Aug. 6, 1968 D. BUCCICONE 3,395,914

SHEET HANDLING MACHINE

Filed Nov. 21, 1966 7 Sheets-Sheet 1

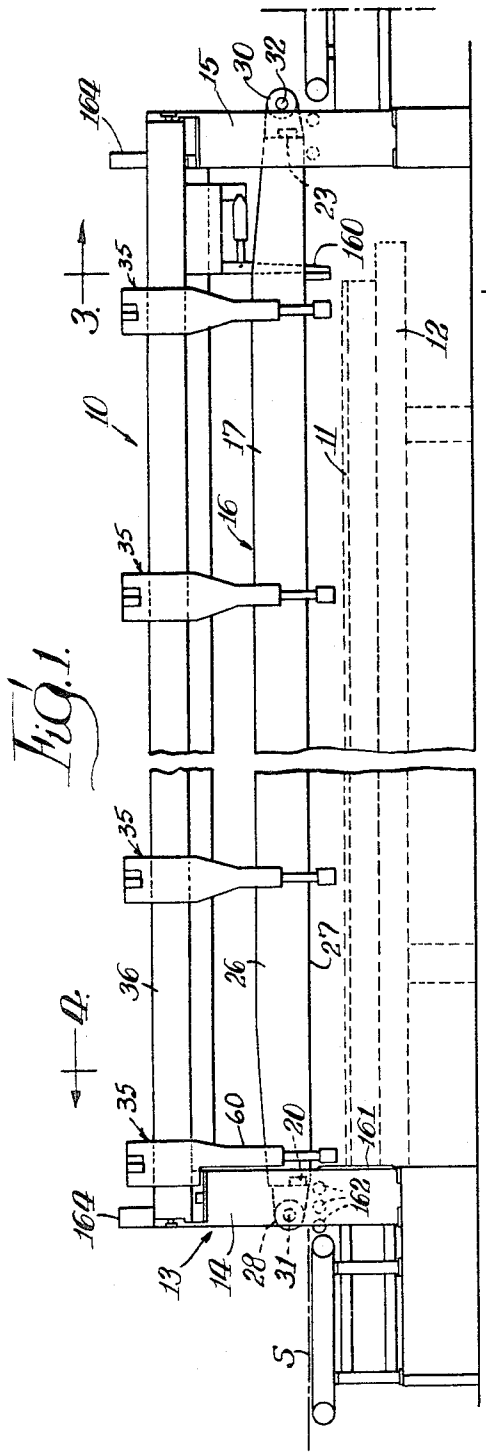


Fig. 1.

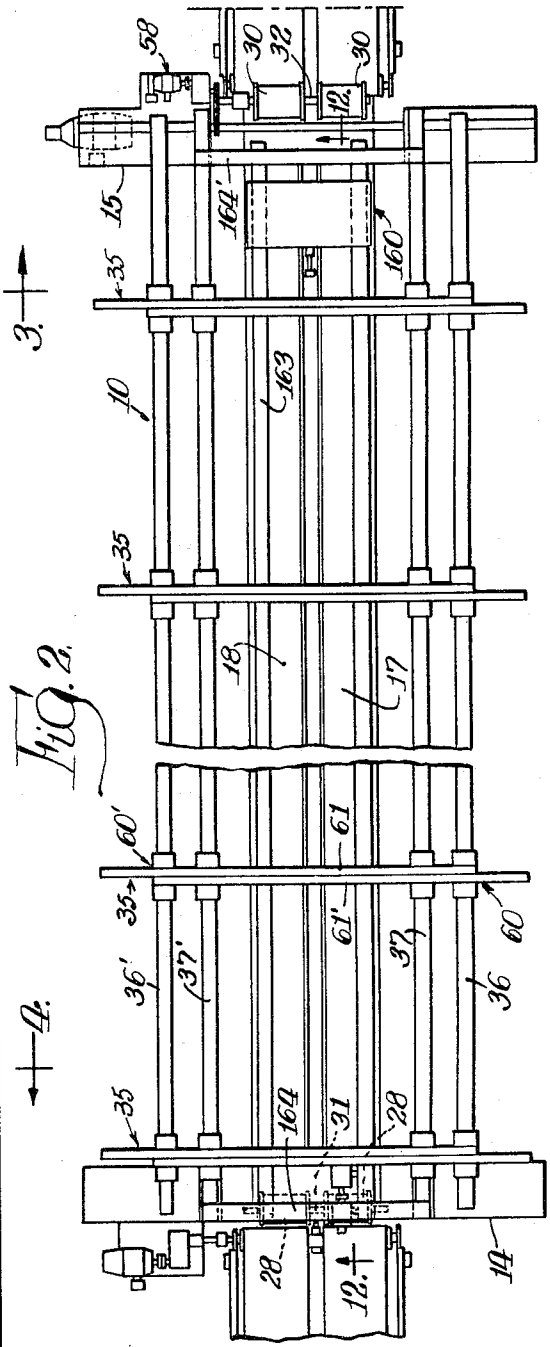


Fig. 2.

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Aug. 6, 1968 D. BUCCICONE 3,395,914

SHEET HANDLING MACHINE

Filed Nov. 21, 1966 7 Sheets-Sheet 2

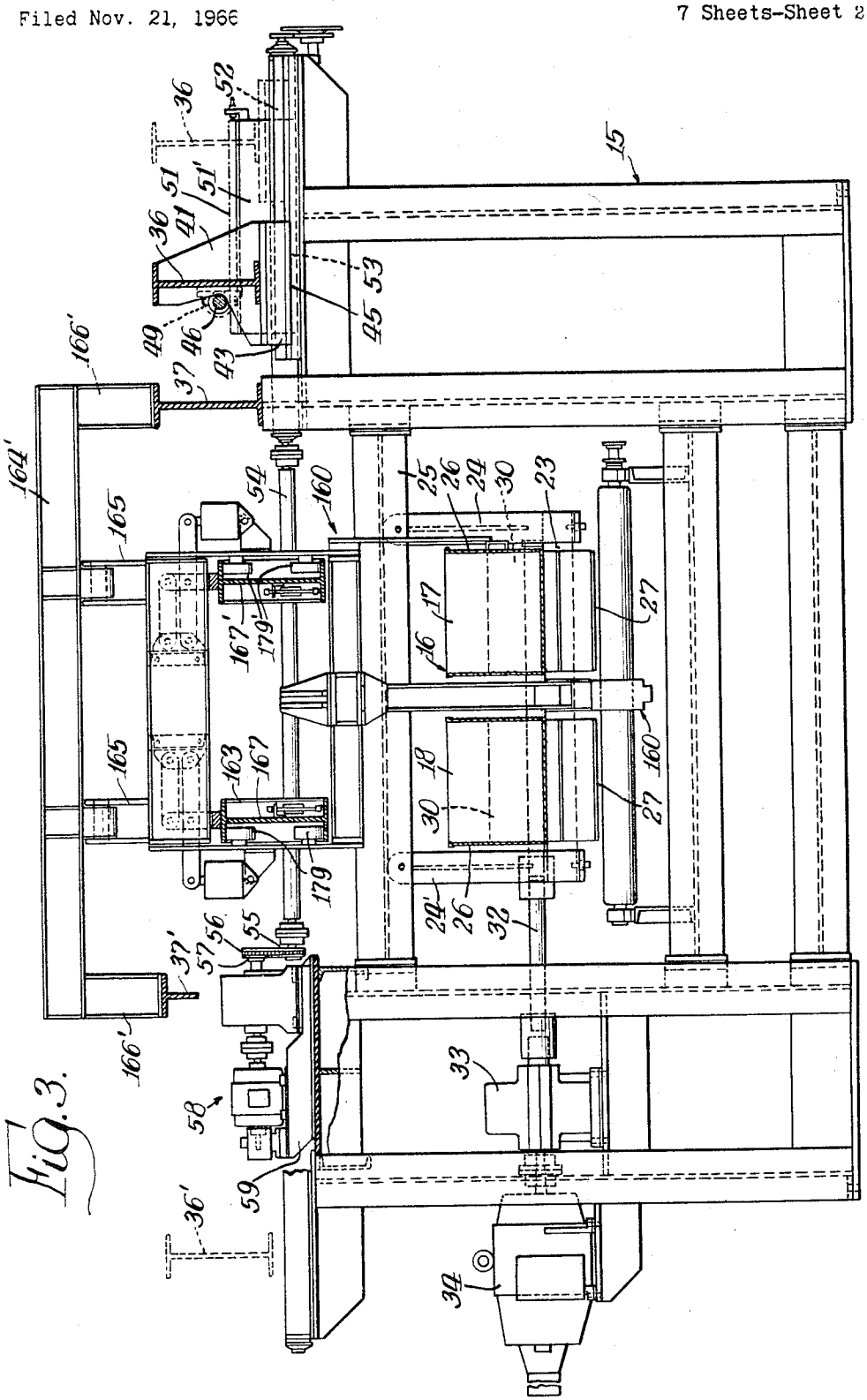


Fig. 3.

Aug. 6, 1968 D. BUCCICONE 3,395,914

SHEET HANDLING MACHINE

Filed Nov. 21, 1966 7 Sheets-Sheet 3

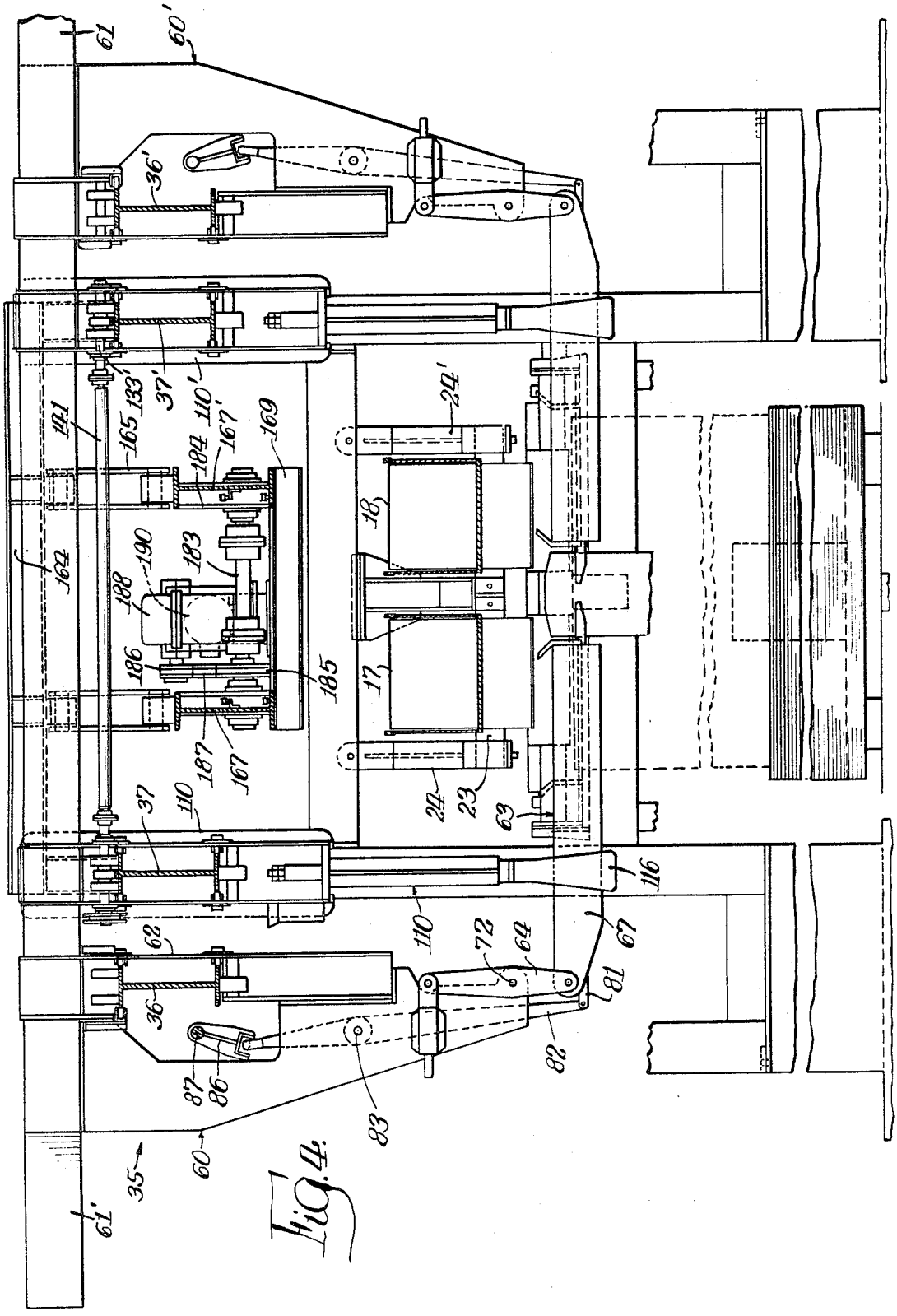


Fig. 4.

Aug. 6, 1968 D. BUCCICONE 3,395,914

SHEET HANDLING MACHINE

Filed Nov. 21, 1966 7 Sheets-Sheet 4

Fig. 6.

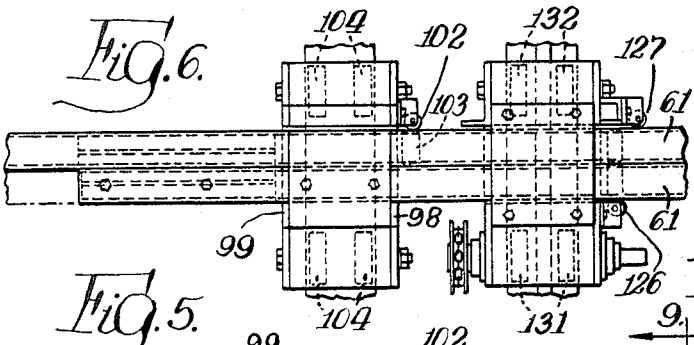


Fig. 7.

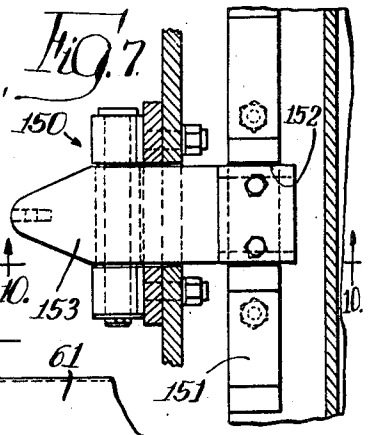
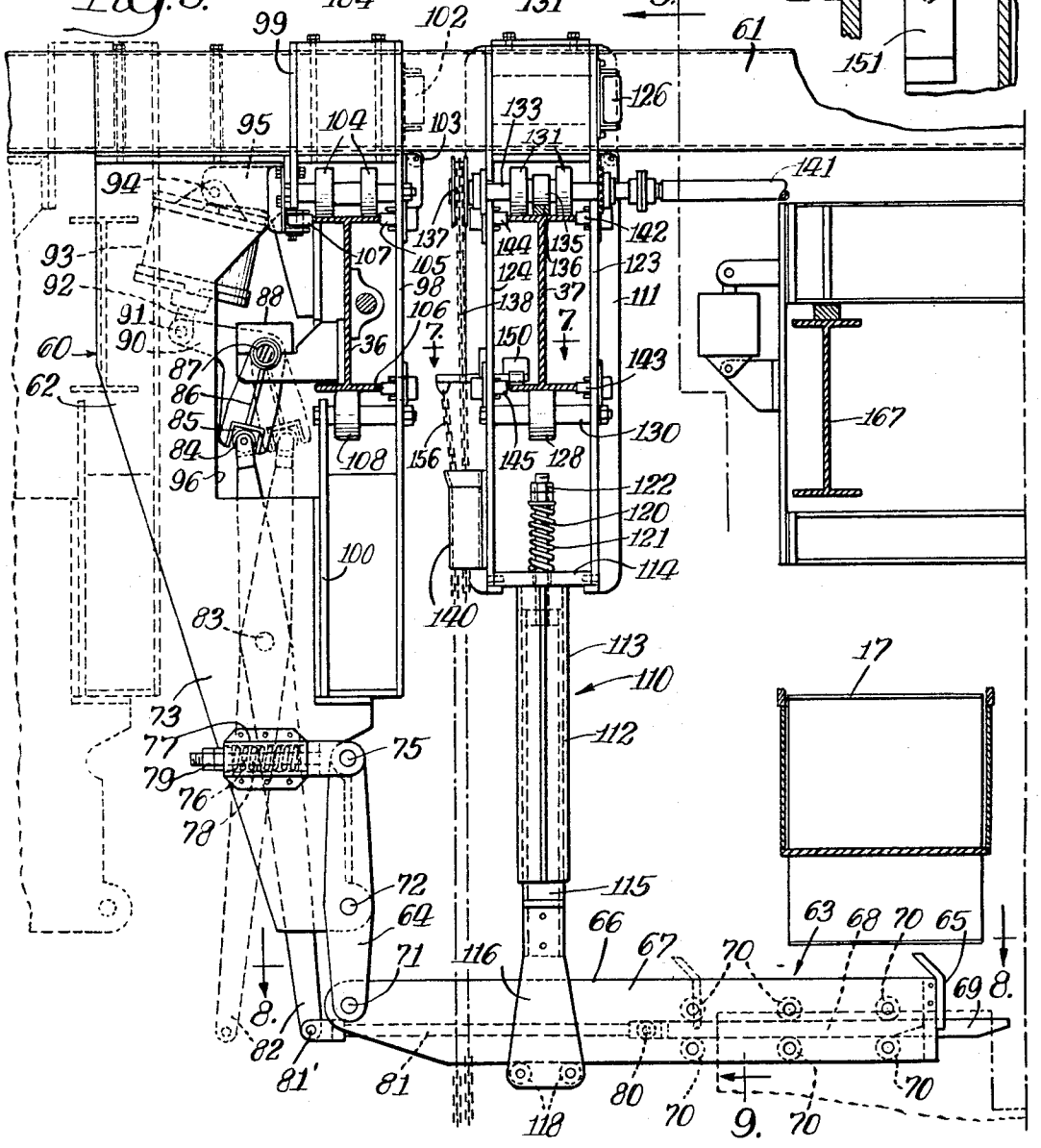


Fig. 5.



Aug. 6, 1968 D. BUCCICONE 3,395,914

SHEET HANDLING MACHINE

Filed Nov. 21, 1966 7 Sheets-Sheet 5

Fig. 11.

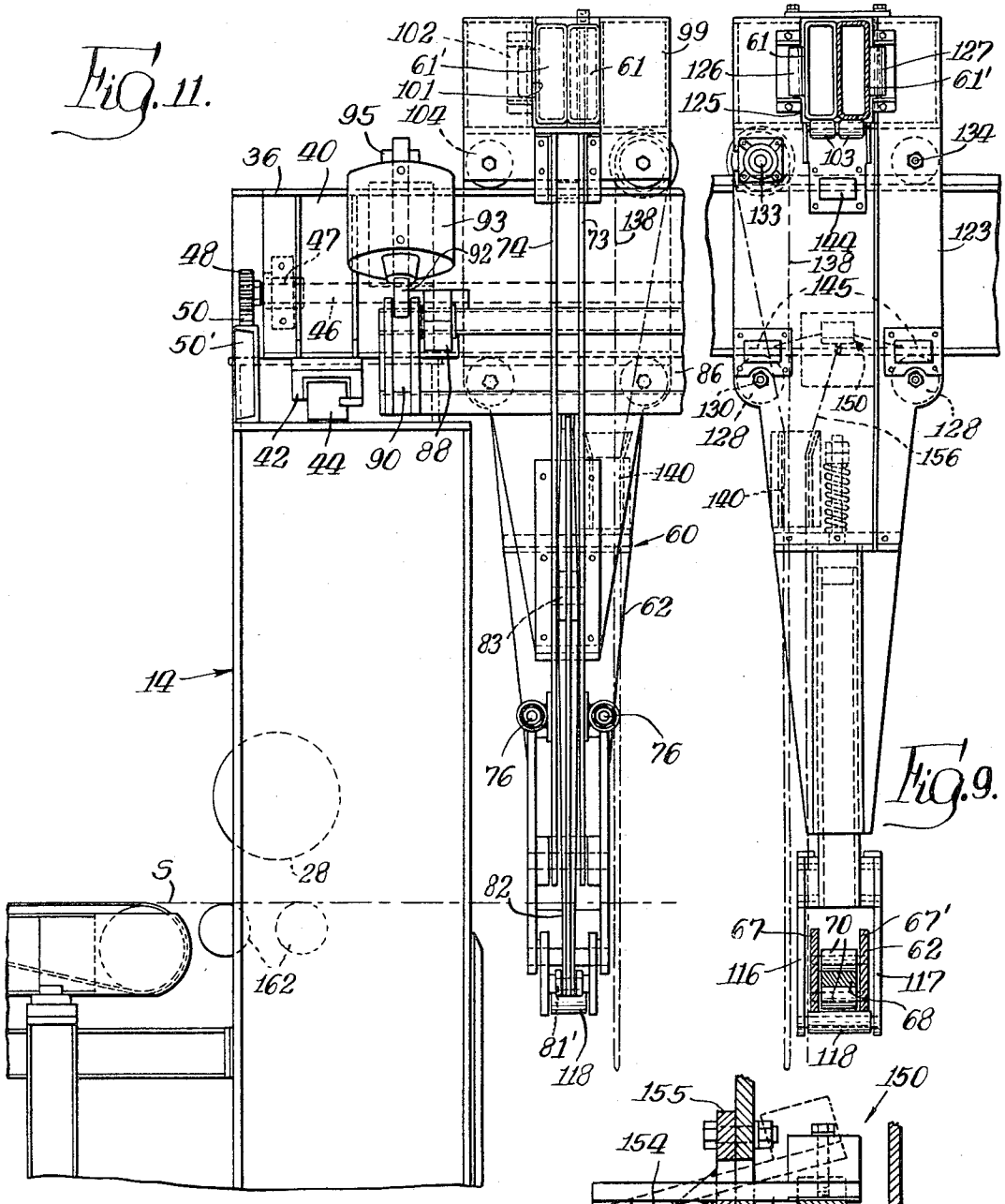


Fig. 9.

Fig. 8.

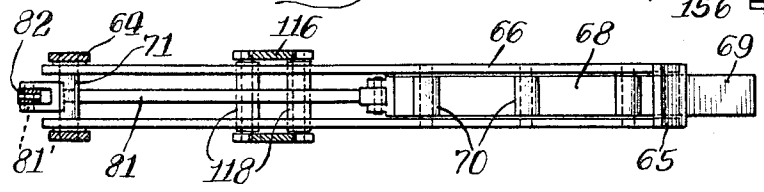
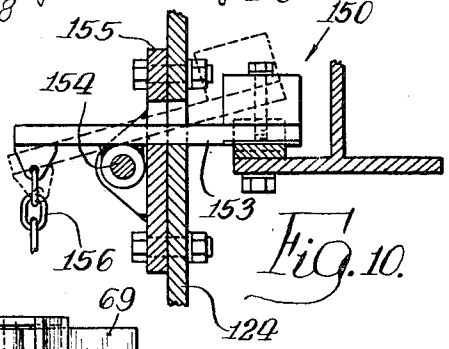


Fig. 10.



Aug. 6, 1968 D. BUCCICONE 3,395,914

SHEET HANDLING MACHINE

Filed Nov. 21, 1966 7 Sheets-Sheet 6

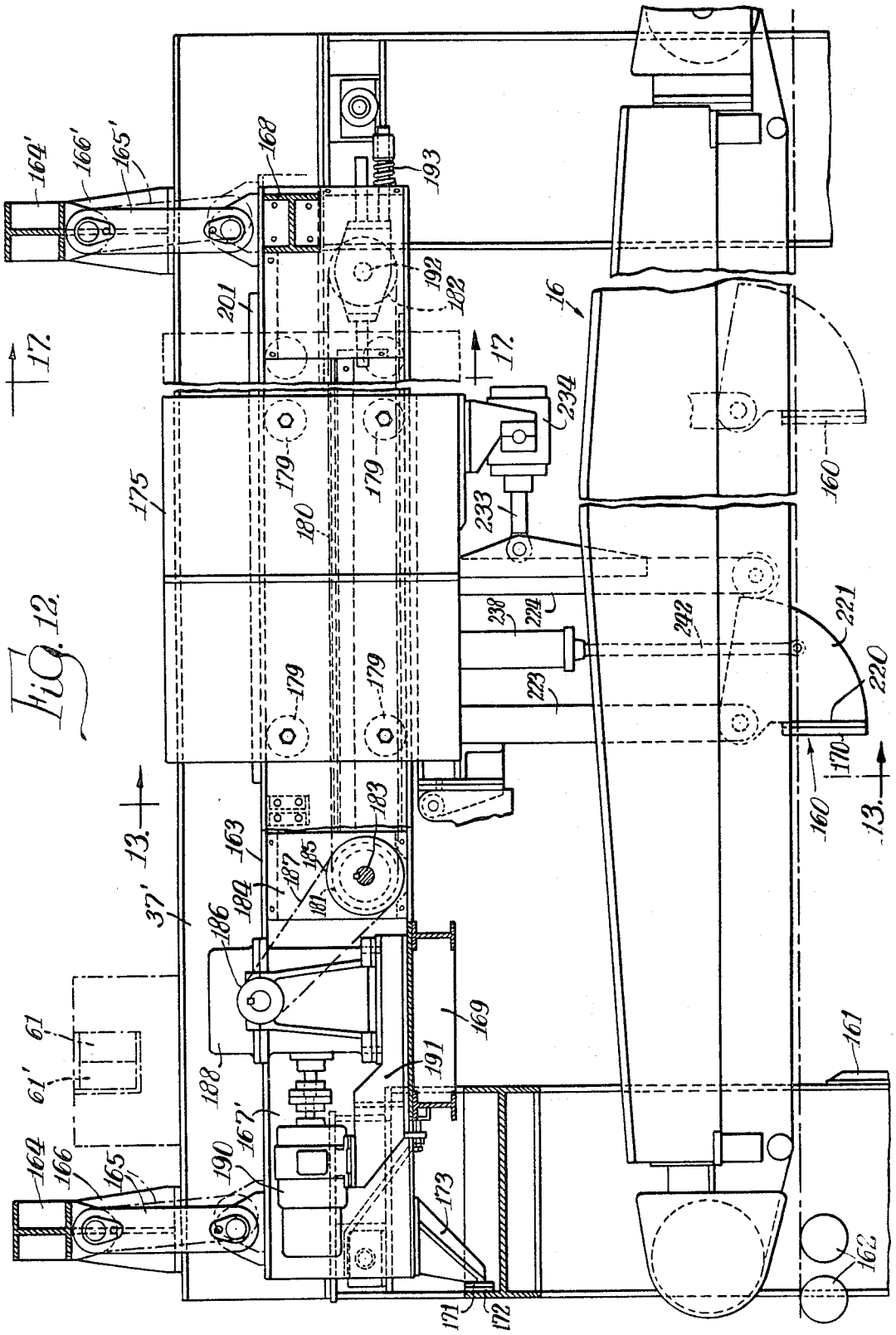
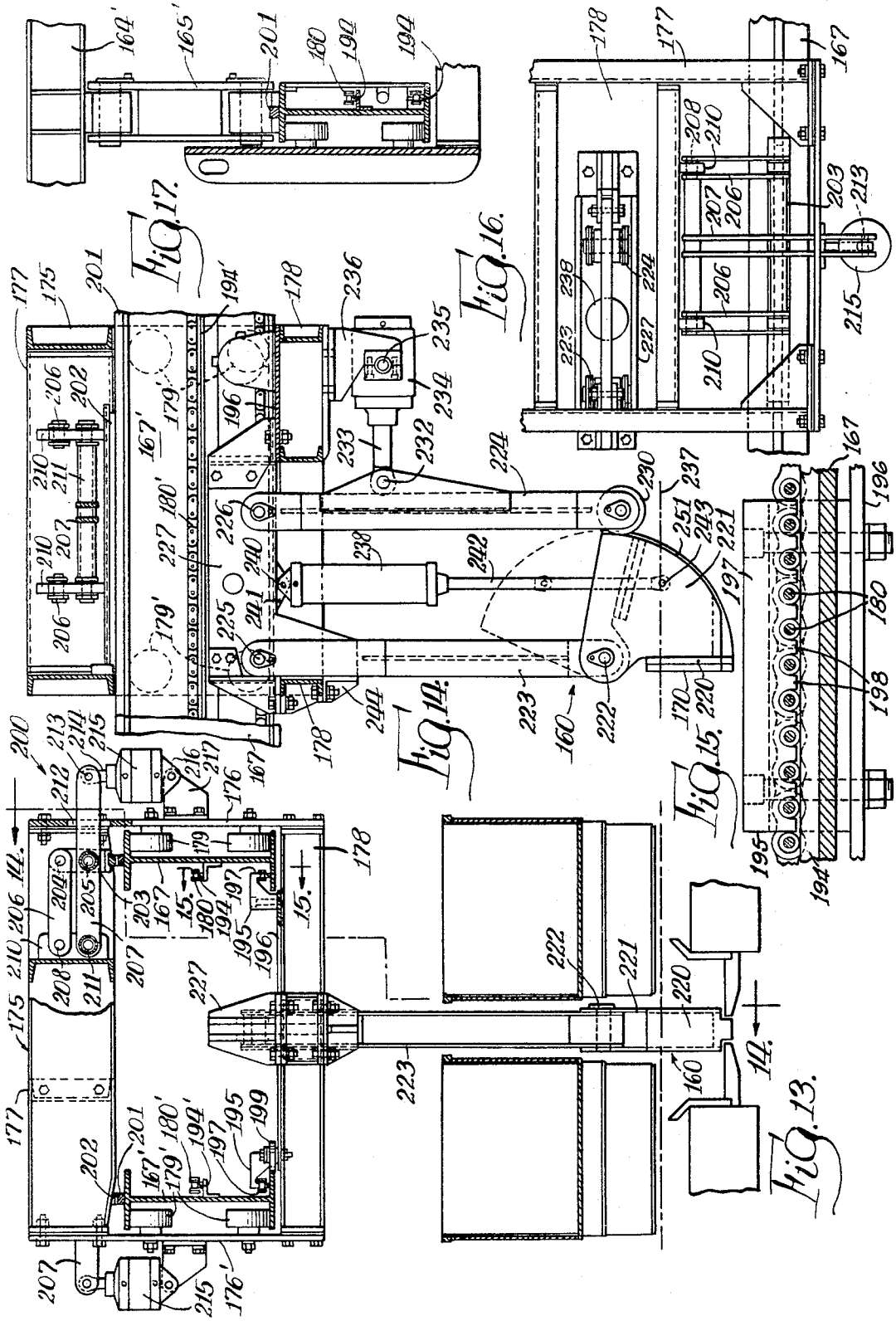


FIG. 12.

Aug. 6, 1968 D. BUCCICONE 3,395,914

SHEET HANDLING MACHINE

Filed Nov. 21, 1966 7 Sheets-Sheet 7



United States Patent Office 3,395,914 Patented Aug. 6, 1968

3,395,914

SHEET HANDLING MACHINE

Dario Buccicone, Gary, Ind., assignor to Bucciconi Engineering Co., Inc., Gary, Ind., a corporation of Indiana

Filed Nov. 21, 1966, Ser. No. 595,826
21 Claims. (Cl. 271—68)

ABSTRACT OF THE DISCLOSURE

A machine for piling metal sheets wherein the sheets are advanced to a pile supporting lift bed at a piling area between upright end frames by a sheet advancing overhead magnetic conveyor structure which is mounted on the end frames, which machine includes side guide assemblies adjustably supported on pairs of longitudinally extending side beams, the innermost beams being fixed on the end frames and the outermost beams being laterally adjustable. The side guide assemblies are arranged in pairs and mounted on pairs of cross beams which are longitudinally adjustable along the longitudinal beams and which are slidable relative to each other with lateral adjustment of the outside longitudinal support beams. Each guide assembly has a sheet positioning finger unit fastened to the lower end of the supporting linkage so as to enable the finger units to swing outwardly when lateral force is applied thereto and avoid damage to the same. An end stop bumper is mounted on a bracket at the bottom end of pairs of pivoted link bars depending from a carriage which is movable longitudinally of the machine on tracks provided on an overhead support frame, the latter frame being supported at opposite ends by parallel links depending from cross bars on the upright end frames so as to provide for limited swinging movement of the carriage support frame.

This invention relates to sheet handling apparatus and is more particularly concerned with improvements in a machine for piling or stacking sheet materials usually at the end of a sheet processing or treating line.

It is the general object of the invention to provide improvements in a machine for piling sheet materials which is especially designed for use in a processing line where it is desired to stack sheets of a predetermined character and to allow other sheets to pass clear through the machine.

It is a more specific object of the invention to provide an improved piler mechanism for sheet materials which employs overhead conveyors of rail-like form having traveling belts and means for holding the sheets against the bottom surface of the belts and also having side guide and end stop devices which are of improved design.

It is another object of the invention to provide a piler for metal sheets which employs overhead magnetic conveyors mounted on spaced end frames and having improved side guide mechanisms which are adjustable longitudinally and transversely of the piler so as to adapt the same for sheets which are of different width and length.

It is still another object of the invention to provide a sheet piler which employs overhead magnetic conveyors mounted on spaced end frames and side guide units which are mounted in paired relation on an overhead frame structure and which are adjustable longitudinally and laterally of the piler so as to permit the guide units to be properly positioned for piling sheets of different widths.

It is a further object of the invention to provide a sheet piler employing overhead magnetic conveyors mounted on spaced end frames and pairs of side guide mechanisms which are independently adjustable along the length of

the piler, with the guides of each pair thereof being adjustable laterally of the piler, so as to handle sheets of different size, and with each guide mechanism having a sheet positioning finger unit which is fastened to the lower end of a supporting linkage so as to enable the finger units to swing outwardly when lateral force is applied thereto and thereby avoid damage to the same.

It is a still further object of the invention to provide a sheet piler of the type described with side guide units which are disposed on opposite sides of an overhead magnetic conveyor and means for adjusting the position of the guide units laterally and longitudinally of the piler and for locking the individual guide unit in adjusted position.

Another object of the invention is to provide a sheet piling machine of the type described having side guide units with sheet engaging fingers which are spring cushioned through a system of levers.

Another object of the invention is to provide in a piling machine having a laterally adjustable side guide mechanism which is supported on an overhead frame structure and provided with sheet engaging fingers supported on horizontally disposed arms which are spring cushioned against outward movement and supported for vertical movement by spring tensioned hanger members.

A still further object of the invention is to provide a sheet piling machine of the type described having an end stop mechanism which is adjustably mounted on an overhead supporting structure with a sheet engaging bumper stop which is movable out of the path of the sheets to permit sheets to be passed through the piler and which has an improved cushioning arrangement.

These and other objects and advantages of the invention will be apparent from a consideration of the piling machine which is shown by way of illustration in the accompanying drawings wherein:

FIG. 1 is a side elevation of a sheet piling machine which incorporates therein the principal features of the invention, with portions broken away and other portions omitted;

FIG. 2 is a plan view of the sheet piling machine with portions broken away and other portions omitted;

FIG. 3 is a cross section taken on the line 3—3 of FIG. 1 to a larger scale and with portions broken away;

FIG. 4 is a cross section taken on the line 4—4 of FIG. 1 to a larger scale and with portions broken away or omitted;

FIG. 5 is a partial cross section, showing the lefthand side of FIG. 4, to an enlarged scale and with portions broken away;

FIG. 6 is a plan view of the mechanisms shown in FIG. 5;

FIG. 7 is a fragmentary cross section taken on the line 7—7 of FIG. 5;

FIG. 8 is a horizontal section taken on the line 8—8 of FIG. 5;

FIG. 9 is a vertical section taken on the line 9—9 of FIG. 5 to an enlarged scale and with portions broken away;

FIG. 10 is a fragmentary cross section taken on the line 10—10 of FIG. 7;

FIG. 11 is a fragmentary side elevation at the entrance end of the machine, to a larger scale;

FIG. 12 is a longitudinal vertical section taken on the line 12—12 of FIG. 2, to an enlarged scale and with portions broken away;

FIG. 13 is a cross section taken on the line 13—13 of FIG. 12;

FIG. 14 is a sectional view taken on the line 14—14 of FIG. 13;

FIG. 15 is a fragmentary cross section taken on the line 15—15 of FIG. 13 to an enlarged scale;

FIG. 16 is a fragmentary plan view of the mechanism shown in FIG. 14; and

FIG. 17 is a fragmentary cross section taken on the line 17—17 of FIG. 12.

The apparatus 10 which is illustrated in the drawings (FIGS. 1 and 2) and which incorporates therein the principal features of the invention, is designed to receive individual metal sheets, from a processing line or the like, and deposit the sheets one by one on a stack or pile 11 on a lift bed structure 12 for removal in a direction laterally of the apparatus. The machine 10 is especially designed for use where it is desired to be able to pass selected sheets through the machine for delivery to other equipment, for example, another piling machine, which may be arranged in longitudinal alignment with the machine 10, suitable control mechanism being provided to select the sheets which are to be passed through the piler 10 and/or operate the piler conveyor either to advance the sheets or to drop the same for piling.

The illustrated machine 10 comprises an upright supporting frame structure 13 which includes longitudinally spaced end frames 14 and 15. The end frames 14 and 15 support opposite ends of an overhead magnetic conveyor structure 16, which, in the form shown, comprises two identical conveyor rail units 17 and 18. The conveyor rail units 17 and 18 may be, for example, the straight bottom type which are disclosed in my co-pending application Ser. No. 499,202, filed Oct. 21, 1965, now Patent No. 3,297,136, or the rail units disclosed in my Patents Nos. 3,229,805 dated Jan. 18, 1966, or 3,150,764 dated Sept. 29, 1964. The rail units 17 and 18 are transversely spaced and supported, at the receiving end of the machine 10 on a cross beam 20 (FIGS. 1 and 4) carried by hanger members 21, 21' depending from a fixed cross beam 22, the latter extending between upstanding side portions of the end frame structure 14. The conveyor rail units 17 and 18 are supported at the other end of the machine 10, on a cross beam 23 (FIGS. 1 and 3) carried by hanger members 24, 24' depending from a fixed cross beam 25 extending between upstanding portions of the end frame structure 15. Each of the rail units 17 and 18 comprises an elongated frame 26 which houses a series of longitudinally spaced magnets (not shown) and a traveling belt 27 which is supported at opposite ends on pulleys 28 and 30 (FIGS. 1 and 2). Pulleys 28 at the entrance end of the machine are idler pulleys which are carried on an idler shaft 31 while the pulleys 30 at the opposite or exit end of the machine are mounted on a shaft 32 (FIG. 3) which is connected in driven relation with the gear reducer 33 and drive motor 34 so as to drive the belts 27.

The machine 10 is provided with a plurality of side guide assemblies 35 (FIGS. 4 to 11) for guiding the side edges of the sheets as they are dropped by the conveyor 16. The side guide assemblies 35 are mounted on longitudinally extending, laterally spaced pairs of supporting I beams 36, 37 and 36', 37' (FIG. 4). The I beams 36, 36' and 37, 37' are substantially identical except for being rights and lefts and they are mounted at their opposite ends on the frame 13 with the innermost beams 37, 37' being in fixed position on the frame 13 and the outermost beams 36, 36' being adjustable laterally of the machine in an identical manner. As shown in FIGS. 1 to 3 and 11, the innermost support beams 37 and 37' are secured at their ends on the tops of the supporting end frame structures 14 and 15 and the beams 36 and 36' are disposed in parallel relation and supported at their ends for lateral movement on the end frame structures 14 and 15. The movable beams 36 and 36' are mounted in an identical manner and the mounting for only one thereof will be described, it being understood that the corresponding beam at the opposite side of the machine is supported in the same manner. The support beam 36 is provided at its opposite ends with brackets 40 and 41 (FIGS. 3 and 11). The brackets 40 and 41 have bottom guide members 42, 43 providing downwardly opening guideways for seating in slidable relation on track forming bars 44 and 45, which are mounted in laterally extending relation on the end frames 14 and 15. An equalizing bar 46 is journaled in suitable bearings at opposite ends of the beam 36 and carries on its outer ends pinions 48 and 49. Pinions 48 and 49 are in engagement with rack formations 50 and 51 mounted on the upper edges of supporting channels 50' and 51' on the end frames 14 and 15. A drive mechanism for adjusting the lateral position of the beams 36 and 36' is arranged on the end frame structure 15 which comprises a screw 52 journaled in a suitable housing at the top of the end frame 15 and having threaded engagement with a nut formation 53 in the bottom of the bracket 41 so that rotation of the screw 52 results in travel of the beam 36 on the track member 45. A like arrangement is provided on the other side of the machine for adjusting the beam 36' and the operating screws which have right and left hand threads are connected by a shaft 54 which carries a sprocket 55 connected by a chain 56 with a suitable output sprocket 57 on a speed reducer forming part of a motor drive mechanism 58 which is mounted on a suitable supporting bracket 59 at the back of the end frame 15. Hand adjustment may be provided for this mechanism, and also, if desired, separate drive motors may be provided for operating the adjusting screws 52 independently of each other so as to provide for independent lateral adjustment of the beams 36 and 36'.

Each of the side guide or edge guide assemblies 35 (FIGS. 4–11) comprises a pair of side guide devices or units 60 and 60' which are substantially identical except for being rights and lefts and which are connected for simultaneous movement longitudinally of the machine by a pair of cross bar or beam members 61 and 61', the latter extending in side by side relation transversely of the machine. The side guide device 60 comprises a carriage forming structure 62 depending from the top cross beam 61 and a sheet guiding and supporting finger structure 63 which is connected to the lower end of the carriage structure 62 by a linkage 64 so that the finger structure 63 is supported in suspended relation on the carriage 62. The edge guide and sheet supporting finger structure 63 comprises a vertically disposed sheet edge guiding plate 65 (FIG. 5) mounted on the inner end of an elongated, horizontally disposed housing 66 which is formed by two laterally spaced, vertically disposed, parallel side plates 67 and 67' between which there is slidably mounted an elongated bar or plate 68 the forward end of which constitutes a sheet supporting finger 69. The bar 68 is slidably mounted on guideway forming rollers 70 journalled in the side plates 67 and 67'. The outer end of housing 66 is pivoted at 71 to the bottom end of the double plate link member 64 which is in turn pivotally mounted at 72 on the lower ends of the vertically disposed parallel plates 73 and 74 on the depending carriage structure 62 and straddles the same. The upper end of link bar 64 is pivoted at 75 to the inner ends of a pair of horizontally disposed pins 76 which are slidably mounted in housing forming brackets 77 on the plates 73 and 74 and carry compression springs 78 which are each held thereon by a nut assembly 79 with the inner end thereof abutting the inner end of the housing 77 so as to form a double spring cushion permitting limited outward movement of the finger supporting housing 66. The finger forming bar or plate 68 has its outer end pivoted at 80 to the inner end of a horizontal link bar 81, the opposite end of which is pivotally connected at 81' to the lower end of a vertically disposed link bar 82, the latter extending upwardly between the plates 73 and 74 and pivoted on a pin 83 intermediate its ends so as to permit retraction of the finger 69 within the housing 66. The vertical link bar 82 carries at its upper end a roller 84 which is received in the downwardly facing guideway 85 formed by an elongate channel secured on the lower edge of a longitudinally extending

plate 86 which is secured at its upper edge to a longitudinally extending rock shaft member 87 journaled in bearing brackets 88 at opposite ends of the beam 36 and having an operating arm 90 at one end thereof which is pivotally connected at 91 to the end of a piston 92 of the hydraulic cylinder 93. The cylinder 93 is pivotally mounted at 94 on a bracket 95 extending laterally of the end of the beam 36 and has suitable connection with a fluid pressure line so as to control the movement of the sheet supporting finger 69. The carriage plates 73 and 74 are cut out at 96 (FIG. 5) to accommodate the rocking movement of the longitudinal plate 86. The plates 73 and 74 are attached to a vertically disposed carriage forming framework which includes an inside plate 98 disposed in a vertical plane on the inside of the beam 36 and outside plates 99 and 100 which are disposed in parallel vertical planes and spaced outwardly of the inside plate 98. The topmost outside plate 99 is connected to the inside plate 98 by suitable cross plate members and this assembly is secured to the top cross beam 61 along with the vertical plates 73 and 74. The plates 98 and 99 are apertured at 101 (FIG. 11) to accommodate the beam 61 on which the carriage structure 62 is supported and also the companion cross beam 61' the latter being slidable in the aperture 101 and supporting the corresponding carriage structure for the companion side guide device 60' on the opposite side of the machine. Rollers 102 and 103 (FIGS. 5 and 6) are suitably mounted at the top of plate 98 so as to bear against the side and bottom of beam 61' and form a track for movement of the same relative to the cross beam 61. Two pairs of guide rollers 104 are mounted on shafts journaled between the plates 98 and 99 and ride on the top flange of the longitudinal support beam 36 as shown in FIGS. 5 and 6. The plate 98 is provided with pairs of small guide rollers 105 and 106 which ride on the inside edges of the top and bottom flanges of the support beam 36. Rollers 107 are mounted in a suitable manner on the bottom edge of the plate 99 in oppositely disposed relation to the rollers 105 and ride on the opposite edge of the support beam 36. A pair of bottom guide rollers 108 are mounted on shafts journaled between the plates 98 and 100 and ride on the bottom flange of the support beam 36. With this arrangement the support beam 36 serves as a track for supporting the entire carriage frame assembly 62 for longitudinal movement.

A spring cushioned hanger support 110 (FIGS. 5 and 9) for the finger housing 66 is mounted in depending relation on the cross beam 61 which comprises an upper carriage forming assembly 111 adapted to ride on the longitudinal support beam 37 for longitudinal adjustment along with the carriage 57 and a depending hanger arm 112. The carriage assembly 111 includes an arrangement for adjusting the position of the entire side guide assembly 35 longitudinally of the machine and for locking the same in adjusted position. The hanger arm 112 comprises a vertically disposed housing 113 in the form of an externally ribbed or reinforced tube depending from the bottom plate 114 on the carriage 111. A bar member 115 is slidably mounted in the housing 113 and carries on its lower end a hanger bracket formed by parallel plates 116 and 117 having a pair of spaced rollers 118 journaled in the bottom thereof for supporting the finger housing 66. At its upper end the bar member 115 has a pin 120 extending through an aperture in the bottom plate 114 and carrying a compression spring 121 which abuts the plate 114 at the lower end thereof and which is adjustably tensioned on the pin 120 by a pair of lock nuts 122 so as to provide a cushioned support for vertical movement of the finger housing 66. The carriage assembly 111 comprises inner and outer parallel, vertically disposed plates 123 and 124 which are spaced apart so as to accommodate between them the fixed I beam 37. The plates 123 and 124 are cut out or slotted at the top at 125 to accommodate the top cross beams 61 and 61' and bearing rollers 126 and 127 are suitably supported on the plate 123 so as to ride on the vertical faces of the cross beams 61 and 61'. A pair of bottom guide rollers 128 are mounted on spaced cross shafts 130 extending between the plates 123 and 124 so as to ride on the bottom flange of the fixed I beam 37. Two pairs of top guide rollers 131 and 132 are mounted on cross shafts 133 and 134 extending between the plates 123 and 124 so as to bear on the top flange of the support beam 37. The one shaft 133 carries a pinion 135 which engages a rack 136 on the top flange of the beam 37 for moving the carriage 111 along the beam. The shaft 133 is extended at the one end and receives a sprocket 137 over which there is trained a length of chain 138 extending down through a guide tube 140 on the outer side of the plate 124, to facilitate manual operation of the shaft 133. A connecting shaft 141 extends from the other end of the shaft 133 to a corresponding shaft 133' (FIG. 4) forming part of the associated side guide device 60' on the other side of the machine. The plates 123 and 124 carry pairs of small guide rollers 142, 143 and 144, 145 which ride on the oppositely disposed edges of the top and bottom flanges of the I beam 37 to hold the carriage in proper alignment on the I beam 37. A like hanger support 110' forms a part of the associated side guide device 60' at the opposite side of the machine.

A lock forming assembly 150 (FIGS. 5, 7, 9 and 10) is provided for securing the carriage 111 in adjusted position along the support beam 37. The lock assembly 150 comprises a series of longitudinally spaced keeper forming members 151 mounted on the upper outside portion of the bottom flange of I bear 37 having keeper slots 152 for receiving the end of a latch plate or arm 153 which is pivotally mounted on a pin 154 supported in suitable bearing brackets 155 on the outside face of plate 124. The latch plate 153 has an extended outer end to which a length of chain 156 is attached and threaded down through guide member 140 for manual operation. The latch end of plate 153 is weighted so that plate 153 will normally swing clockwise as viewed in FIG. 10 and remain in a keeper slot 152 when dropped therein. This locks the entire side guide assembly 35 in position longitudinally of the machine.

The machine 10 is provided with an end stop assembly 160 (FIGS. 1 and 2) which is adjustable longitudinally of the machine so as to adapt the machine for handling sheets of different lengths and a co-operating back stop plate 161 mounted in vertically disposed fixed relation at the entrance end of conveyor 16. Back stop plate 161 has its top edge located below the entrance plane of the sheets, the latter being determined by the sheet supporting entrance rollers 162 mounted on the end frame 14.

The end stop assembly 160 (FIGS. 1, 3 and 12 to 17) is adjustably mounted on a longitudinally extending frame 163 which is suspended above the conveyor 16 between cross frame members 164 and 164' by means of pairs of parallel links 165, 165' depending in paired relation from the cross frames 164 and 164' and connected to the opposite ends of the support frame 163. The cross frame members 164 and 164' are mounted on fixed brackets 166 and 166' upstanding from the fixed beams 37 and 37' at opposite ends of the machine. The longitudinally extending frame 163 comprises elongate I beams 167 and 167' connected in parallel relation by a cross beam 168 at the exit end and a motor and drive unit supporting cross frame 169 at the entrance end of the machine. The frame 163 is free to swing on the links 165 and 165' in the direction of advance of the sheets when a sheet is released by the conveyor and the leading end thereof engages the bumper pad 170 on the end stop mechanism 160. When the frame 163 swings in the opposite direction bumper pad members 171 of rubber or like material which are mounted on the end frame member 172 at the entrance end of the machine are engaged by the bracket members 173 depending from each of the beams 167 and 167' so as to prevent the frame 163 from swinging as a pendulum.

The frame 163 is normally biased as indicated by the dot-dash line position of the suspending links 165 and 165'.

The end stop assembly 160 is supported on the longitudinally extending frame 163 by means of a carriage 175 which is in the form of a rectangular frame encompassing the longitudinal beams 167 and 167' and comprising parallel side plates 176 and 176' which are disposed in vertical planes on the outside of the beams 167 and 167' and top and bottom connecting frame structures 177 and 178. The carriage 175 is supported for longitudinal movement on the beams 167 and 167' by rollers 179 and 179' rotatably mounted on the side plates 176 and 176' in rectangular arrangement and riding on the outermost portions of the top and bottom flanges of the beams 167 and 167'.

The carriage 175 is adjustable along the beams 167 and 167' by means of a pair of chains 180 and 180' which are mounted on pulleys 181 and 182 at opposite ends of the beams 167 and 167'. The pulleys 181 at the entrance end of the machine are supported on a cross shaft 183 which is journaled in bearing forming members 184 mounted on the inside flanges of the beams 167 and 167' and carrying a sprocket 185 which is connected by the drive chain 186 with a sprocket 187 on the output shaft of a gear reduction unit 188 which is driven by motor 190. The motor drive unit is supported on bracket 191 on the bottom cross frame 169 which extends between the beams 167 and 167' at the entrance end of the machine. Suitable adjustment is provided for the bracket 191 in order to tension the drive chain 187. At the other end of the beams 167 and 167' the sprockets 182 are each mounted on a stub shaft 192 journaled in suitable bearings carried on the beams 167 and 167' and a tensioning mechanism, indicated at 193, is provided for each of the sprockets 182 so as to tension the chains 180 and 180'. The chains 180 and 180' ride on horizontally disposed guide rails 194 and 194' mounted on the inside faces of the beams 167 and 167'. The carriage 175 is connected to the chains 180 and 180' for movement therewith by connector brackets 195 (FIGS. 13 and 15) which are attached in upstanding relation to a bottom cross plate 196 on the carriage 175 and are provided with flanges 197 overhanging the inside portions of the bottom flanges of the beams 167 and 167'. The connector flanges 197 have a tooth formation 198 on the downwardly facing edge which is engaged with the links of the chains 180 and 180' as shown in FIG. 15. Guide rollers, one of which is shown at 199 on FIG. 13, are provided on the bottom frame plate 196 which ride on the inside edges of the lower flanges of the supporting I beams 167 and 167' so as to hold the carriage 175 against lateral shifting as it is moved along the supporting beams. A lock mechanism 200 (FIGS. 13, 14 and 16) is incorporated in the top frame 177 for locking the carriage 175 in adjusted position longitudinally of the supporting beams 167 and 167'. The lock mechanism 200 comprises an identical arrangement at each side of the carriage 175, only one of which is fully shown in FIGS. 13 and 16, it being understood that duplicate mechanism is provided on the opposite side of carriage 175, as indicated in FIG. 13. A locking bar member 201 is fixed on the top of the I beam 167 and a co-operating locking bar 202 is carried on the bottom of the link bar frame 203 which extends below and in pivotally connected at 204 and 205 to pairs of horizontally disposed, parallel link bars 206 and 207. The uppermost link bars 206, which are of lesser length than the lowermost bars 207, are pivoted at 208 to brackets 210 on the inside of the cross frame 177 and extend short of the outside carriage plate 176. The longer, lowermost link bars 207 are pivoted to the brackets 210 on a shaft 211 mounted between the brackets 210 with their outer ends extending through an aperture 212 in the side plate 176 and pivotally connected at 213 to the end of the piston 214 extending upwardly from an operating cylinder 215 which is pivotally connected at 216 to a bracket 217 mounted on the outer face of the side plate 176. Operation of the cylinder 215 raises and lowers the link bar frame 203 and engages and disengages the lock bar members 201 and 202, which, when engaged, hold the carriage 175 in adjusted position on the longitudinal frame 163.

The end stop mechanism 160 (FIGS. 13 and 14) comprises an end stop pad 170 mounted on a backing plate 220 on the forward edge of a bracket 221 which is in the form of a segment pivotally mounted at 222 on the lower end of the foremost one of a pair of link bar structures 223 and 224. The link bars 223 and 224 are pivoted at 225 and 226 to a supporting bracket frame 227 mounted on the bottom frame structure 178 of the carriage 175. The rearmost link bar structure 224 carries at its lower end a roller 230 which rides on the curved track forming back edge 231 of the pad supporting bracket 221. The rearmost link bar 224 is pivotally connected at 232 to the forward end of a piston 233 extending from a cushioning cylinder 234 which is pivotally mounted at 235 to a supporting bracket 236 depending from the bottom of the carriage bottom frame 178. The pad 170 and its supporting bracket 221 are adapted to be moved, as shown in FIG. 14, from a position where the pad 170 is disposed vertically to an out-of-the-way position, as indicated in dotted lines, where the pad 170 is above the pass line 237 for the sheets which are carried on the conveyor. The bracket 221 is raised to the out-of-the-way position by means of an air cylinder 238 pivotally mounted at 240 on the bottom of the bracket 241 which depends from the carriage bottom frame 178. The cylinder 238 has its piston 242 pivotally connected at 243 to the bracket 221. The forward movement of the foremost link bar 223 is limited by engagement with a stop member 244 on the carriage bottom frame 178. The cushioning cylinder 234 limits the movement of the linkage and the end stop pad 170 in the opposite direction.

In using the machine whic his illustrated, the end stop mechanism 160 is adjusted longitudinally of the supporting frame 163 to position the end stop pad 170 at the proper distance from the back stop plate 161 to accommodate the length of sheet which is to be piled. This adjustment is accomplished through operation of the motor 190 which drives the chains 180 and 180'. The end stop carriage 175 is locked in adjusted position on the beams 167 and 167' by the lock mechanism 200 which is operated through the fluid cylinders 215, the latter being connected to a suitable fluid supply line with appropriate control mechanism for operation thereof. The side guide assemblies 35 are adjusted longitudinally of the machine and also laterally thereof accordingly to the length and width of the sheet which is to be piled. Longitudinal adjustment is accomplished by rotation of the sprockets 137 through manipulation of the chains 138 so that the assemblies 35 are spaced along the edges of the sheets. Lateral adjustment of the assemblies 35 is accomplished by rotation of the screws 52 through the shaft 54 which is driven by the motor drive mechanism 58. The lateral position of the supporting beams 36 and 36' is adjusted so that the vertical guide plates 65 are separated the proper distance to receive the sheets on the supporting fingers 69, the housings 66 being resiliently supported and spring tensioned for limited lateral movement so as to absorb without damage stresses resulting from the movement of the sheets in both the vertical and horizontal direction as they are dropped onto the fingers 69. The sheets are dropped onto the pile by retraction of the supporting fingers 69 into the housings 66 through operation of the fluid motors 93 which are connected to a suitable fluid supply line with appropriate controls for operating the same. When the side guide mechanisms are moved out to accommodate the wider sheets, which will usually be of greater weight, the hanger assemblies 110 are most effective in cushioning the fall of the sheets.

The end stop cushioning cylinder **234** is, of course, connected to a fluid pressure line so as to absorb the force exerted by the sheets when they strike the bumper pad **170**. A part of the force exerted by the sheet as it strikes the bumper pad **170** may be absorbed by movement of the supporting frame **163** for the bumper pad assembly, the supporting frame **163** being free to swing on the links **165** and **165'**, with the weight of the mechanism, which will be substantial, serving to return the frame to its normal position and the co-operating bumper members **171** and **173** dampening the movement of the frame. When it is desired to pass a sheet through the machine the bumper pad **170** is moved to the elevated position above the path of the sheet by operation of the fluid cylinder **238** which is connected to a suitable fluid line with controls for operation of the same. If stagger piling is desired, the machine may be equipped with end stop and back stop apparatus which includes stagger piling devices (not shown) for accomplishing this operation.

While particular materials and specific details of construction are referred to in describing the illustrated form of the machine, it will be understood that other materials and equivalent structural details may be resorted to within the spirit of the invention.

I claim:

1. A machine for handling sheet material comprising an elongate overhead conveyor for advancing selected sheets to a piling area where the sheets are deposited by gravity on a pile upon release by the conveyor, upright end frames supporting opposite ends of said conveyor, a back stop adjacent the entrance end of the machine, an end stop bumper pad adapted to be positioned forwardly of the back stop for engagement by the leading edges of the sheets as they are released by the conveyor, an end stop bumper pad carriage mounted for adjustment longitudinally of the conveyor, an overhead frame having a track on which said carriage moves and means for suspending said overhead frame from said upright end frames so that said overhead frame has a limited retractive movement in the direction longitudinally of the machine and means mounting said end stop bumper pad on said carriage so that it may be moved between a vertical position where it will be engaged by the leading edge of an advancing sheet as it is released by the conveyor and a generally horizontal position above the path of sheets advanced through the machine by the conveyor, and a guide mechanism for engaging opposite side edges of the sheets as they are released by the conveyor so as to guide the sheets into stacked, vertically aligned relation on the pile.

2. A machine as recited in claim **1**, and the means for suspending the overhead frame on which the bumper stop carriage is mounted comprising top cross frame members on the upright end frames and link members depending therefrom and pivotally attached at opposite ends to the top cross frame members and said overhead frame.

3. A machine as recited in claim **2**, and co-operating interengaging stop members on said overhead frame and an upright end frame for limiting the extent of forward movement of said overhead frame.

4. A machine as recited in claim **1**, and endless chains extending lengthwise on said overhead frame, power drive means for said chains carried on said overhead frame and means connecting the bumper stop carriage to said chains for adjustment longitudinally along said overhead frame.

5. A machine as recited in claim **1**, and parallel link bar members depending from said bumper pad carriage, a bumper pad bracket pivoted on the bottom end of the forward one of said link bar members in the direction of the entrance end of the machine and having a curved surface slidingly engaging the bottom of the associated link bar member, means for normally holding said bracket in a position where the bumper pad is disposed vertically in the path of the sheets and adapted to swing said bracket to move the bumper pad into an elevated, generally horizontal position out of the path of the sheets, and means for cushioning retractive movement of said link bar members resulting from engagement of the leading edge of a sheet against the bumper pad when the bumper pad is disposed in a vertical position.

6. A machine as recited in claim **5**, and stop means limiting the forward movement of said link bar members relative to said bumper pad carriage.

7. A machine as recited in claim **5**, and the means for cushioning the retractive movement of said link bar members comprising a fluid cylinder having its piston connected to the link bar member which is slidably engaged by said bumper pad bracket.

8. A piler machine for sheet material comprising a rail-type overhead conveyor mounted on opposite ends of spaced upright end frames and having traveling belts for advancing on the bottom face thereof successive sheets which are delivered to an entrance end of the conveyor and advanced to a piling area between said end frames, an end stop device for arresting the forward travel of the sheets when they are released by the conveyor, and a side guide mechanism, said side guide mechanism including parallel support beams extending longitudinally of the conveyor and mounted for adjustment laterally of the conveyor, a plurality of side guide assemblies mounted on said support beams for adjustment longitudinally of said beams, each of said side guide assemblies including a pair of transversely extending bar members which are slidably connected to each other, a pair of carriages secured to each of said transversely extending bar members, one carriage of each pair thereof having a depending frame and a link bar pivotally mounted adjacent the lower end thereof, an elongate arm forming member pivotally mounted on the link bar and extending transversely of the machine in a generally horizontal plane, means resiliently connecting the link bar and the depending frame so as to cushion the arm member for limited movement in a direction laterally of the machine, a side guide plate having a vertical face mounted on the inner end of the arm member and a sheet supporting finger bar slidably mounted thereon and adapted to project in one position thereof inwardly of said side guide plate, means for resiliently supporting said arm member intermediate its ends, and means for retracting the sheet supporting finger bar.

9. A piler machine as recited in claim **8**, and said means for resiliently supporting said arm member comprising a hanger frame depending from the other carriage of each pair thereof and connecting means at the lower end thereof for supporting said arm member while permitting movement of said arm member laterally of the machine.

10. A piler machine as recited in claim **8**, and said means for supporting said arm member comprising a hanger frame depending from the other carriage of each pair thereof and a bracket at the lower end thereof in the form of a cradle for receiving said arm member in sliding relation thereon whereby to support said arm member intermediate its ends while permitting lateral movement of said arm member.

11. A piler machine as recited in claim **8**, and the other carriage of each pair thereof having a hanger frame for slidingly supporting said arm member for movement laterally of the machine and a locking device for securing said other carriage to a fixed support beam so as to lock the guide assembly in adjusted position longitudinally of the machine.

12. A piler machine as recited in claim **9**, and one of said carriages of each side guide assembly having locking means for securing the same to the support beam on which it is slidingly mounted for longitudinal adjustment so as to lock the guide assembly in adjusted position.

13. A piler machine as recited in claim **8**, and said means for resiliently supporting said arm member inter-

mediate its ends comprising a vertically disposed hanger member having means at its lower end connecting said arm member for movement of said arm member laterally of the machine, a carriage on which said hanger member is mounted for resilient vertical movement, and a longitudinally extending support beam having a track for mounting said carriage for adjustment longitudinally of the machine.

14. In a machine for piling sheet material which comprises an overhead conveyor mounted on spaced upright end frames and having power driven belts with means for holding on the bottom face of the belt successive sheets which are delivered to the entrance end thereof and an end stop device for arresting the forward travel of the sheets when they are released by the conveyor for deposit on a pile between said end frames, side guide mechanism for guiding the side edges of the sheets as they drop onto the pile, which side guide mechanism comprises parallel support beams extending longitudinally on opposite sides of the conveyor, a plurality of side guide assemblies mounted on said support beams for adjustment longitudinally thereof, each of said side guide assemblies comprising a pair of carriages mounted on support beams on opposite sides of the conveyor and secured on transversely extending bar members which are adjacent each other so that the carriages are movable longitudinally of the support beams as a single unit, one carriage of each pair thereof having depending frame members for supporting a horizontally disposed side guide arm member at the lower end thereof, a side guide plate having a vertically disposed face portion mounted in fixed position on the inner end of said arm member, a retractible and extensible finger-like support for the sheets mounted on said arm member for catching the sheets when they are freed from the conveyor and dropped toward the pile, and means for connecting said arm member to the depending carriage frame members so as to permit limited cushioned movement of said arm member relative to said carriage frame members in a direction laterally of the machine.

15. In a machine for piling sheet material as recited in claim **14**, and the support beams for the outermost carriage of each pair thereof being movably supported on said end frames for adjustment laterally of the machine.

16. In a machine for piling sheet material as recited in claim **15**, and power drive means for moving said support beams so as to adjust the outermost carriages laterally of the machine.

17. In a machine for piling sheet material as recited in claim **14**, and the outermost carriage of each pair thereof having a depending frame for supporting said horizontally disposed side guide arm member, a rock bar mounted on the support beam for the outermost carriages of each pair thereof, said rock bar having a connection with each finger-like support for the sheets so as to retract and extend simultaneously the finger-like supports of each side guide assembly.

18. In a machine for piling sheet material as recited in claim **17**, and a link member pivotally mounted on each said depending frame, which link member has a pivotal connection with the outermost end of said finger-like support and a sliding connection with said rock bar.

19. In a machine for piling sheet material as recited in claim **14**, and a link member pivotally mounted on each said depending frame which link member has a pivotal connection at one end thereof with said horizontally disposed side guide arm member and a connection at the other end thereof with a spring for cushioning movement of said side guide arm member.

20. In a machine for piling sheet material as recited in claim **14**, and each said side guide assembly including a resilient support for each side guide arm member, said resilient support having sliding engagement therewith intermediate the ends of said side guide arm members and being located at a fixed distance laterally of the machine.

21. In a machine for piling sheet material as recited in claim **20**, and said resilient support comprising a depending hanger member mounted on a carriage which is slidable on a track forming beam extending longitudinally of the machine, and means for cushioning downward movement of said hanger member.

References Cited

UNITED STATES PATENTS

3,256,011 6/1966 Buccicone ---------- 271—86

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