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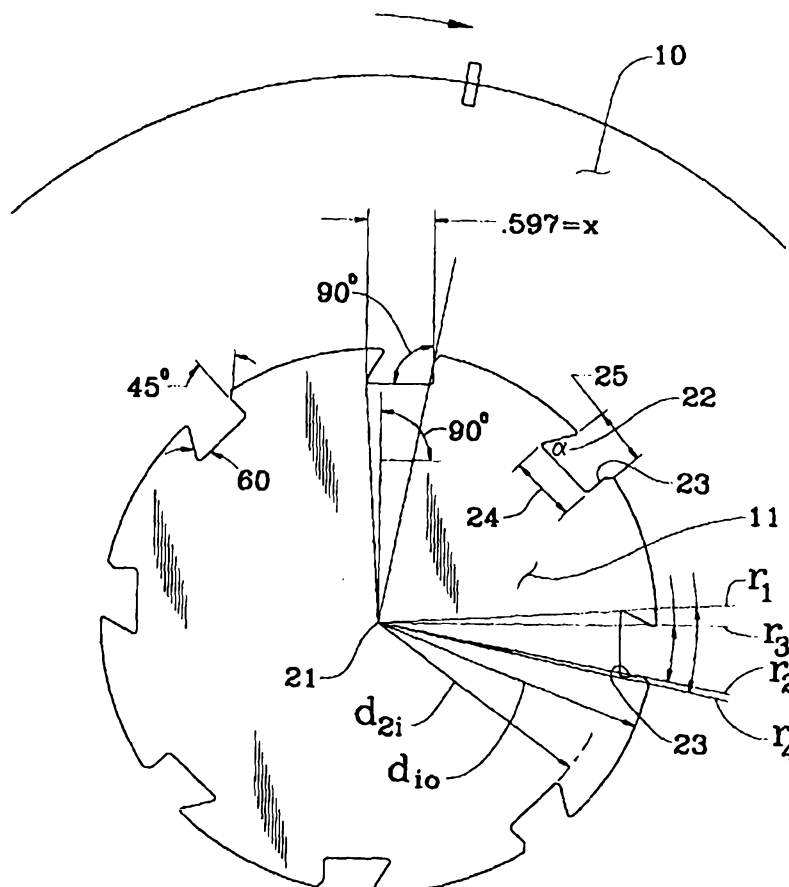
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(54) Title: SAW BLADE DRIVE SYSTEM

(57) Abstract

A saw blade (10) and a drive spline (11) having a drive configuration therebetween. The drive configuration comprises inner driven surfaces (22) on the saw blade (10) which are driven by the drive spline (11) which has outer drive recesses (23) complementary to the inner driven surfaces (22) of the saw blade (10). First and second radials (r₁, r₂) extend outwardly from the axis of rotation (21) of the drive spline (11) and saw blade (10). They extend so as to contact the ends of a respective recess or drive surface most closely located to the axis of rotation. Third and fourth radials (r₃, r₄) extend to contact the ends of the most remotely located recess or drive surface. The angular distance between the first and second radials is greater than the angular distance between the third and fourth radials.



SAW BLADE DRIVE SYSTEM

INTRODUCTION

This invention relates to a saw blade and a drive system therefore and, more particularly, to a sawblade and its associated drive spline having a specific driving
5 configuration.

BACKGROUND OF THE INVENTION

Circular type sawblades for use in cutting cants or lumber are of course known as are their associated drive splines. Typically, the drive spline has a series of rounded or convex male drive pieces spaced intermittently and circumferentially
10 around the drive spline. These male drive pieces mate with corresponding concave female recesses in the saw blade. Typically, the sawblade is mounted onto the drive spline endwise. It slides over the spline until the desired operating position on the drive spline is reached. Under operating conditions, the sawblade is maintained in its desired position with sawguides which prevent undesirable movement in the
15 sawblade. This keeps the kerf or cutting width created by the blade narrow which is desirable in order not to avoid wood wastage during the sawing operation.

Drive splines which employ the aforementioned convex or rounded male driving pieces suffer from various disadvantages and drawbacks. These problems relate to safety, tolerances and sawblade driving efficiency.

20 With respect to safety, there has arisen the unfortunate practice of "tree spiking" by those protective of logs which they feel should not be felled. This

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practice involves driving large nails or spikes into the trunks of trees before cutting. Often the spikes are not readily observed by either the fellers or the sawmill operators with the result that during sawmill operations, the sawblade may strike a spike within the cant or log during the cutting operation. This is a most dangerous occurrence since the sawblade can tear or fragment and pieces of shrapnel are distributed at high energy levels throughout the area where the cutting is taking place. This disintegration takes place because there is no retention of the sawblade by the spline when the sawblade splits or tears after contact with the spike. Sawmill operators lives have been lost and their injuries have been severe because of these tree spiking practices. It would be advantageous if the sawblade did not tear away from the drive spline under such conditions.

Yet a further disadvantage with present sawblades and the convex type drive splines relates to operating tolerances. By virtue of the convex type drive spline which mates with corresponding type recesses in the sawblade, a series of point contacts occur when the two curved surfaces meet. This point contact results in a series of high stress points between the drive spline and the sawblade which increases wear on both members and reduces the driving efficiency between the spline and the sawblade.

Yet a further disadvantage with the present sawblade-drive spline system is that the position of the sawblade on the drive spline can change during operation. This is so because there are tolerances between the convex drive surfaces of the drive spline and the concave driven surfaces of the sawblade. The saw blade will move upwardly and downwardly on the spline during operation while various impact

loadings occur and the sawblade moves upwardly and downwardly on the spline through these tolerances. Thus, the actual driving efficiency is adversely affected.

Yet a further disadvantage with the present drive spline design is the fact that the spline has to be hardened to a hardness greater than that of the blade. This practice is time consuming and expensive.

SUMMARY OF THE INVENTION

According to one aspect of the invention, there is provided a sawblade of circular configuration for being mounted on an arbor to effect cutting through rotation of the sawblade in a rotational direction about a rotational axis, the sawblade having an outer cutting edge and a center opening for receiving the arbor, the center opening in the sawblade being bounded by a plurality of inner driven surfaces circumferentially spaced about the central opening for operatively interfacing with drive surfaces on the arbor so that rotation of the arbor results in rotation of the sawblade, each of the plurality of inner driven surfaces extending between a first point and a second point, the second point being located radially outwardly of the first point, each of the inner drive surfaces being configured so that a second radial extending through the second point is positioned forwardly with respect to the rotational direction of a first radial extending through the first point.

In a preferred embodiment, a second angular distance is defined between a third radial and a fourth radial, with the third and fourth radials contacting each end of the respective one of the driven surfaces located most remotely from the axis of rotation. The angular distance between the first and second radials is greater than the angular distance between the third and fourth radials.



According to a further aspect of the invention, there is provided a drive spline for engaging a sawblade to rotatably drive the sawblade in a rotational direction about a rotational axis to effect cutting by the sawblade, the drive spline having an outer peripheral surface provided with a plurality of drive surfaces engageable with driven surfaces on the sawblade to impart rotational movement to the sawblade during rotation of the arbor, each of the plurality of drive surfaces extending between a first point and a second point, the second point being located radially outwardly of the first point, each of the inner drive surfaces being configured so that a second radial extending through the second point is positioned forwardly with respect to the rotational direction of a first radial extending through the first point.

In a preferred form, the first and second radials contact each end of a respective one of the drive recesses located most closely to the axis of rotation and the third and fourth radials contact each end of

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a respective one of the drive recesses located most remotely from the axis of rotation. The angular distance between the first and second radials is greater than the angular distance between the third and fourth radials.

According to a further aspect of the invention, there is provided a drive
5 spline of circular configuration having an axis of rotation, with the drive spline having a plurality of drive recesses provided with replaceable drive surfaces along a first angular distance between a first and second radial, said drive surfaces extending axially along the drive spline.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

10 A specific embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawing figures in which like elements are designated by like reference numerals and wherein:

Figure 1 is a side diagrammatic view of a circular sawblade mounted on a drive spline which, in turn, is mounted on an arbor, the sawblade and drive spline
15 having a configuration according to the invention;

Figure 2 is a side diagrammatic enlarged view of a circular sawblade mounted on a drive spline and illustrating the drive configuration between the spline and the sawblade according to a first embodiment of the invention;

Figure 3 is an enlarged view of the circular sawblade of Figure 2;

20 Figures 4A, 4B, 4C and 4D are enlarged views of four different drive spline configurations according to a further aspect of the invention; and

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Figure 5 is an enlarged view of an insert according to a further aspect of the invention.

DESCRIPTION OF SPECIFIC EMBODIMENT

Referring now to the drawings and, more particularly, to Figure 1, a circular sawblade 10 is mounted on a drive spline 11 which, in turn, is mounted on an arbor 12. The arbor 12 is journalled in bearings 13 and a source of turning power for the arbor 12 is provided (not shown) which is then transferred to the sawblade 10 to turn the sawblade 10 and cut the wood diagrammatically illustrated at 14. A pair of sawguides 20 are mounted on either side of the circular sawblade 10. They guide the sawblade 10 and can move it axially on the drive spline 11. It will be appreciated, of course, that a plurality of sawblades could be mounted on the drive spline 11 depending on the lumber which is being cut and the desires of the operator.

Reference is now made to Figure 2 which illustrates the sawblade 10 mounted on the drive spline 11. The drive spline 11 and the sawblade 10 have a common axis of rotation 21 and, under operation, the sawblade 10 rotates clockwise as seen by the arrows. A series of inner driven surfaces 22 of the sawblade 10 are complementary to outer drive recesses 23 of the drive spline 11. The radially innermost distance 24 of the drive surface 22 is greater than the radially outermost distance 25 so that if the sawblade contacts a foreign object such as a spike in a tree being cut, the blade 10 will not be hurled from the drive spline 11, but will be

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retained by the drive spline 11 such that the operator may immediately terminate operation of the drive system.

More particularly, the outside circumference of the drive spline is indicated by a first diameter d_{1o} and the inside diameter of the drive spline is indicated by a
5 second diameter d_{2i} . The distance between d_{1o} and d_{2i} is the distance between the outer diameter of the drive spline 11 and the radially inwardmost distance of the drive recess 23.

First and second radials r_1 , r_2 are drawn from the axis of rotation 21 to touch
the ends of the drive recess 23 located radially most closely to the axis 21. Third
10 and fourth radials r_3 , r_4 are drawn from the axis of rotation 21 to touch the ends of the drive recess 23 located radially most remotely from axis 21. The angular distance between r_1 and r_2 will be larger than the distance between r_3 and r_4 as can clearly be seen from Figures 2 and 3.

For example, in a first embodiment of the invention as illustrated in Figure
15 2, the distance between the ends of the drive recess 23 located closest to the axis 21 is .597 in. as illustrated. This distance is obtained by drawing radials to each of the ends of the drive recess 23 and measuring the distance of .597 in. A 60 degree angle is cut into the drive spline 23 and a surface is formed 90 degrees to the line defining the distance of .597 in. which meets the 60 degree angle cut. This surface
20 defines the most advanced point of the radial r_1 and the most retarded point of radial r_2 .

It will be readily seen that a number of different configurations for the drive recesses 23 of the drive spline 11 and the drive surfaces 22 of the sawblade 10 could

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be used in order to achieve the benefits of the present invention. Reference is made, for example, to Figures 4A, 4B, 4C and 4D.

In Figure 4A, the drive surfaces 30 take a somewhat partially convex configuration and in Figure 4B, the drive surfaces 32 take on an appearance similar
5 to the drive surfaces 22 of Figures 2 and 3 but extend inwardly a much greater distance. However, it remains the case that the angular distance θ_1 between the radials r_1 , r_2 is less than the angular distance θ_2 between the radials r_3 , r_4 .

Figures 4C and 4D illustrate two further drive configurations according to further aspects of the invention. In each of these configurations, there is a drive
10 surface 40, 41 which has an angle α relative to radial r_3 which is greater than zero degrees. Thus, there will be a partial retaining effect executed on the sawblade 43 by the forces executed between drive surfaces 41, 42 of the spline by the sawblade.

In Figure 5, replaceable drive surfaces 34 are located along removable inserts made of hardened steel material 35 extending axially along the spline 11, and
15 being secured to the drive spline with bolts 36.

While specific embodiments of the invention have been described, such descriptions should be taken as illustrative of the invention only and not as limiting its scope as defined in accordance with the accompanying claims. For example, although the above-described embodiments and the illustrations in the drawing
20 figures depict projections on the sawblade and recesses on the arbor, it is to be understood that similar advantages could be achieved if the projections were provided on the arbor and the recesses provided on the sawblade.

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WHAT IS CLAIMED IS:

1. A sawblade (10) of circular configuration for being mounted on an arbor (12) to effect cutting through rotation of the sawblade in a rotational direction about a rotational axis (21), the sawblade having an outer cutting edge and a center opening for receiving the arbor, the center opening in the sawblade (10) being
5 bounded by a plurality of inner driven surfaces (22) that are circumferentially spaced about the center opening for operatively interfacing with drive surfaces on the arbor (12) so that rotation of the arbor results in rotation of the sawblade, characterized in that each of the plurality of inner driven surfaces (22) extends
10 between a first point and a second point, the second point being located radially outwardly of the first point, each of the inner driven surfaces being configured so that a second radial (r_3) extending through the second point is positioned forwardly with respect to the rotational direction of a first radial (r_1) extending through the first point.

15 2. A sawblade as in Claim 1, wherein said sawblade is provided with a plurality of projections and each of the inner driven surfaces form a part of one of the projections.

3. A drive spline (11) for engaging a sawblade (10) to rotatably drive the sawblade in a rotational direction about a rotational axis (21) to effect cutting by
20 the sawblade, the drive spline having an outer peripheral surface provided with a plurality of drive surfaces (23) engageable with driven surfaces (22) on the sawblade to impart rotational movement to the sawblade during rotation of the drive spline,



each of the plurality of drive surfaces extending between a first point and a second point, the second point being located radially outwardly of the first point, each of the inner drive surfaces being configured so that a second radial extending through the second point is positioned forwardly with respect to the rotational direction of a

5 first radial extending through the first point.



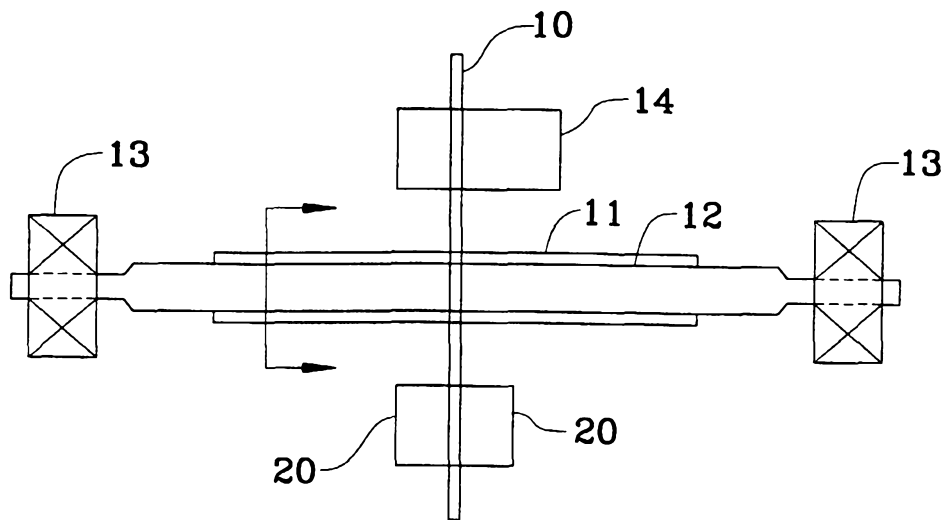
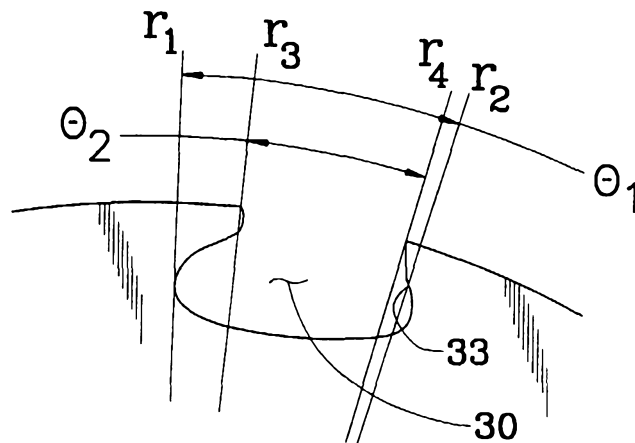
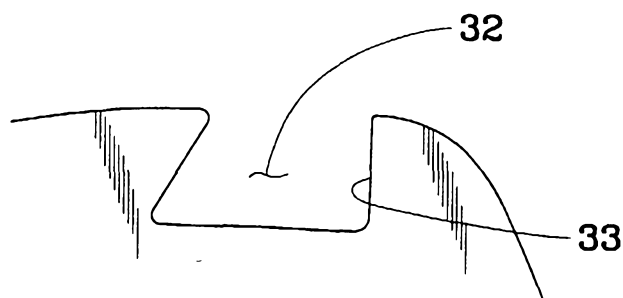
FIGURE 1*FIGURE 4A**FIGURE 4B*

FIGURE 2

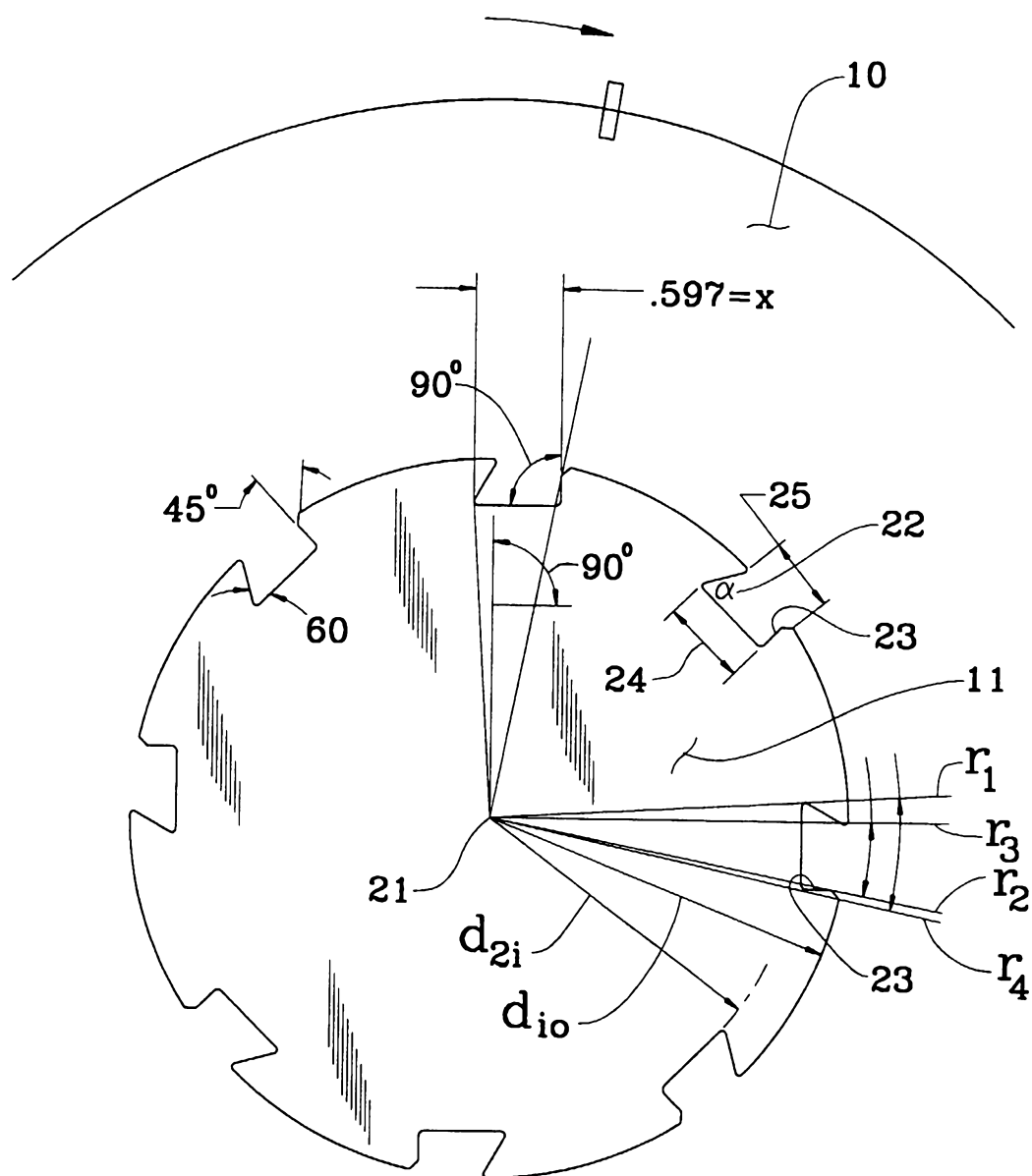


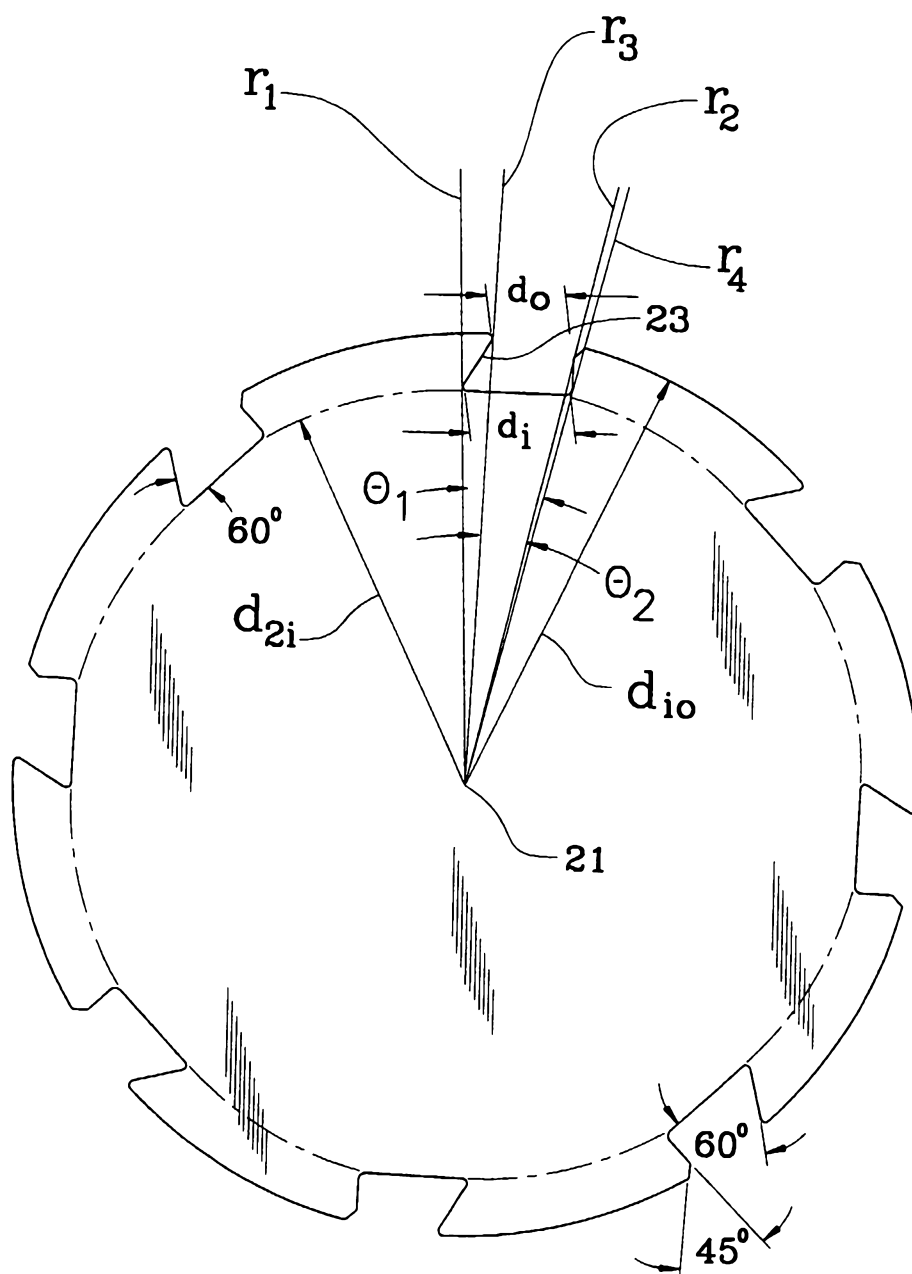
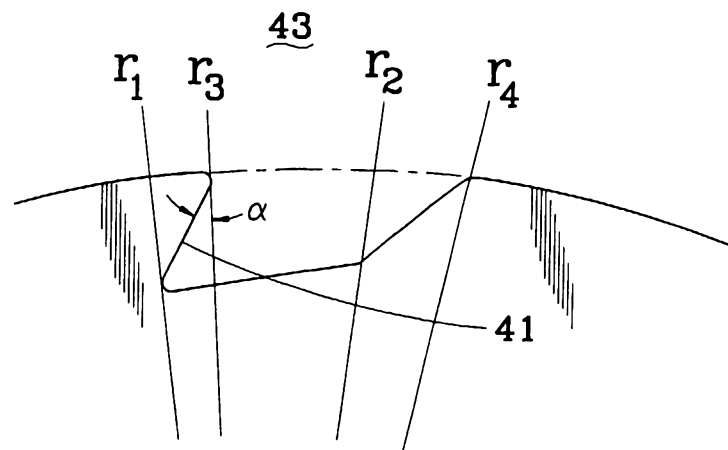
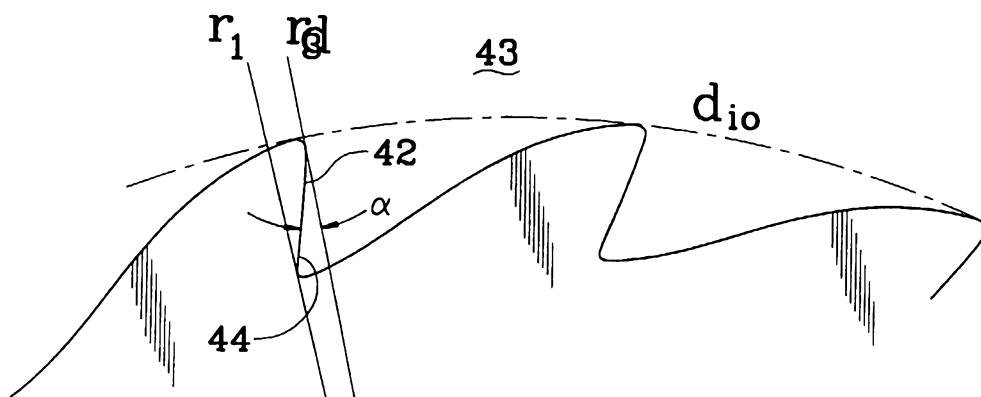
FIGURE 310

FIGURE 4C*FIGURE 4D**FIGURE 5*