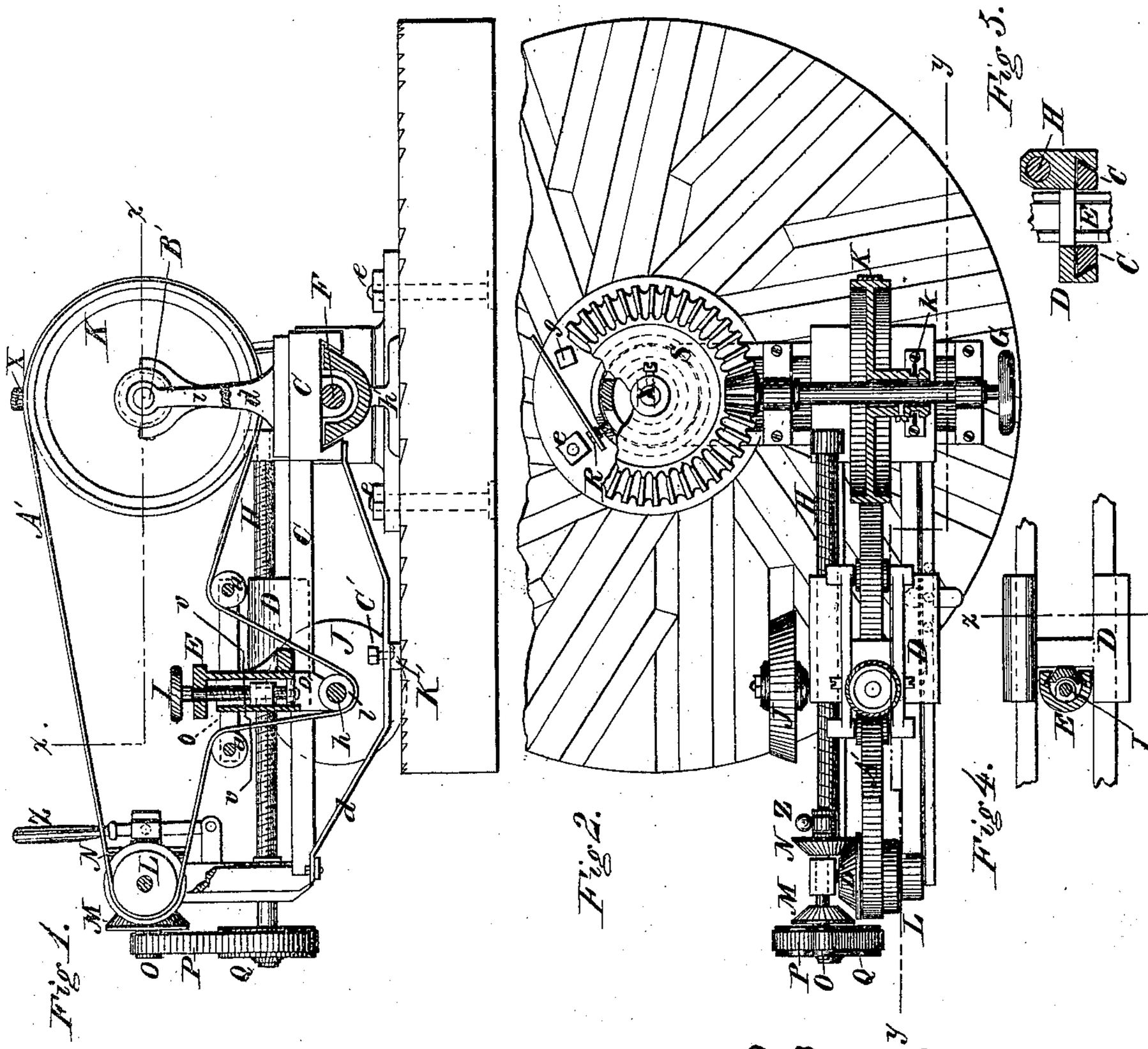
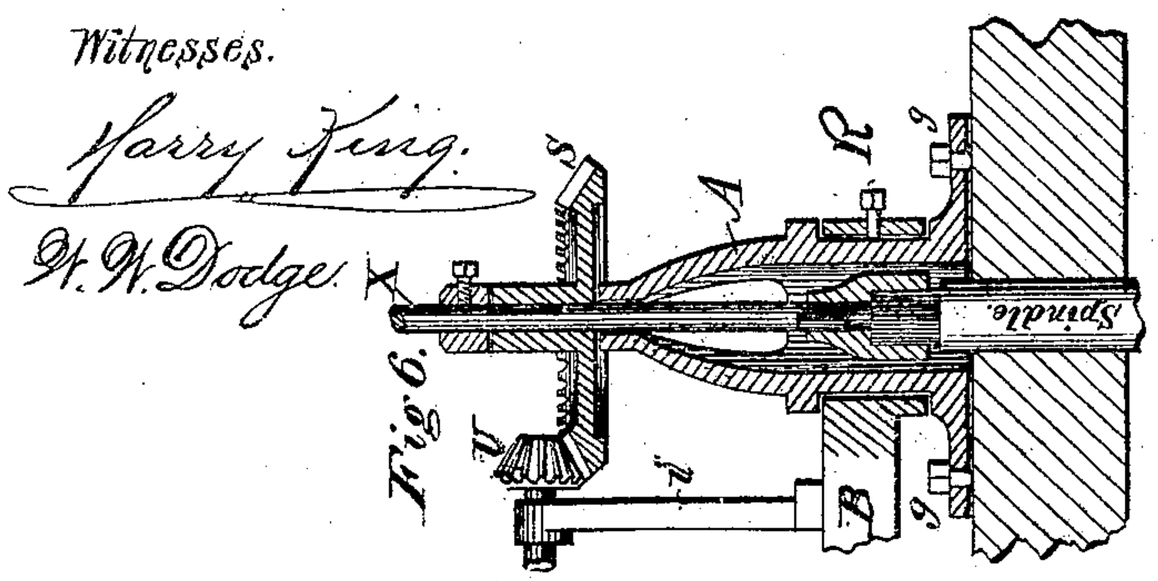
2 Sheets--Sheet 1.

F. A. HOYT.

Machines for Dressing Mill-Stones.

No. 136,517. Patented March 4, 1873.





2 Sheets--Sheet 2.

F. A. HOYT.

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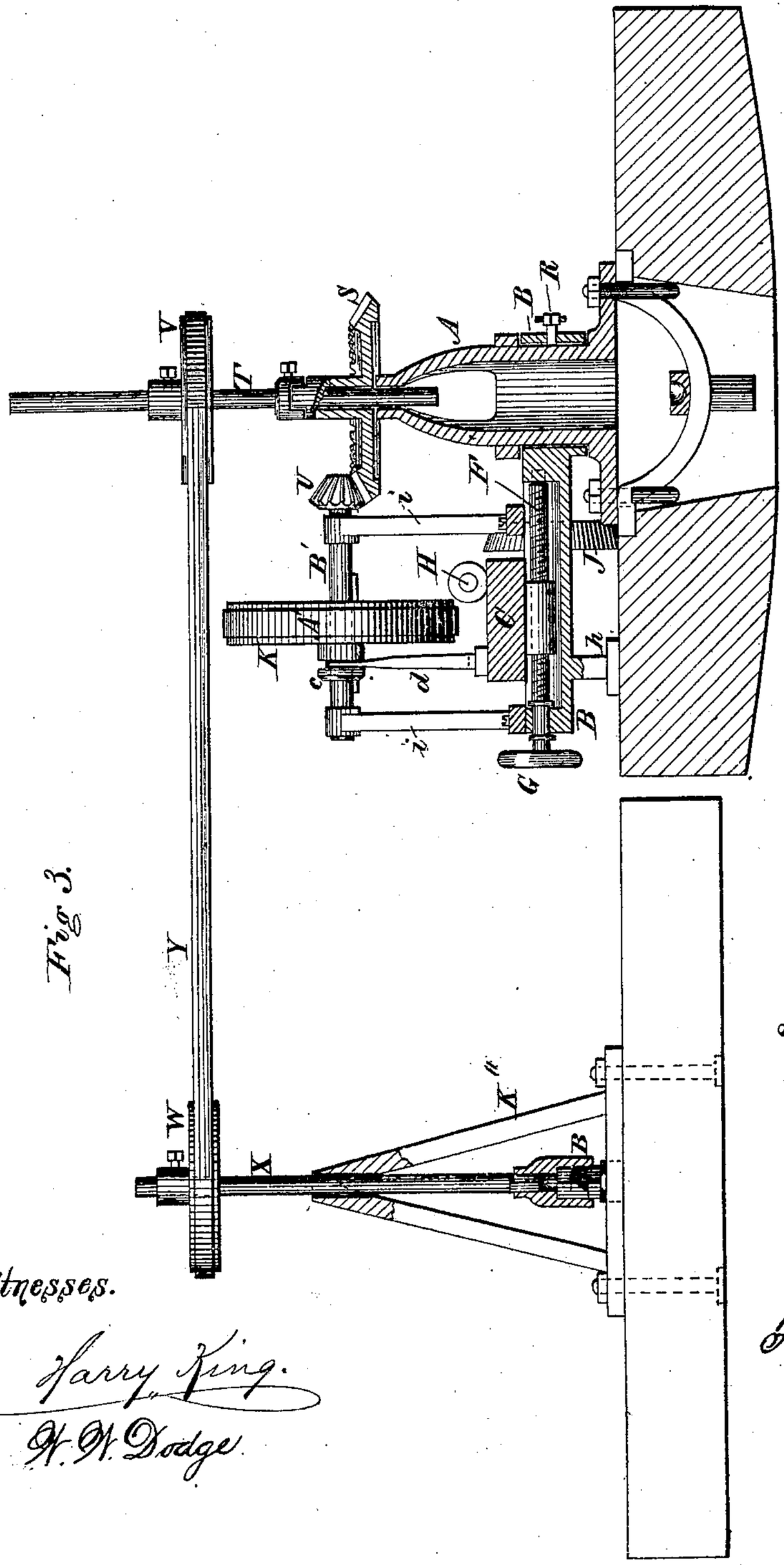

Fig 3.

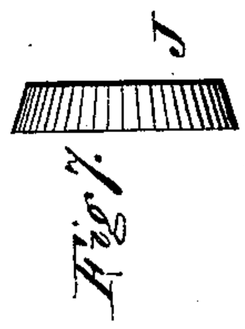

Fig 7.

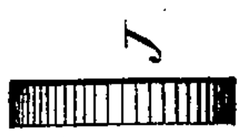

Fig 8.

Witnesses.

Harry King.

H. W. Dodge

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By Dodge & Son,

Attys

UNITED STATES PATENT OFFICE.

FRANCIS A. HOYT, OF LA CROSSE, WISCONSIN, ASSIGNOR OF TWO-THIRDS OF HIS RIGHT TO GEORGE A. LITTLE AND DEAN, SMITH & CO., OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR DRESSING MILLSTONES.

Specification forming part of Letters Patent No. **136,517**, dated March 4, 1873.

To all whom it may concern:

Be it known that I, FRANCIS AZOR HOYT, of La Crosse, in the county of La Crosse and State of Wisconsin, have invented certain Improvements in Method and Machine for Dressing Millstones, of which the following is a specification:

My invention relates to an improved method of and apparatus for dressing and furrowing millstones; and it consists in the employment of a solid emery-wheel revolving at a high speed to dress and furrow the stones, and in a novel machine for driving and manipulating the cutter-wheel, as hereinafter explained. The object of my invention is to produce a machine by which the millstones may have their furrows sharpened and the glazing removed from the face expeditiously and in such manner as to leave smooth clean faces and sharp feather-edges to the furrows.

It is a fact well known to all familiar with milling that the furrows in the grinding-stones have their edges worn rapidly away, so that they require to be frequently sharpened; and, also, that the oil contained in the wheat forms a smooth hard glazing on the stones, which interferes with their proper operation and must be frequently removed. In dressing the furrows it is very desirable that their inclined sides shall be as smooth as possible, and that the opposite sides shall have sharp true edges, and also that the flat or level faces shall be as smooth and true as possible.

Various machines have, I am aware, been devised for the purposes of sharpening the furrows and removing the glazing, but up to the present time they have all failed to accomplish the purposes satisfactorily. Among other plans that have been tried are those of using metal picks, revolving metal cutters, and revolving cutters armed with diamond or carbon points. By neither of these plans can the stones be prepared in such manner as to make the best quality of flour at once, for after the stones are prepared their surfaces are so rough and irregular that it is necessary to run from four to eight hundred bushels of grain through them before they will produce the finest quality of flour.

Another very great objection to the diamond cutters, which are the ones most in favor, is that they cannot be used to dress down the entire surface, but merely to "crack" it, as it is technically called. This cracking consists in breaking fine lines through the surface, so that when the two stones are set to running again the dust or particles loosened by the cracking will take hold and remove the glaze from that portion of the surface between the lines. At the same time, however, that the dust and loose particles accomplish this purpose they wear away the sharp edges of the furrows, and thus, in a measure, defeat the very end to be attained.

After many experiments I have ascertained that the true way to dress and sharpen the stones is not by means of cutters acting percussively thereon, as heretofore, but by means of a smooth grinding-wheel, acting thereon steadily and continuously with an abrasive action, and that the only cutter which will answer the purpose is a solid wheel or disk of emery revolving at a very high velocity. The employment, therefore, of a rapidly-revolving emery-wheel for this purpose forms the main feature of my invention.

In practice I have found that the best results are attained by the use of a wheel about eight inches in diameter, driven at a speed of about twenty-eight hundred revolutions per minute. A wheel thus driven, and applied with a moderate pressure, will cut through the glazing and into the body of the stone quite easily and with considerable rapidity, and will leave the surface perfectly even and as smooth as the texture of the stone will admit of. When the faces of the stones are to be dressed or freed from glaze I use an emery-wheel having a flat edge or face; but when the furrows are to be dressed or sharpened, I employ a wheel having an edge of the exact size and form as the furrows, and then feed it while revolving back and forth therein. By means of the emery-wheel I am enabled not only to remove the glazing and sharpen the furrows with great rapidity, but to leave a surface which permits the stones to be used at once for making the finest quality of flour.

Thus, it will be seen, I not only save the expense and labor in preparing the stones, but also obviate the necessity of running the coarse grain through, and save the time required

therefor. As the earnings of a run of medium-sized stone are estimated at one dollar an hour, the value of the time saved by my method of dressing is at once apparent.

In order to operate my cutter I have devised the machine shown in the drawing; but it is obvious that the cutter may be driven and controlled by any suitable mechanism.

Figure 1 is a side elevation of my machine in position to dress the lower or bed stone. Fig. 2 is a plan view of the same. Fig. 3 is vertical section of the machine in position to dress the stone, showing the manner in which it is driven from the mill-spindle. Fig. 4 is a section on the line *v v* of Fig. 1. Fig. 5 is a section on the line *z z*, Fig. 4. Fig. 6 is a vertical section, showing the manner in which the machine is driven from the mill-spindle when operating upon the lower or bed stone. Figs. 7 and 8 are views of two different forms of the emery cutting-wheel, one for dressing the face of the stone and the other for sharpening the furrows.

In proceeding to construct my machine, I first provide an upright hollow post or arbor, A, having a broad base, provided with holes to receive bolts for fastening it to the center of the millstone. This post forms the main support of the machine and a center around which the machine is swung in order that it may operate on the different portions of the stone. In order to provide for elevating the post when necessary, and for bringing it to a true vertical position, I provide its base with set-screws *g*, which bear on the face of the stone, as shown. On the post A I mount one end of a horizontal arm or way, B, which extends out radially, and has its outer end supported by a foot, *h*, which bears on the face of the stone, as shown in Figs. 1 and 3. The arm B is free to swing around the post A over the entire face of the stone, and is provided at its inner end with a set-screw, R, by which it may be locked rigidly to the post in any required position. On the arm B I mount one end of a long way or guide, C, which extends outward at a right angle to the arm over the edge of the stone, as shown in Figs. 1 and 2. In the arm B, which is made hollow, I mount a longitudinal screw-rod, F, which passes through a nut on the way or guide C, and has a hand-wheel, G, applied to its outer end, as shown in Figs. 1 and 3, so that by turning the hand-wheel the end of way C may be moved inward and outward on arm B. On way or guide C I mount a sliding frame or carriage, D, having in its lower end a transverse shaft, *h*, on the end of which the emery cutting-wheel J is secured, as shown in Figs. 1 and 2. Along the side of the way C I mount a screw-shaft, H, which passes through a nut on the carriage D in order to move the latter back and forth on the way C, so as to carry the cutting-wheel to and from the edge of the stone. On the arm B I secure two standards, *i*, and mount therein a horizontal shaft, B′, provided with a sliding pulley, K, and also with a bevel-pinion, U, which gears into a pinion, S, mounted on the upper end of the center post A, as shown in Figs. 2, 3, and 6. The pulley K is prevented from turning on its shaft by a spline thereon; and it is provided on one side with a grooved hub, into which there fits an arm, *d*, secured to the way or guide C. When the way C is moved sidewise on the arm B the arm *d* moves the pulley to correspond, and thereby keeps it always in line with the other pulleys on the way C, as hereinafter explained. On the shaft *h* of the cutter-wheel J I secure a pulley, *l*, and in the upper corners of the movable frame D, which supports the shaft, I mount two pulleys, *a*, as shown in Fig. 1. I then mount a pulley, L, on the outer end of the way C, and pass a driving-belt, A′, around the pulleys K and L, over the pulleys *a*, and under the pulleys *l* on the shaft of the cutter-wheel, as shown in Fig. 1, so that when the belt is set in motion it drives the cutter-wheel J and the pulley L. The peculiar arrangement of the belt and the pulleys *a* permits the carriage D to move back and forth on the way without affecting materially the tension of the belt or its action on the cutting-wheel. The screw H, which moves the carriage or frame D and the cutter-wheel, is provided on its outer end with a pulley, Q, which is driven by a belt, P, from a pulley, O, just above, as shown in Figs. 1 and 2. The shaft which carries pulley O is provided with two bevel-pinions, M and N, and is connected by a swivel with an upright hand-lever, Z, by moving which the shaft can be adjusted endwise. On the side of pulley L there is attached a pinion, D′, which gears with one or the other of the pinions M N, according to the direction in which the hand-lever is moved. When the lever is moved in one direction the pinion M is thrown in gear and the screw H set in motion so as to feed the frame D and its cutting-wheel in one direction, while if the lever is moved in the opposite direction the pinion N is thrown in gear and the lateral movement of the frame and cutter reversed. Thus it will be seen that by simply moving the lever Z to and fro the cutter is caused to travel back and forth, to and from the edge of the stone, while, at the same time, it is revolved at a high speed. The shaft of the cutter-wheel J is not mounted rigidly in the frame D, but in a vertical slide, *o*, which is attached to the frame and held by a hand-screw, I, as shown in Fig. 1, so that by adjusting the screw the cutter may be raised and lowered, as may be required. The pulleys *a* are also mounted on the slide *o*, so that they remain in the same relative position to the pulley of the cutter-wheel, notwithstanding its adjustment up and down. The way C, on which the carriage or frame D slides, is provided with a brace, *d*, which is provided with a screw, C′, bearing on a block or shoe, K′, as shown in Fig. 1. This brace and shoe form the support for the outer end of the way or guide C. The way is ordinarily arranged parallel with the face of the stone; but by turning down the screw C′ its outer end may

be raised, so that, as the cutter-wheel moves outward toward the edge of the stone, it will be gradually raised. In this way the furrows may be made of decreasing depth toward the edges of the stone, as is sometimes desirable.

In employing the machine on the lower or bed stone I place the central post A over the mill-spindle and bolt it down firmly in place, as shown in Figs. 2 and 6. I then pass a shaft, X, down through the post A and pinion S, and connect it to the mill-spindle and to the pinion by suitable couplings, as shown. When the spindle is set in motion it drives the shaft, which, in turn, drives the pinion S and sets the machine in operation.

When the machine is to be used on the upper or runner stone the stone is removed and placed face up by the side of the bed-stone in the usual manner, as shown in Fig. 3. The center post is then bolted down in place on the stone and the pinion S provided with a shaft, T, carrying a pulley, V. The shaft X is then coupled to the mill-spindle and provided with a pulley, W, and, lastly, the pulleys V and W connected by a belt, Y. By this arrangement motion is communicated from the mill-spindle to the machine on the upper stone, located at one side.

When the machine is in motion the cutter-wheel is carried along the side of the way C automatically. By adjusting the screw I the cutter may be raised and lowered as desired; and by swinging the arm B and adjusting the screw the cutter may be caused to travel over every portion of the surface, and in any direction desired.

Having thus described my invention, what I claim is—

1. The herein-described method of dressing and furrowing millstones—that is to say, by means of a rapidly-revolving wheel of emery.

2. The central tubular post provided with the pinion S, in combination with the frame of the machine pivoted thereon, and provided with the pinion U and screw R or its equivalent, as shown and described, whereby the machine may be driven by the mill-spindle.

3. The adjustable shoe K′ or its equivalent, arranged to support the outer end of way C, whereby the way may be inclined and the cutter caused to rise as it approaches the edge of the stone, as and for the purpose set forth.

4. The support K″ or its equivalent, provided with a shaft arranged to be connected to the mill-spindle, whereby the machine, when placed on the upper stone, may be operated directly from the mill-spindle, as set forth.

FRANCIS AZOR HOYT.

Witnesses:
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W. C. DODGE.