

Sept. 21 , 1926.

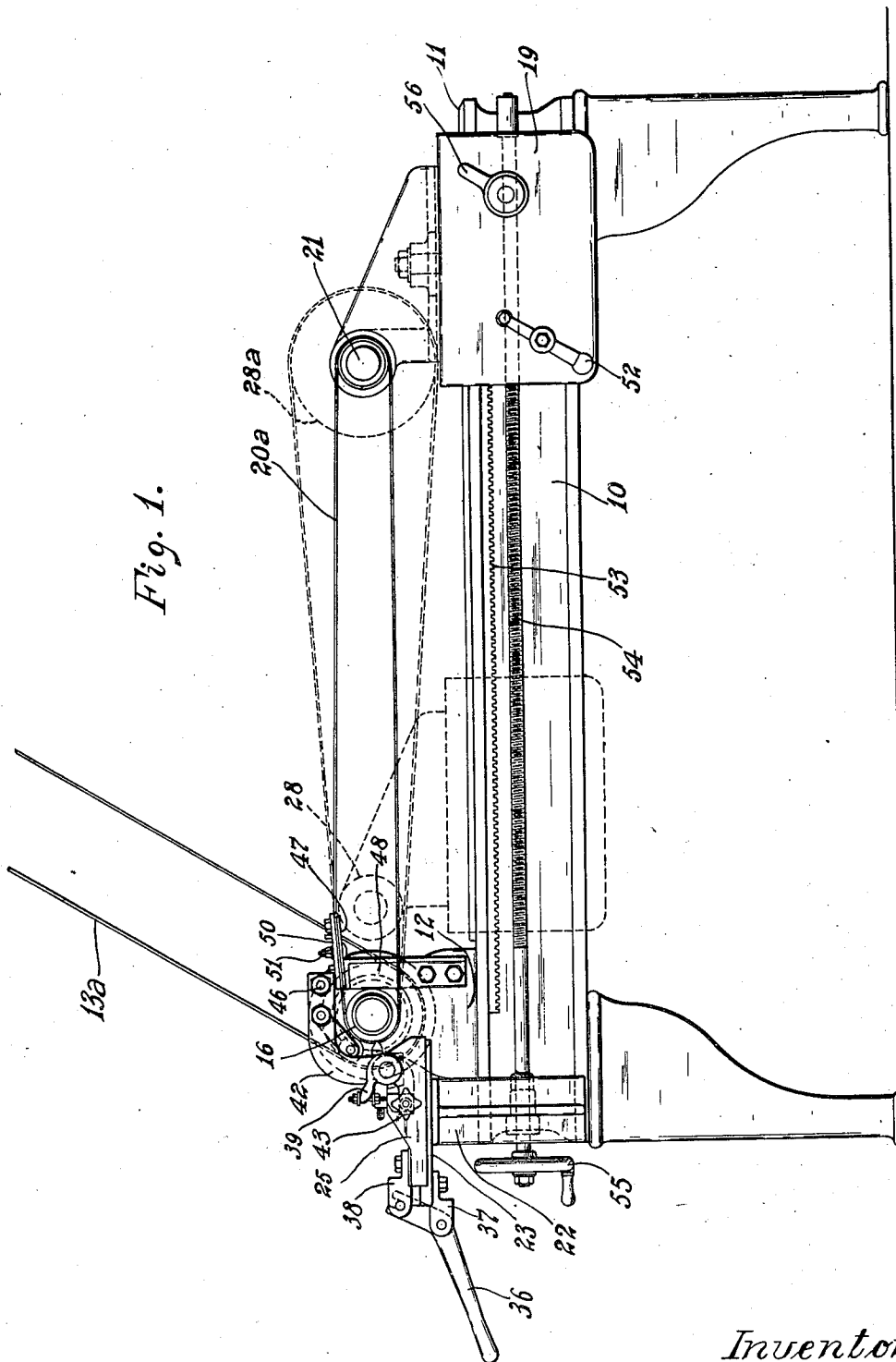
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METHOD AND APPARATUS FOR SLITTING SHEET MATERIAL

Filed June 27, 1921

3 Sheets-Sheet 1



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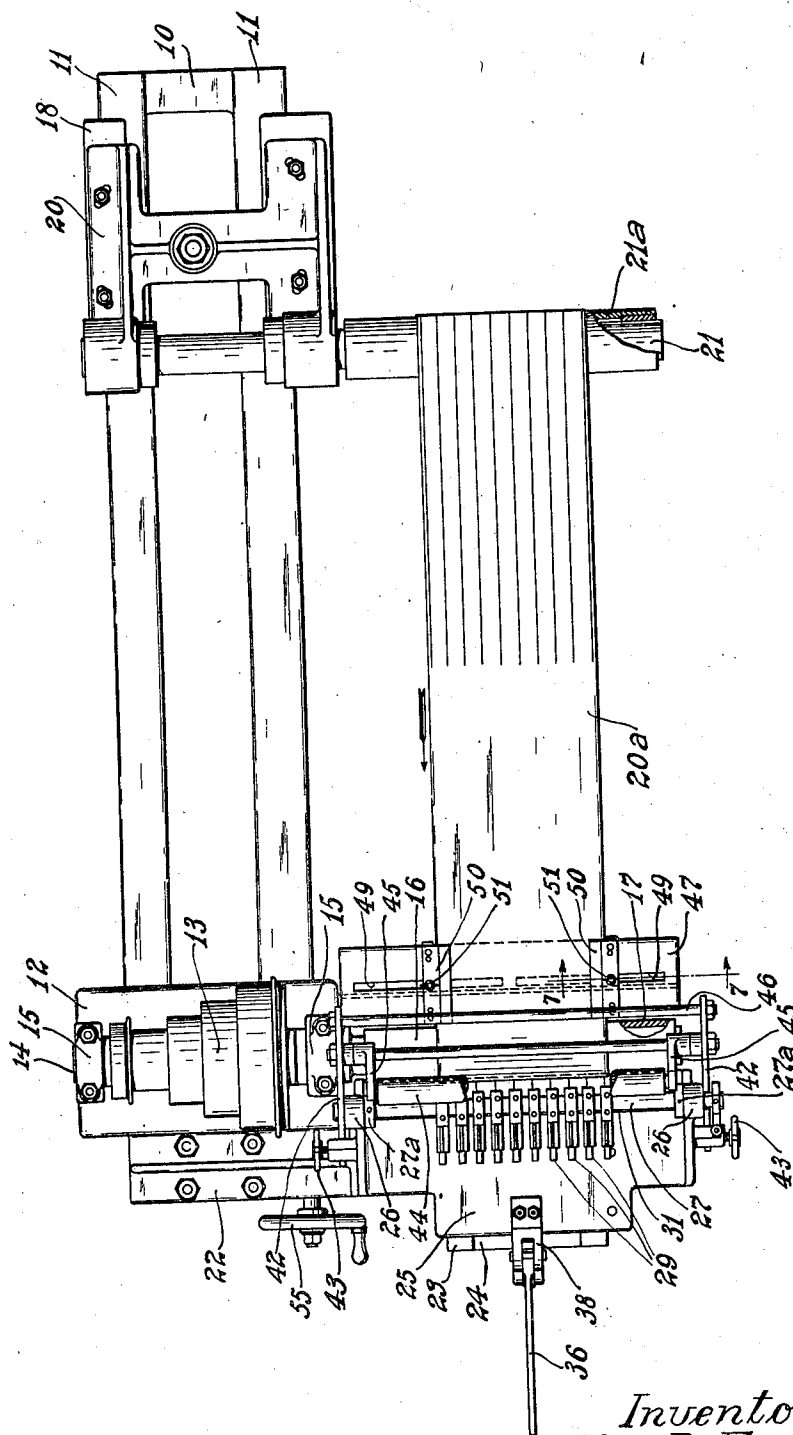
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3 Sheets-Sheet 2

Fig. 2.



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3 Sheets-Sheet 3

Fig. 3.

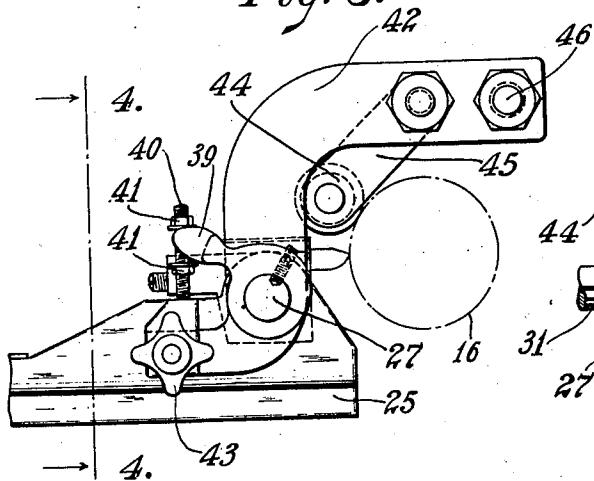


Fig. 4.

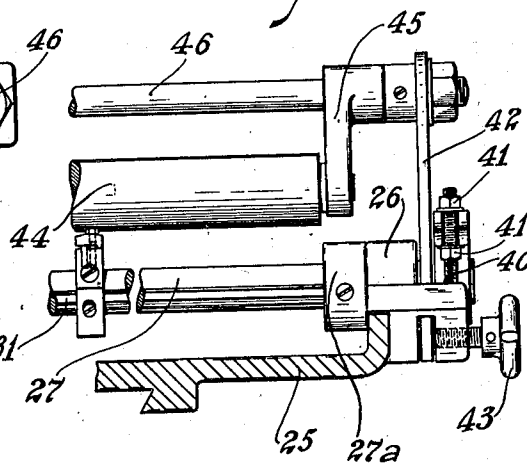


Fig. 5.

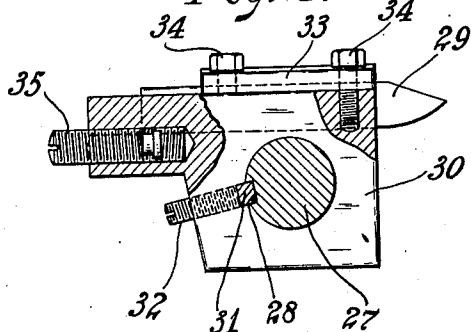


Fig. 6.

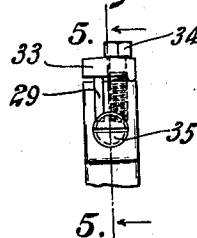


Fig. 7.

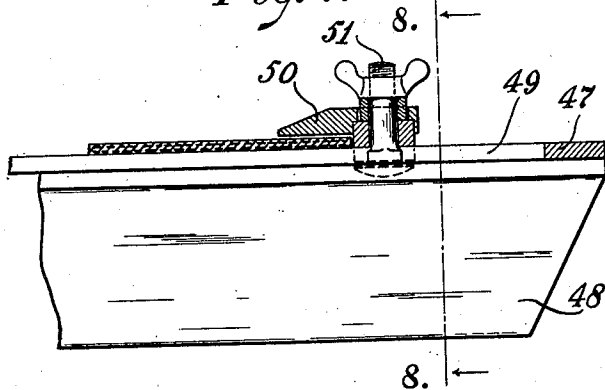
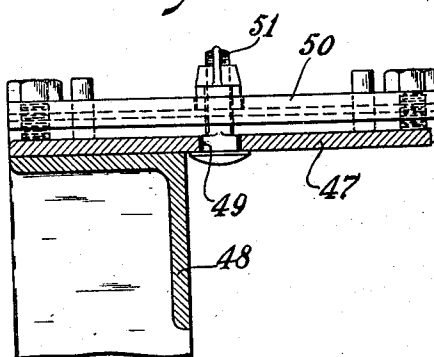


Fig. 8.



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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR SLITTING SHEET MATERIAL.

Application filed June 27, 1921. Serial No. 480,677.

This invention relates to the art of slitting sheet material wherein the work is progressively drawn past a knife or set of knives. The embodiment herein described is a machine for cutting an endless band such as a rubber or rubberized fabric belt into a plurality of endless bands or belts of narrower widths.

The object of my invention is to provide a method and machine by which the slitting operation may be accurately and rapidly performed, and which readily may be used upon endless bands of material of different lengths.

Of the accompanying drawings:—

Fig. 1 is a side elevation of a machine embodying and adapted to carry out a preferred form of my invention, showing the work in place.

Fig. 2 is a plan view of the same.

Fig. 3 is a side view of a knife and presser roller mounting.

Fig. 4 is a partial section on line 4—4 of Fig. 3.

Fig. 5 is a side view, partly in section, on line 5—5 of Fig. 6, of a knife and a holder therefor.

Fig. 6 is an end view of the same, looking toward the work.

Fig. 7 is a section through one of the adjustable side-guides, on line 7—7 of Fig. 2.

Fig. 8 is a section on line 8—8 of Fig. 7.

Referring to the drawings, 10 is a frame formed with guide-ways 11, 11 lengthwise thereof. 12 is a bearing member secured transversely upon said frame near one end thereof and supporting a cone pulley 13, on a shaft 14, loosely journaled in bearings 15, 15 on said bearing member, and 13^a is a drive-belt. 16 is an overhanging, belt-supporting roll secured upon an extension of the shaft 14 and preferably provided with an exterior coating of soft rubber 17. A carriage 18 is slidably mounted upon the guide-ways 11 of the frame 10 and provided with an apron 19 and with a double bearing-bracket 20, adjustably secured thereon, in which latter is loosely journaled, transversely of the frame 10, an overhanging belt-supporting spindle or arbor 21, in alignment with the roll 16 at the other end of the frame. 21^a is a cylindrical drum or roll detachably mounted upon the spindle 21, and 20^a is the work, in the form of an

endless band, in position upon the rolls 16 and 21^a.

At the end of the frame 10 adjacent the bearing member 12 is a bracket 22 extending from the frame parallel with the overhanging roll 16. A table 23 is secured upon said bracket 22 and formed with a dovetail guideway 24 parallel with the frame 10. A tool head or knife-holding slide 25 is mounted in said guideway and provided with adjustment bearings 26, 26 for a knife-supporting rod 27 formed with a lengthwise key-seat 28. 27^a, 27^a are adjustable collars secured upon the rod 27 adjacent the bearings 26. A set of knives 29, 29 having their points adjacent the rubber-covered roll 16 are secured in clamps 30, 30 slidably keyed upon the rod 27 by a key 31. 32 is a set-screw threaded through the clamp 30, abutting against the key 31, and adapted to secure the clamp in a desired longitudinal position upon the rod 27. The knives 29, by cap-plates 33 and stud-bolts 34, 34 are adjustably secured in grooves formed in the clamps 30. 35 is a set-screw threaded into the rear end of the clamp 30, its inner end being formed with a swivel-flange which engages a notch in the knife 29. The knives are adapted to be moved from and toward the work by a lever 36 pivoted in a bracket 37 secured to the table 23, and formed at its inner end with a fork which engages a pin in a forked bracket 38 secured to the slide 25.

Means for adjusting the inclination of the knives comprises a lever 39 secured upon the outer end of the knife-supporting rod 27, its outer end being formed with a fork which straddles a stud-bolt 40 mounted upon the slide 25, and is adjustably secured thereon by nuts 41, 41.

Pivotally mounted upon the ends of the rod 27 are S-shaped brackets 42, 42 their lower ends fitting into notches on the under side of overhanging extensions from the slide 25 and being clamped therein by hand-screws 43, 43. A presser roller 44 is journaled in links 45 pivotally suspended from said brackets 42, 42, and adapted to press the work against the rubber-covered roll 16 to compel it to move therewith in accurate alignment. 46 is a brace-rod connecting the upper ends of the brackets 42, 42.

An over-hanging feed-table 47 is sup-

ported from the bearing member 12 by a bracket 48, said feed-table being formed with slots 49, 49 (Figs. 2 and 7) disposed transversely of the machine. 50, 50 are adjustable overhanging side-guides mounted upon said feed-table 47 and secured thereto by clamping bolts 51, 51, slidably mounted in said slots.

Journalled upon the apron 19 is a hand-wheel 52 provided with gears, not shown, co-operating with a rack 53 for major movements of the carriage 18 upon the guideways 11. 54 is a feed-screw provided with a hand-wheel 55 for minor longitudinal adjustment of the carriage 18 upon the guideways 11. A locking-lever 56 is provided, with the usual divided clamping nut, not shown, for holding the carriage 18 and the feed-screw 54 in or out of threaded engagement.

In the operation of the machine the knives 29 are withdrawn from the roll 16 by lowering the lever 36, and the presser roller 44 is swung over out of the way on its links 45 until the latter rest upon the brace-rod 46 or, if more working space is desired, the brackets 42 may be swung about the rod 27. A relatively broad endless band 20^a adapted to be slit lengthwise into a plurality of endless belts of narrower width is then mounted upon the roll 16 and the roll 21^a and the upper reach of said band is inserted between the overhanging side-guides 50, 50 upon the feed-table 47. The knives 29 are adjusted lengthwise of the rod 27 according to the widths of the belts desired. The locking-lever 56 is operated to disengage the carriage 18 from the feed-screw 54 and the hand-wheel 52 is turned to run the carriage back until the endless band 20^a is drawn approximately taut between the roll 16 and the roll 21^a.

The carriage 18 is then caused to be engaged by the feed-screw 54 by turning the locking-lever 56, and the band 21^a is appropriately stretched by turning the hand-wheel 55, and the presser roller 44 is swung back to press the band 20^a against the roll 16. Power is then applied, revolving the roll 16 counter-clockwise as viewed in Fig. 1, and the set of knives 29 carried by the slide 25 are brought into cutting position by raising the lever 36. Thus the band 20^a is slit lengthwise on a plurality of lines by the knives 29, and I find that with this arrangement I am able to cut the band accurately, each line of cut returning to its starting point upon the work when the band 20^a has made one complete circuit. The stretching of the band facilitates the cutting action of the knives and the accurate feeding of the work. The feed table 47, being positioned so as to hold the work slightly out of a straight course, and being close to the roll against which the knives act, is adapted to

steady the work as it passes onto said roll and to prevent lateral flexure of the work under the force of the side guides, and yet the sliding contact of the table with the work permits the latter to respond more freely to the force of the guides than it would if carried upon the surface of a roll at the position of the guides. The table exerts only a moderate force against the work, and the "friction in motion" of the work and the table offers small resistance to the force of the guides, which latter are not required to initiate relative movement between the work and the table.

The overhanging feature of said table and the work-supporting rolls, and the quickly operable tensioning means shown permit the ready mounting and removal of the work.

The rubber coating upon the roll against which the knives cut permits the latter to extend entirely through the work, even though the ends of the knives are not all in perfect alignment transversely of the work. A clean cut is thus obtained, and this without exerting such force against the ends of the knives as to disturb their angular relation and result in an objectional, helical cut.

For belts of ordinary length or extremely short belts, the small drum 21^a as shown in full lines in Figs. 1 and 2 is used, as its axis may be brought close to the roll 16 as indicated in dotted lines at 28, Fig. 1. For belts of greater length than can be held extended by the roll 21^a at its outermost position on the guideways 11, I substitute a larger roll as shown in dotted lines at 28^a in Fig. 1.

The alignment of the knives 29 with each other may be adjusted by momentarily loosening the stud-bolts 34 and adjusting the set-screws 35, and the tilt of their cutting edges may be varied by adjustment of the lever 39 by means of the nuts 41 on the stud-bolt 40. Endwise play of the rod 27 is prevented by adjustment of the collars 27^a.

I am aware that parts of the machine may be varied or used in other combinations without departing from the invention, and I do not desire to limit myself wholly to the specific construction shown.

I claim:—

1. The method of making endless belts from fibrous sheet material which comprises forming an endless band of said material, thereafter stretching said band, and circumferentially driving said band, while holding it so stretched, past a stationary slitting device, whereby said endless band is cut into a plurality of endless belts.

2. The method of making endless belts of fibrous sheet material which comprises forming of said material a transversely flat,

endless band adapted to be longitudinally severed into a plurality of endless belts of equal length, and circumferentially driving said band past a stationary slitting knife, in slitting relation thereto, while supporting and tensioning said band by engagement with its inner face at isolated, spaced positions, whereby said band is cut into a plurality of endless belts.

3. A belt-cutting machine comprising a plurality of aligned, cylindrical, parallel rolls adapted to support an endless band of material by engagement with its inner face, means for tensioning said band upon said rolls, means for driving one of said rolls to drive said band, means for guiding said band, and a cutter adapted to slit said band longitudinally into a plurality of endless belts as it is so driven.

4. A belt-cutting machine comprising a cylindrical belt driving roll, a cylindrical belt supporting roll, said rolls being adapted to engage the inner face of an endless band mounted thereon, means for varying the distance between said rolls to tension said band, said means comprising a track member, a roll-support slidably mounted thereon, and means for moving said roll-support along said track member, means for guiding said band, and a cutting device adapted to sever an endless band of material mounted upon said rolls into a plurality of endless belts.

5. A machine for slitting sheet material comprising a plurality of revolvable, work-supporting members adapted to hold an endless band under tension by engagement with its inner face, means for driving one of said members, and a series of knives secured in spaced relation to each other laterally of the work and adapted to be introduced to and withdrawn from the work concurrently, to sever the latter into a plurality of endless belts.

6. A machine for slitting sheet material comprising a plurality of over-hanging, revolvable, work-supporting members adapted freely to receive the work from an axial direction, means for driving one of said members, and a cutter adapted to be introduced to the work to sever the latter into a plurality of endless belts.

7. A machine for slitting sheet material comprising a plurality of overhanging, revolvable, work-supporting members adapted to support an endless band by engagement with its inner face, means for driving one of said members, a cutter adapted to be introduced to the work as it passes around one of said members, and means for guiding the work onto the last said member by engagement with the lateral edges of the work.

8. A machine for slitting sheet material comprising a plurality of revolvable work-supporting members adapted to hold an

endless band under tension by engagement with its inner face, means for driving one of said members, a cutter adapted to be introduced to a band as it passes around one of said members, and a presser roller adapted to bear upon said member adjacent said cutter, immediately at the side of said cutter from which the work approaches.

9. A belt-cutting machine comprising means for supporting under tension and circumferentially driving an endless band of belt forming material, by engagement with the inner face of said band at isolated positions, a soft backing member for said band, a slitting knife, and means for holding said knife against said soft backing member in slitting relation to said band.

10. A belt-cutting machine comprising a pair of parallel, aligned rolls adapted to support and drive an endless band of belt-forming material by engagement with its inner face, a soft cover upon one of said rolls, and a plurality of spaced apart knives adapted to be held against said soft cover in slitting relation to said band.

11. A belt-cutting machine comprising a plurality of parallel, aligned rolls adapted to support and drive an endless band of belt-forming material by engagement with its inner face, a cutter at one of said rolls adapted to sever said band longitudinally at a part thereof passing about said roll in contact therewith, and a coating of soft rubber upon said roll.

12. A belt-cutting machine comprising a plurality of parallel, aligned rolls adapted to support and drive an endless band of belt-forming material by engagement with its inner face, a cutter at one of said rolls adapted to sever said band longitudinally at a part thereof passing about said roll in contact therewith, a feed table adapted to hold the band out of a straight course, by sliding contact therewith, as said band passes onto said roll, and side guides adapted to act upon the edges of said band as the latter slides upon said feed table.

13. A belt-cutting machine comprising a plurality of parallel, aligned, overhanging rolls adapted to support and drive an endless band of belt-forming material by engagement with its inner face, an overhanging guide-table adapted to hold the band out of a straight course as it passes from one of said rolls to another, said guide table and said rolls being adapted freely to receive said band from a direction parallel to said rolls, means for driving one of said rolls to drive said band, means for tensioning said band, and a slitting device adapted to cut said band into a plurality of endless belts as said band is so driven.

14. A belt-cutting machine comprising a plurality of parallel, aligned, cylindrical rolls adapted to support and drive an end-

less band of belt-forming material by engagement with its inner face, a knife, a support for said knife adapted to hold the latter in slitting relation to said band as the latter is so driven, and means for securing said knife on said support in different positions laterally of the work.

15. A machine for slitting sheet material comprising a rubber-coated work-supporting roll, a slide adapted to be moved from and toward said roll in a direction transverse to the latter's axis, and a set of knives mounted upon said slide and adapted to be adjusted relative to each other upon said slide.

16. A machine of the class described comprising means for supporting and driving the work, a slide adapted to be moved from and toward the work, a set of knives mounted on said slide and adapted to be presented to the work, means for adjusting said knives from and toward each other, means for adjusting said knives individually from and toward the work, and means for adjusting the tilt of each knife.

17. A machine for slitting sheet material comprising means for supporting and driving the work, a tool head adapted to be moved from and toward the work, a hand lever for so moving said tool head, a bar journaled on said tool head, a set of clamps slidably mounted upon said bar, means for securing said clamps in different positions upon said bar, means for securing said bar in different rotary positions, and knives adjustably secured in said clamps.

18. A machine for slitting sheet material comprising a roll adapted to support and drive an endless band of material, a cutter adapted to be introduced to the work as it passes around said roll, and a spindle adapted to be adjusted relative to said roll to tension said endless band, said spindle being adapted to receive rolls of different sizes for tensioning endless bands of different lengths.

19. A machine for slitting sheet material comprising an overhanging roll adapted to support and drive an endless band of material, a splitter adapted to be introduced to the work as it passes around said roll, a slide mounted for movement toward and from said roll, a second overhanging roll mounted on said slide in alignment with the first roll, and a screw feed device for adjusting said slide, said overhanging rolls being adapted freely to receive said endless band in operative relation from an axial direction.

20. A machine for slitting sheet material comprising an overhanging roll adapted to support and drive an endless band of mate-

rial, a splitter adapted to be introduced to the work as it passes around said roll, a slide mounted for movement toward and from said roll, a second overhanging roll mounted on said slide in alignment with the first roll, a screw feed device for adjusting said slide, and means for enabling and disabling said screw feed device, said overhanging rolls being adapted freely to receive said endless band in operative relation from an axial direction.

21. A machine for slitting sheet material comprising an overhanging roll adapted to support and drive an endless band of material, a splitter adapted to be introduced to the work as it passes around said roll, a slide mounted for movement toward and from said roll, a second overhanging roll mounted on said slide in alignment with the first roll, a screw feed device for adjusting said slide, means for enabling and disabling said screw feed device, and a rack and pinion device for moving said slide when said screw feed device is disabled, said overhanging rolls being adapted freely to receive said endless band in operative relation from an axial direction.

22. A belt-slitting machine comprising a plurality of rolls adapted to tension and drive an endless band of belt material, a set of non-rotating knives adapted to be brought against the work on said rolls in substantially normal relation thereto, and quick-acting, hand-operated means for so actuating said knives as a group.

23. In a belt cutting machine, mechanism for rotating a loop of belting in a substantially oblong path, in combination with cutting elements movable toward and from said path, means for gradually feeding said cutting elements toward said oblong path for cutting said loop into strips during its rotation, and means for adjusting said elements.

24. In a machine for longitudinally cutting belts, a belt rotating means, and driving means therefor, tension elements adapted to maintain a suitable tension in said belt, a cutting element, and means for advancing it into cutting contact with said belt.

25. In a machine for longitudinally cutting belts, a belt rotating means, and driving means therefor, adjustable tension elements adapted to maintain a suitable tension in said belt, a cutting element, and means for advancing it into cutting contact with said belt.

In witness whereof I have hereunto set my hand this 21 day of June, 1921.

WALTER B. FREEMAN.