This invention relates to a slitter for sheet material and more particularly to a slitter for removing marginal feed bands from a plurality of superposed stationery strips. The severing or cutting of continuous stationery strips may be accomplished by rotary cutting wheels in a slitter such as that shown in the copending application of John E. Euth, Serial No. 766,991 filed October 13, 1958, and assigned to a common assignee. In such a machine, the stationery is fed to the cutting heads of the blades by a rotary pin wheel or the like, which also properly positions the paper strips so that the desired portion of the feed bands bearing the pin wheel perforations is removed. Difficulties often arise, however, when the paper is not properly aligned on the pin wheels. When this happens, uneven cutting and wrinkling of the paper results. It is even possible to jam the machine in some instances.

The problems of misalignment of the stationery at the trimming cutters is solved by the invention to be described herein. In general, the present invention uses a rotary element to urge the paper into the proper alignment without actually gripping the paper. It has been found that the action of this new structure controls the paper for accurate feeding to the slitters.

It is therefore, the primary object of this invention to provide a new and improved slitter of the character described.

It is another object of this invention to provide a slitter mechanism in which the strips of stationery are properly positioned on the pin wheels for presentation to the cutting blades.

It is yet another object to provide such a mechanism in which the paper is properly positioned adjacent the pin wheel but spaced therefrom to urge the perforate feed band into proper alignment with the pin wheel to provide proper presentation of the stationery to the rotary cutters.

It is a still further object of this invention to provide a stationery slitter having a pair of driven shafts with a pin wheel positioned on one of the shafts, a cutting blade mounted beside the pin wheel on the shaft, a second cutting blade mounted on the other shaft and a rotatable roller positioned in driving contact with the pin wheel and having a surface spaced from the pin bearing portion of the pin wheel adapted to urge the perforate feed band into proper alignment with the pins to provide proper presentation of the stationery to the blades.

Other objects and advantages of this invention will be apparent from the following description taken together with the accompanying drawings, in which:

FIGURE 1 is a partial top plan view of the slitter of this invention showing a stationary strip passing through, which is partially broken away for clarity.

FIGURE 2 is an enlarged vertical sectional view of the cutting blades and rotary hold down roller taken along the line 2--2 of FIGURE 1.

FIGURE 3 is an enlarged partial side view showing the drive for the slitter of this invention.

FIGURE 4 is an enlarged fragmentary vertical sectional view showing a fold in a strip of stationery entering the slitter taken along the line 4--4 of FIGURE 1.

FIGURE 5 is an enlarged partial vertical sectional view of the gear drive taken along the line 5--5 of FIGURE 1.

FIGURE 6 is an enlarged partial vertical sectional view of the cutting blades taken along the line 6--6 of FIGURE 1.

FIGURE 7 is an enlarged fragmentary sectional view of the rotary hold down roller and the pin wheel taken along the line 7--7 of FIGURE 1.

The slitter of the present invention may be used for various slitting operations on continuous form stationery and interleaved carbon strips and may be used in connection with various types of machines found in business offices using continuous form stationery. The principles of operation of the slitter of this invention may be utilized in other processes and with other equipment.

Referring now to the drawings, FIGURE 1 shows a pair of slitting devices 10 mounted on portions 11 and 12 of the frame of a burning machine. Continuous form stationery S is shown passing through the burning machine in the direction of the arrows. The middle of the stationery S is broken away for clarity in the description of the slitters on the machine. The marginal feed bands 13 and 14 on the stationery S are shown attached to the stationery in the lower portion of FIGURE 1 before it passes through the machine. These feed bands are also partially shown in dotted lines at 13a and 14a as they are passing through the slitters. At this point the marginal feed bands are of course, slit from the stationery S and are dropping away to a waste pile.

The slitters 10 which are shown in FIGURE 1 are left and right hand units which are the same except for being mirror images of each other. In the description of the slitter one complete unit will be described, though views are taken in both the left and right hand units.

The units are mounted on rotatable shafts 15 and 16. For ease of description the units will be divided into an upper slitter portion 17 mounted on the shaft 15 and a lower slitter portion 18 mounted on the shaft 16. The shafts are journaled in the frame portions 11a and 12a. Several spacer bars 19, 20, 21 and 22 are also mounted in the frame portions 11a and 12a of the burning machine to provide a rigid structure.

The upper portion of the slitter 17 which is clearly shown in FIGURE 6 includes a sleeve 23 which slides horizontally on the shaft 15. A circular blade 25 is attached to a front flange 23a on the sleeve 23 by means of several screws 26 which pass through the blade into the face of the flange 23a. A second sleeve 28 has a skirt 28a which fits over the end of the sleeve 23. These sleeves are held in position by the set screw 24 which passes through them. A helical spring is located between the rears of the flange 23a of the sleeve 23 and a flange portion 28b of the sleeve 28. The spring gives the blade 25 a desirable resiliency. A set screw 29 passes through the flange portion of the sleeve 28 and abuts against the shaft 15 and thus holds the entire upper unit on the shaft.

The position of the unit may be varied depending on the width of the paper S.

A safety guard 30 is provided to protect the operator of the burning machine from cutting himself on the upper blade 25. This often happens since strips of stationery have only one perforate edge which need be removed. As can be seen in FIGURE 2, the guard 30 rotates about the sleeve 23 and has a cam opening 30a through which the spacer bar 21 passes. This bar 21 and opening 30a provide a guide for the guard plate 30. A retaining ring 65 seated in a channel 23b in the sleeve 23 holds the guard in place. A washer 66 is held in place on the guard by a nut 67. This washer provides an over center lock to hold the guard in the up X or down Y position. The guard 30 is placed in the upper X position when the upper slitter 17 is not in use to protect the operator, and also so that the margin 13 can pass through
under the guard without disturbance when it is not being trimmed off. The guard 30 is placed in the down Y position when the slitter is in use. In this position it also serves as a trim deflector since the portion 30a guides the trimmed margin 13a to a trash collecting portion not shown.

The lower slitter member 18 is quite similar to the upper slitter member 17. However, it also includes a pin wheel 33 for advancing the paper through the slitter. The pin wheel 33 is part of a sleeve 32 which is rotated by and slides on the shaft 16. The outer end of the sleeve 32 is a flange 34. The inner part 34a of the flange 34 is of a smaller diameter than the rest of the flange and contains a plurality of radially extending pins 35 which make up the pin wheel 33. The outer part 34b of the periphery of the flange 34 is raised and provides a driving surface for the rotary hold down roller 36 which will be described later. A set screw 37 passes through the flange 34 and engages a keyway 16a in the lower shaft 16 thus anchoring the sleeve 32. A second sleeve 38 fits over the sleeve 32 and is held in position thereon by a second set screw 39. A lower blade 27 which is similar to the upper one, is attached to this second sleeve by means of a group of screws 40. The blades 25 and 27, 20 and lower slitter unit, about each other until the units are in position and the upper blade 25 overlaps the lower blade 27 slightly so that when rotating, they will slit the paper S as it passes between them. The pin wheel 33 advances the paper between the shafts 15 and 16 and the blades 25 and 27 by means of the radially extending pins 35 which are inserted into the perforations in the marginal strips.

The rotary hold down roller 36 is supported on a bolt 76 on an arm 41. The arm 41 is supported for rotation on the spacer bar 20. A helical spring 68 is wound around the arm 20 and abuts against a flange 42 on the arm 41 to force the rotary hold down roller 36 against the driving portion of the flange 34. The roller 36 has a raised outer portion 43 which rides on the flanged portion 34 so that the roller is rotated by this frictional contact. The inner portion 45 is of less diameter than the outer portion 43 so that when the flange 34 and roller 36 are in contact, there will be a space thick enough for a slot of stationery between the inner portion 45 and the surface of the pin wheel 33. A channel 44 is also provided in the inner portion 45 of the roller 36. This channel is designed to receive the pins 35 of the pin wheel 33.

A pair of paper platforms 46 are provided to support the paper as it exits slit. These are hooked over the spacer bars 20 and 22 by means of an eye 46a which holds the platform on the bar 20 and a square-shaped metal clip 47 welded at the outer edge which holds the platform on the bar 22. The platform thus provides a surface which roughly approximates the point of passage of the stationary strip between the blades 25 and 27 and gives the stationery a surface to ride on while being slit. Openings 46b are left in the platform to accommodate the slitters and the pin wheels.

The drive for the slitters is shown in FIGURES 3 and 5. A conventional electric motor 69 is mounted by brackets 48 which are bolted 49 to a portion of the bursting machine frame 50. A drive belt 51 passes around a drive pulley 52 on the motor shaft 53 and an upper pulley 54 which is mounted on a stub shaft 55 having a hand turn knob 71 journalled in a bracket 56 screwed 70 to the bursting machine frame 11a. A smaller spur gear 57 is also mounted on the inner end of the shaft 55. This gear 57 meshes with a larger spur gear 58. The gear 58 is mounted on the outer end of the drive shaft 45 which is journalled in the bearing 59 also mounted in the bracket 56. A second gear 60 is also mounted on the drive shaft 15 inwardly of the gear 58. This gear meshes with a similar gear 61 mounted on the lower shaft 16 which is also journalled 62 in the bracket 56. Thus the shaft 15 and 16 are rotated at substantially the same speed through the meshed pin gear 45 and the sprocket 63 is also mounted on the shaft 55 outwardly of the gear 57. A chain 64 is shown passing around this sprocket which may be used to drive other portions of the bursting machine not shown.

In operating the slitter of this invention a strip of stationery material having marginal feed bands 13 and 14 along its edges is threaded into the slitter between the drive shafts 15 and 16 so as to mesh with the pin wheels 33. The position of the slitting units and the pin wheels, is of course, adjusted by sliding the slitters along the drive shafts and then anchoring them by means of the set screws 37 and 29 to properly meet the marginal feed bands. As the strip of stationery advances through the slitters under the drawing force of the pin wheels 33 the portion 45 of the rotary hold down roller 36 which is spaced from the pin wheel is rotating with a surface speed slightly less than that of the advancing speed of the paper. This is so because the portion 45 is of smaller diameter than the raised portion 43 and the flange 34 of the pin wheel which are in driving contact. Since the portion 45 of the roller 36 is not in contact with the paper S it places no force on it. However, when a tent or fold 59 such as shown at F in FIGURE 4 or some other misalignment in the paper is presented to the slitters 15 and 16, it will gently urge the paper into a flattened condition and urge the perforations on the pins 35 of the pin wheel 33. This gives a proper presentation of the paper to the cutting blades 25 and 27 avoiding jagged cutting, and the like. As can be seen in FIGURE 5, the paper is held by the pins through the cutting operation since the pin P is synchronized to be substantially right at the point of cutting between the blades 25 and 27. After the marginal feed bands are slit from the paper they drop downwardly to a trash collecting portion not shown, while the remainder of the stationery proceeds through the bursting machine.

Thus the slitter of this invention is able to provide a neat straight edged cut and to prevent jamming and clogging of the slitter because the rotary hold down rollers 36 urge the stationery on to the pin wheels even though there may be folds or other misalignments in the paper.

Having thus described my invention as related to the embodiment shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description unless otherwise specified, but rather be construed broadly within the spirit and scope as set out in the accompanying claims.

I claim:

1. An improved stationery slitter for removing a perforate feed band from a strip of stationery, comprising: paper slitting means adapted to slit a strip of moving stationery; rotatable means including a pin wheel mounted adjacent said slitting means adapted to engage the perforations in said stationery to advance the same through said slitting means; and driven rotatable means positioned adjacent and in driving contact with a portion of said rotatable means but having at least a portion of its surface laterally spaced radially outwardly from said pin wheel, said stationery being adapted to pass between said spaced portion of said rotatable means and said pin wheel to urge said perforate feed band into proper alignment with said pin wheel to provide proper presentation of said stationery to said slitting means.

2. An improved stationery slitter for removing a perforate feed band from a strip of stationery, comprising: paper slitting means adapted to slit a strip of moving stationery; rotatable means including a pin wheel mounted adjacent said slitting means having generally radially extending pins adapted to engage the perforations in said stationery to advance the same through said slitting means; and driven rotatable means positioned adjacent and in driving contact with a portion of said rotatable means, said rotatable means having a surface spaced
laterally outwardly in a radial direction a small distance from the pin bearing portion, said stationery being adapted to pass between said surface and said pin bearing portion whereby said surface though normally not in direct contact therewith tends to urge said perforate feed band into proper alignment with said pins and does directly contact irregularities in said stationery to urge them into proper alignment to thereby provide over-all proper presentation of said stationery to said slitting means.

3. An improved stationery slitter for removing a perforate feed band from a strip of stationery, comprising: paper slitting means adapted to slit a strip of moving stationery; rotatable means including a pin wheel mounted adjacent said slitting means having generally radially extending pins adapted to engage the perforations in said stationery to hold and advance the same to said slitting means whereby it is slit while held on said pin wheel; and a driven rotatable roller positioned adjacent and in frictional driving contact with a portion of said rotatable means, said roller having a surface spaced laterally outwardly in a radial direction a small distance from the pin bearing portion, said stationery being adapted to pass between said surface and said pin bearing portion whereby said surface though normally not in direct contact therewith tends to urge said perforate feed band into proper alignment with said pins and does directly contact irregularities in said stationery to urge them into proper alignment to thereby provide over-all proper presentation of said stationery to said slitting means.

4. An improved stationery slitter for removing a perforate feed band from a strip of stationery, comprising: paper slitting means adapted to slit a strip of moving stationery; a rotatable pin wheel mounted adjacent said slitting means, a first portion of the periphery of said pin wheel having generally radially extending pins adjacent thereto for the purpose of engaging the perforations in said stationery to hold and advance the same to said slitting means whereby it is slit while held on said pin wheel; said wheel having a second portion adjacent said pins, remote from the first portion and said slitting means and a roller positioned in driving contact with the said second portion of the periphery of said pin wheel so as to be rotated by said pin wheel, said roller having a surface spaced laterally outwardly in a radial direction a small distance from the pin bearing portion, said stationery being adapted to pass between said surface and said pin bearing portion whereby said surface though normally not in direct contact therewith tends to urge said perforate feed band into proper alignment with said pins and does directly contact irregularities in said stationery to urge them into proper alignment to thereby provide over-all presentation of said stationery to said slitting means.

5. An improved stationery slitter for removing a perforate feed band from a strip of stationery, comprising: paper slitting means adapted to slit a strip of moving stationery; a rotatable pin wheel mounted adjacent said slitting means, one portion of the periphery thereof remote from the slitting means being slightly raised, another portion between the raised portion and slitting means having generally radially extending pins adapted to engage the perforations in said stationery to hold and advance the same to said slitting means whereby it is slit while held on said pin wheel; and a roller held down roller having a first peripheral portion positioned in driving contact with said raised portion of said pin wheel, said roller having a second peripheral portion of a diameter less than said first portion located adjacent but spaced laterally outwardly in a radial direction a small distance from the pin bearing portion of said pin wheel and said roller rotating at a speed greater than said pin wheel, said stationery being adapted to pass between said surface and said pin bearing portion whereby said second portion though normally not in direct contact therewith tends to urge said perforate feed band into alignment with said pins and does directly contact irregularities in said stationery to urge them into proper alignment to thereby provide over-all proper presentation of said stationery to said slitting means.

6. An improved stationery slitter for removing a perforate feed band from a strip of stationery, comprising: paper slitting means adapted to slit a strip of moving stationery; a rotatable pin wheel mounted adjacent said slitting means, one portion of the periphery thereof remote from said slitting means being slightly raised, another portion between said raised portion and the slitting means having generally radially extending pins adapted to engage the perforations in said stationery to hold and advance the same to said slitting means whereby it is slit while held on said pin wheel; and a roller held down roller positioned adjacent said pin wheel and having a first peripheral portion positioned in driving contact with said raised portion of said pin wheel, said roller having a surface spaced laterally outwardly in a radial direction a small distance from the pin bearing portion, said stationery being adapted to pass between said surface and said pin bearing portion whereby said second portion though normally not in direct contact therewith tends to urge said perforate feed band into proper alignment to thereby provide over-all proper presentation of said stationery to said slitting means.

7. An improved stationery slitter for removing a perforate feed band from a strip of stationery, comprising: a pair of spaced driven shafts; a pin wheel mounted on one of said shafts and adapted to engage the perforations in said stationery to advance the same between said shafts; a first cutting blade mounted beside said pin wheel on said shaft and having a cutting edge at the periphery of the wheel; a second cutting blade mounted on the other shaft and having a cutting edge adapted to cooperate with said first blade cutting edge to slit a strip of stationery moving therebetween; and a rotatable roller positioned in driving contact with said pin wheel remote from said cutting blades and having a surface intermediate said driving contact and cutting blades spaced laterally outwardly in a radial direction a small distance from the pin bearing portion of the pin wheel, said stationery being adapted to pass between said surface and said pin bearing portion whereby said surface though normally not in direct contact therewith tends to urge said perforate feed band into proper alignment with said pins and does directly contact irregularities in said stationery to urge them into proper alignment to thereby provide over-all presentation of said stationery to said blades.

8. An improved stationery slitter for removing a perforate feed band from a strip of stationery, comprising: a pair of spaced driven shafts; a pin wheel mounted on one of said shafts, one portion of the periphery thereof having generally radially extending pins adapted to engage the perforations in said stationery to hold and advance the same between said shafts; a first cutting blade mounted beside said pin wheel on said shaft and having a cutting edge at the periphery of the wheel; a second cutting blade mounted on the other shaft and having a cutting edge adapted to cooperate with said first blade cutting edge to slit a strip of stationery moving therebetween; and a roller positioned in driving contact with a portion of the periphery of said pin wheel remote from said cutting blades and having a surface intermediate said driving contact and said blades spaced laterally outwardly in a radial direction a small distance from the pin bearing portion, said stationery being adapted to pass between said
surface and said pin bearing portion whereby said surface though normally not in direct contact therewith tends to urge said perforate feed band into proper alignment with said pins and does directly contact irregularities in said stationery to urge them into proper alignment to thereby provide over-all proper presentation of said stationery to said blades.

9. An improved stationery slitter for removing a perforate feed band from a strip of stationery, comprising: a pair of spaced driven shafts; a pin wheel mounted on one of said shafts, one portion of the periphery thereof being slightly raised, the other portion having generally radially extending pins adapted to engage the perforations in said stationery to hold and advance the same between said shafts; a first cutting blade mounted on said shaft beside said pin wheel on the pin bearing side thereof and having a cutting edge at the periphery of the wheel; a second cutting blade mounted on the other shaft and having a cutting edge adapted to cooperate with said first blade cutting edge to slit a strip of stationery moving therebetween; and a rotary hold down roller positioned adjacent said pin wheel and having a first peripheral portion in driving contact with the raised portion of said pin wheel remote from said cutting blades, the other peripheral portion of said roller having a diameter less than said first portion being positioned adjacent but spaced laterally outwardly in a radial direction a small distance from the pin bearing portion of said pin wheel and adapted to rotate at a surface speed slower than said pin wheel, said other portion having a pin receiving channel therein, said stationery being adapted to pass between said surface and said pin bearing portion whereby said other portion though normally not in direct contact therewith tends to urge said perforate feed band into proper alignment with said pins and does directly contact irregularities in said stationery to urge them into proper alignment to thereby provide proper over-all presentation of said stationery to said blades.

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