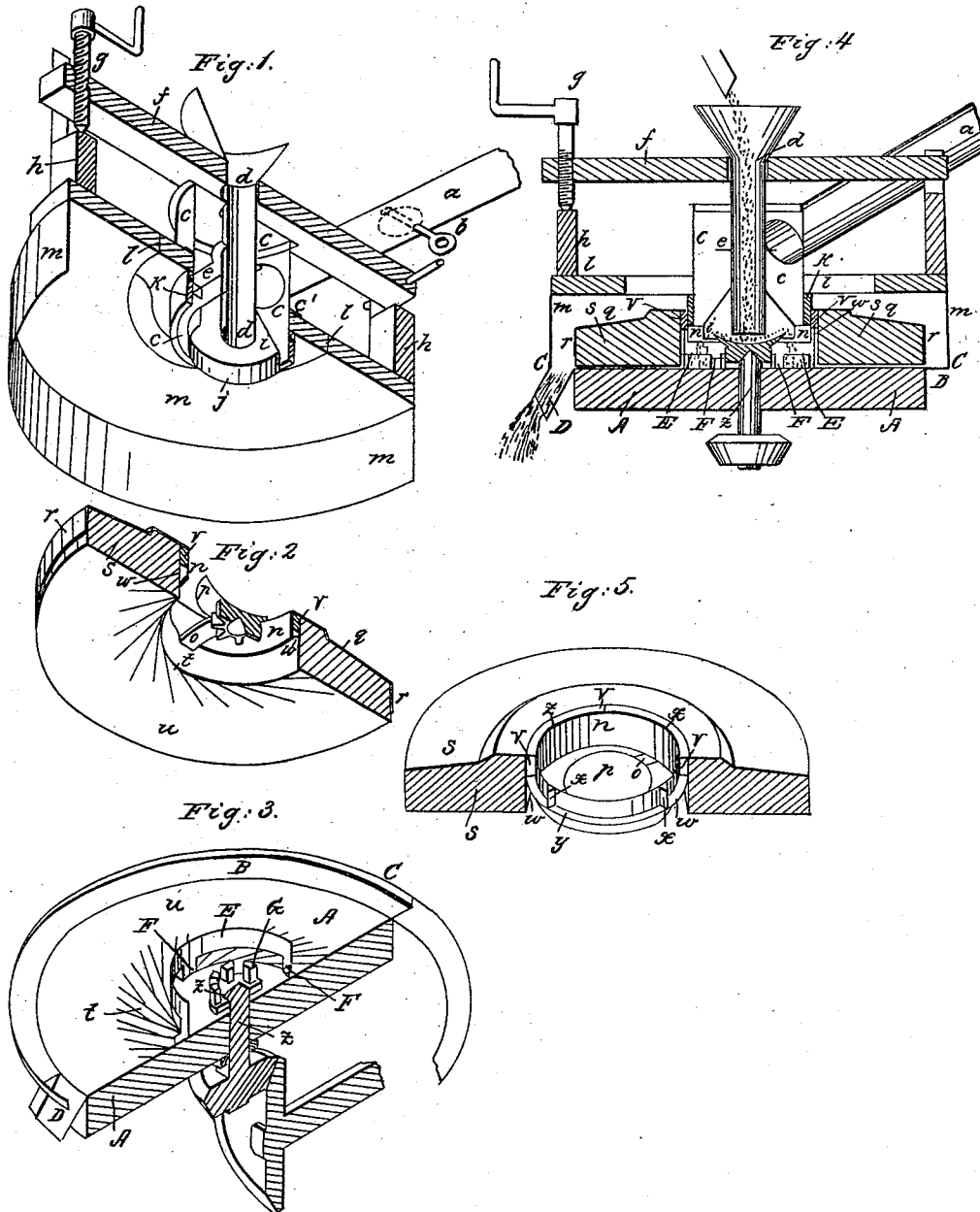


L. FAGIN.
Flour Mill.

No. 6,827.

Patented Oct. 30, 1849.



UNITED STATES PATENT OFFICE.

LEWIS FAGIN, OF CINCINNATI, OHIO.

MILL FOR GRINDING.

Specification of Letters Patent No. 6,827, dated October 30, 1849.

To all whom it may concern:

Be it known that I, LEWIS FAGIN, of Cincinnati, Hamilton county, Ohio, have invented new and useful Improvements in Ordinary Flouring-Mills; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawing, making part of this specification, in which—

Figure 1 is an isometrical view in section of the parts connected with the casing of the stoves, and comprising the feeding tube, shield, and pneumatic apparatus. Fig. 2 represents in similar view the runner stone, showing the face and the irons attached to the runner. Fig. 3 is also a similar view of the bed-stone, showing its face and the stationary cylinder. Fig. 4 is a central and vertical section of the improvements combined and in place ready for operation, and Fig. 5 is a view of the cylinder inserted in the eye of the runner, the cylinder being cast with an annular and also vertical flanges above and between which the cement is poured. The balance-rive is also represented in the same figure.

From all of these figures it will readily be perceived that I pass a blast of air through the eye of the runner in such wise as to prevent its interference with the regularity required in the feed, that I attach the balance-rive so as to keep it out of the way of the equable distribution of the feed between the stones and cast it with, or permanently fasten it to a cylinder inserted into the eye of the runner and cemented at its upper portion thereto by itself or in connection with a back plate and hoop, and that I also furnish the bedstone with a stationary cylinder resting on feet between which the grain passes to the faces of the stones, the stationary cylinder preventing the grain hanging in the eye of the stone and that I leave the external area of the stones to the extent of half the radius, more or less, all land.

It is obvious that the blast of air may be used either hot or cold and that the runner itself may be made the fan-blower by attaching vanes to its upper side and conducting the air caught therein to the eye of the runner and that dampers and registers can be applied either to the vanes of the fan or to an additional hoop placed above the ordinary one. Various analogous ways of intro-

ducing air are too obvious for particular notice.

The action of the air between the surfaces of the stones tends to deliver the flour first made from the grain so soon as it is made and to leave the stones free to act upon the more glutinous in contradistinction to the more starchy part of the body of the grain. There is no danger therefore of killing any portion of the pulverized material as that which is the lightest is blown through and the stones being kept cool and the pores free that portion which is the heaviest, is subjected to the action of the stones under the most favorable circumstances and is least liable to gum or paste the stone; to remedy which evil there is no alternative but to take the stone up and clean it. The meal when inflated with air is much more lively and cool, and in a condition to be bolted to an advantage equal to 33 per cent. over the same quantity with the same amount of cloth when treated in the old way.

The first part of my invention consists in devising a means for the protection of the feed from the disturbing influences of an unguided blast, the same having a tendency to cause an irregular distribution of the feed and crowd it at one or more points and also drive portions of it against the eye of the runner where it is liable to hang and be carried around by the centrifugal force.

The second part of my invention consists in inserting and extending down a suitable distance into the eye of the runner, a cylinder attaching it to the upper portion or back of the stone, its lower portion forming an annular recess in the eye of the stone into which the stationary cylinder on the bed-stone projects and reaches above the balance-rive which is cast with or permanently attached to this first mentioned cylinder whereby I am enabled to elevate the attachment between the runner and the rive above the face of the stone and avoid destroying or diminishing or making any break in the grinding surface of the runner and prevent the obstruction to regularity in feeding caused by the balance rive and driven as commonly constructed, or the hanging of the grain in the eye of the runner stone I also cast this same cylinder with or without or attach it permanently to a metallic back or hoop for the runner so as to connect it permanently enough with the back of the run-

ner stone to suspend the stone resting upon the cock head thereby.

The third part of my invention consists in attaching a cylinder having feet appended thereto, to the bed-stone, the cylinder being of such diameter as will allow it to project up into the eye of the runner and into the recess aforementioned without contact with either the cylinder or the stone forming the said recess for the purpose of preventing the hanging of the grain in the eye of the runner. Thus the grain middlings or other material to be ground is thrown against a stationary tube or cylinder, instead of against the eye of the stone, in motion.

The fourth part of my invention, in combination with a blast of air, consists in dressing the stones to one half the radial distance, more or less, between the usual commencement of the furrow and the periphery and leaving the rest of the faces of the stones all land.

The first part of my invention I effect by inserting into the ordinary hoop a board that lies across the eye of the hoop or cover of a pair of stones, a cylindrical air chamber, into which the air is introduced through a pipe having the usual adjusting valves, the ordinary feed pipe being passed down in the axis of the said chamber till its mouth dips somewhat into the feed cup placed centrally as usual on the balance rive. On the lower portion of the feeding tube I firmly attach a conical shield, the base of which is of greater diameter than the feed cup, and from this base I project a cylinder dipping down around and somewhat below the top of the feed cup. By means of leather or other suitable packing the air chamber which dips down into the cylinder inserted into the eye of the runner can be made sufficiently tight for all practical purposes. It will readily be perceived on examination of this arrangement, that the centrifugal motion or action of the feed cup that the grain is thrown out of the cup in full force while the shield diffuses equally the force of the blast and guides the same by its cylindrical projection in a vertical current directly down toward the face of the bedstone, to be by it spread out toward the only exit for the air, viz, between the faces of the runner and itself. The shield and its cylindrical projection being perfectly adjustable so as to regulate the amount of feed required, there is no tendency in the grain to hang therein should any come into contact with the cylindrical portion of the shield in as much as there is no centrifugal action the feed pipe and shield remaining still therefore the law of gravity would at once cause the grain to drop and be carried by the diffused blast between the grinding surfaces of the stones. It will also be perceived that the cylindrical portion of the shield projects sufficiently far

down to prevent the grain from flying against the cast iron cylinder to which the balance rive is attached and which revolves with the runner-stone, but that the grain (at least portions of it) does come in contact with the stationary cylinder on the bed-stone. This last mentioned cylinder acts precisely as does the cylindrical portion of the shield. It annuls the centrifugal law by which the grain was propelled and subjects it (the grain) at once to the law of gravity. Whereas when the grain (as has hitherto been the case) is allowed to come into contact with the surface of the eye of the stone or a lining thereunto attached, it (the grain) has been carried around by the runner and thus caused to hang in the eye, instead of passing at once between the surfaces of the stones. The feeding tube is regulated as to the position of elevation or depression of its mouth so that the feeding cup will deliver the quantity practically ascertained to be the average amount of feed required by the stones. When the mill is in operation, it is obvious there will be a centrifugal force exerted by the cup that will increase or diminish the delivery to that quantity which the motion and speed of mill requires.

The second part of my invention I effect by inserting a cylinder to which the balance rive is permanently attached or cast and extending it down a suitable distance into the eye of the runner stone which cylinder and balance rive may be permanently attached to or cast with or without an iron back and hoop for the runner stone. Into this cylinder the pneumatic chamber projects and is fitted thereto by means of leather or other suitable packing, so that it can be made as near air tight as is necessary. The upper part of this cylinder is firmly attached to the runner by plaster of Paris or other suitable cement or device. The lower portion however is made to form in connection with the stone a recess into which a stationary tube or cylinder on the bedstone projects and remains without contact when the runner is in motion. This lower portion of the cylinder attached to the runner, extends down about one inch below the stationary cylinder which projects up within the eye of the stone about two inches above the balance rive, and sufficiently high so that no grain thrown out of the feed cup can go over the top of the standing cylinder or tube, and thereby enables me to avoid difficulties and defects hitherto insuperable. To running a mill stone at high speed, or in grinding middlings, these difficulties being caused by the balance-rive and driver being inserted cross-wise in notches made in the face and down into the eye of the stone to a depth only sufficient to bury the balance rive beneath the level of the face of the stone. The old-

fashioned attachment of the balance rive being thus made at the bottom of the eye of the runner it was of course exactly in the way of the feed as it sought to pass out between the grinding surfaces of the stones. 5 It also served as a resting point for the grain, the grain falling thereon near the place of attachment between the runner and the rive, and this being nearly on a level with the feed on the bed-stone, it (the balance rive) also increased the amount that 10 hung in the eye of the runner as it rapidly revolved. In my improvement the grain not being allowed, on account of the action of the cylindrical projection of the shield, to 15 touch the runner or the cylinder inserted into the eye of the same, the grain, under the law of gravity either drops at once to the bed-stone, or when it falls on the balance-rive, it does so immediately beneath the space 20 between the shield, cylinder, and feed-cup, and is swept off by the centrifugal action before it can be carried out to the point where the balance-rive and runner cylinder meet. 25 Moreover this point where they meet being so elevated above the level of the face of the bed-stone, the rive cannot touch the feed traveling thereon and more than this the feed finds the grinding surfaces of the stones unbroken and equidistant from the axis all 30 around, every inch of area of the stones being brought into action and turned to good and useful account.

The third part of my invention I effect by 35 simply attaching by suitable feet or rests to the bed-stone within the sweep of the eye of the runner, a stationary tube or cylinder which being somewhat less in diameter than the eye of the runner and somewhat larger 40 in diameter than the cylinder inserted into the eye of the runner to which the balance rive as attached allows them both, the latter within and the former around it, to revolve and thereby makes itself a circular parti- 45 tion shutting out the vertical wall of the eye of the runner from any contact with the grain as it is fed to the guiding surfaces of the stones. It will be readily perceived that the stationary cylinder is not subjected 50 to any revolving motion and that it is consequently not calculated to retain on its vertical walls any grain coming in contact therewith; but rather annihilates any such tendency and restores anything under such 55 tendency, owing to the centrifugal force pervading and driving it, to instant subjection to the law of gravity, by which means the grain falls at once to the bedstone and by the force of the blast of air, which is 60 suitably deflected by the conical portion of the shield, to effect the purpose, is rapidly carried between the grinding surfaces of the stones and made into flower.

The fourth part of my invention I effect 65 by dressing the stones, only to the extent of

one half the radius, more or less, between the sweep of the eye of the runner and the periphery of the stones, leaving an annular space constituting the rest of the face of the stone all land. The furrows may be 70 tangential to a circle of equal diameter with the eye of the runner and diverge in straight or curved lines or be cut to any other design. Furrows near the periphery are put into mill-stones for the purpose of only or in 75 a great measure to securing a more rapid delivery of the grain when floured. Near the eye they give greater facility for the breaking of the grain. This effected, the unbroken surface of the rest of the area of 80 the stones is equal to flouring the crushed grain and the blast is best adapted to delivering the same in the manner before described as fast as the flour is made. In practice I have actually found that furrows 85 should not be carried beyond the point at which the grain is thoroughly crushed. Beyond that point the furrows only clog up and retain the meal, thereby killing the meal and gumming the stones, so that the meal 90 and machinery are both detrimentally affected by the extension of the furrow to the periphery of the stones. In the runner gravity corrects in a measure the evil tendency. In the bed-stone, however, the same 95 law increases the defects spoken of. My plan of leaving an annular area from the periphery of the stones inward to the extent stated obviates all difficulties and beneficially promotes the process of flouring grain, 100 especially when combined with a blast of hot or cold air.

Having tested my improvement by actual trial under the ordinary routine of a flour- 105 ing mill I have found them equal to any expectation I entertained with regard to grain and have more especially been gratified with their ability to grind middlings and such stuff as is only suitable for feeding 110 horses or cattle. Hitherto this has not been profitably attained. I have however succeeded and I on this account attach the greater importance to the improvements in- 115 vented by me and set forth in this specification.

In the drawing hereunto annexed and making part of this specification, (a) is the air-tube, (b) the valve therein for adjusting the air-blast, (c) the air-chamber, (d) the feed-pipe, (e) a guide to keep the feed pipe 120 centrally arranged with regard to the air chamber and feed cup, (f) the lever, (g) the screw and (h) the standards ordinarily used for adjusting the feed, (i) the conical shield fixed on the feeding tube and (j) 125 the cylindrical projection attached to the conical portion, (k) the leather packing, (l) the cross-bar resting on the casting (m) and supporting the air-chamber (c) by a flange (c'), (n) the cylinder inserted into 130

the eye of the runner and cast plain as in Fig. 2 with or without the back-plate (*q*) and hoop (*r*) or with vertical flanges (*x*) and an annular flange (*y*) and without the back plate and hoop, (*v*) the plaster of Paris or other kind of cement for connecting the stone to the cylinder &c., (*w*) the recess left between the lower portion of the cylinder (*n*) and the stone, the recess being roofed by the flange (*y*) in Fig. 5 and by the cement alone in Fig. 2, (*o*) the balance rive, (*p*) the feed cup, (*s*) the runner stone, (*t*) the furrows, (*u*) the land, (*z*) the spindle, (A) the bed-stone, (B) the floor of the chamber in the casing where the meal is received previous to its delivery at the spout (D), (C) a flange on (B) for retaining the casing (*m*) in position (E) the stationary cylinder attached to the bedstone by feet (F), (G) the driver.

Having thus fully described and represented the nature and operation of my improvements in flouring mills what I claim therein as new and desire to secure by Letters Patent is—

1. Surrounding the feeding tube and cut with a shield constructed and attached as described or in any analogous manner and for the purpose described, viz, preventing the blast of air from disturbing the regularity of the feed and deflecting and directing the same vertically downward so as to cause it to force the grain between the grinding surfaces of the stones.

2. Inserting and extending down into the eye of the runner a cylinder to which the balance rim is permanently attached or cast (whether made with or without a metallic back and hoop for the stone) attached at its upper portion to the stone, forming with the eye of the runner stone at its lower portion a recess into which the stationary cylinder of the bed-stone projects, and furnishing an attachment for the balance-rive, elevated above the center or face of the runner, the whole being arranged as described or in any analogous manner and for the purpose described, viz, preventing any grain jumping over the top of the stationary cylinder that stands on the bedstone and hanging against or choking the eye of the runner

stone directing the air-blast vertically downward in connection with the cylindrical projection of the shield and most important of all affording an attachment for the balance-rive above the level of the grinding surface of the runner, thus leaving the same undiminished and unbroken and avoiding the usual interference of the balance-rive and driven with the feed or its tendency to hanging in the eye of the runner stone if the stationary cylinder on the bed-stone is rotated.

3. Attaching to the bedstone a cylinder resting on slidable feet and within the sweep of the eye of the runner the cylinder or circular partition being of such diameter and elevation as fit it to project up into the recess formed by the eye of the runner stone and the cylinder which is inserted and attached therein and to allow the same to revolve around and within it, the whole being arranged as described or in any analogous way and for the purpose described, viz, preventing the grain coming into contact with the eye of the same, the grain not having the same tendency to hang on the vertical wall of a stationary cylinder, and also continuing the vertical and downward direction given to the blast until it escapes between the stones.

4. In combination with the closed air chamber for passing the blast between the stones, dressing the inner and leaving without dress the outer portion of the area or face of the stones; say from the circle described by the eye of the runner, dressing one half the radial distance more or less, thence out, and leaving the balance all land.

5. The combination of the shield (*i i*) the cylinder (*n*) and the cylinder (E) arranged and constructed as described, or in any analogous way and for the purpose described.

LEWIS FAGIN.

Teste:

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