that if the pitch-circle was just twice the diameter of the stone, or smaller, the furrows described by a tram from the draft-circle O to the verge would bag between the draft-circle and the verge.

In laying off the dress of a stone, or a pattern for the same, on my improved plan, I proceed as follows:

I first strike a circle, S, fig. 3, which represents the diameter of the stone; I then strike a draft-circle, O, fig. 3, for a stone four feet in diameter. The draft-circle should be at least ten inches in diameter; I then strike a pitch-circle, T, equal to twice the diameter of the stone, and the diameter of the draft-circle O, added together; I then lay off the circle of the stone in as many sections as I want leading-furrows; I then set my tram in the pitch-circle, at *c'*, the other point touching the draft-circle, at *a'*, and sweep outward to the verge, which describes the feather edge of the leading furrow *a*; I then contract my tram to strike the line of the back of the furrow, and, having spaced the sections into as many spaces as I want furrows to the sections, so that all of the furrows, both short and leading furrows, shall be equidistant from each other at the verge, using in a stone four feet in diameter, twelve sections, and one leading and two short furrows to the section, I then strike two more draft-circles, *p* and *q*, fig. 3. The diameter of these circles may be varied to suit the quality of stone, for the purpose of giving more or less grinding surface at the eye; but I regulate the diameters so that the distance from the back of one of the leading furrows to the feather edge of the first short furrow in the section immediately preceding it, shall equal three-fourths of the width of the furrow at the point of the intersection of the said short furrow with its leading furrow; and, having thus determined the diameter of draft-circle *p*, I strike a third draft-circle, *q*, as much larger in diameter than circle *p* as circle *p* is larger than draft-circle O, so that the distance on a radiating line from *p* to *q* shall be equal to the distance from O to *p;* I then proceed to set my tram so that when one point is set in pitch-circle T, the other shall touch draft-circle *p;* I then set one point of the tram in the last space-mark of the section in circle S, and find at what point the other point will strike pitch-circle T, which is found to be *n;* I then sweep the other point back from the verge toward the eye until it intersects leading furrow *a*. This describes the feather edge of furrow *u;* I then contract the tram, and strike the line for the back of the furrow; I then set my tram to draft-circle *q*, and proceed to find point *r'* in pitch-circle T, as in the other case, and sweep from the verge toward the draft-circle *q'*, as in the former case, and by so doing describe the line of the feather edge of furrow *r;* I then contract my tram and strike the back of the same furrow. This completes one section, and, if desired, may be laid off on a thin board or metal, and cut out for a pattern, as shown in fig. 3, having a hole large enough cut in it, to fit over the neck of the spindle, for laying off the bed-stone, and then, by fitting a plug in the same, with a smaller hole in its center, to fit over a center pin, which may be set in a piece of wood in the eye; the runner may be laid off by the same pattern by moving the pattern around the stone, setting the back of the pattern to each section-mark, and marking the furrow out by it. The form of dress plainly shown in figs. 2 and 4 is thus produced:

This dress has the advantage of uniformity of distribution over the face of the stone, and the mode of giving a great draft to the furrows near the center, to convey the meal out rapidly where there is but little centrifugal force, and decreasing in the proper proportion, as the periphery is approached, tends to

equalize the work performed to the time and space at all points. This dress can be readily varied to suit different qualities of stone, or to suit different sections of the country.

The number of sections in the circle may be increased or diminished, or the number of furrows to the section may be varied, or the draft at the eye may be varied; but, in any case, the diameter of the pitch-circle should be at least twice the diameter of the stone, or more.

In order to show clearly the manner in which the furrows cross each other when the mill is in operation, I have drawn three sections of the dress, reversed, on the face of the stone, fig. 2, and have also indicated the direction of the motion of the running stone by an arrow at the verge.

Having thus fully described the construction and operation of my invention,

What I claim therein as new, and desire to secure by Letters Patent, is—

1. Cross-head E, hinged by lugs in the eye of the millstone, on a plane with the center of oscillation on the point of the spindle, substantially as set forth and described.

2. Pivoted cross-head E, with pendants *d d*, constructed and arranged in the manner and for the purposes substantially as set forth and described.

3. A millstone-dress, consisting in the arrangement of a series of curved furrows, *a*, leading from the eye to the periphery of the stone, and one or more series of shorter furrows, *r u*, leading from points of intersection of these to said periphery, with the feather or grinding edge on the convex side of all the furrows, substantially as herein set forth.

A. J. VANDEGRIFT.

Witnesses:
L. F. POTTER,
THOS. STAFFORD.