Sept. 28, 1965 C. C. KINKER 3,208,603

SHEET STACKING AND HANDLING APPARATUS

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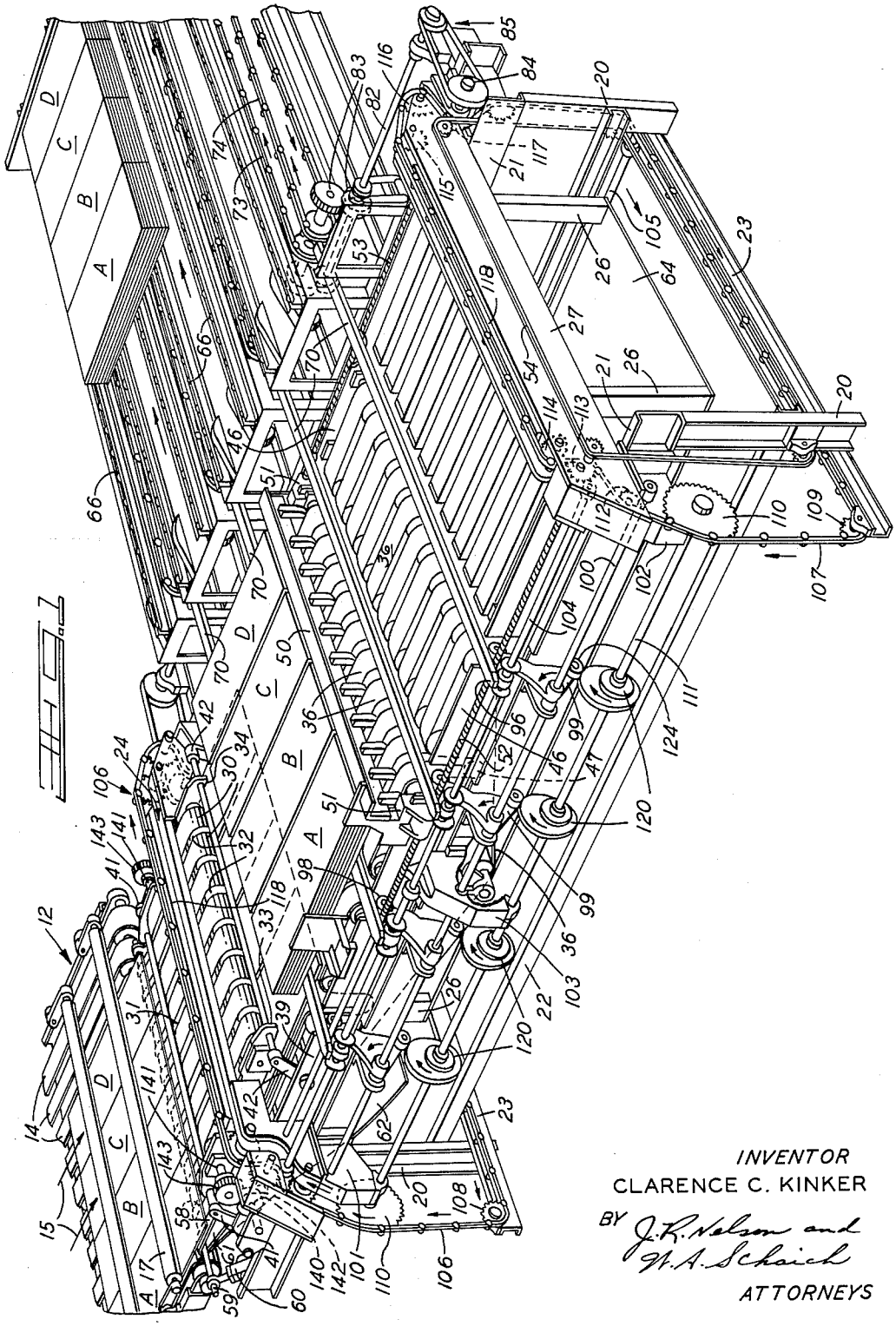

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SHEET STACKING AND HANDLING APPARATUS

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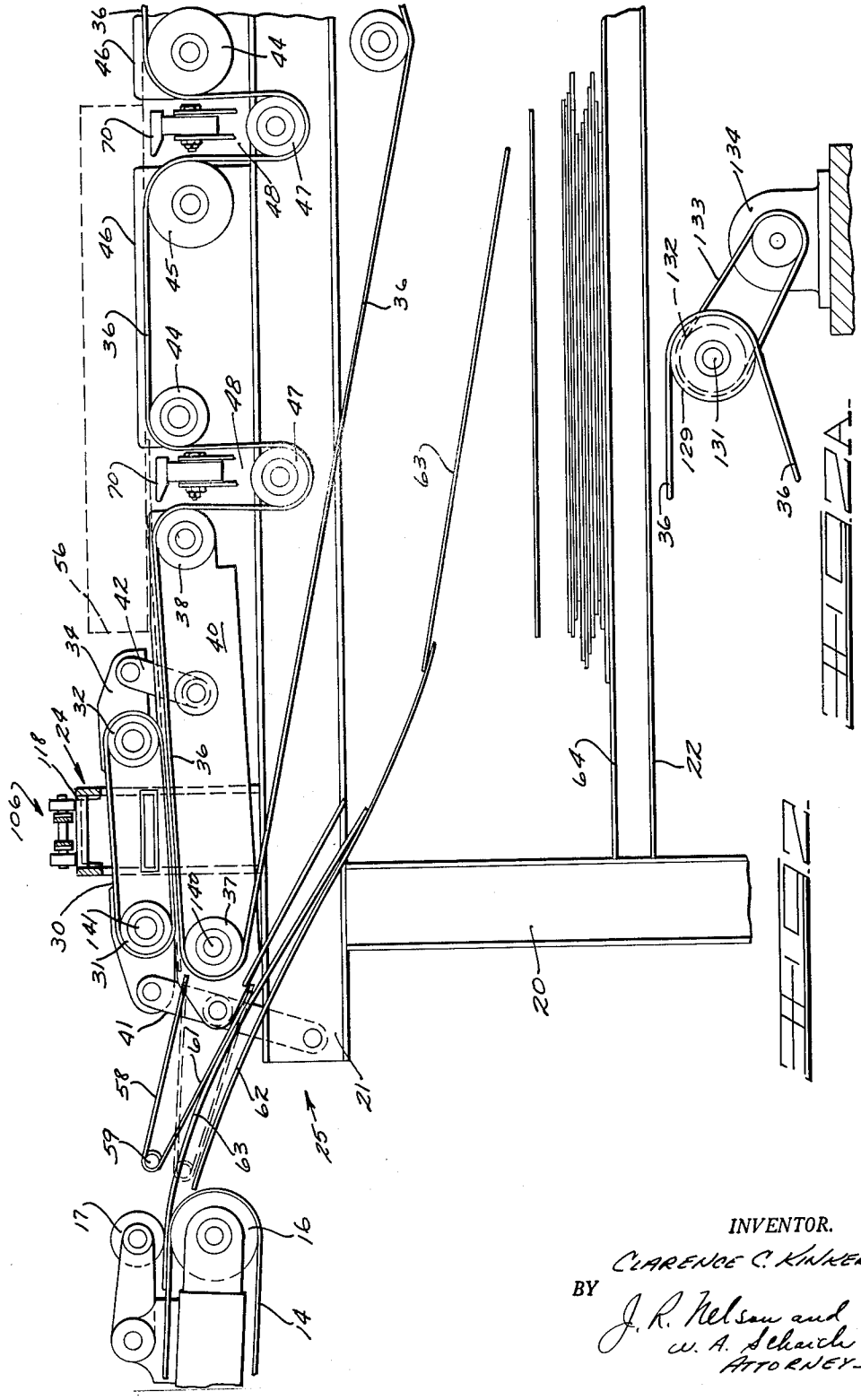

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SHEET STACKING AND HANDLING APPARATUS

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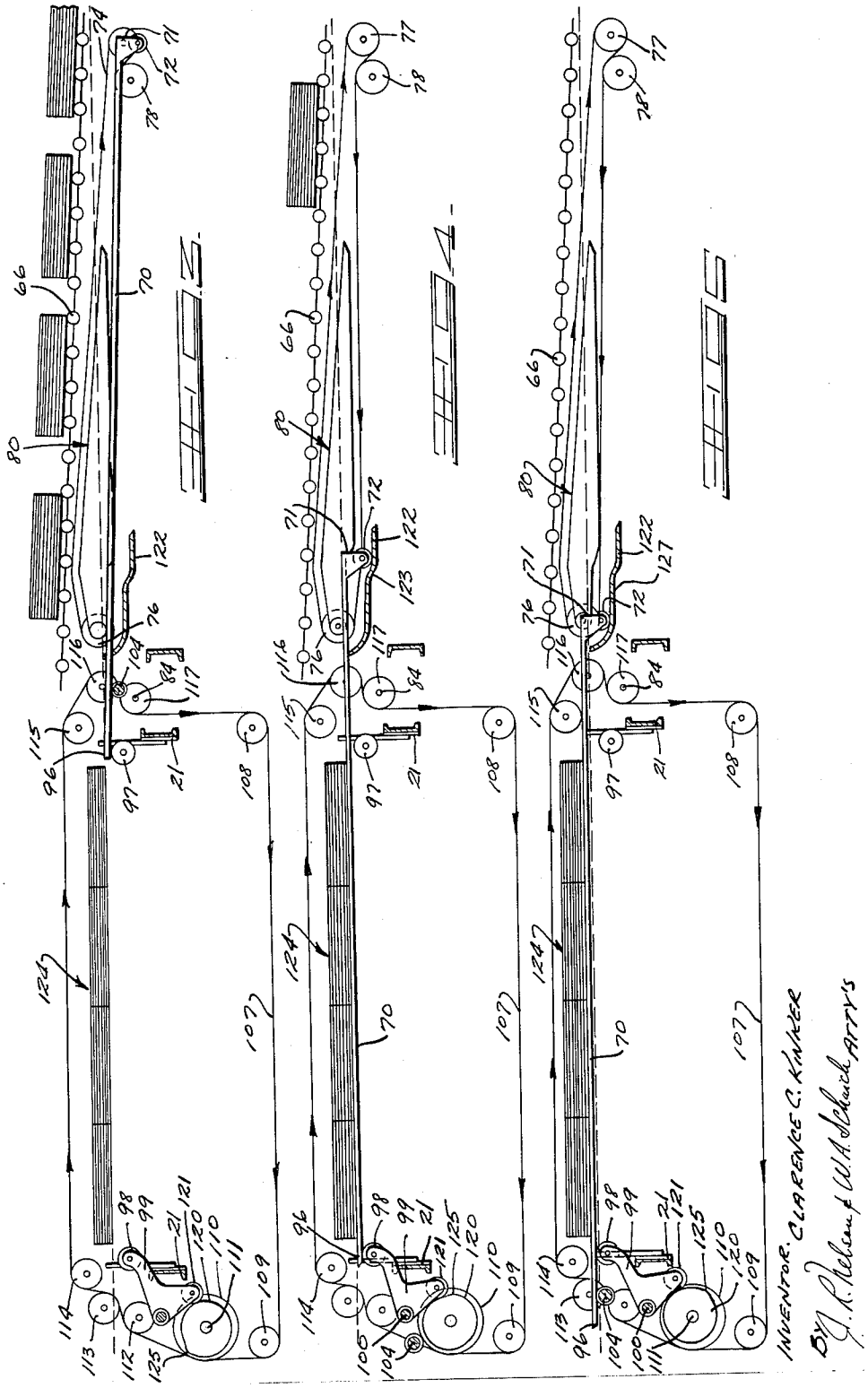

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SHEET STACKING AND HANDLING APPARATUS

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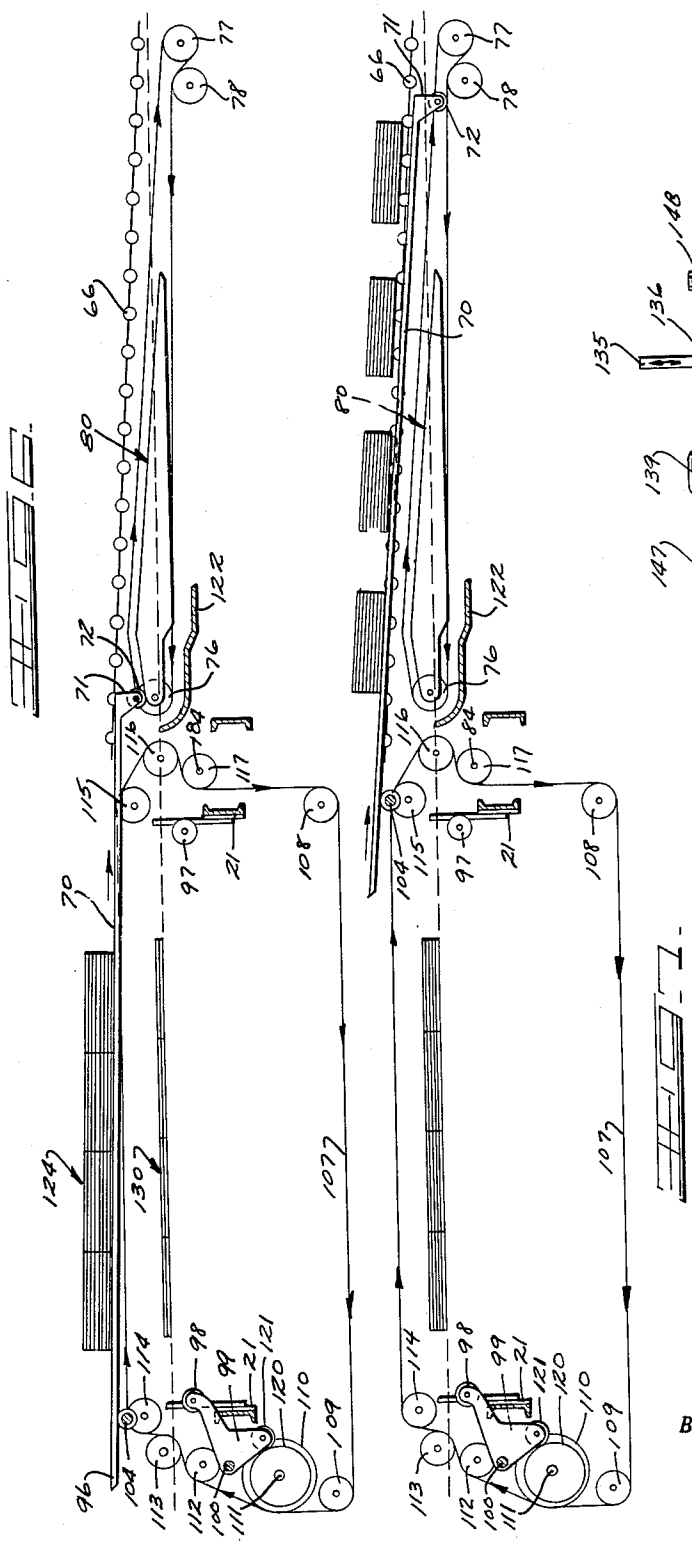

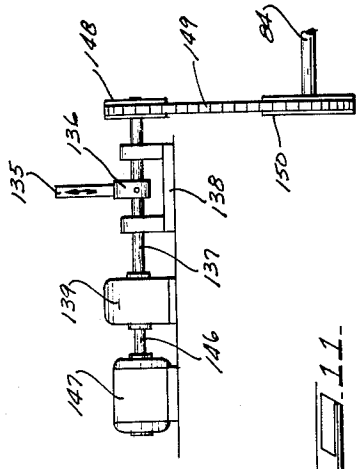

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SHEET STACKING AND HANDLING APPARATUS

Filed Sept. 4, 1962 5 Sheets-Sheet 5

FIG. 9

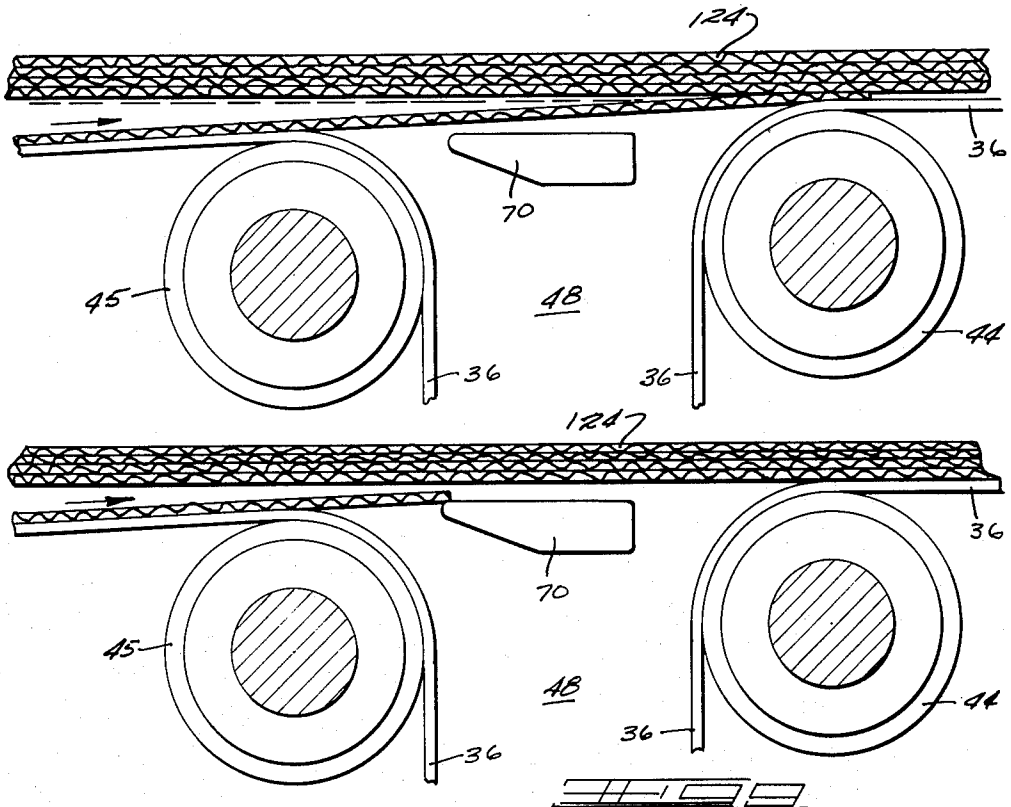

FIG. 10

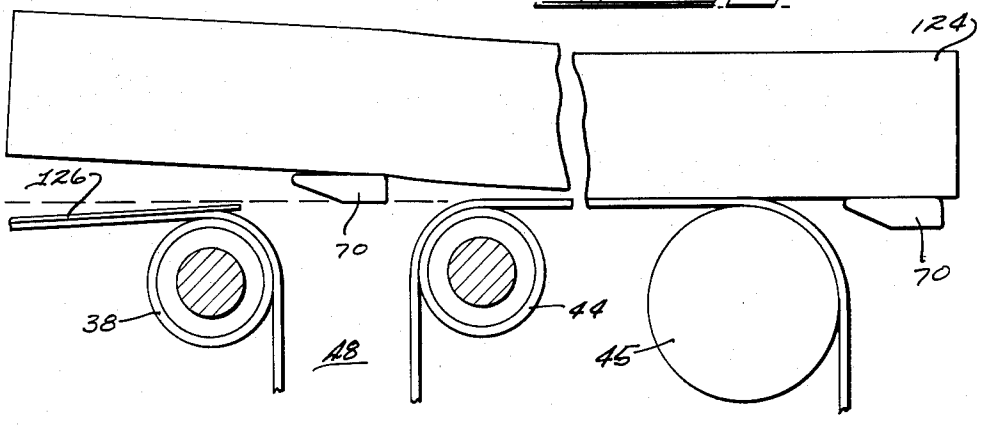

FIG. 10

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SHEET STACKING AND HANDLING APPARATUS

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Filed Sept. 4, 1962, Ser. No. 221,261
16 Claims. (Cl. 214—6)

This invention relates to improvements in the construction of a unit useable at the delivery end of a sheet forming machine such as a corrugator for stacking and removing sheets.

Among the principal objects of the invention are to provide a unit of this type which will operate to continuously collect sheets into stacks or bundles at a single station, each stack containing a desired number of individual sheets, and transfer a stack, when complete, to a station for removal without interrupting of the flow of sheets from the delivery end of the machine in which they are formed; to provide in a unit of this type means whereby unwanted or damaged sheets may be diverted from a stack being collected so as not to be intermingled therewith; to provide a stacking and handling unit which incorporates an underfeed type of stacker—that is, one where each sheet received by the stacking unit is fed under an immediately preceding sheet; and to provide a unit which will satisfactorily handle sheets over a range in sheet length ordinarily encountered in commercial practice.

A sheet stacking and handling unit constructed in accordance with the invention includes suitable framework which supports a sheet receiving bed preferably formed by conveying means such as a belt or belts arranged in a plurality of sheet supporting segments, each segment being spaced from each adjacent segment in the direction of sheet travel, or longitudinally of the unit, thereby forming a plurality of transversely extending spaces between the segments.

Underfeed stacking means is mounted at the sheet receiving end of the unit and is adapted to deliver each sheet received onto the sheet supporting bed under each preceding sheet. A stop is provided and is engageable by the leading edge of each sheet to define its position on the sheet supporting bed and thereby define the location of a stack which is gradually formed as each sheet received by the unit is delivered by the stacking means under each preceding sheet. A removal station is located to one side of the sheet receiving bed. Transfer means, driven in synchronism with the rate at which the sheets are received by the stacking means, are operable to transfer a stack formed on the sheet supporting bed to the removal station, the transfer means including a plurality of transfer bars and means for moving the bars in unison, each bar travelling in a generally orbital path which extends through one of the aforementioned spaces between the segments of the sheet supporting bed.

In the presently preferred construction to be disclosed herein, means for supporting and moving the transfer bars in a transfer cycle include a first series of chain circuits, one for each individual transfer bar. Each transfer bar is connected to its respective first chain circuit adjacent its leading end in the direction of transfer movement, and means are provided for driving all of the first series of chains in unison so as to move the transfer bars on transfer and return strokes, there being an upward component of motion at the beginning of a transfer stroke and a downward component at the end thereof. The trailing ends of the transfer bars are supported during a transfer stroke by a common movable beam which is connected between a pair of chain circuits one at each end of the machine. This transfer beam operates in conjunction with a series of cam actuated bell

crank levers—one for each transfer bar—which aid in imparting an initial quick upward stroke to each bar at the beginning of a transfer movement, thereby bringing each bar into rapid engagement with a stack to lift the stack clear of the sheet supporting bed in time for the next sheet received to slip under it.

Preferably, a sheet deflector is mounted at the entrance end of the unit and is operable to intercept advancing unwanted sheets prior to their engagement by the underfeed stacking means and deflect them downwardly to a supporting bed provided below the normal sheet supporting bed.

Other objects and advantages of the construction will appear from the following description of the presently preferred embodiment of the invention shown in the accompanying drawings which consist of the following views:

FIGURE 1, an isometric view showing the overall unit—with the exception of a portion of the transfer station—installed at the delivery end of a sheet forming machine such as a corrugator;

FIGURE 2, a sectional side elevation, on an enlarged scale, of the receiving end of the unit, including a portion of the adjacent delivery end of the corrugator;

FIGURE 2A, a partial end view showing the drive for the endless belts;

FIGURE 3, a partially schematic transverse elevation showing a transfer bar at the beginning of a return stroke;

FIGURE 4, a schematic elevation similar to FIG. 3 showing a transfer bar at the end of a return stroke;

FIGURE 5, a similar schematic elevation showing a transfer bar in the initial stage of a transfer operation;

FIGURE 6, a similar schematic elevation showing a transfer bar at the beginning of its movement to the transfer station;

FIGURE 7 shows a transfer bar approaching the end of a transfer stroke;

FIGURES 8–10, enlarged sectional details each showing progressive stages in the relative positions between a transfer bar and sheet supported on the bed of the machine during the initial portion of a transfer operation; and

FIGURE 11, a schematic view of the drive utilized to operate the chain circuit in a phased relationship with the mechanism forming and supplying the sheets.

Referring to FIGS. 1 and 2, the delivery end of a corrugator **12** is shown at the left including driven belts **14** which support and continuously advance, in the direction of the arrows **15**, sheet material which has been cut to length and optionally severed lengthwise into strips A, B, C, D, by a conventional shearing and slitting apparatus not shown. The very end of the machine is marked by belt training rolls **16** and a transverse hold down roll **17**, best shown in FIG. 2.

The sheet stacking and handling unit of the invention is placed immediately adjacent the delivery end of the corrugator as shown, and includes a suitable framework of corner posts **20**, upper longitudinal beams **21**, a pair of lower longitudinal beams **22** and a pair of lower transverse members **23**, all connected between the corner posts **20**. A transverse bridge-like member **24** interconnects the upper longitudinal beams **21** at the receiving end **25** of the unit and a transverse member **27** is similarly employed at the other end of the machine.

A combined underfeed stacker and sheet supporting bed is mounted on this frame structure. The stacking means in this combination includes an upper series of belts **30** trained about a pair of rolls **31** and **32** which are carried between mounting plates **33** and **34**, and a lower series of endless belts **36** which also form the sheet supporting bed. Belts **36** are trained about a feeding roll **37** and a snubber roll **38** of the stacking means,

these rolls being mounted between a pair of lower plates 39 and 40 which are each pivotally secured to one of a pair of links 41. The upper roll mounting plates 33 and 34 are also each secured to one of the links 41 and to a second link 42 secured to one of the lower side plates 39 and 40.

These links 41 and 42 are in pairs and serve as parallel motion arms on each side of the bridge. The shafts 140 and 141 are respectively provided with meshing gears 142 and 143 (FIG. 1) at the opposite ends thereof. Thusly, the upper mechanism on the plates 33 and 34 is driven by the meshing gears 142 and 143, and they are in turn driven through the drive on shaft 140, as will be presently made apparent.

Belts 36 are also trained about pairs of upper longitudinally spaced bed defining rolls 44–45 carried between pairs of side plates 46 on the upper frame members 21, the first roll 44 being mounted at an elevation slightly above that of the roll 38 at the trailing end of the feeder. A depressed idler roll 47 is mounted between each adjacent pair of bed supporting rolls, thereby separating or dividing the bed into a series of longitudinally spaced sheet supporting segments with a transversely extending trough 48 between each adjacent segment.

The belts 36 are reeved about end pulley 129 on shaft 131 (FIG. 2A). Shaft 131 has a drive pulley 132 that is power driven through the belt 133 at constant speed by the electric motor 134. This drive to belts 36 supplies rotational movement to shaft 140 and in turn the mentioned meshing gears 142 and 143 of the same diameter transmit the same constant speed to shaft 141 and through the pulleys 31 to the upper belts 30.

A stop member 50 extends transversely across the bed formed by the sheet supporting belts 36, being carried by a pair of brackets 51 each of which is engaged by one of a pair of threaded adjusting shafts 52 and 53 rotatable in unison by a sprocket chain 54 so that the position of the stop member 50 can be adjusted longitudinally of the sheet supporting bed according to the length of sheet being delivered by the corrugator 12. The stop member 50 will be positioned so that, regardless of the length of the sheet being delivered from the machine, the trailing ends 56 of the sheets will be located in the relation shown in FIG. 2, overlapping the snubber roll 38 of the stacking means thus permitting each sheet being advanced through the stacker to be fed under sheets previously delivered and engaging the stop 50.

From the foregoing description it is apparent that this stack forming portion of the unit feeds sheets received from the corrugator 12 against the stop 50, each sheet being fed under each preceding sheet thereby building up a stack which is supported upon the bed formed by the belts 36.

A diverter (FIGS. 1 and 2) is provided at the receiving end of the unit so that any damaged or imperfect sheets coming from the corrugator may be intercepted and segregated from the stack being formed. This diverter consists of a series of V-shaped straps 58 mounted on a cross member 59 which in turn is supported by a pair of fluid pressure actuating cylinders 60 which permit the cross bar and diverter straps 58 to be moved between the full line diverting position shown in FIG. 2 and the non-diverting, guiding position shown in dash line. In diverting position the lower faces 61 of the straps 58 are extended into the normal path of travel of sheets 63, forcing the leading edge and the sheet downwardly in a path defined by a guide member 62 which directs the sheets onto a platform suspended by frame members 26.

A stack removal station is provided to one side of the stack forming portion of the unit together with transfer means operating to segregate a formed stack from the sheets being received and to transfer each formed stack to the removal station.

The stack removal station consists of suitable framework, not shown in detail, which is tied into the framework previously described and supports stack conveying means and a portion of the transfer means, the conveying means including the inclined roller conveyor sections 66 for delivering each transferred stack to a removal point.

The transfer means includes a series of transfer bars 70 together with means for supporting and moving the bars on a transfer stroke and a return stroke in a path, which for each of the bars extends through one of the spaces 48 between the segments to the stack supporting bed. Referring to FIGS. 1 and 3, the right hand or leading end 71 of each bar 70 is provided with supporting rollers 72 and is connected between a pair of strands of roller sprocket chain 73 and 74 (FIG. 1), each strand of chain being trained about a driving sprocket 76, idler sprockets 77 and 78, and being guided along a portion of its path of travel by suitable track structure 80.

All of the driving sprockets 76 are driven in unison from a shaft 82 (FIG. 1) each sprocket 76 being connected to the shaft 82 through a pair of gears 83. Shaft 82 is in turn driven from the main drive shaft 84 of the machine which is suitably connected to the shearing mechanism of the corrugating machine so that the shaft 84 is driven in synchronism with the rate at which sheets are formed, a sprocket and silent chain connection 85 being employed between the shafts 84 and 82.

As shown schematically on FIG. 11, the just described mechanism is driven by torque applied to shaft 84. The corrugator machine is provided with a slitter or shearing mechanism that cuts the sheets into predetermined length from the continuous web of corrugated paper board supplied by the machine. This shearing mechanism is well understood by those of ordinary skill in the industry and a detailed description here should not be needed. Briefly, this shearing knife constitutes a "flying shears" that is brought up to the speed of the paper and then actuated through the paper to make a clean cut. The cycle is repeated at equal time intervals for a constant speed of the corrugator supply. The knife (not shown) is driven by a pitman arm 135 on an eccentric 136 journaled on the shaft 137. Shaft 137 is bearing mounted on a member 138 of the slitter machine. Shaft 137 connects to the input of a phase differential transmission unit, well-known as a PIV transmission 139, which is driven by the shaft 146 of motor 147. The speed and phase of the shaft 84 is controlled in step with the means to supply the sheets by an end sprocket 150 on the shaft 84 being drivably connected through drive chain 149 to a drive sprocket 148. The sprocket 148 is mounted on the outer end of the shaft 137 that is driven and controlled in speed and phase by the transmission and motor combination 139 and 147.

Motion of the pairs of chains 73 and 74 thus moves the transfer bar 70 connected therebetween back and fourth on transfer and return strokes, and also, in conjunction with the track 80, controls the elevation of the leading end 71 of each transfer bar.

On a return stroke, the beginning of which is shown in FIG. 3, the opposite end 96 of each transfer bar is guided and supported by a roller 97 carried by the right hand frame member 21. Towards the end of a return stroke, as shown in FIG. 4, the end 96 of each transfer bar engages a roller 98 mounted on one arm of a bell-crank member 99 which constitutes part of a stack lifting mechanism. There is a bell-crank member 99 provided for each of the transfer bars 70, and all of the bell-crank members are carried on a shaft 100 which is supported by brackets 101 and 102 at the ends of the machine and an intermediate bracket 103.

On a transfer stroke, the trailing end 96 of each transfer bar 70 is supported on one of a pair of moving transfer beams 104 and 105 each connected at their ends between a pair of similar roller chains 106 and 107. Referring to FIGS. 1, 2 and 3, each of the chains 106 and 107 travels in a vertical loop in a path defined by a pair of lower sprockets 108 and 109, a power take-off sprocket 110 for a cam shaft 111, and sets of upper sprockets 112, 113

and **114** at the left side of the machine, and **115**, **116** and **117** at the right side of the machine, sprocket **117** being carried by the main drive shaft **84**. Along the upper run of the chains **106–107** the path of travel is further defined by a track **118** (FIGS. 1 and 2) forming part of the structure of each of the frame cross-members **24** and **26**. Cam shaft **111**, which is also supported on the brackets **101**, **102** and **103**, carries a set of similar cams **120**, one for each of the bell-crank lifting levers **99**.

Further details of the transfer mechanism can best be brought out by describing the operation thereof, shown in progressive stages in FIGS. 3–7. In FIG. 3, the transfer bars **70** are beginning a return stroke, each moving through one of the spaces **48** in the supporting bed below the upper surface of the belts **36** thereof as shown in FIG. 8. As the transfer bars **70** approach the end of a return stroke their tapered ends **96** each engage a roller **98** of the bell-crank lifting arm **99** while the roller **72** at their leading end **71** engages a supporting track **122**, as shown in FIG. 4, causing a slight rise in elevation of the bars **70**, as shown in FIG. 9. During this time successive sheets of material delivered from the corrugator are being formed into a stack **124**, and when the last sheet is being fed into the stack, the transfer mechanism is in the position shown in FIG. 4 in which the transfer bars **70** have their ends **96** each resting on a roller **98** of a bell crank lifting lever **99** and the roller **72** at their other ends **71** is approaching the rise **123** in the cam track **122**. As the rollers **72** traverse the rise **123** the roller follower **121** of each bell crank **99** traverses a rise **125** on the cam **120** with the result that the transfer bars **70** are quickly moved upwardly into engagement with the stack **124**, raising it above the stack supporting bed an extent sufficient to permit the first sheet **126** of a successive stack to pass under the bars.

As shown in FIG. 10, this initial lifting action of the transfer bars **70** is preferably a progressive one, the cams **120** and cam tracks **122** being arranged so that the transfer bars are moved upwardly one by one, beginning with the transfer bar immediately following the stacking mechanism—that is, the transfer bar closest to the receiving end of the unit. Thus, FIG. 10 shows that this first transfer bar, which is intermediate the belt training pulleys **38** and **44**, has been moved upwardly while the immediately following transfer bar is just beginning an upward movement. Such progressive movement of the transfer bars more evenly distributes the lifting action, results in a smoother operation, and has the added function of guiding the first sheet of the next stack to proper position on the belts **36**.

The transfer bars **70** are then held in this initial raised position while the roller followers **124** pass over a uniform raised dwell section on cams **120** and the transfer bar rollers **72** pass over the straight dwell section **127** of cam tracks **122** as shown in FIG. 5. During this dwell period all lifting bars **70** reach their initial raised position and the lifting beam **104** moves from the position shown in FIG. 4 to the position shown in FIG. 5 where it comes into engagement with the ends **96** of the transfer bars **70**.

The transfer beam **104** moves upwardly in the path defined by the chain sprockets **113** and **114**, the ends **71** of the transfer bars **70** are moved upwardly in the path defined by the sprockets **76** with the result that the stack **124** is raised well above the supporting bed on which following sheets are being collected into a new stack **130**, as shown in FIG. 6. The stack **124** is then moved transversely away from the stack forming station to the removal station supported on the transfer bars **70** which in turn are supported at their ends **71** by the rollers **72** travelling on the tracks **80** and by their ends **96** resting on the travelling transfer beam **104**. The tracks **80** incline downwardly at an inclination greater than do the roller conveyor sections **66**, resulting in the bundles A, B, C, and D of a stack being successively deposited on the roller conveyor **66** as shown in FIG. 7.

When the transfer bars complete their next return stroke, the second transfer beam **105** will have travelled with the chains **106** and **107** and be approaching a position to engage, lift and support the ends **96** of the transfer bars for the next transfer operation.

It is apparent from the foregoing description that the apparatus of the invention is operative to continuously stack and transfer individual sheets at a speed directly related to the rate at which sheets are delivered to the apparatus, without interference with the sheet forming operation, and without interrupting the flow of formed sheets. The amount of time available for removing stacks from the transfer station can be varied as required without affecting the stack forming and transfer operations, since the size of the transfer station can be varied to accommodate any number of stacks desired, or alternately, stacks can be fed directly from the transfer station to a suitable conveyor.

While prefered embodiments have been described above in detail, it will be understood that numerous modifications might be resorted to without departing from the scope of the invention as defined in the following claims.

I claim:

1. Apparatus for stacking and handling bundles of material delivered in successive sheets from a machine such as a corrugator comprising

(a) frame structure forming a sheet receiving station in the line of discharge movement of sheets coming from said machine and a transfer station located laterally adjacent said receiving station with respect to such direction of movement;

(b) means for feeding each sheet delivered to said receiving station under each immediately preceding sheet to form a stack;

(c) means carried by said frame structure for supporting said stack, said supporting means including a plurality of separated segments;

(d) stop means for defining the position of the leading edge of each sheet on said supporting means; and

(e) transfer means for moving a formed stack from said receiving station to said transfer station, said transfer means including a plurality of transfer bars and means for moving each of said transfer bars upwardly between a pair of adjacent segments of said supporting means to a level thereabove, transversely to said transfer station on a conveying stroke, downwardly to deposit a formed stack, and transversely to return to said receiving station at a level below said supporting means in timed relation with the delivery of sheets to said apparatus.

2. Sheet material handling apparatus according to claim **1** wherein the sheet feeding means and the sheet supporting means include in common an endless belt, pulley means for defining a path of belt travel which includes a feeding portion and a plurality of spaced supporting portions to form the segments of the supporting means, and means for driving the endless belt.

3. Sheet material handling apparatus according to claim **2** wherein the first of said supporting portions in the direction of travel is located adjacent to and slightly above the discharge end of the feeding portion.

4. Sheet material handling apparatus according to claim **1** wherein the means for moving each of said transfer bars upwardly between a pair of adjacent segments of said supporting means includes a plurality of lifting levers, means mounting each lifting lever for engagement with one of said transfer bars, and means for moving said lifting levers on a lifting stroke.

5. Sheet material handling apparatus according to claim **4** further characterized by said lever moving means being arranged to sequentially engage said transfer bars beginning with the first transfer bar in the path of movement of sheets into said receiving station.

6. Sheet material handling apparatus according to claim **1** wherein the means for moving each of said transfer

bars comprises a plurality of first endless chain circuits, means mounting each of said first endless chain circuits for travel over said transfer station, means connecting one end of each transfer bar to one of said first endless chain circuits, second endless chain circuit means, means mounting said second endless chain means for travel in a loop around the said supporting means at the receiving station and a transfer beam carried by said second endless chain circuit means adapted to engage and support the other end of said transfer bars on a conveying stroke.

7. Sheet material handling apparatus according to claim 6 wherein said means for moving each of said transfer bars comprises a plurality of lifting levers, means mounting each lifting lever for engagement with one of said transfer bars adjacent the said other end thereof, and means for moving said lifting levers into engagement with said transfer bars to raise each transfer bar initially rapidly upwardly in advance of the engagement of said transfer beam with the transfer bars.

8. Sheet material handling apparatus according to claim 7 wherein the means for moving said lifting levers comprises a plurality of cams, a cam shaft on which each of said cams are mounted for engagement with one of said lifting levers, and means for driving said cam shaft in synchronism with said first and second endless chain circuit means.

9. Sheet material handling apparatus according to claim 8 further characterized by said lifting lever cams being arranged to sequentially actuate said lifting levers beginning with the lifting lever for the first transfer bar in the path of movement of sheets into said receiving station.

10. Sheet material handling apparatus according to claim 1 wherein the means for moving each of said transfer bars includes a first roller chain circuit for each of said transfer bars, sprocket and track means mounted at said transfer station for defining a path of movement of each first roller chain circuit, means connecting each transfer bar to one first chain circuit adjacent the leading end of the transfer bar on a conveying stroke, a pair of second roller chain circuits, a pair of sprocket and track means spaced longitudinally along said receiving station for defining a path of movement of said second chain circuits which extends over and under said stack supporting means, a transfer beam mounted between said pair of second chain circuits, and means for driving said first and second chain circuits in synchronism whereby said transfer beam is brought into engagement with all transfer bars to support the trailing ends thereof on a conveying stroke.

11. Apparatus for stacking and handling material delivered in successive sheets from a machine such as a corrugator, comprising:

(a) means for feeding each sheet delivered from said machine under each immediately preceding sheet to form a stack;

(b) means for supporting said stack, said supporting means including a number of segments with each segment being spaced from each adjacent segment in the direction of sheet movement from said machine;

(c) stop means for defining the position of a stack on said supporting means;

(d) a plurality of transfer bars;

(e) means for moving each of said transfer bars in a vertical loop including an upward lifting motion through one of the spaces between adjacent segments in said supporting means, a conveying motion in a direction transverse to said supporting means, a downward depositing motion and a return motion;

(f) means for driving said transfer bars in timed relation with the delivery of sheets from said machine to raise a stack from said supporting means in advance of the arrival of the first sheet of the next stack thereon; and

(g) means for receiving a stack from said transfer bars on the downward depositing movement thereof.

12. Apparatus for stacking and handling bundles of material delivered in successive sheets from a machine such as a corrugator comprising frame structure forming a sheet receiving station in the line of discharge movement of sheets coming from said machine and a transfer station located laterally adjacent said receiving station with respect to such direction of movement; means for feeding each sheet into said receiving station under each immediately preceding sheet to form a stack; means for supporting a stack at said receiving station, said supporting means including a plurality of longitudinally spaced supporting segments; a plurality of stack transfer members; means mounting said transfer members for movement in vertical planes each of which pass through one of the said spaces in said supporting means, driving means for moving said transfer members substantially in unison in timed relation with the rate at which sheets are delivered from said machine, said mounting means defining a path of movement for said transfer members which includes an initial upward component wherein said members are brought into engagement with the lower sheet of a bundle prior to the arrival of a first sheet of a following stack to raise said bundle above said supporting means, a conveying component in which said members are moved laterally from said receiving to said transfer station, a depositing component in which said members are moved downwardly and a return component in which members are moved transversely through said spaces in said supporting means below the level thereof, and means for receiving a bundle from said transfer members at said transfer station during the said depositing component of movement thereof.

13. Apparatus for stacking and handling bundles of material delivered in successive sheets from a machine such as a corrugator comprising:

(a) frame structure forming a sheet receiving station in the line of discharge movement of sheets coming from said machine and a transfer station located laterally adjacent said receiving station with respect to such direction of movement;

(b) sheet feeding and supporting means carried by said frame structure including a driven lower belt for feeding each sheet into said receiving station under each preceding sheet, and roller means about which said belt is trained arranged to define a plurality of sheet supporting belt segments spaced from each other in the direction of belt movement;

(c) stop means for defining the position of the leading edge of each sheet on said supporting belt segments, said driven lower belt acting to advance the leading edge of each sheet into engagement with said stop means thereby forming a stack of sheets;

(d) transfer means for moving a formed stack from said receiving station to said transfer station, said transfer means including a plurality of transfer bars and means for moving each of said transfer bars in vertical and transverse directions in a plane which passes through one of the spaces between said sheet supporting belt segments, and means for driving said transfer bars in timed relation with the delivery of sheets to said apparatus.

14. Sheet material handling apparatus according to claim 3 wherein the means for moving said transfer bars comprises first endless chain means, means mounting said first endless chain means for travel over said transfer station, means connecting one end of each transfer bar to said first endless chain means, second endless chain means, means mounting said second chain means for travel over said receiving station, a transfer beam carried by said second endless chain means adapted to engage and support the other end of said transfer bars on a transfer stroke, and means for driving said first and second endless chain means in synchronism.

15. Sheet material handling apparatus according to claim 4 further characterized by means for lifting each of said transfer bars intitially rapidly upwardly to raise a formed stack above said sheet supporting belt segments in advance of the arrival of the first sheet of a following stack thereon, said lifting means including a lifting lever engageable with the other end of each transfer bar, and cam means driven in synchronism with said endless chain means for moving said lifting levers on a lifting stroke.

16. Sheet material handling apparatus according to claim 5, further characterized by said lifting lever cam means being arranged to sequentially actuate said transfer bars on a lifting stroke beginning with the first transfer bar in the path of travel of sheets into said receiving station.

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HUGO O. SCHULZ, *Primary Examiner.*

MORRIS TEMIN, *Examiner.*