

United States Patent

Dreher

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[54] **QUICK-RETURN SEVERING DEVICE FOR A MOVING CONTINUOUS ROD**

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[52] U.S. Cl. 83/32 C

[51] Int. Cl. B26d 1/56

[58] Field of Search. 83/318, 319, 320

[56] **References Cited**

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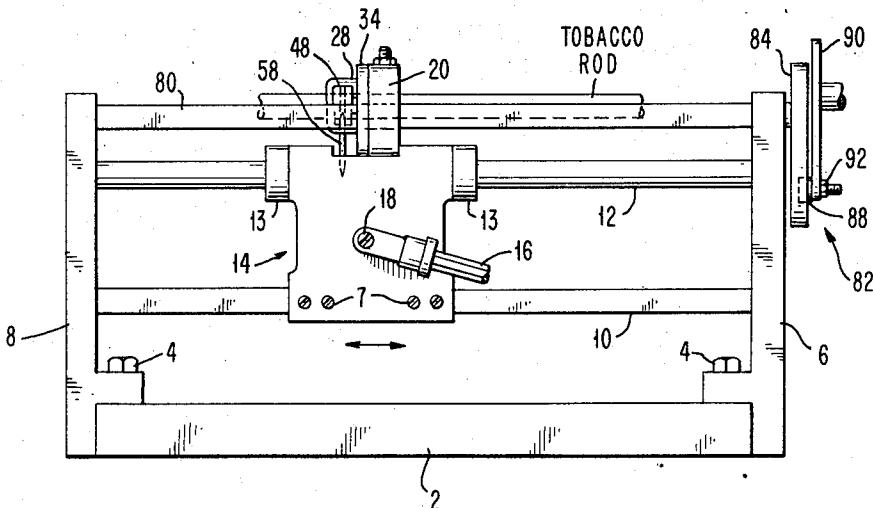
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[57] **ABSTRACT**

In a high-speed machine for making a tobacco rod of the cigar or cigarette type, a quick-return, rotary severing device is mounted on a support plate having a longitudinal ledger guide for the tobacco rod. The support plate is transversely attached to a frame which reciprocates parallel to the tobacco rod passing through the ledger guide. In timed relation to the reciprocation of the frame and attached support plate, the blade of the rotary severing device cuts through the continually moving tobacco rod.

7 Claims, 5 Drawing Figures



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FIG. 1

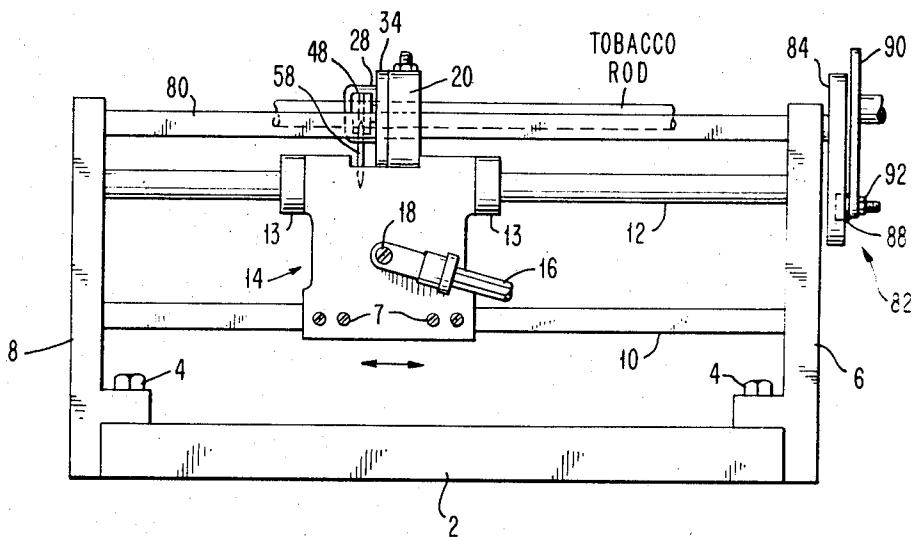
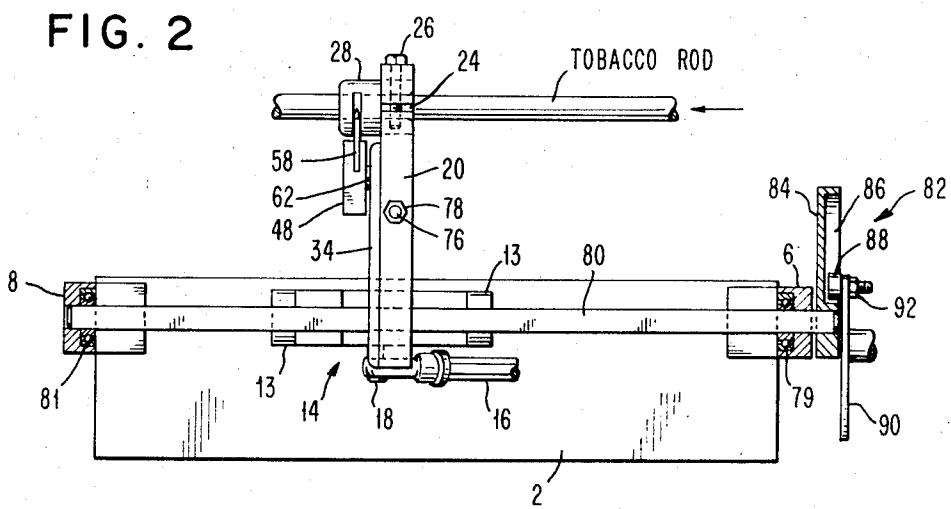


FIG. 2



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FIG. 3

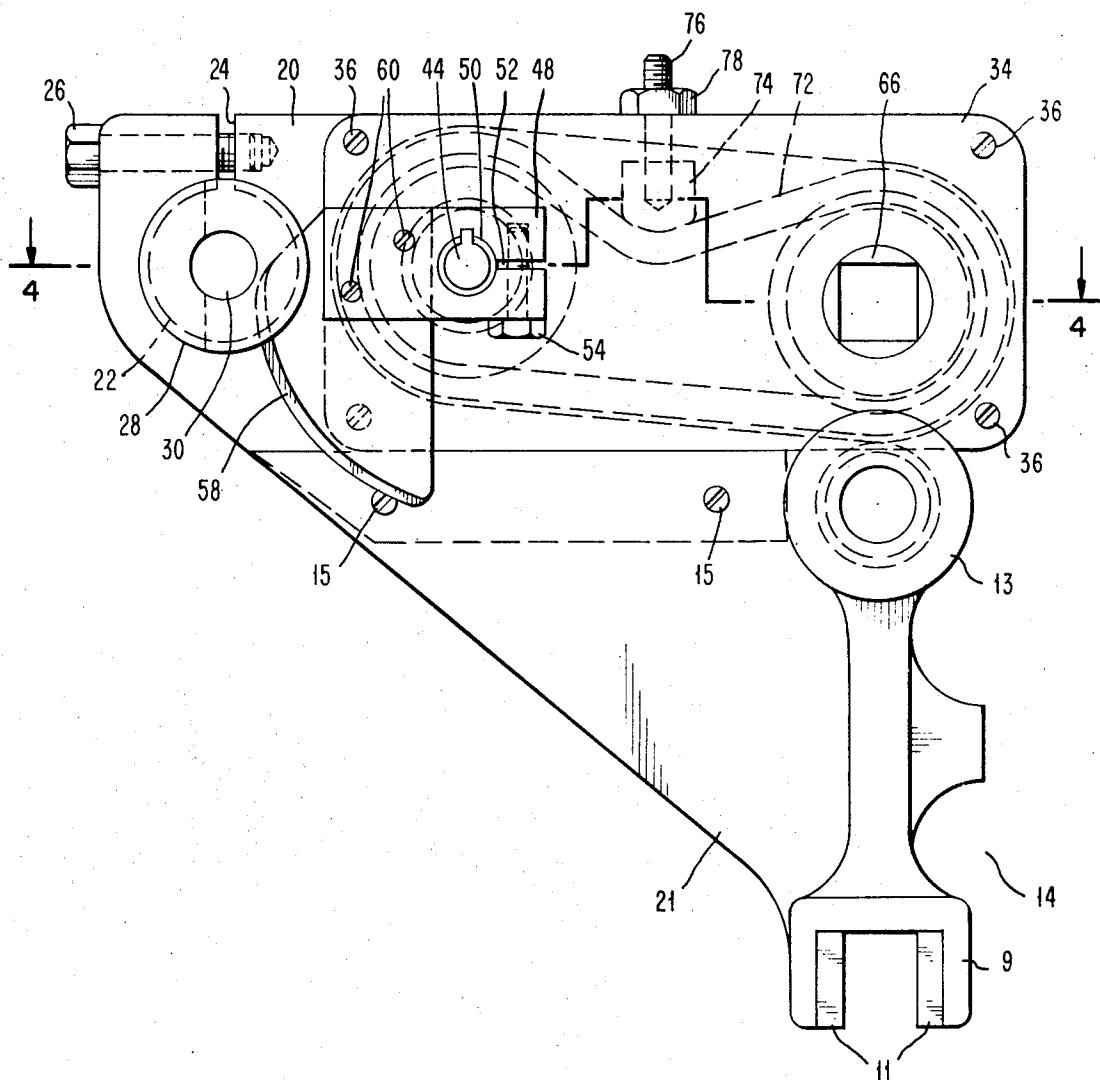
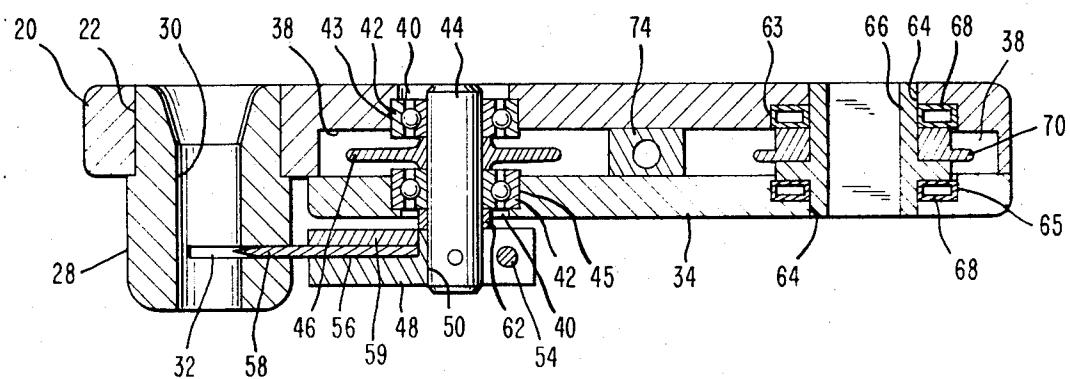


FIG. 4

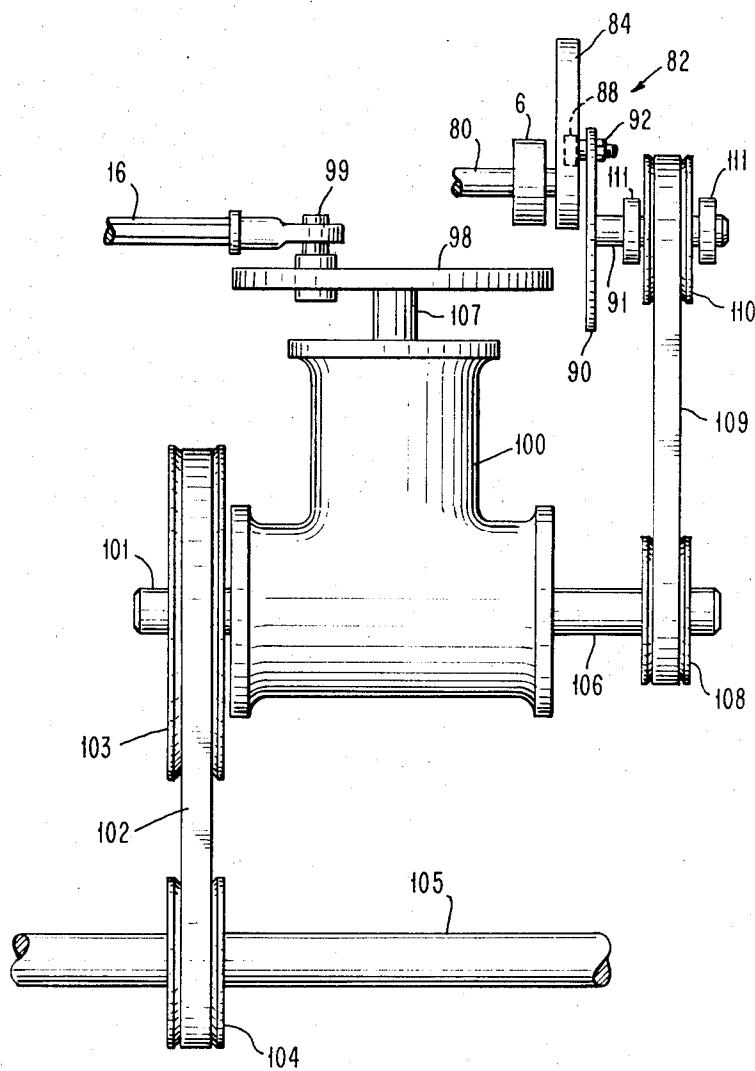


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FIG. 5



QUICK-RETURN SEVERING DEVICE FOR A MOVING CONTINUOUS ROD

BACKGROUND OF THE INVENTION

The present invention relates to an improved device for severing a tobacco rod of the cigarette or cigar type while it is continually issuing from a rod-making machine.

As is well known, cigarette-making machines have been adapted to the manufacture of cigars essentially by substituting a tobacco sheet for the usual cigarette paper. Whether the tobacco rod is of the cigarette or cigar type, it must be cut into a plurality of rod segments while the rod is issuing from the rod-making machine.

In the case of cigars, devices have been developed for continuously wrapping another tobacco sheet helically on the rod segments, usually double the length of the finished cigars, while these rod segments are still aligned serially in end-to-end relationship. Such a device is shown in U.S. Patent No. 3,467,108 issued Sept. 16, 1969 to Wallace. Inasmuch as the additional tobacco sheet wrapped on the tobacco rod segments is applied as a continuous ribbon, the rod segments leave the wrapping device as an apparent continuous rod in which the rod segments are linked or held together by the helical wrapping of tobacco sheet. Therefore, in such case, it again becomes necessary to cut the linked rod at the point where the end of each original rod segment is adjacent the end of next rod segment in the series of rod segments passing through the wrapping device. In this operation, the cutting device severs only the helically wrapped tobacco sheet so that the original rod segments are no longer linked together.

Numerous severing devices have been proposed for cutting a tobacco rod as it issues continually from a rod-making machine but these have not been entirely satisfactory for one or more reasons. For instance, many devices are massive and 1,000 while others vibrate excessively at high cutting speeds.

Accordingly, it is an object of this invention to provide a severing or cutting device for a longitudinally moving tobacco rod which is relatively compact, simple and inexpensive but is effective at high cutting speeds such as 1000 cuts per minute.

It is another object of this invention to provide two such cutting devices that can be synchronized with the rod-making machine and each other in an operation producing cigar rods with a helically wrapped tobacco sheet.

SUMMARY OF THE INVENTION

In accordance with this invention, a quick-return rotary severing device is mounted on a support plate which has a longitudinal ledger guide for the tobacco rod and which is transversely attached to a frame that reciprocates parallel to the axis of the tobacco rod passing through the ledger guide to be cut into rod segments. The Whitworth movement is incorporated in the quick-return rotating knife blade of the severing device.

It will be understood that while the preferred embodiment of the invention is directed to a tobacco rod, the device has application to the cutting of any rod-shaped object such as a paper, plastic or rubber rod or tube.

For a better understanding of the invention, reference is now made to the accompanying drawings which illustrate a preferred embodiment.

5 BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a rear elevation of the severing device showing the supporting frame and two drive connections;

FIG. 2 is a top view of the severing device shown in FIG. 1, partially cut away to show certain elements;

10 FIG. 3 is an enlarged left end view of the severing device without the supporting frame and the two drive connections;

FIG. 4 is a sectional view of the severing device taken 15 along the line 4-4 FIG. 3 but without the lower T-frame, and belt 72; and

15 FIG. 5 is a top view, similar to FIG. 2, showing the driving connections.

20 DESCRIPTION OF A PREFERRED EMBODIMENT

The severing device as shown in FIG. 2 is mounted adjacent and parallel to the axis of the tobacco rod issuing from a rod-making machine. Attached to base plate 2 by screws 4 are vertical supports 6 and 8 between 25 which square track 10 and cylindrical rod 12 are held parallel to each other and to the axis of the tobacco rod. T-frame 14 is slidably reciprocated along track 10 on its channel 9 lined with Teflon strips 11 which are held by screws 7 and along rod 12 on bearings (not 30 shown) in bushings 13 by connecting rod 16 pivotally attached to T-frame 14 by screw 18 and to a driven rotating disk 98 by pin 99 (Figure 5).

Plate 20 is mounted on right-angled projection 21 of 35 T-frame 14 by screws 15 and projects transversely through the axis of the tobacco to be cut into rod segments. Near its free end, plate 20 has aperture 22 with its axis coincident with the axis of the tobacco rod. Slot 24 intersects aperture 22 which together with screw 26 40 forms a clamp to hold ledger guide 28. Bore 30 in quide 28 is of sufficient diameter to permit the tobacco rod to pass freely therethrough and is tapered at its entry end. Near its exit end, ledger guide 28 has slot 32 cut transversely through bore 30.

45 Cover plate 34 held by screws 36 to plate 20 encloses milled area 38 of plate 20. Aligned apertures 40 on an axis parallel to that of ledger quide 28 pass through both plate 20 and cover plate 34. Bearings 42 set in counterbore 43 of plate 20 and counterbore 45 of 50 cover plate 34 support shaft 44 in apertures 40. Sprocket 46 is mounted on shaft 44 within milled area 38 of plate 20. Arm 48 with aperture 50 and slot 52 near one end is clamped to shaft 44 with the aid of screw 54. The other end of arm 48 has cut-out 56 in 55 which knife blade 58 in the form of a spiral segment is fixed by means of backing plate 59 and screws 60. Spacer 62 aligns knife blade 58 on arm 48 with slot 32 in ledger guide 28.

60 Aligned apertures 64 near the other end of plate 20 and cover plate 34 have, respectively, counterbores 63 and 65 to hold drive collar 66 in bearings 68. Fixed to drive collar 66 is sprocket 70. Timing belt 72 connects sprocket 46 on shaft 44 and sprocket 70 on drive collar 66. Tension block 74 is adjustably held against the top run of belt 72 by means of screw 76 threaded in an aperture through the top of plate 20 and fixed by locknut 78.

Drive collar 66 is engaged by and slidably movable along square drive shaft 80 which is supported between vertical supports 6 and 8 parallel to track 10 and rod 12 and is rotatable in bearings 79 and 81, respectively, in supports 6 and 8. One end of drive shaft 80 extends beyond support 6 and is fitted with a Whitworth quick-return drive 82 to impart a quick-return motion to knife blade 58 by way of shaft 80, sprockets 46 and 70, and belt 72.

Whitworth quick-return drive 82 comprises arm 84 mounted on the end of shaft 80 extending beyond support 6. Arm 84 has cam slot 86 in its outer face which engages cam follower 88 attached near the edge of driven disk 90 by bolt 92, disk 90 being attached to the end of driven shaft 91.

A Boston right-angle gear box 100 with three external shaft connections can be utilized to reciprocate frame 14 and at the same time differentially rotate knife blade 58 by means of Whitworth quick-return drive 82. Lateral shaft 101 of the right-angle gear box 100 is driven by a timing belt 102 connecting a sprocket 103 on the shaft 101 with a sprocket 104 on a drive shaft 105 of the rod-making machine (not shown). Rotation of the driven lateral shaft 101 in turn causes rotation of the other lateral shaft 106 and the end shaft 107 at right angles thereto. A sprocket 108 on this other lateral shaft 106 of the gear-box 100 is connected by another timing belt 109 to a sprocket 110 on the rotatable shaft 91 held in bearings 111 and carrying driven disk 90 of Whitworth quick-return drive 82. The end shaft 107 of the gear-box 100 carries a disk 98 near the edge of which is a pivot pin 99 holding the end of connecting rod 16 opposite to the end held by screw 18 on frame 14. The dimensions of the linkage and drive components and the gear ratios are selected so that the tobacco rod is severed into rod segments of a desired length. One severing device of this invention may be at the discharge end of a rod-making machine and another such device at the discharge end of a helical wrapping machine such as that of U.S. Patent No. 3,467,108. In such case, the first severing device cuts the tobacco rod issuing from the rod-making machine into a series of rod segments which become linked together by a ribbon of tobacco sheet while passing through the helical wrapping machine. The second severing device then cuts the linking tobacco sheet at each point where the end of one rod segment is adjacent the end of another rod segment to yield a series of helically wrapped tobacco rod segments which in effect are cigars. Particularly when the movement of the series of tobacco rod segments through the helical wrapping machine is simultaneously rotational and translational, the severing device of this invention is advantageous in making clean cuts.

The Whitworth quick-return movement adopted for use in differentially rotating knife blade 58 functions to rotate blade 58 at the fastest rotational speed when blade 58 is passing upwardly through slot 56 in ledger guide 28 to sever the tobacco rod. During the remainder of each rotation of knife blade 58, the speed of rotation is diminished. Simultaneous with this action, frame 14 is reciprocated so that while it is moving in the same direction as the moving tobacco rod, knife blade 58 passes through slot 32 in ledger guide 28, generally when frame 14 is at about the mid-point of its

stroke which is concurrent with the rod movement. After blade 58 has cut the rod, frame 14 goes on to complete its concurrent stroke, reverses to make its stroke countercurrent to the rod movement, and again reverses to make its concurrent stroke at about the mid-point of which blade 58 again cuts the tobacco rod.

Those skilled in the art will readily visualize many modifications and variations of the embodiment of the invention which has been described in detail for illustrative purposes. For instance, square drive shaft 80 may be a cylindrical shaft with a coextensive key engaging drive collar 66. Figures 3 and 4 show slot 32 in ledger guide 28 as not extending completely through bore 30. It is unnecessary to have a deeper slot to cut the wrapped cigar bunches at the points where they are linked by the helically applied wrapper. When the continuous tobacco rod is first cut into rod segments or cigar bunches, slot 32 extends completely through bore 30 of guide 28. Also, slot 32 in ledger guide 28 may be omitted; in such case, knife blade 58 may be made to cut the rod adjacent the exit end of guide 28. Timing belt 72 is a term intended to include timing chains. 25 Knife blade 58 may be eccentrically mounted directly on shaft 44 without arm 48.

What is claimed is:

1. A rotary severing device for cutting a longitudinally moving continuous rod into rod segments which comprises:

- a. a frame reciprocally movable parallel to the axis of said rod;
- b. a support plate transversely mounted on said frame;
- c. a cylindrical ledger guide held by said plate near its free end, said guide being positioned with its bore so that said rod passes therethrough;
- d. a rotatable shaft supported by said plate with its axis parallel to the axis of said rod;
- e. a knife blade eccentrically mounted on said rotatable shaft and coacting with said guide to cut said rod when said blade passes transversely therethrough;
- f. drive transmission means on said plate extending to said rotatable shaft from a parallel drive shaft of a length to permit reciprocation of said frame therealong; and
- g. means to reciprocate said frame and simultaneously rotate said drive shaft so that said blade cuts one of said rod segments from said rod with each complete reciprocation of said frame.

2. The severing device of claim 1 wherein the drive transmission is a timing belt engaging sprockets on the drive shaft and on the rotatable shaft.

3. The severing device of claim 1 wherein the drive shaft is rotated by a Whitworth drive connected to an end of said drive shaft.

4. The severing device of claim 1 wherein the cylindrical ledger guide has a transverse slot through which the knife blade passes to cut the rod.

5. The severing device of claim 1 wherein the knife blade has the form of a segment of a spiral.

6. The severing device of claim 5 wherein the cylindrical ledger guide has a transverse slot through which the knife blade passes to cut the rod, and the drive shaft is rotated by a Whitworth drive connected to an end of

said drive shaft so that said blade passes through said slot at its highest rotational speed.

7. The severing device of claim 6 wherein the drive shaft is substantially square in cross-section, and the drive transmission means is a timing belt engaging 5 sprockets on said drive shaft and on the rotatable shaft.

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