June 19, 1934. E. L. WALKER ET AL 1,963,183

FEEDING AND SLITTING DEVICE

Filed Sept. 23, 1929 3 Sheets-Sheet 1

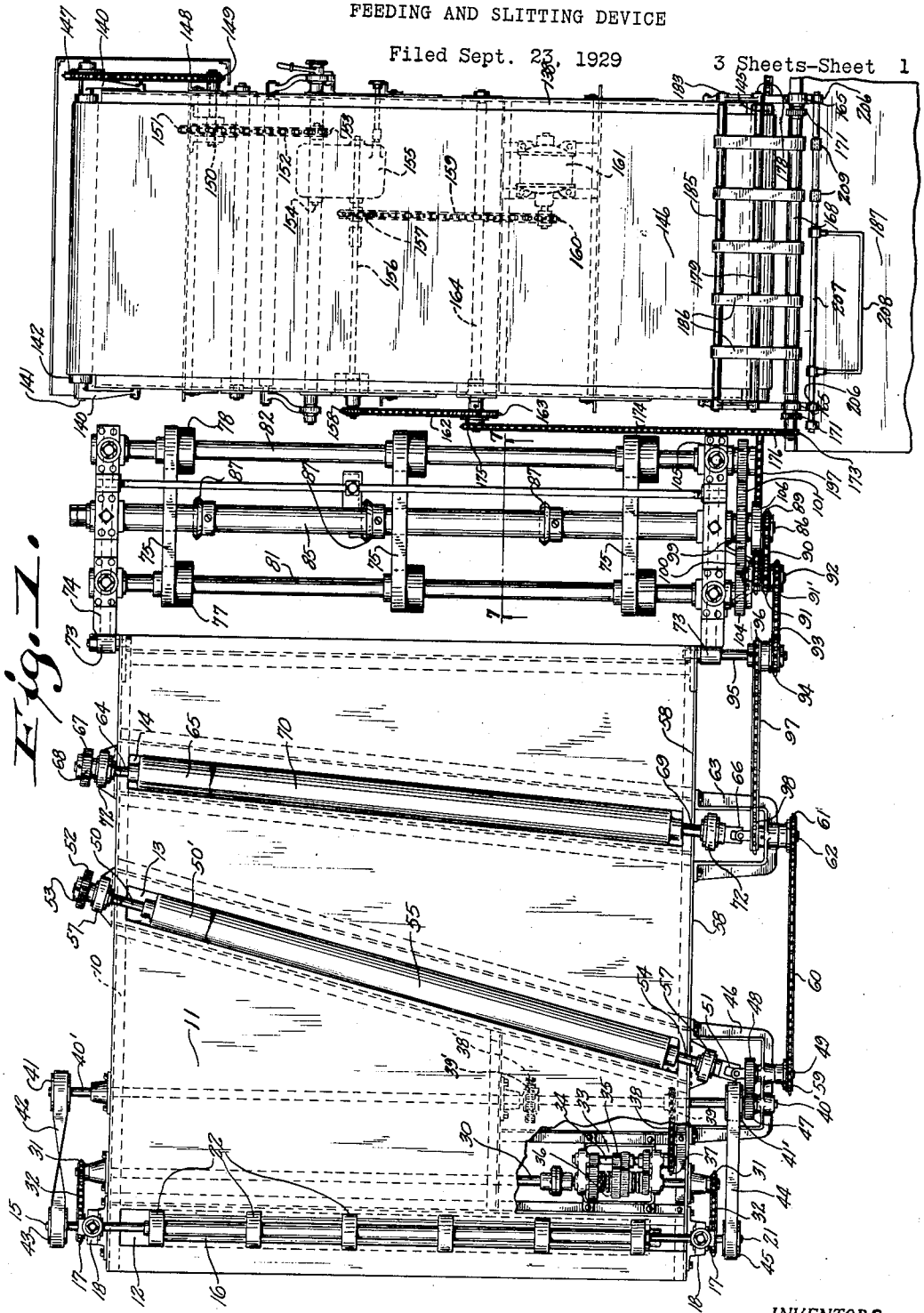

Fig. 1.

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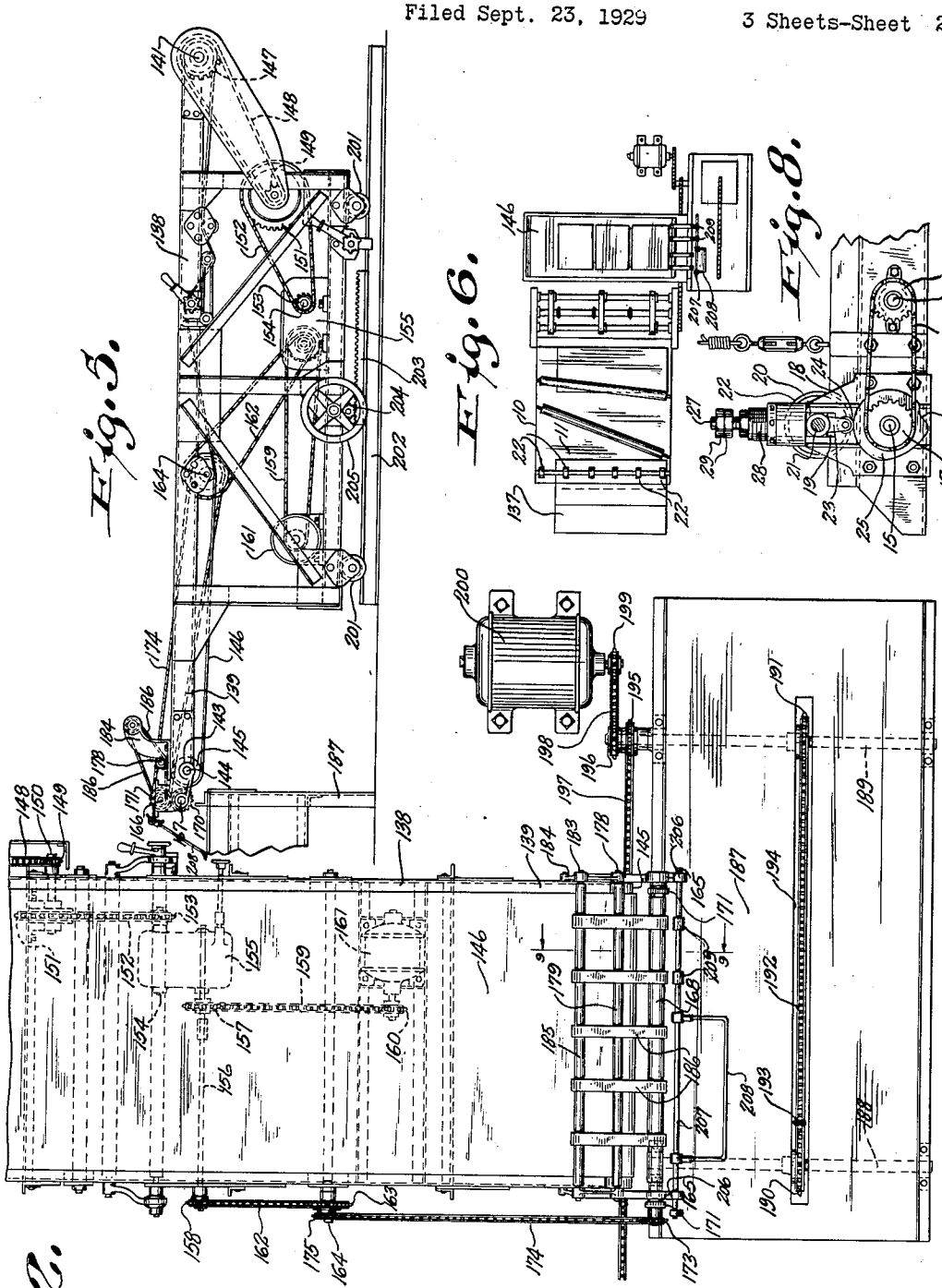

Fig. 2.

Fig. 5.

Fig. 6.

Fig. 8.

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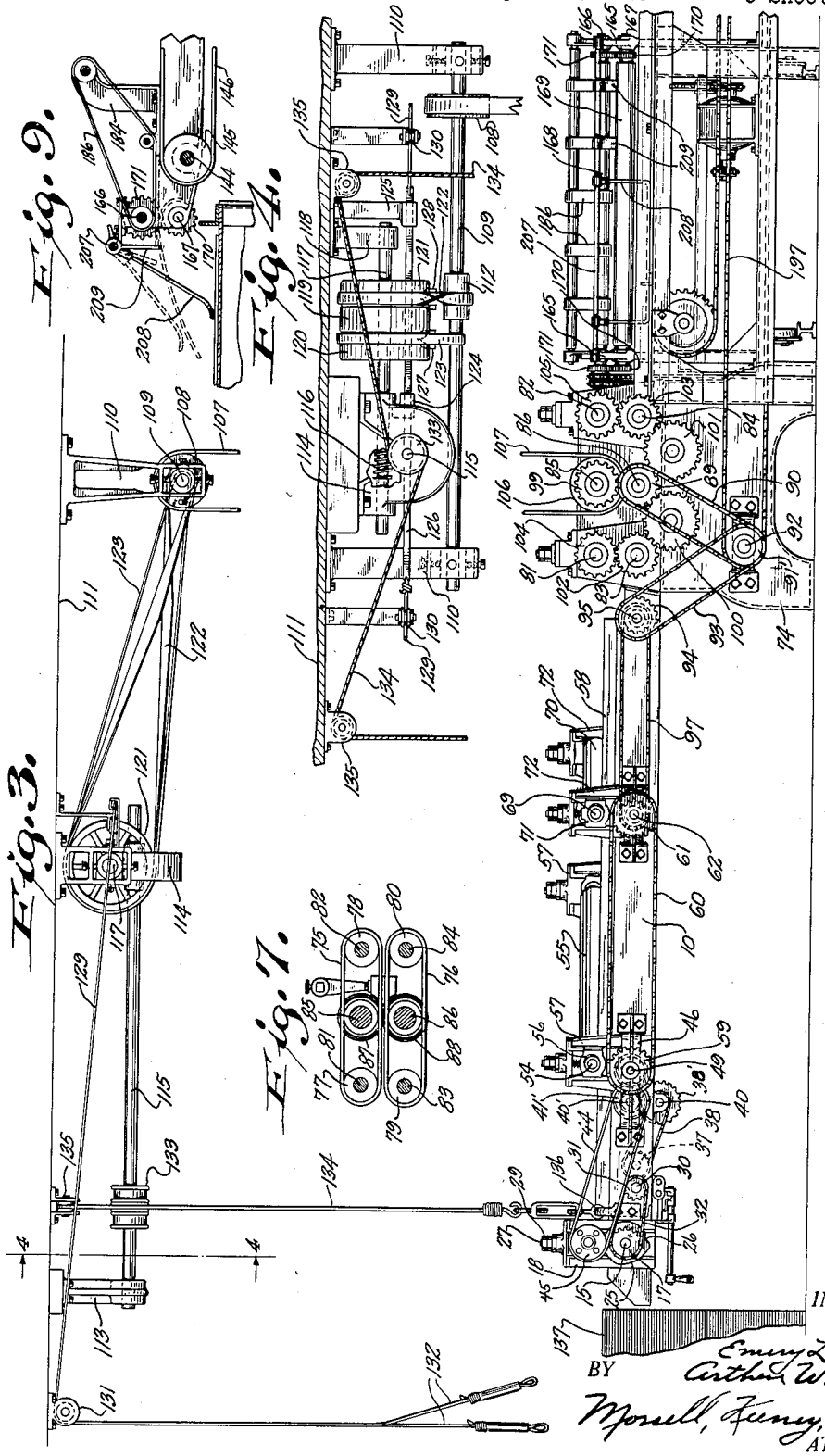

Fig. 3.

Fig. 4.

Fig. 7.

Fig. 9.

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FEEDING AND SLITTING DEVICE

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Application September 23, 1929, Serial No. 394,534

10 Claims. (Cl. 271—49)

This invention relates to improvements in sheet feeding and slitting devices.

It is one of the objects of this invention to provide a device which is adapted to receive wide sheets of material, to cut said sheets into a plurality of sections each of a desired size, and to arrange said cut sections in single file and in spaced apart relation ready to be fed to a box making machine.

A further object of this invention is to provide an improved sheet feeding and slitting device having a plurality of units provided with driving mechanism which is so arranged that the operation of the various units will be properly timed with respect to one another.

A further object of the invention is to provide a device of the class described in which one of the units is laterally adjustable with respect to an adjacent unit.

It is a further object of this invention to provide an improved sheet feeding and slitting device in which one of the units is vertically adjustable to aline its receiving end with the top of a stack of sheets of material.

A further object of this invention is to provide an improved sheet feeding and slitting device which will minimize the amount of labor and expense in connection with the preparing of sheets of material for the manufacture of containers, which will increase production, and which will operate with maximum efficiency.

With the above and other objects in view, the invention consists of the improved sheet feeding and slitting device and all its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, illustrating one complete embodiment of the preferred form of the invention, in which the same reference numerals designate the same parts in all of the views:

Fig. 1 is a plan view of a portion of the device, part being broken away;

Fig. 2 is a plan view of another portion of the device;

Fig. 3 is a side elevation of the portion of the device shown in Fig. 1, parts being broken away;

Fig. 4 is an enlarged detail view taken on line 4—4 of Fig. 3;

Fig. 5 is a side view of the transversely extending unit;

Fig. 6 is a diagrammatic plan view of the complete device;

Fig. 7 is a sectional detail view taken on line 7—7 of Fig. 1;

Fig. 8 is an enlarged detail view of the cam member in connection with the feed rollers; and

Fig. 9 is a sectional detail view taken on line 9—9 of Fig. 2.

Referring to the drawings the entrance conveyor comprises a frame 10 on which a supporting top 11 is mounted, the latter being provided with transverse openings 12, 13 and 14. Journaled transversely of the frame, at the entrance end thereof, is a shaft 15 carrying a rigidly mounted roller 16 within the frame, and carrying loosely mounted sprocket wheels 17 on each end. Brackets 18 extending upwardly from opposite sides of the frame are provided with slots 19 within which bearing blocks 20 are slidably mounted (see Fig. 8). A shaft 21 journaled in said bearing blocks carries a plurality of rigidly mounted rollers 22. The bearings 20 are provided with downwardly extending arms 23 carrying rollers 24 on their lower ends. The said rollers are adapted to be engaged by cam members 25 loosely mounted on each end of the shaft 15, but secured to the sprocket wheels 17 and driven thereby. The said cams are provided with recesses 26, which when in registration with the rollers 24 allow the bearing blocks 20 to drop in the slots 19 and cause the rollers 22 on the shaft 21 to engage a sheet of material placed between said rollers and the lower roller 16. This causes said sheet to be moved rapidly into the machine ready for engagement by the conveyer. When the upper rollers 22 and bearing blocks are in the upper position shown in Fig. 8 there will be no engagement with the sheet. Thus, upon rotation of the sprockets 17 and cams 25, the shaft 21 will be moved up and down at regular intervals, gripping a sheet at the end of each downward movement, and thus timing the entrance of the sheets.

Adjustment bolts 27, which are positioned in the bore of a threaded nut 28, and which engage the bearing blocks 20, the latter being slidable in side brackets 18, are provided with nuts 29 on their upper ends. By manipulating said nuts, the blocks 20 may be lowered to adjustably limit the downward pressure of the gripping rollers 22.

Journaled through the side of the frame 10 is a shaft 30 carrying rigidly mounted sprocket wheels 31 on each end. The said sprockets are connected by endless chains 32 with the sprockets 17 on the shaft 15 to drive the cams 25. The shaft 30 extends through a gear reduction box 33. Another shaft 34, in said box, carries gears 35 which mesh with gears 36 on the shaft 30. Through said gears 35 and 36 and through

clutches in the box, the shaft 30 may be driven at various speeds. The shaft 34 carries a sprocket wheel 37 on its outer end, the said sprocket being driven by an endless chain 38 connecting with a sprocket wheel 39 on a shaft journaled under the frame 10. The shaft 40 carries a rigidly mounted gear 38' which meshes with a gear 39' rigidly mounted on an upper shaft 40'. The shaft 40' carries a rigidly mounted pulley 41 which is connected by a crossed endless belt 42 with a pulley 43 on the shaft 15, and the shaft 40' also carries a pulley 41' at the opposite side of the frame which is connected by a belt 44 with a pulley 45 rigidly mounted on the shaft 21.

One end of the shaft 40' is journaled in a U-shaped bearing extension 46, the latter projecting from the side of the conveyer frame. A gear 47 is rigidly carried at said end of the shaft 40' and said gear meshes with a gear 48 mounted on a short shaft 49, the latter shaft being also journaled in the bearing extension 46. A shaft 50, which carries a rigidly mounted lower roller 50' is journaled obliquely across the frame. One end of said shaft is connected by a universal joint 51 with the end of the short shaft 49, and the other end of the shaft 50 carries a rigidly mounted gear 52. The gear 52 meshes with a gear 53 mounted rigidly on one end of a shaft 54, the latter shaft carrying an upper roller 55. The shaft 54 is journaled in adjustable bearings 56 carried by brackets 57. The rollers 50' and 55 are positioned on each side of the opening 13 in the supporting top and are adapted to grip sheets therebetween and to move said sheets along the conveyer, and at the same time, due to this oblique position, are adapted to aline one edge of each sheet with the side piece 58 of the conveyer frame.

The outer end of the short shaft 49 carries a rigidly mounted sprocket wheel 59 which is connected by an endless chain 60 with a sprocket wheel 61 mounted on the outer end of a short shaft 62 similar to the shaft 49. The latter shaft is journaled in a bearing extension 63. A shaft 64, which carries a rigidly mounted lower roller 65, is journaled obliquely across the frame at an angle slightly less than a right angle with the side piece 58. One end of the shaft 64 is connected by a universal joint 66 with the inner end of the short shaft 62, and the other end carries a rigidly mounted gear 67 which meshes with a gear 68 mounted rigidly on one end of a shaft 69 carrying an upper roller 70. The shaft 69 is journaled in adjustable bearings 71 carried by brackets 72. The rollers 65 and 70 are positioned on each side of the opening 14 in the supporting top.

The entire frame 10 is pivotally connected at its inner end, as at 73, to the frame 74 of the sheet slitting apparatus. The sheets are moved through the slitting apparatus by means of upper and lower belts 75 and 76 respectively, connecting upper rollers 77 and 78 and lower rollers 79 and 80, the upper rollers being mounted on shafts 81 and 82 and the lower rollers on shafts 83 and 84. Upper and lower shafts 85 and 86 are provided with rotatable knives 87 and 88 respectively, which are adapted to engage the sheet of material passing between the belts to slit said sheets into a plurality of sections, each of the proper size for forming a carton, see Fig. 6.

On an outer end of the shaft 86, is a sprocket wheel 89 which is connected by an endless chain 90 with a sprocket wheel 91 on a shaft 92. The latter shaft also carries another sprocket wheel 91' which is connected by an endless chain 93 with a sprocket wheel 94 mounted on a shaft 95. The shaft 95 also carries another sprocket wheel 96 which is connected by an endless chain 97 with a sprocket wheel 98 mounted on the shaft 62 to drive the latter and the two sets of obliquely positioned rollers.

Also mounted on the shaft 86 is a gear which meshes with a gear 99 on the shaft 85 to drive said shaft. The gear on the shaft 86 also meshes with idler gears 100 and 101 which drive gears 102 and 103 rigidly mounted on the shafts 83 and 84. The latter gears in turn mesh with gears 104 and 105 rigidly mounted on the shafts 81 and 82. Thus through the sprocket wheel 89 on the shaft 86, the cutting members 87 and 88 and the feed belts 75 and 76 are driven.

The pulley 106, on the shaft 85, is connected by an endless belt 107 with a pulley 108 rigidly mounted on a shaft 109 (see Figs. 3 and 4). The said shaft is journaled in brackets 110 depending from the ceiling 111. A pulley 112 is also rigidly mounted on the shaft 109.

A bearing 113 and a housing 114 are also suspended from the ceiling. A longitudinal shaft 115 has one end journaled in the bearing 113 and has its other end journaled in the housing 114, the said end being provided with a worm gear within the housing. The said worm gear meshes with a worm 116 mounted rigidly on a shaft 117 (see Fig. 4). The latter shaft is journaled in the housing 114 and in a depending bracket 118. Mounted on said shaft is a rigid pulley 119 and loose pulleys 120 and 121 on each side thereof. A crossed belt 122 connects the pulley 121 with the pulley 112, and a belt 123 connects the pulley 120 with the shaft 109.

Mounted in the bracket 124 projecting from the housing 114 and in a bracket 125 depending from the ceiling is a slidable rod 126 having belt shifters 127 and 128 extending therefrom and engaging the belts 123 and 122 respectively. The ends of the rod 126 have cables 129 connected thereto, the said cables passing over pulleys 130 and 131 and terminating in portions 132 which are adapted to be pulled by the operator to cause a shifting of the belts 122 and 123.

A drum 133 is rigidly secured to the shaft 115, and said drum has cables 134 windable thereon. The said cables pass over pulleys 135 and have their ends connected to opposite sides of the conveyer frame as at 136.

In operation the belts 122 and 123 are normally on the loose pulleys 120 and 121, and consequently there is no rotation of the shaft 115. When, however, there is a pull upon the end 132 of one of the cables 129, the rod 126 is moved and the belt shifters move the belts 122 and 123 and cause one of them to engage the drive pulley 119. This causes rotation of the shaft 117, and through the worm 116, rotation of the shaft 115. This causes the cables 134 to be wound on the drum to raise the end of the conveyer frame 10, which is pivoted at its other end, so that the free end is flush with the top of the stack of sheets of material 137 which are to be fed into the machine. By pulling on the end of the other cable 129, the conveyer frame may be lowered in a similar manner, due to the fact that the belt 122 is crossed, thereby reversing the direction of rotation of the shafts and drum 133.

Positioned adjacent the slitting apparatus and extending at right angles thereto is a frame 138 having an extending portion 139 overhang-

ing therefrom (see Fig. 5). Bearings 140, at one end of the frame, have a shaft 141 carrying a rigidly mounted roller 142, journaled therein. At the other end of the frame, on the extending portion 139 are bearings 143 within which a shaft 144, carrying a roller 145, is journaled. An endless belt 146 connects the rollers 142 and 145.

Rigidly mounted on one end of the shaft 141 is a sprocket wheel 147, which is connected by an endless chain 148 with a sprocket wheel 149 rigidly mounted on short shaft 150 below the frame. A sprocket wheel 151, mounted rigidly on the latter shaft, is connected by an endless chain 152 with a sprocket wheel 153 mounted on a shaft 154 of a gear box 155. Another shaft 156 extends from said gear box through the opposite side of the frame and carries rigidly mounted sprocket wheels 157 and 158. The sprocket 157 is connected by an endless chain 159 with a sprocket wheel 160 mounted on the drive shaft of a motor 161. The sprocket wheel 158 is connected by an endless chain 162 with a sprocket wheel 163 rigidly mounted on a transversely journaled shaft 164.

At the end of the outwardly extending portion 139 of the conveyer frame 138 are bearings 165 within which shafts 166 and 167 carrying high speed rollers 168 and 169 are journaled. Gears 170 and 171 on said shafts mesh with each other. The shaft 166 also carries a rigidly mounted sprocket wheel 173. The sprocket wheel 173 is connected by an endless chain 174 with a sprocket 175 mounted rigidly on the shaft 164. A shaft 178 is journaled transversely and carries a rigidly mounted roller 179. A shaft 183 is journaled in the upwardly extending bearings 184 and carries a rigidly mounted roller 185. Endless belts 186 extend around the rollers 168, 179 and 185.

It will be noted that by having a portion of the belts 186 extending at an angle upwardly, that when sheets of material pass therebeneath, curled up portions thereof will be ironed down.

The portion 139 of the conveyer 138 is adapted to overhang a conveyer frame 187. The latter frame has shafts 188 and 189 journaled transversely thereof, carrying rigidly mounted sprocket wheels 190 and 191 respectively which are connected by an endless chain 192. The latter chain is provided with sheet engaging lugs 193 which are adapted to travel in a slot 194 and to move sheets of material, which have been discharged by the rollers 168 and 169, from the conveyer belt 146, along the conveyer 187. The shaft 189 carries on one end rigidly mounted sprocket wheels 195 and 196, the sprocket 195 being connected by an endless chain 197 with a sprocket wheel mounted rigidly on the shaft 92 of the slitting device, and the sprocket wheel 196 being connected by a chain 198 with a sprocket 199 mounted on the shaft of a driving motor 200.

The conveyer 138 is mounted on wheels 201 which ride on tracks 202. A rack bar 203 positioned on the tracks is engaged by a pinion 204. The latter pinion is adapted to be rotated, through suitable connections, by a hand wheel 205, so that the conveyer may be moved toward or away from the conveyer 187 as desired.

Journaled in bearings 206 projecting from the bearings 165 of the conveyer frame 138 is a rod 207. An arm 208, which is preferably U-shaped as shown, is mounted rigidly on said rod. Depending lugs 209 are also mounted on the rod 207. When sheets are discharged from the conveyer belt 146, their edges engage the lugs 209 and cause the arm 208 to be pivoted upwardly so that the sheets may pass onto the platform 187. The arm then falls back by gravity and holds the sheets flat on the conveyer 187 while they are being moved therealong by the lugs 193.

In the use of the device a stack of sheets of cardboard, fiberboard or other similar material is placed near the end of the conveyer 10 as at 137 (see Figs. 3 and 6). Next, one of the cables 132 is operated to cause a rotation of the drum 133, as previously described in detail, to vertically aline the end of the conveyer 10 with the top of the stack of sheets. The operator then feeds the sheets one at a time between the feed rollers 16 and 22. As the upper rollers 22 are moved up and down by the timed cam member 25 the sheets are gripped and thrown onto the conveyer where they are engaged by the rollers 50′ and 55. The said rollers and the rollers 65 and 70 move the sheets along the conveyer, and at the same time due to their oblique position crowd the edges of the sheets against the side 58 of the conveyer so that the sheets are in proper alinement for entrance into the slitting device.

When the sheets reach the end of the conveyer 10, they are engaged by the belts 75 and 76 of the slitter and are carried past the rotatable knives 87 and 88 where they are cut into a plurality of sections. The several sections into which the sheet has been cut are then discharged onto the conveyer belt 146 simultaneously (see Fig. 6). If the conveyer 146 moved in a direction parallel to the direction of movement of the conveyer 10 the sheets would be carried in groups of three's. Inasmuch as it is desired to have the sheets travel in single file the conveyer belt 146 extends at right angles. The sheets are carried by the belt 146 toward the belts 186 by means of which they are guided between the rollers 168 and 169. Through the gearing below the conveyer, the rollers 168 and 169 are driven at a considerably higher speed than the conveyer belt 146 is driven. For this reason the sheets are withdrawn rapidly from the conveyer 138 and are deposited upon the conveyer 187 one at a time. On the latter conveyer each sheet is engaged by one of the lugs 193 and is again conveyed in a direction parallel to its original direction of travel, each sheet being moved along by the chain lug 193 before the next sheet is discharged by the rollers 168 and 169.

Through the gear box 155, the conveyer belt 146 may be driven at a speed which is inversely proportional to the number of sheet sections deposited on said belt. The fewer the number of sections, the wider each one will be and it is necessary that wide sections be discharged with greater rapidity than narrow sections in order to deposit them at the proper time on the conveyer 187. In the drawings three slitting knives 87 are shown, but this number may be varied with a resulting variance in the number of sheet sections discharged on the belt 146 and in the width of said sections.

Although only one form of the invention has been shown and described it is not desired to be limited to the exact showing as the broad concept of the invention includes all changes and modifications as may fairly come within the scope of the claims.

What we claim is:

1. In a sheet conveying device means for conveying a plurality of sheet sections in one direction, means having a side edge adjacent an end of said first conveying means for conveying said

sheet sections in a direction at right angles to the direction of movement of said first conveying means, and a pair of high speed rollers adjacent said first conveying means and operable to move the sheets in the same direction as said first conveying means for rapidly withdrawing sheet sections therefrom and for depositing the same one at a time in position on said second conveying means.

2. In a sheet conveying device, two sheet conveying units, one of said conveying units having an end positioned adjacent a side edge of the other conveying unit, and a pair of high speed rollers adjacent said first unit for rapidly withdrawing sheets therefrom and for depositing the same one at a time in position on the other conveying unit.

3. In a sheet feeding device, a conveyer for receiving sheets of material from a stack, said conveyer having a pivotal connection at one end, an overhead drum, a flexible member having one end windable on said drum and having its other end secured to the free end of said conveyer, and means for rotating said drum to cause the conveyer to be swung on its pivot to vertically aline its free end with the top of said stack of sheets.

4. In a sheet conveying device, two conveying units, one of said units having a discharge portion which is adapted to overhang said other unit, and means for laterally moving said first mentioned unit to adjust the position of said discharge portion with relation to said second mentioned unit.

5. In a sheet conveying device, two conveying units, one of said units having a discharge portion which is adapted to overhang said other unit, and rack means for laterally moving said first mentioned unit to adjust the position of said discharge portion with relation to said second mentioned unit.

6. In a sheet conveying device, two sheet conveying units, means on one of said units for rapidly withdrawing sheets therefrom and for depositing the same, one at a time in position on the other conveying unit, and a pivoted arm operable by the moving sheets for maintaining said sheets in position on the last mentioned conveying unit.

7. In a sheet feeding device, a conveyer for receiving sheets of material from a stack, said conveyer having a pivotal connection at one end, an overhead drum, driving means for said drum, a flexible member having one end windable on said drum and having its other end secured to the free end of said conveyer, clutch mechanism between said driving means and said drum, and a control member having one end in connection with said clutch and having its other end remote therefrom for causing shifting of said clutch to cause rotation of the drum and swinging of the conveyer on its pivot to vertically aline its free end with the top of said stack of sheets.

8. In a sheet feeding device, a conveyer for receiving sheets of material from a stack, said conveyer having a pivotal connection at one end, an overhead drum, driving means for said drum including reversing mechanism and a selective clutch, a flexible member having one end windable on said drum and having its other end secured to the free end of said conveyer, and a control having one end secured to said clutch and having its other end remote therefrom for selectively causing operation of said drum in either direction to cause the conveyer to be swung on its pivot to vertically aline its free end with the top of said stack of sheets.

9. In a sheet handling device, conveying means for sheets of material, operating members adjacent said conveying means, upper and lower feed rollers for receiving sheets therebetween, means for positively driving said upper roller to rotate the same, and means for intermittently moving said upper feed roller away from the lower roller to provide for intermittent dropping by gravity into engagement with a sheet therebelow, said means having a timed relationship with said conveying means and with said operating members.

10. In a sheet handling device, conveying means for sheets of material, operating members adjacent said conveying means, upper and lower feed rollers for receiving sheets therebetween, means for positively driving said upper roller to rotate the same, and cam means for intermittently moving said upper feed roller away from the lower roller to provide for intermittent dropping by gravity into engagement with a sheet therebelow, said cam means having a timed relationship with said conveying means and with said operating members.

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