No. 682,810. Patented Sept. 17, 1901.

L. F. PARKS.

GAINING CUTTER HEAD.

(Application filed Jan. 26, 1899.)

(No Model.)

Fig. 1

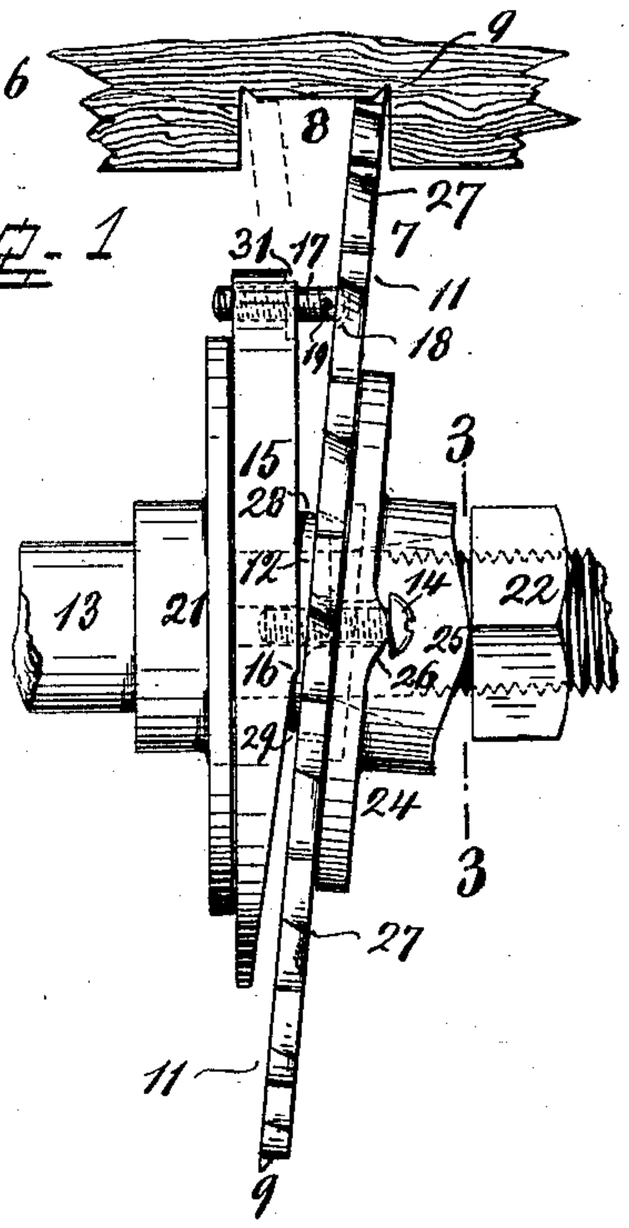

Fig. 2

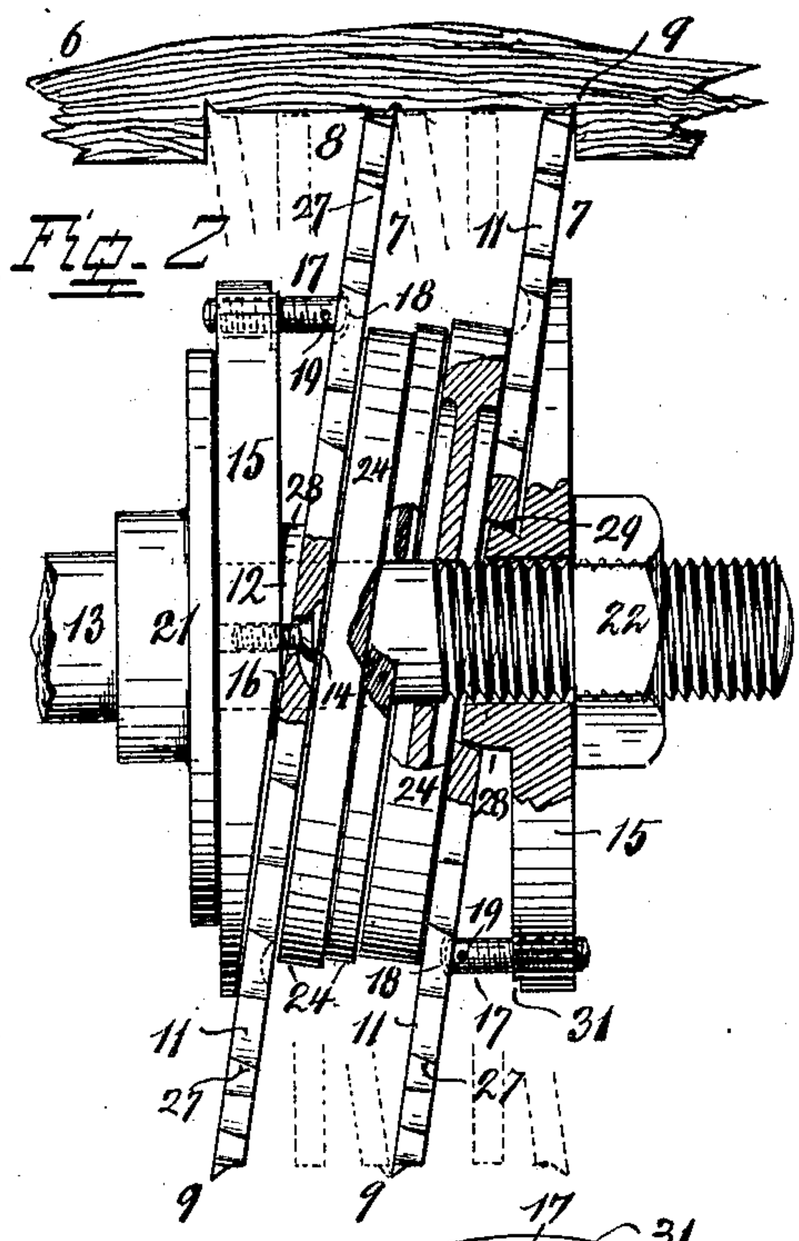

Fig. 3

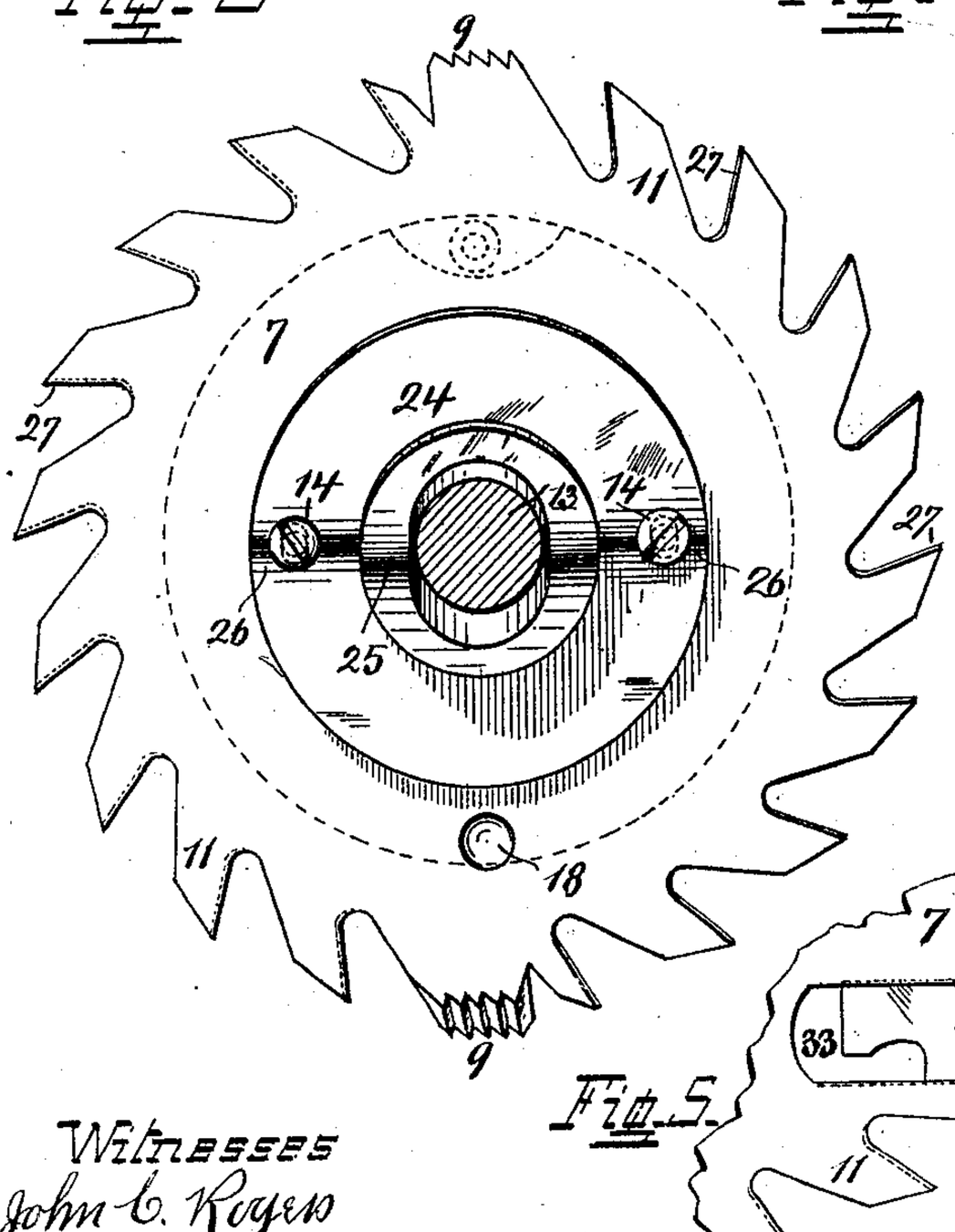

Fig. 4

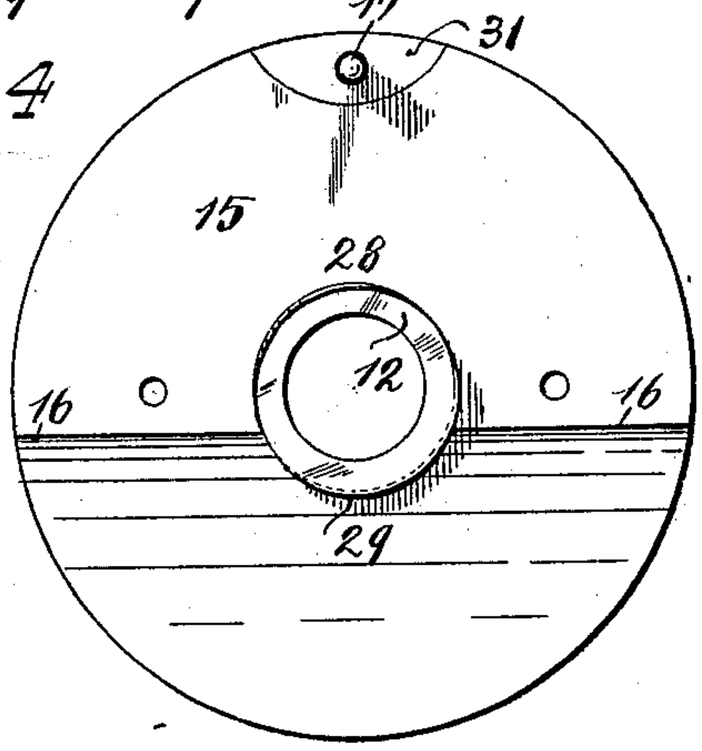

Fig. 6.

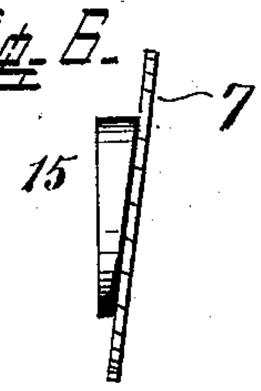

Fig. 5.

Witnesses
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UNITED STATES PATENT OFFICE.

LEWIS F. PARKS, OF CINCINNATI, OHIO.

GAINING CUTTER-HEAD.

SPECIFICATION forming part of Letters Patent No. 682,810, dated September 17, 1901.

Application filed January 26, 1899. Serial No. 703,427. (No model.)

To all whom it may concern:

Be it known that I, LEWIS F. PARKS, a citizen of the United States, and a resident of Cincinnati, Hamilton county, State of Ohio, have invented a new and Improved Gaining Cutter-Head; and I do hereby declare the following to be a clear, full, 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, attention being called to the accompanying drawings, with the reference-numerals marked thereon, which form a part of this specification.

The subject of this invention is a gaining cutter-head used in working wood and for doing work called "gaining"—that is, cutting grooves, recesses, rabbets, &c. Such work is now done by specially-constructed cutter-heads, while circular saws have also been used, chiefly for cutting narrow gains or grooves. By setting such saws at an angle to cause them to wabble wider grooves can also be cut by them. The objection to the use of saws is, however, that they tear the wood, particularly at the sides and edges of the grooves, thereby producing rough work.

The object of my invention is therefore to overcome these deficiencies, so that such saws or circular disks provided with cutting-teeth may be used in such connection by doing clean work without tearing the wood. This I do by providing, in addition to the usual saw-teeth, cutting or scoring knives, which act in advance of the former and by cutting the wood ahead of these teeth prevent them from tearing the same.

Other features of my invention relate to the means whereby such toothed cutting-disks are attached to the mandrel in an inclined position, the construction of these means being such as to permit adjustment of the particular angle of such inclination. Finally, it embraces certain details of construction which are referred to at the proper time.

In the following specification, and particularly pointed out in the claims at the end thereof, is found a full description of my invention, together with its operation, parts, and construction, which latter is also illustrated in the accompanying drawings, in which—

Figure 1 shows an edge view of such a cutter-head, consisting of one saw or disk mounted upon a mandrel and engaged in active operation for cutting a groove into a piece of wood. Fig. 2 shows in a similar view a cutter-head engaged in like manner, its cutting capacity as to size being increased, however, by the addition of another disk. Parts in this view are broken away and shown in section. Fig. 3 is a cross-section on line 3 3 of Fig. 1. Fig. 4 shows the means (a flanged hub) used for supporting a cutting-disk. Fig. 5, in a detail view, shows a modified construction of the cutting or scoring knives of the disk. Fig. 6 shows, at reduced scale, a modified construction for mounting a cutter-head in its tilted position on the mandrel.

In doing the kind of work here in view the wood 6 is usually placed above the saws or cutting-disks 7, the depth of the groove 8 to be cut being regulated by the position vertically of the means which support the wood. This means is usually a table vertically adjustable and is not shown. The width of the groove is governed by the extreme lateral position which the edge of the disk is capable of assuming at points of its greatest inclination, and such width may be decreased as the disk is adjusted to approach a vertical position, in which latter it finally cuts a narrow groove only as wide as the thickness of the cutting-blade. To prevent tearing of the wood by the cutting-teeth at the sides and edges of the groove to be cut, I provide cutting or scoring knives 9, being knife-edged points considerably thinner than the disk-blade, from the edges of which they project. They are placed diametrically opposite each other, and while one set is on one edge of the face of the disk and even with one side thereof the other set is located on the opposite edge of the face and even with the other side of the disk. This brings these knife-edges to the outer edges at the outer sides of the disk, meaning thereby those edges and sides which pass nearest and at the sides of the groove. (See Figs. 1 and 2 and dotted lines shown therein.) These knives merely sever the fiber of the wood, while the regular cutting-teeth 11 of the disk remove the wood between these advance cuts or scoring-lines produced by the former. For such purpose these knife-edged points project beyond teeth 11.

The means I provide for securing such a cutting-disk upon its mandrel are of a construction which permits also adjustment to different angles of inclination and consists of a hub 12, which receives the disk and is mounted upon a mandrel 13. This hub is provided with a flange 15, which projects from it and receives screws 14, which pass through the disk, thereby holding the latter in place. A part of this flange, beginning from a line at 16 near the middle thereof and extending across the whole width of it, is removed on a line tapering toward the edge of the flange, so as to provide room and clear that half of the disk which approaches the flange when the former is adjusted to its inclined position. The particular angle of such inclination is determined by an adjusting-screw 17, seated in flange 15, and which bears against the disk, entering a socket 18 at the point of its engagement. This screw holds the disk away from the flange which supports it, while screws 14 hold it against the latter, so that between these opposing actions the disk is securely held in position. Screw 17 may be manipulated in any suitable manner—as, for instance, by a key or crooked piece of wire to be inserted into an opening 19 therein. For adjusting the inclination of the disk the manipulation is by screw 17, screws 14 having been loosened first, after which when the proper angle is found screws 14 are tightened again, thus securing the disk in its adjusted position, in which it is held between three bearing-points, of which one is the end of screw 17 and the other two are located in line at 16, where the tapered part of flange 15 commences. This latter rests against another flange 21, permanently attached to the mandrel and against which the whole cutter-head is held by a nut 22, which engages the threaded end of the mandrel.

As shown in Fig. 1, only one cutting-disk is used; but work of various character may be performed by using two or more disks in combinations on a mandrel of sufficient length. For instance, a number of grooves may be cut at the same time by using a corresponding number of saws or disks with space between them, the proper distance being obtained by interposed washers, or a groove of extended width may be cut by using two disks, as shown in Fig. 2. It may be mentioned here that for cutting wider grooves the use of two or more cutting-disks is preferable to the use of one only tilted to an extreme angle. For such combinations washers 24 of various thicknesses are used to make up and adjust the spaces between the disks. When only one washer is used, as shown in Fig. 1, the washer between the latter and nut 22 requires some provision—as, for instance, a central ridge 25, as shown—to permit nut 22 to properly bear against and engage the washer when set at an angle. The opening in this latter is increased toward nut 22, so as not to interfere with this angular adjustment and permit it to assume an inclined position. The increase of this opening is by elongation in one direction only, which direction is at right angles to the line on which the disk tilts and whereby in placing the parts their proper position is at once indicated, since the washer could not be tilted while in any other position except the right one, (indicated by the elongated opening.) In cases where this particular washer is used—that is, as shown in Fig. 1—screws 14 may also pass through it, similar ridges 26 being provided where the heads of these latter impinge on the washer, thereby preventing interference with the inclined adjustment of the latter. As shown in Fig. 2, where such screw-heads bear directly against the disks, such interference is prevented by countersinking the holes in the latter, through which the screws pass. All washers are recessed on their flat sides between the outer edges thereof to clear hub 12 whenever parts of it project beyond the bore of the disk, and in which case such part reaches into the recess of the washer next to the disk. The edge of hub 12 may also be beveled off, as shown in Fig. 2, to prevent its projection beyond the disks altogether, and which permits the use of two disks in close contact with each other—for instance, in position as shown in Fig. 2—but with the intervening washers all removed. In such cases and as shown in Fig. 2 the use of screws 14 may be altogether dispensed with, since the action of nut 22 is sufficient to hold the parts in place. The proper position of disks 7 is then readily found and is indicated by socket 18, which must be opposite the end of screw 17 to permit the latter to occupy it. This proper position is with the scoring-knives at points of greatest inclination, which puts them at the extreme points reached laterally by the wabbling motion of the disk and is thus defined by the engagement of the end of screw 17 when within socket 18.

The cutting edge of saw-teeth 11 is slightly beveled, so that they bite more readily into the wood and obviate thereby also the tendency to glance off therefrom or pushing the same aside. For such purpose that corner or end of the cutting edge of each tooth which leads in the lateral advance of the saw-disk across the bottom of the groove-cutting (each succeeding tooth moving and cutting in a circular plane and each passing in a plane a little closer toward the other side of the groove) cuts with reference to the direction in which it so progresses laterally a little in advance of the other end or corner of the cutting edge. Fig. 3 and the edge views will show this, the corner in advance being indicated by the numeral 27. In these latter views the teeth now visible in front follow and operate in the wake of the scoring-knives, now shown as in the lowest position, and the leading ends or corners of the cutting edges of these former are all on one and the same side of the disk, as

shown. In those teeth following and working after the scoring-knives, shown now as in the uppermost position, and which are about entering into active operation, cutting their way across the bottom of the groove toward the other side thereof, the advanced corners 27 of their cutting edges are all on the other side of the disk—that is, on the side opposite to where they are shown on the edge of the disk now visible. In order to maintain this bevel of the cutting edges of the saw-teeth, the whole front side of these latter is beveled accordingly, so that as the cutting edge wears down by use and repeated grindings the bevel takes care of itself and is always present. This beveled front side of the cutting-teeth appears in Fig. 3, the double lines close to each other indicating it, being full lines for one half of the teeth and dotted lines for the other half. In their tilting or angular adjustment these saw-disks swing on an imaginary axis which passes through the center of the disk on a line at right angles to the line indicating greatest inclination of the disk and at the end of which latter line the cutting-knives 9 are located. The middle of this imaginary axis lies about within the axis of the mandrel. To permit the disk to go through this movement and maintain for it at the same time the full support of the hub without having to enlarge the bore of the disk, it is necessary that the hub, particularly at top and bottom, (with reference to the position now in,) be curved on circular lines struck from the center of the mentioned imaginary axis on which the disk tilts. This is in order to permit the disk to slide off and outwardly on the hub, as shown at 28, and to move correspondingly in and up thereon, as shown at 29, and to have at all points its bore fitting always closely and fully around the hub to prevent lost motion.

A recess 31 is shown in flange 15 surrounding adjusting-screw 17 to permit access to the keyhole in the latter in cases when the disk comes very close to the flange at that point. Scoring-knives 9 may also be removably secured, as shown in Fig. 5, a key 32 being used to hold them in position within a slot 33 and which permits independent renewal in case they wear quicker than the saw-teeth. They may thus also be tempered differently from the balance of the saw.

In establishments doing large quantities of work of the same size—as, for instance, cutting grooves of certain fixed or stock sizes—time may be saved for adjusting from one size to another by providing a number of cutting-disks each attached to a hub or flange inclined at one side to a certain angle which produces a groove of a certain width. They being properly numbered or labeled, it is then only necessary to remove the nut at the end of the mandrel and replace the cutting-disk and its supporting-flange with another one without any further adjustment; or such inclined hubs or flanges only may be provided, their proper inclination then determining the angular position of the disk, which is simply attached thereto. In such case these flanges may be of wood, which permits also change to any special angles by simply planing them off.

Having described my invention, I claim as new—

1. In a cutter-head a rotary disk having cutting-teeth in its periphery, a hub on which it is mounted in a manner to permit it to be tilted thereon, a flange projecting from said hub and to which the disk is held and an adjusting-screw for changing the angle to which the disk may be tilted.

2. In a cutter-head a rotary disk having cutting-teeth in its periphery, a hub on which it is mounted in a manner to be tilted thereon, the outer surface of said hub occupied by the disk and forming the seat thereof, being curved on circular lines constructed from a center which corresponds with the center on which the disk swings when adjusted to its tilted positions and means to hold and secure the disk in these positions.

3. In a cutter-head, the combination of a mandrel, a hub 12 mounted on it, a flange 15 projecting therefrom, a cutting-disk resting against the same and mounted on the hub on which it is capable of a tilting adjustment, said hub being curved and shaped as shown at 28 and 29 to permit such tilting and at the same time furnish full support to the disk in all the latter's positions, part of flange 15 from the axis on which the disk tilts outwardly removed on a taper to clear the approaching part of the disk when so fitted, an adjusting-screw 17 mounted in flange 15 and projecting therefrom to engage and hold the receding part of the disk, a washer on the other side of the cutting-disk, screws 14 whereby it is secured to flange 15 with the cutting-disk between the two, said screws being located in a line parallel to the axis on which the disk tilts, the bore of the washer being enlarged and flaring outwardly, so as not to interfere with this tilting adjustment, which enlargement is however an elongation merely in one direction only, the major axis of which is located at right angles to the axis on which the tilting adjustment of the disk takes place which adjustment is thereby limited to one in this direction only, projections 25 on this washer also located in a line parallel to the tilting axis and a nut 22 which, engaging these projections, holds all these parts in position on the mandrel.

4. In a cutter-head, the combination of a mandrel, a hub 12 mounted on it, a flange 15 projecting therefrom, a cutting-disk resting against the same and mounted on the hub on which it is capable of a tilting adjustment, said hub being curved and shaped as shown at 28 and 29 to permit such tilting and at the same time furnish full support to the disk in all the latter's positions, part of flange 15 from the axis on which the disk tilts outwardly removed on a taper to clear the approaching

part of the disk when so fitted, an adjusting-screw 17 mounted in flange 15 and projecting therefrom to engage and hold the receding part of the disk, a countersink in the side of the cutting-disk adapted to receive the end of screw 17, a washer on the other side of said disk its bore fitting the mandrel next to the side of the disk and elongated outwardly, allowing it to tilt only when the elongation is diametrically in line with screw 17, projections 25 on the outer side of this washer and a nut 22 which engaging these projections holds all parts in positions on the mandrel.

5. The combination of a rotary disk having saw-teeth in its periphery with scoring-knives between them diametrically opposite each other and a depression or socket 18 in that one of its flat sides where the scoring-teeth are beveled and in line with the scoring-teeth, a screw 17 the end of which is adapted to enter said socket thereby locating the position of the disk with reference to flange 15 and bringing the scoring-teeth at points of greatest inclination, screws 14, a nut 22, bearing-points 16 in line across flange 15 and at right angle with a diametrical line to screw 17, they being off the center of flange 15 and opposite to screw 17, so as to hold the disk against screw 17 when nut 22 or screws 14 are tightened.

6. The combination of a rotary disk having saw-teeth in its periphery with scoring-knives diametrically opposite each other, the front sides of the cutting-teeth being beveled so as to produce a beveled cutting edge, of which one corner 27 cuts in advance of the other, this bevel being on one half of the saw-teeth in one direction and opposite thereto in the other half, the line defining these two half sets of teeth, being coincident with a diameter which is also in line with the scoring-teeth, a depression or socket 18 in its flat side in line with the scoring-teeth and on that side where the scoring-teeth are beveled, a screw 17, the end of which is adapted to enter said socket 18, screws 14 and a nut 22, bearing-points 16 in line across flange 15 at right angle with a diametrical line to screw 17, bearings 16 being off the center of flange 15 and opposite to screw 17 to hold the disk against the latter when nut 22 or screws 14 are tightened, a washer between nut 22 and said disk, its bore fitting the mandrel next to the side of the disk and elongated outwardly, allowing it to tilt only when the elongation is diametrically in line with screw 17, projections 25 on the outer side of this washer and a nut 22 which engages these projections and holds all parts in position on the mandrel.

In testimony whereof I hereunto set my hand in presence of two witnesses.

LEWIS F. PARKS.

Witnesses:
PAUL CROSLEY,
C. SPENGEL.