April 12, 1955 H. H. LANDIS 2,706,000

SLITTING KNIFE ARRANGEMENT

Filed June 29, 1951 2 Sheets-Sheet 1

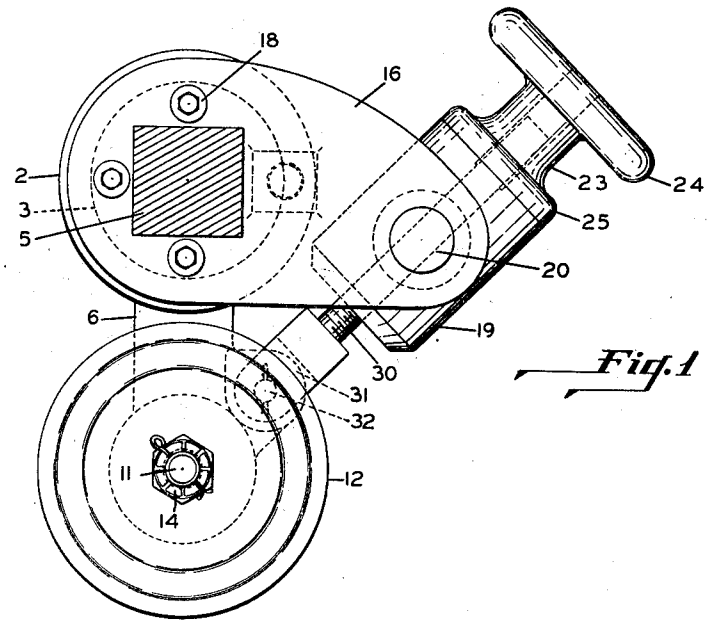


Fig. 1

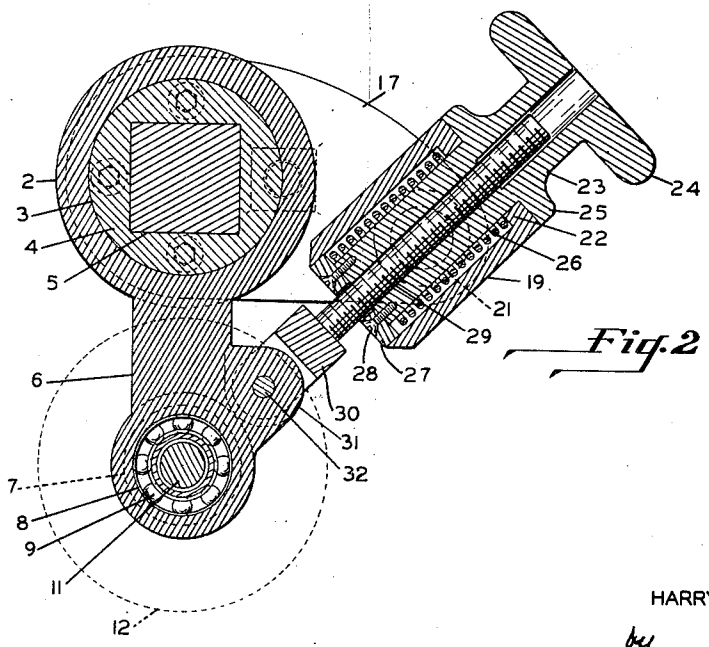


Fig. 2

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Fig. 3

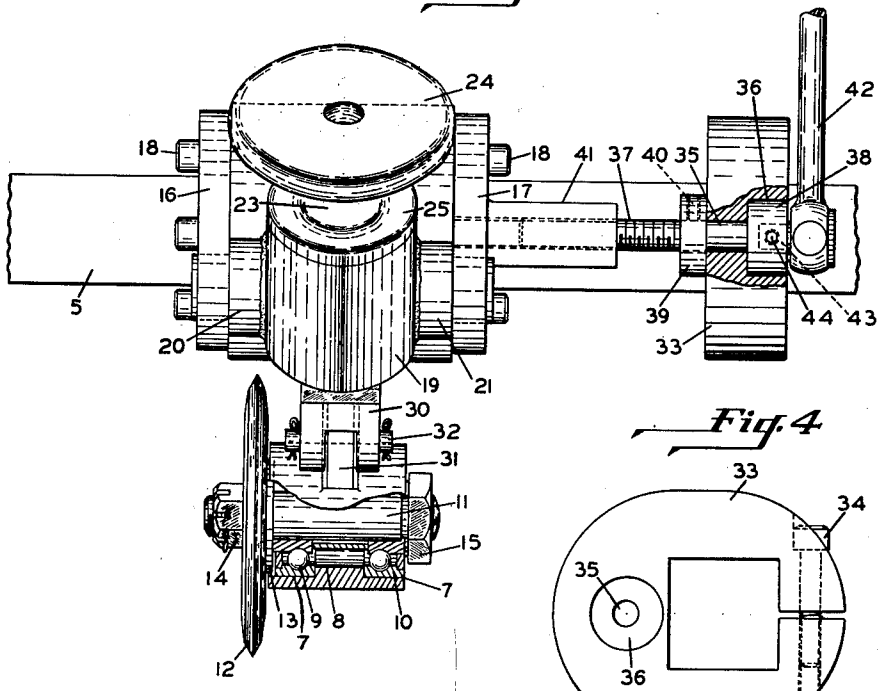


Fig. 4

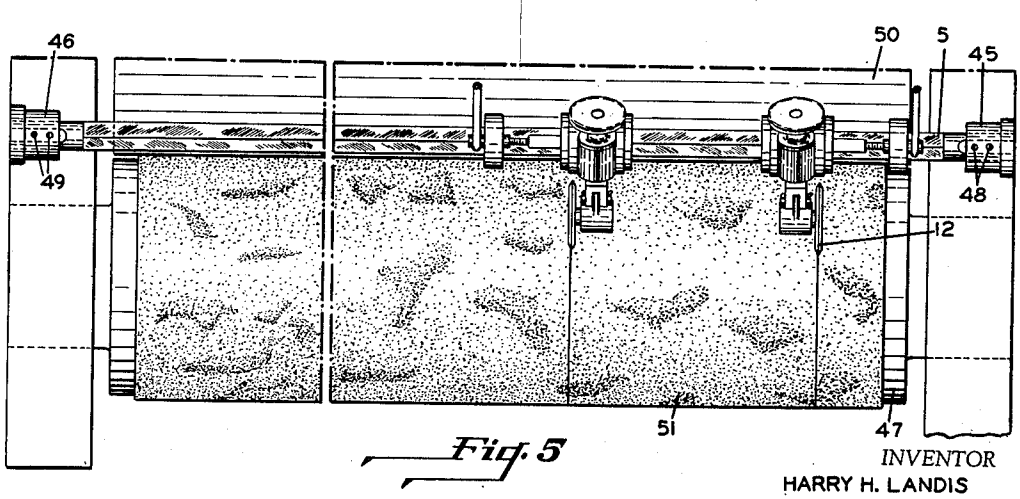


Fig. 5

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SLITTING KNIFE ARRANGEMENT

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4 Claims. (Cl. 164—60)

This invention relates to a slitting knife arrangement and is concerned more particularly with a slitting knife for use on calender rolls such as those used in the formation of linoleum and the like.

In the manufacture of linoleum, the mix is fed as a comminuted mass to a pair of calender rolls which are effective for consolidating the particles into a sheet. This sheet may be subsequently severed into individual inlays which are applied to a backing such as burlap or waterproofed felt. In the calendering operation the sheet which is formed has irregular longitudinal edges due to irregular extrusion of the material through the nip between the calender rolls. This selvage material is severed from the sheet and may be reworked or discarded. Slitting knives are frequently provided on the calender to sever the selvage edges.

In the manufacture of inlaid linoleum from calendered sheets, it is frequently desirable to sever the sheet into ribbons or strips, and common practice is to employ slitting knives on the calenders which sever the formed sheet into a plurality of ribbons.

It is of utmost importance that the slitters do not engage the surface of the calender roll with sufficient force to effect any scoring or marring, for such damage to the surface of the roll results in the formation of an undesirable defect in the surface of the calendered sheet of linoleum or the like. In addition, the application of excessive force rapidly dulls the rotary cutters, requiring frequent removal for grinding and sharpening.

An object of the present invention is to provide a slitting arrangement which may be adjusted to effect proper severance of the sheet without the application of any excessive or damaging force to the calender roll or the cutter.

In linoleum making the products produced are of different gauges; and, consequently, it is necessary to provide a cutter which will effectively sever sheets of varying thickness. Some mixes are more difficult to sever than are others, and this requires adjustability in the cutter to provide adequate force to effect proper severance without damage to the calender rolls or cutter.

A further object of the invention, therefore, is to provide a cutter arrangement by which the force applied by the cutter may be readily adjusted to a point where proper severance may be effected without the application of any damaging force thereto.

Other objects of the invention will become apparent from a consideration of the following detailed description of one embodiment of the invention which is illustrated in the attached drawings, in which:

Figure 1 is an end elevational view of a slitting knife arrangement embodying the present invention;

Figure 2 is a longitudinal sectional view of the slitting knife arrangement of Figure 1;

Figure 3 is a front elevational view of the slitting knife arrangement of Figure 1 showing a lateral adjustment mechanism provided thereon;

Figure 4 is a top plan view of a holder forming part of the lateral adjusting mechanism; and

Figure 5 is a side elevational view diagramamtically illustrating the application of two slitting knife arrangements embodying the present invention mounted upon a calendering machine.

The device comprises a housing **2** which has a circular opening **3** which receives a sleeve **4** mounted on a shaft **5**. The shaft **5** is preferably square in cross section as shown to prevent rotation of the sleeve **4** with respect

thereto. The sleeve may be keyed or held by a set screw to a cylindrical shaft, but a square shaft provides a simpler construction and facilitates lateral adjustment, as will be more fully hereinafter explained. The housing **2** is rotatable about the sleeve **4** as a bearing. The housing **2** also includes a depending leg **6** and has a pair of circular openings **7** separated by an intervening web **8** (Figure 3) which openings receive a pair of ball bearings **9** and **10** which support a cutter shaft **11**. A circular cutter **12** is keyed to the shaft **11** and is positioned between a flange **13** (Figure 3) and a nut **14** which holds the cutter in assembled position for free rotation with the shaft **11** in bearings **9** and **10**. A nut **15** on the end of the shaft opposite to the nut **14** clamps the shaft **11** against the bearing races.

Means are provided for rotating the housing **2** about the axis of the sleeve **4**. This arrangement includes a pair of supports **16** and **17** which are fastened to the sleeve **4** by recessed head screws **18**. An adjusting screw barrel **19** is provided with gudgeons **20** and **21** which are journaled for pivotal motion in the supports **16** and **17**. The barrel **19** has an inwardly directed annular flange **22** with a central opening therein which receives an adjusting nut **23** provided with a hand wheel portion **24** to facilitate manual operation. The adjusting nut **23** has a flange **25** complementary to the flange **22** on the barrel **19**. The nut **23** is held in position with respect to the barrel **19** by a spring **26** which is disposed within the barrel **19** and is confined between the annular shoulder **22** of the barrel **19** and a retainer **27** fastened by screws **28** to the nut **23**. The nut **23** is provided with a central threaded portion **29** which receives the threaded portion of an adjusting clevis rod or screw **30**. The clevis rod **30** is connected to a tongue **31** which projects from the depending leg **6** of housing **2**. A clevis pin **32** holds the clevis rod to the tongue for pivotal movement of the housing.

Means are provided for adjusting the lateral position of the housing and its associated mechanism on the shaft **5**. This comprises a split holder **33** (Figure 4) which is disposed over the shaft **5** and is secured in adjusted position thereon by a clamping screw **34**. The holder is provided with a bore **35** and a counterbore **36** which receive an adjusting screw **37** which has its head **38** received within the counterbore **36**. The screw **37** is held against lateral or axial movement with respect to the holder **33** by means of a collar **39** which is shouldered against the holder **33** and is secured to the screw **37** by a set screw **40**. The screw **37** is received within a threaded boss **41** projecting from support **17** and welded thereto. The screw **37** may be rotated by a standard reversible ratchet wrench **42**, the tang **43** of which is received within an opening provided in the head **38** of the screw **37**, and a set screw **44** is provided to hold the wrench and screw in operative position.

Figure 5 diagrammatically shows two of the devices mounted upon a calender such as a linoleum sheeting calender where they are used to sever a ribbon of material from the sheet.

The shaft **5** is mounted in the bearing brackets **45** and **46** provided on the calender frame. The ends of the shaft **5** are cylindrical to permit rotary motion of the shaft **5** to bring the cutter **12** into its approximate position with respect to the surface of calender roll **47**. Set screws **48** and **49** are provided for locking the shaft **5** in adjusted position.

In operation of the device, the shaft **5** is rotated to a position where cutter **12** is close to the surface of calender roll **47**. Set screws **48** and **49** are then tightened to lock the shaft **5** in adjusted position. A flat or flats may be provided on the shaft to be engaged by the set screws. Flats are provided on each end portion of the shaft shown in Figure 5. Clamping screw **34** on split holder **33** is loosened and the cutter mechanism shifted to approximately the desired position along the axis of the calender roll **47**. The clamping screw is then drawn down, clamping the split holder **33** to the shaft **5**. Ratchet wrench **42** is then operated to turn screw **37** to traverse the cutter housing and bring cutter **12** into the final desired lateral position. The screw **37** may be long enough to permit a

one-inch adjustment in either direction from an initial position as shown in Figure 3.

After proper lateral adjustment has been attained, the cutter housing **2** is pivoted about sleeve **4** and shaft **5** to bring cutter **12** into position to sever a sheet disposed on calender roll **47** and formed between roll **47** and another complementary calender roll **50**, a portion only of which is shown in Figure 5. This pivotal motion is effected by turning hand wheel **24** of the adjusting nut **23** to extend or retract the clevis rod **30**. The adjusting screw barrel **19** is journaled in supports **16** and **17** which are fixed to sleeve **4**, and clevis rod **30** is pivoted to tongue **31** of housing **2** by clevis pin **32**. Thus motion of hand wheel **24** causes the cutter housing **2** to rotate about the sleeve **4** to move the cutter **12** toward and away from the calender roll **47**. Preferred practice is to set the cutter **12** so that its edge barely engages the roll to avoid any scoring of the roll surface. Thereby no substantial force is applied to the roll by the cutter, but sufficient force is applied to the cutter through spring **26** to insure that the cutter will fully penertate the sheet of linoleum **51** formed on the calender, the spring **26** acting against the resistance of the sheet of linoleum **51** to penetration by the cutter **12**.

Should it be found that the cutter is not fully penetrating the sheet, additional force can be applied by turning the hand wheel **24** while the calender is in operation, and the spring **26** will be compressed to an extent adequate to increase the force applied to the cutter to cause the cutter to penetrate the sheet. This will vary with different types of mixes and with sheets of varying thicknesses.

Where two or more cutters are provided, each will be adjusted in a similar manner. As shown in Figure 5, some of the units may have lateral adjusting arrangements provided on the right side of the device while others may have the lateral adjusting mechanism on the left-hand side. Any number of cutters may be provided. The cutters of the present invention are suitable for use as selvage cutters when mounted adjacent to the roll ends. The invention will be found useful in slitting materials of various kinds, including linoleum, rubber, plastic and other materials. It is particularly useful on calenders where marring of the roll surface by the slitter or slitters can not be tolerated.

It will be clear from the foregoing that the cutter may be brought into adjusted position with respect to the material to be severed disposed on the roll without in any manner altering the predetermined minimum force applied by the spring, but that, if necessary, the spring tension may be increased, even during operation of the calender, to effect proper severance of the material. This adjustability is not affected by reduction in the diameter of the cutter due to sharpening, for the cutter housing is pivotable to bring the cutting edge into the desired relationship with the roll.

I claim:

1. In a slitting device, the combination of: a shaft; a sleeve mounted on the shaft; a housing rotatable about the sleeve as a bearing; means secured to the sleeve for pivoting said housing about said sleeve comprising a support projecting from the sleeve and fixed with respect thereto, an adjusting screw pivoted to said housing, an adjusting screw barrel pivoted to said support, an adjusting nut for said screw slidable within said barrel and rotatable therein, and yielding means disposed between said adjusting nut and barrel to urge the adjusting nut and adjusting screw threaded therein in one direction and compressible upon sliding movement of said nut in an opposite direction; and a cutter carried by said housing.

2. In a slitting device, the combination of: a sleeve, a housing rotatable about the sleeve, a support projecting from the sleeve and fixed with respect thereto, an adjusting screw barrel pivoted to said support, with the axis of the pivot parallel to the axis of said sleeve, an adjusting screw pivoted to said housing, an adjusting nut for said screw slidable within said barrel and rotatable therein for moving said adjusting screw, a spring received within said barrel between a shoulder thereon and a retainer carried by said adjusting nut to urge the adjusting screw carried by the adjusting nut to an extended position and compressible upon sliding movement of said nut in an opposite direction, and a cutter rotatably carried by said housing.

3. In a slitting device, the combination of: a shaft, a sleeve mounted on said shaft, said sleeve being fixed against rotation with respect to said shaft, a housing rotatable about said sleeve as a bearing, a leg depending from said housing, a cutter rotatably mounted on said leg, a support projecting from said sleeve and fixed with respect thereto, a barrel pivoted to said support, an adjusting nut slidable within said barrel, a clevis rod pivoted to said housing at said leg, said clevis rod being threaded into said adjusting nut received within said barrel, and yieldable means disposed between said barrel and nut for urging said clevis rod toward an extended position to maintain the cutter carried by said housing into yieldable slitting relationship with the material to be slit.

4. In a slitting device, the combination of: a shaft; a slitting cutter supporting and adjusting unit carried by said shaft and comprising a sleeve movable along said shaft, a housing mounted on said sleeve and rotatable about said sleeve, and means secured to said sleeve for pivoting said housing about said sleeve comprising a support projecting from the sleeve and fixed with respect thereto, an adjusting screw pivotally secured to the housing, an adjusting screw barrel pivotally secured to said support, an adjusting nut for said screw slidable and rotatable within said barrel, and means disposed between said barrel and nut for yieldably urging said screw to an extended position; a cutter rotatably carried by the housing; and means for moving the unit along said shaft comprising a holder secured to the shaft and an adjusting screw rotatably secured to the holder against axial movement with respect to said shaft and received within a threaded opening provided in said unit, rotation of said screw traversing said unit along said shaft.

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