April 4, 1961 R. K. POTTLE 2,978,093

SHEET SLITTING MACHINE WITH STRIP HOLDING AND RELEASING DEVICE

Filed April 16, 1958

3 Sheets-Sheet 1

Fig. 1

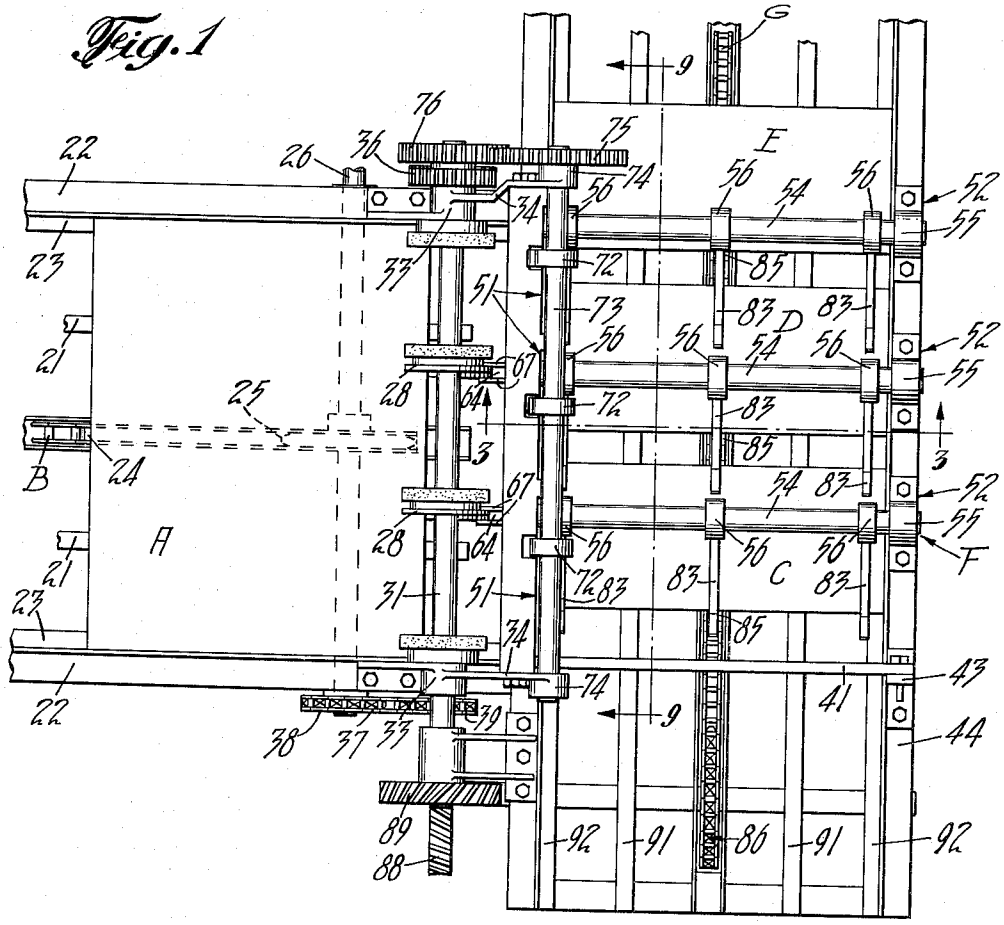
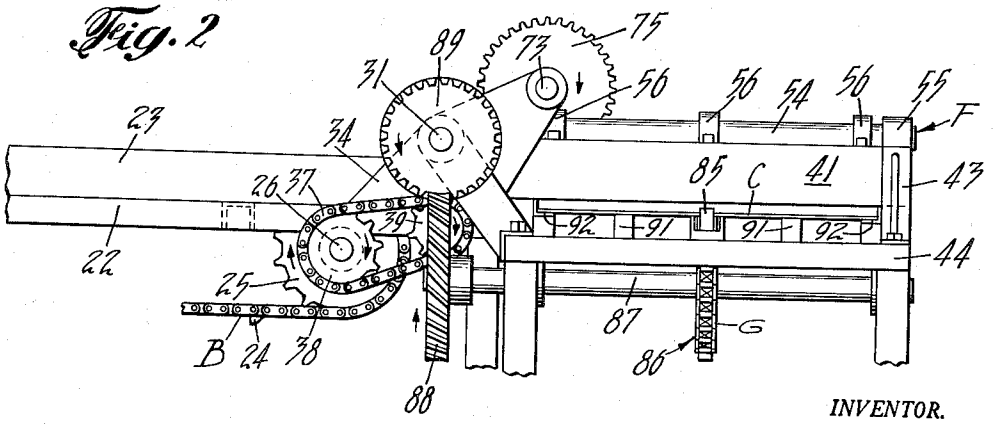


Fig. 2



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SHEET SLITTING MACHINE WITH STRIP HOLDING AND RELEASING DEVICE

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Fig. 3

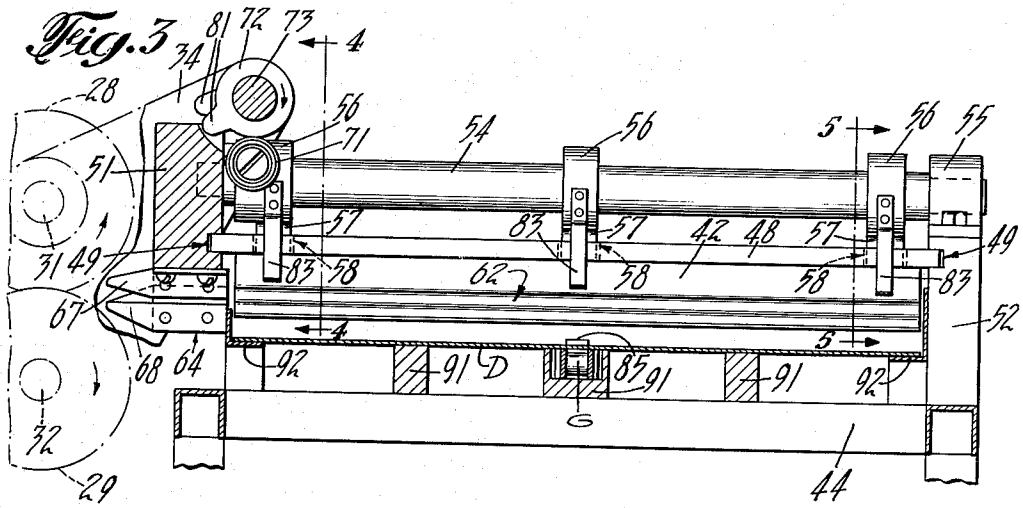


Fig. 4

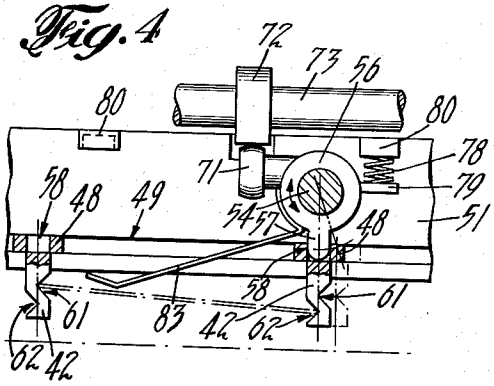


Fig. 5

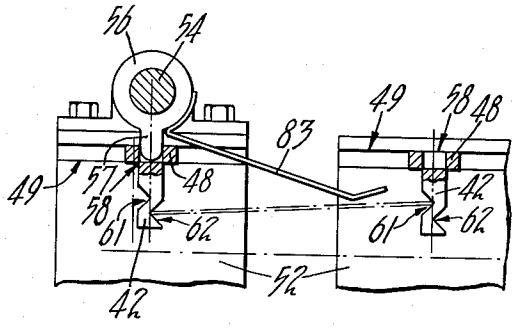


Fig. 6

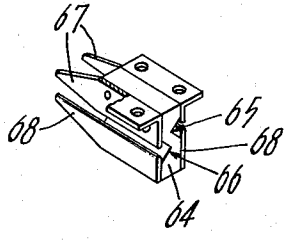
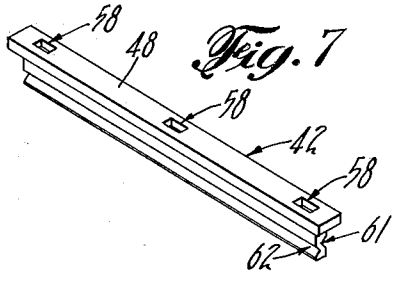


Fig. 7



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3 Sheets-Sheet 3

Fig. 9

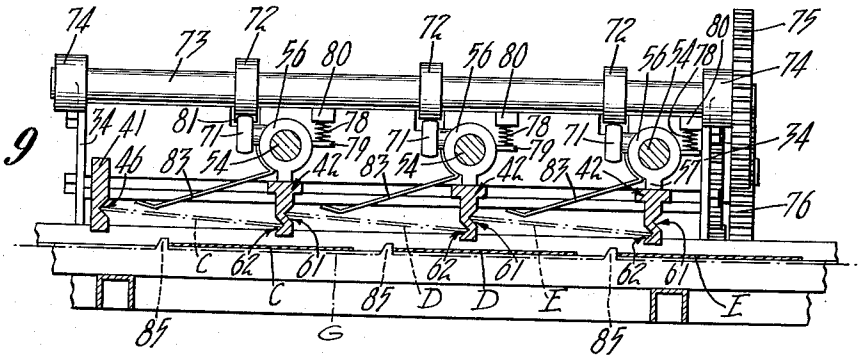


Fig. 10

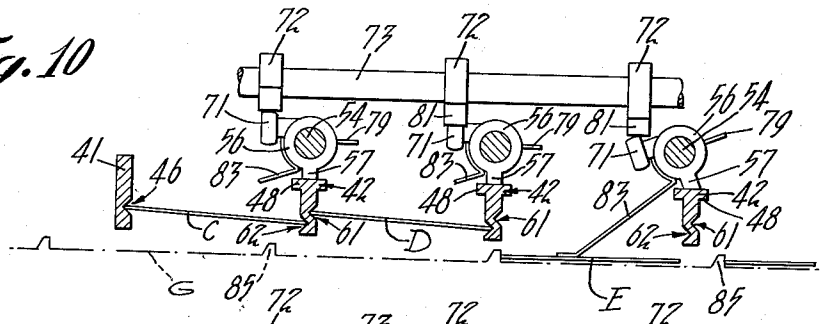


Fig. 11

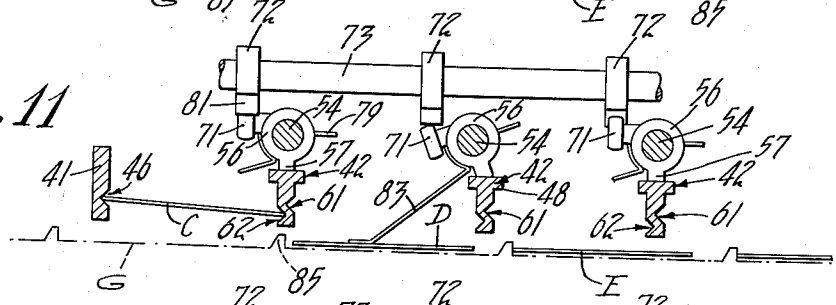


Fig. 12

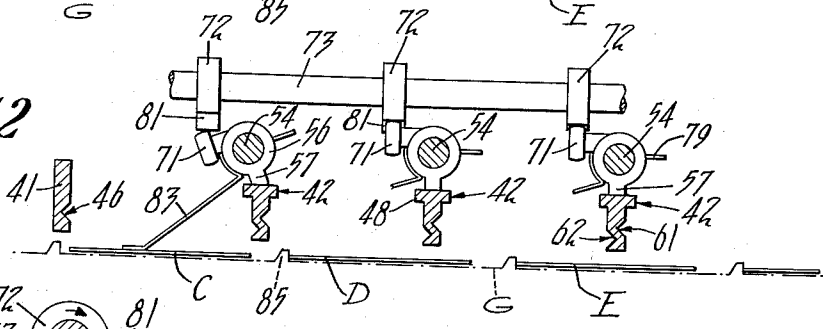
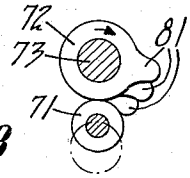


Fig. 8



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2,978,093

SHEET SLITTING MACHINE WITH STRIP HOLDING AND RELEASING DEVICE

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Filed Apr. 16, 1958, Ser. No. 728,894

3 Claims. (Cl. 198—34)

The present invention relates to machines for feeding and splitting or cutting sheets or blanks and has particular reference to reciprocating devices for receiving the cut sheets or blanks and for releasing them in timed spaced relation for further advancement.

This invention is an improvement over the structure disclosed in my United States application 445,283 filed July 23, 1954, now United States Patent Number 2,849,098.

In the manufacture of cans or containers, sheet material, such as tin plate or aluminum for metallic containers and fibre material for fibre containers, is cut into strips or blanks to be subsequently formed into container bodies or other container parts. Cutting such material into strips or blanks preferably is effected by slitting rollers which merely slit the material without leaving any space between adjacent blanks. Where further feeding of the severed blanks by engagement with their newly cut edges is contemplated, difficulty is sometimes encountered because of the lack of space between the blanks.

In the instant invention, adjacent or coterminous edges of the cut blanks are shifted vertically, one edge being elevated and the other being depressed for engagement by mechanically operated devices which can be readily operated to release the blanks in succession so as to space and time them for further advancement.

An object of the instant invention is the provision in a slitting machine of an improved mechanically operated holding and releasing device which is non-rocking or non-oscillating but which in its simplest form is merely planarly or laterally movable in a straight line, for receiving the blanks resulting from the slitting operation and for releasing them in spaced and timed order for further advancement, to overcome certain failings in electrical and magnetic devices of a similar character.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings.

Fig. 1 is a top plan view of a slitting machine embodying the instant invention, with parts broken away;

Fig. 2 is a side elevation of the machine shown in Fig. 1, with parts broken away;

Fig. 3 is an enlarged sectional view taken substantially along the line 3—3 in Fig. 1, with parts broken away;

Figs. 4 and 5 are detailed sectional views taken substantially along the respective lines 4—4 and 5—5 in Fig. 3;

Fig. 6 is a perspective view of a slit blank edge elevating device shown in Fig. 3;

Fig. 7 is a reduced perspective view of one of the blank edge holding elements shown in Figs. 3, 4 and 5;

Fig. 8 is a schematic side view of a cam device shown in Fig. 3;

Fig. 9 is an enlarged sectional view taken substantially along the line 9—9 in Fig. 1, with parts broken away; and

Figs. 10, 11, and 12 are schematic views similar to Fig. 9 and showing various stages in receiving and releasing in proper sequence, slit blanks to be further advanced after the slitting operation.

As a preferred and exemplary embodiment of the instant invention the drawings illustrate the principal parts of a tandem slitting machine of the type disclosed in United States Patent 2,355,079 issued August 8, 1944, to L. L. Jones on Sheet Slitting Machine. In such a machine large primary metal sheets A (Fig. 1), of substantially rectangular configuration are conveyed longitudinally of the machine by a primary conveyor B and are trimmed and initially cut or slit into a plurality of smaller strips or blanks from which container parts are made. The drawings show three such strips C, D, E although the primary sheets A may be cut into any number of smaller strips depending upon the width desired.

The strips C, D, E as initially cut, with substantially no spaces between their cut edges, are received in a holding and releasing device F which temporarily locates and holds the strips and then releases them in succession so that they fall in timed and spaced order onto an auxiliary conveyor G (Fig. 1) located preferably at right angles to the path of travel of the primary sheets A. The auxiliary conveyor G advances the strips C, D, E in timed and spaced relation for transversely cutting into smaller portions preferably to produce individual can body blanks or other container parts.

The primary sheets A enter the machine preferably in processional and timed order on the conveyor B from any suitable source of supply and are supported in a substantially horizontal position on support rails 21 (Fig. 1) carried in a frame 22 which is part of the main frame of the machine. Side guides 23 supported on the frame 22 guide the sheets A.

The conveyor B preferably is an endless chain provided with spaced feed dogs 24 for engaging behind the primary sheets A to advance them as shown in the above mentioned Jones Patent 2,355,079. The conveyor preferably is operated continuously by a sprocket 25 (Figs. 1 and 2) which is mounted on a sprocket shaft 26 journaled in bearings formed in the machine frame 22. The sprocket shaft 26 is the main drive shaft and is rotated in any suitable manner.

The conveyor B advances the primary sheets A into the grip of pairs of cooperating upper and lower slitting rollers or cutters 28, 29 (Figs. 1 and 3). These cutters 28, 29 are mounted on and rotate with, spaced and parallel upper and lower slitter shafts 31, 32 which extend across the path of travel of the primary sheets A and which are journaled in bearings 33 formed in brackets 34 attached to the frame 22. The two slitter shafts 31, 32 are rotated in unison through a pair of meshing gears 36 (Fig. 1) mounted one on each of the two shafts. The lower slitter shaft 32 is driven from the sprocket shaft 26 through an endless chain 37 (Figs. 1 and 2) which operates over a driving sprocket 38 on the sprocket shaft 26 and over a sprocket 39 on the slitter shaft 32.

As the primary sheets A are fed into the grip of the slitting rollers 28, 29, the rollers continue the advancement of the sheets and feed them through and simultaneously slit the sheets along longitudinal lines of severance to produce the strips C, D, E. Since the severing of the sheets into strips is a slitting operation, no spaces are produced between the strips along the lines of severance while they are being cut. As their cut portions leave the slitting rollers and advance toward the releasing device F, the newly slit edges of the strips are in substantially abutting relation.

The releasing device F is disposed immediately adjacent the slitter rollers 28, 29 and preferably comprises a stationary notched support bar or element 41 and a plu-

rality of notched, planarly movable support bars or elements 42 all of which extend out over the auxiliary conveyor G and which are disposed in endwise alignment with the severed edges of the strips C, D, E being cut from the sheets A, including the outer edges of the sheets A or the trimmed edges if the sheets are trimmed.

The stationary support bar 41 (at the left as viewed in Fig. 9) is aligned with the outer or trimmed edge of the sheets A and is secured at one end to the adjacent bracket 34 and at its other end to a bracket 43 attached to an auxiliary frame 44 which supports the auxiliary conveyor G (see Figs. 1 and 2). The inner face of this stationary support bar 41 is formed with a longitudinal groove or notch 46 preferably having tapered sides for the reception of the outer or trimmed edge of a strip C cut from a sheet A.

The movable, support bars 42 preferably are each integrally formed with a flat, rectangular shaped, slide element 48 (see Fig. 7) which extends along the top edge of the bars. The ends of these slide elements 48 project beyond the ends of the bars 42 and slide in oppositely disposed horizontal grooves 49 (Figs. 3, 4 and 5) formed in a pair of spaced and parallel slide blocks 51, 52 secured to the auxiliary frame 44.

The support bars 42 are movable laterally relative to each other, along the slide grooves 49 through a suitable connection with a plurality of rocker shafts 54 (Figs. 1, 2, 3, 4 and 5) which are disposed above and parallel with the support bars. There is one rocker shaft 54 for each support bar. The outer ends of the rocker shafts 54 are journaled in bearings 55 secured to the slide blocks 52. The inner ends of the shafts are journaled in bearings formed in the slide blocks 51 (see Fig. 3). Each rocker shaft 54 carries a plurality of collars 56 having depending tongues 57 which operate in recesses 58 formed in the top of the slide element 48 of the support bars 42. This construction permits of a straight line or planar movement of the support bars 42.

Each of the support bars 42 in their side faces (at the right in Fig. 9) remote from the notched face of the stationary support bar 41, is provided with a longitudinal notch or groove 61 (see Figs. 4, 5, 7 and 9) having tapered sides or ledges which is similar to the notch 46 in the stationary support bar 41 and which is disposed at the same level or elevation as the notch 46. In a similar manner, the opposite faces (at the left in Fig. 9) of the movable support bars 42, i.e., the faces which face the notched face of the stationary support bar 41, are provided with longitudinal notches or grooves 62 having tapered sides or ledges which are disposed at a lower level or elevation than the notch 46 in the stationary support bar 41. This difference in level or elevation of the notches 61, 62 in each movable support bar 42 gives the bar an S-shape as viewed in Figs. 4, 5, 7 and 9. These notches 61, 62 in the support bars 42 are designed to receive the severed edges of the strips C, D, E.

The severed edges of the strips C, D, E are directed into the notches 61, 62 by short fixed support bars 64 (Fig. 6) which are similar to the support bars 42 and which form disconnected continuations of the bars 42. These bars 64 are provided with grooves or notches 65, 66 which align with the notches 61, 62 in the bars 42. The fixed bars 64 are secured to the bottoms of the slide blocks 51 as best shown in Fig. 3, guide plates 67, 68 secured to the fixed bars 64 extend toward and into close proximity to the slitting rollers 28, 29 as shown in Fig. 3, to guide the strip edges into the proper grooves or notches in the bars.

As the strips C, D, E are slit from the primary sheets A, they advance directly into the notches 65, 66 of the fixed support bars 64 and continue on into the notches 61, 62 of the bars 42 where they are temporarily held in suspended relation over the auxiliary conveyor G. The guide plates 67, 68 during this advancement, separate the abutting edges of the strips, vertically, to elevate one edge above the other for alignment of the edges with the proper notches. This results in a slight tilting of the strips transversely into angular positions as best shown in dotted lines in Fig. 9.

When the strips C, D, E are fully supported by the movable support bars 42 and the one stationary support bar 41, they are released in succession and in timed order by mechanical manipulation of the movable support bars 42, to drop vertically onto the auxiliary conveyor G for further advancement. This mechanical manipulation of the movable support bars is effected by cam action. For this purpose, the inner-most collar 56 on each rocker shaft 54, carries a cam roller 71 (Figs. 3 and 4) which rides against an edge cam 72 mounted on and rotating with a cam shaft 73 disposed adjacent and above the slide blocks 51 (see Fig. 1). The ends of the shaft 73 are journaled in bearings 74 in the brackets 34. The shaft is rotated continuously in time with the other moving parts of the machine, by way of a gear 75 mounted on the shaft and meshing with a gear 76 on the upper slitter shaft 31 (Fig. 1).

There is one edge cam 72 for each movable support bar 42. Compression springs 78 (Fig. 4) interposed between a lug 79 on the collars 56 and a lug 80 on the adjacent slide block 51, hold the cam rollers 71 against the edge cams 72.

Each edge cam 72 is formed with a high spot or actuating lug 81 (see Figs. 3 and 8) for depressing the cam rollers 71 at the proper time to rock the rocker shafts 54 and through their connection with the support bars 42, to slide the bars 42 along their grooves 49 in the slide blocks 51, 52 as mentioned hereinabove. The cam lugs 81 are located in circumferentially spaced relation, preferably about twelve degrees apart, as shown in Fig. 8, for lateral shifting of the support bars 42 in timed sequence.

In operation, the cam lug 81 at the extreme right as viewed in Fig. 10, and lowermost as viewed in Fig. 8, engages its cam roller 71 first and rocks the associated rocker shaft 54 counterclockwise as shown in Fig. 10. This action slides the associated support bars 42, horizontally, in a straight line, toward the right in Fig. 9, away from the next adjacent support bar 42, into the position shown in Fig. 10 and thus withdraws its support from under one edge of the strip E. A plurality of yieldable pressure fingers 83 attached to the collars 56 press down against the strip E during the rocking movement of the rocker shafts 54 and thus force the strip E out of its taper sided notch 61 in the adjacent support bar 42 (at the left in Fig. 10) as the support bar 42 on the right shifts laterally and thus press the strip down against the auxiliary conveyor G for further advancement.

This same operation is repeated for each of the movable support bars 42 as shown in Figs. 10, 11 and 12, to release their strips D, C to the auxiliary conveyor G, the strips being released in rapid succession and as soon as a preceding strip is clear of its supporting bars. As soon as a strip is released and delivered to the auxiliary conveyor G, its movable support bar 42 is shifted laterally through a return sliding movement to its original position in alignment with the short fixed support bars 64 for a repeat operation on the next primary sheet A.

The strips E, D, C as they are delivered to the auxiliary conveyor G in that order are received on the auxiliary conveyor G in timed relation to and in front of spaced feed dogs 85 (Figs. 1, 2, 3, 9) carried on the conveyor. This conveyor preferably is an endless chain which operates over a sprocket 86 (Fig. 2) mounted on a cross shaft 87 journaled in bearings in the auxiliary machine frame 44. The shaft is rotated continuously in time with the other moving parts of the machine by way of a helical gear 88 mounted on the shaft and meshing with a helical gear 89 carried on the upper slitter shaft 31 (see Fig. 1).

The upper run of the auxiliary conveyor G receives the strips C, D, E and conveys them to any suitable place of

deposit, along spaced and parallel support rails 91 and guide rails 92 (Figs. 1, 2 and 3) on the auxiliary frame 44.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A mechanism for slitting and feeding sheet material, comprising a conveyor having means for advancing the same, a plurality of spaced parallel support bars extending transversely over said conveyor for receiving and supporting opposite edges of strips of sheet material fed between adjacent bars, a plurality of rock shafts disposed in spaced parallel relation respectively above and parallel to said support bars, means for mounting said support bars for lateral planar movement in opposite directions relative and normal to the axes of said rock shafts, means connecting said rock shafts to said support bars respectively, and means for rocking said shafts in the same direction and in succession relative and in timed relation to each other to successively impart said lateral planar movement in one direction to said support bars to progressively increase the spacing between adjacent bars and thus positively and successively release said strips supported thereby to said conveyor for the advancement of said strips by the conveyor in spaced and timed order.

2. A machine for slitting and feeding sheet material,

comprising a conveyor having means for advancing the same, a plurality of spaced parallel support bars extending transversely over said conveyor for receiving and supporting opposite edges of strips of sheet material fed between adjacent bars, the opposite ends of said bars being mounted in slide grooves in the machine frame for lateral planar movement relative thereto, a plurality of rock shafts disposed in spaced parallel relation respectively above and parallel to said support bars, a plurality of tongue and groove connections between said rock shafts and said support bars, and means for rocking said shafts in the same direction and in succession relative and in timed relation to each other to slide the bars laterally in one direction in said slide grooves to progressively increase the spacings between adjacent bars and thus positively release said strips in succession to said conveyor for the advancement of said strips thereby in spaced and timed order.

3. The machine for slitting and feeding sheet material defined in claim 2, wherein said tongue and groove connections comprise a plurality of longitudinally spaced depending tongues on said rock shafts respectively projecting into a corresponding plurality of longitudinally spaced recesses in said support bars for the purpose specified.

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