(No Model.) 2 Sheets—Sheet 1.

J. L. MORRISON & A. D. ROWE.

MACHINE FOR GRINDING ROTARY DISK CUTTERS.

No. 398,741. Patented Feb. 26, 1889.

Fig. 1.

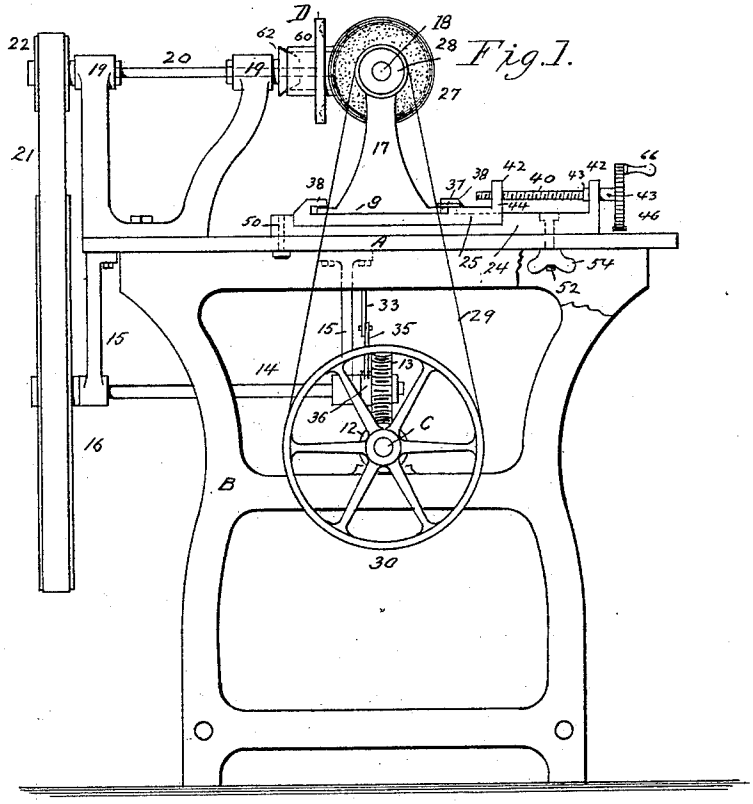
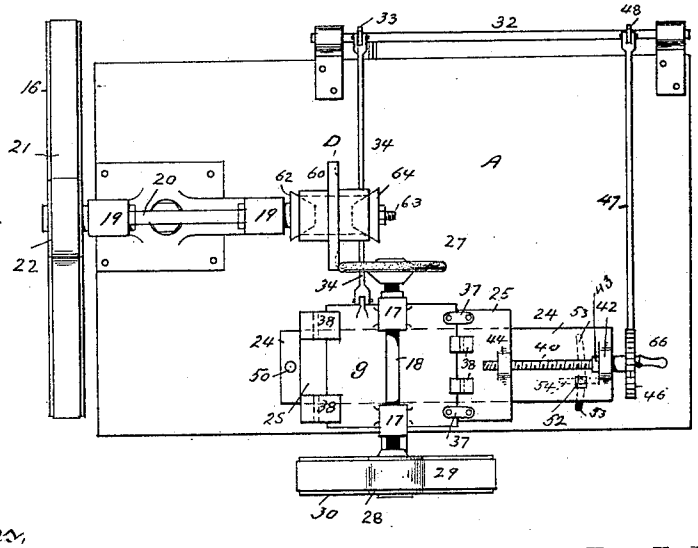


Fig. 2.



Witnesses,

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

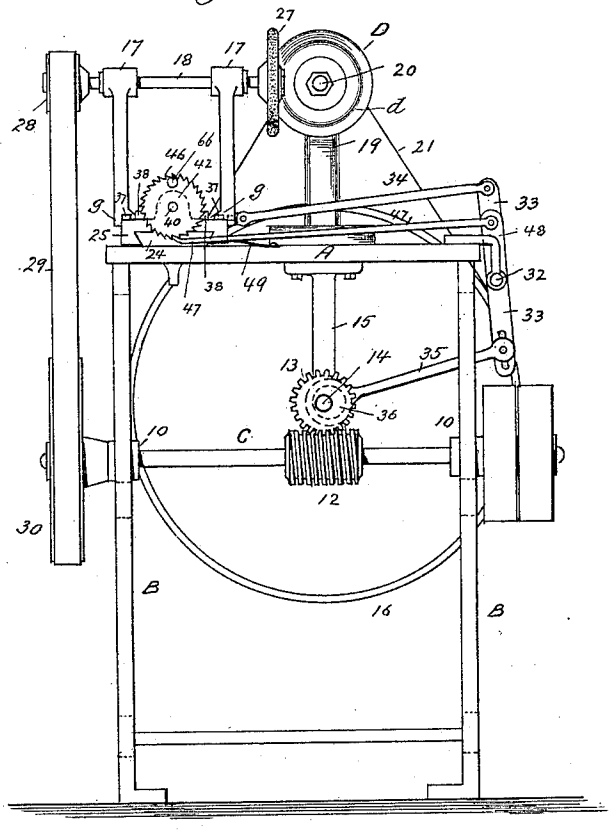


Fig. 4.

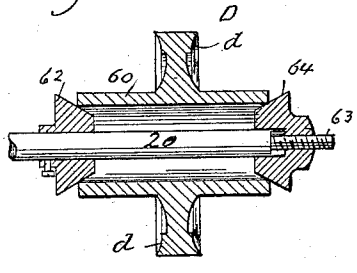
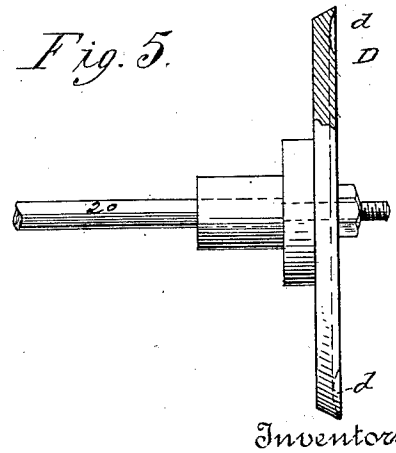


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN L. MORRISON AND AMOS D. ROWE, OF HOLYOKE, MASSACHUSETTS.

MACHINE FOR GRINDING ROTARY DISK CUTTERS.

SPECIFICATION forming part of Letters Patent No. 398,741, dated February 26, 1889.

Application filed September 13, 1888. Serial No. 285,314. (No model.)

To all whom it may concern:

Be it known that we, JOHN L. MORRISON and AMOS D. ROWE, citizens of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Machines for Grinding Rotary Disk Cutters, of which the following is a specification.

This invention relates to machines for grinding and rabbeting with a shallow channel the side of a disk-shaped rotary cutter at and within its edge for sharpening the same, said cutters in use being arranged in pairs, with their faces slightly overlapping for a shearing action, and as commonly employed—and known as "web-slitters"—in paper-machines; and the invention consists in the construction and combination of parts whereby cutters of the class named may be mounted and rotated, and whereby the rotary grinding-wheel may be properly presented for the desired action against the face of the cutter, and all substantially as will hereinafter more fully appear, and be set forth in the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation of the machine. Fig. 2 is a plan view thereof, and Fig. 3 is an end elevation of the same. Fig. 4 is a view in detail illustrating in section one form of cutter of the class described and the means for securing its true mounting and centering on the holder-shaft; and Fig. 5 is a side elevation, partly in section, of a cutter of different form from the one shown in Fig. 4, its cutting-edge, however, being the same.

In the drawings, A represents the supporting-table of the machine affixed to and supported upon the frame B, and C represents the driving-shaft extending from front to rear of the machine, being supported in bearings 10 of the frame.

On an intermediate portion of the driving-shaft is fixed a worm-screw, 12, with which engages a worm-wheel, 13, which is supported on a counter-shaft, 14, mounted in brackets 15, and extending at right angles to the driving-shaft, and on the outer end of which is fixed a pulley, 16, and mounted in bearings 19, supported above the table, is another shaft, 20, receiving rotation by the belt 21, passing between and around its pulley 22 and the said pulley 16. The disk-shaped cutter D is to be centered and held on the said shaft 20 for rotation therewith.

On the table, near the front thereof, secured in any suitable manner, but preferably adjustable thereon, is a longitudinal slide-plate, 24, on which is a sliding carriage, 25, and on the said carriage 25 is a carriage, *g*, arranged for a transverse movement thereon. In the bearings 17 of the latter carriage *g* is a shaft, 18, in or about in the same horizontal plane as the cutter-holder shaft 20, on the inner end of which is affixed the grinding-wheel 27, a pulley, 28, being provided on its outer end, and through the belt-connection 29 between said pulley 28 and the pulley 30 on the driving-shaft said grinding-wheel is speeded.

At the rear side of the machine-frame, on a horizontal rocker-rod, 32, is fixed intermediately of its length a tilting lever, 33, a connecting-rod, 34, being hung by one end to the upper end of the said tilting lever, and by its other end connected to the rear edge of the grinder-supporting carriage, and to the lower end of the tilting lever is connected one end of a connecting-rod, 35, which by its other end embraces an eccentric, 36, on the counter-shaft.

The grinder-carriage *g* is by its one side, which is at right angles to that at which the connecting-rod 34 is attached, connected by links 37 to the longitudinally-sliding carriage 25, whereby the transverse movement imparted to the said carriage and to the grinder-wheel by the connections from the eccentric described is a curvilinear reciprocating motion and one corresponding to the transverse contour of the channel *d* in the face of the grinder-disk. Lugs 38 on the carriage 25, overlying the top of the grinding-carriage *g*, constrain the movements of the latter in a horizontal plane, a suitable space being allowed between the edges of the grinder-carriage and the inner walls of the lugs to permit free play of the grinder-carriage in its curvilinear reciprocating traverse.

An unthreaded portion of a screw-shaft, 40, has a bearing for rotation in a lug, 42, of the longitudinal slideway or plate 24, being held

against lengthwise movement therein by the collars or shoulders 43 43, and the screw-threaded portion of said shaft 40 engages a tapped lug, 44, on the longitudinally-sliding carriage 25, and a ratchet-wheel, 46, is fixed on the outer end of said screw-shaft 40, with which a pallet-rod, 47, engages, said pallet-rod being by its outer end pivotally hung on a radial arm, 48, fixed to and moving with the rocker-rod 32, a spring, 49, suitably applied, serving to maintain the end of the pallet-rod in engagement with the ratchet-wheel.

With the cutter-disk D mounted on the holder-shaft 20, and the carriages adjusted so as to have the edge of the grinding-wheel presented against the face of the cutter-disk near its edge, as seen in Figs. 2 and 3, under the driving of the parts described from the main shaft, the edge of the rotating grinder-wheel is made to traverse in a curvilinear course across the face of the cutter-disk to form the curved channel required, and through the rotation of the screw-shaft from the connections described or otherwise the carriage 25 is moved longitudinally, so as to advance the grinder-wheel for a constant presentation, as the face of the grinder is rabbeted.

In order to adapt the present machine for use for grinding disk cutters in which the transverse curve of the annular channel may be of somewhat varying contour, the slide-plate 24, on which all the grinder-carrying parts are supported, may be made adjustable, whereby the direction of its length may be varied, and to this end the said slide-plate is by one end pivoted by pin 50 to the table A, it carrying at its other end portion a stud, 52, downwardly extending through an arc-shaped slot, 53, in the table, receiving at its screw-threaded end below the table a thumb set-nut, 54.

Many of the disk cutters are formed, as shown in Fig. 4, with a hollow hub, 60, extending from each face thereof, and in the said Fig. 4, as also in the preceding figures, devices for mounting and centering this form of cutter are shown, and consist in providing at a suitable distance from the end of the holder-shaft 20 a fixed conical collar or shoulder, 62, and at its outer end a screw-threaded portion, 63, on which a removable collar or shoulder, 64, similar to the one 62, may be fixed and adjusted. The one open end of the hub 60 is forced on and over the end of the inner conical shoulder, the outer shoulder-collar being of course removed, after which said collar is screwed on the end of the shaft and by its tapering face brought to a bearing within and against the opposing open end of the said hub 60, bringing the cutter-disk true and concentric on the holder-shaft. Other devices may of course be employed for centering the cutter-disks on the holder-shaft than those shown.

After the cutter-disk has been sufficiently and automatically ground by the mechanism, and in the manner substantially as described, by disengaging the pallet-rod from the ratchet-wheel and through the crank-handle 66 thereof turning the said ratchet-wheel in the opposite direction from that imparted thereto, as before described, through said screw-rod engagement, the carriages may be withdrawn into what would be their required position at the beginning of the operation to grind another cutter. Again, if desired, instead of feeding the carriages forward in a direction against the face of the cutter to be ground automatically, as described, the carriage may be forced in said direction directly by an operative, the screw-feed connection being omitted; or, again, by turning the feed-screw through the crank-handle, the carriages may be properly moved.

What we claim as our invention is—

1. In a machine for grinding rotary cutter-disks, substantially as described, the combination, with a rotary holder-shaft on which to center the disk, of a carriage having mounted thereon a rotary grinding-wheel adjusted for a bearing by its edge against the face of said cutter-disk, and said carriage and grinding-wheel having a reciprocating traverse oblique to the plane of the disk-face, substantially as described.

2. In a machine for grinding rotary cutter-disks, substantially as described, the combination, with a rotary holder-shaft on which to center the disk, of a carriage having mounted thereon a rotary grinding-wheel adjusted for a bearing by its edge against the face of said cutter-disk, and said carriage and grinding-wheel having a reciprocating traverse oblique to the plane of the disk-face, and also mounted for a slide in the direction of the axis of said holder-shaft, substantially as described.

3. The combination, with the rotary holder-shaft on which to center a cutter-disk, of a longitudinally-sliding carriage, 25, having thereon the traverse grinding-carriage *g*, linked at one end to the said carriage 25, and carrying the rotary grinding-wheel, a tilting lever, 33, and a connecting-rod between said lever and said grinding-carriage, substantially as and for the purpose described.

4. The combination, with the rotary holder-shaft on which to center a cutter-disk, of a longitudinal slideway, 24, a carriage, 25, adapted to slide on said way, the grinding-carriage mounted for a transverse slide on said carriage 25, and by one end linked thereto, a tilting lever, 33, and a connecting-rod between said lever and said grinding-carriage, and a screw-shaft having a screw engagement with said carriage 25, and a fixed bearing for free rotation on the slideway 24, and provided with a crank-handle, substantially as described.

5. The combination, with the rotary holder-shaft on which to center a cutter-disk, of a longitudinal slideway, 24, a carriage, 25,

adapted to slide on said way, a screw-shaft, 40, having a screw engagement with said carriage 25, and a fixed bearing for free rotation on the slideway 24, and provided with a ratchet-wheel, the grinding-carriage mounted for a transverse slide on the carriage 25, and by one end linked thereto, a rocker-shaft, 32, having thereon the swinging levers 33 and 48, the connecting-rod 34 between the lever 33 and the grinding-carriage, and the pallet-rod 47, connected by one end to the said lever 48 and engaging by its other end the said ratchet-wheel, substantially as and for the purpose described.

6. The combination, with the carriage 25 and the grinding-carriage constrained for a curvilinear traverse thereon, substantially as described, of the eccentric 36 and rocker-shaft 32, the lever 33, intermediately fixed on said rocker-shaft, the connecting-rod 34, connected to the said grinding-carriage and to the upper end of said lever 33, and the connecting-rod 35, by one end engaging said eccentric and by its other connected to the lower end of said lever 33, all substantially as and for the purpose described.

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