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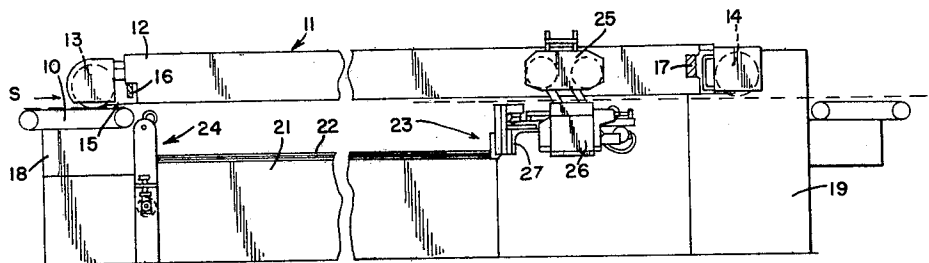
[54] **SHEET PILER WITH STAGGER STOP MECHANISM**
20 Claims, 11 Drawing Figs.

[52] U.S. Cl. **271/86,**
271/68
[51] Int. Cl. **B65h 31/34**
[50] Field of Search **271/68, 86,**
89

[56] **References Cited**
UNITED STATES PATENTS
2,839,295 6/1958 Bernard..... 271/86
3,369,806 2/1968 Buccicone..... 271/68

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ABSTRACT: An end stop bumper structure for an overhead conveyor-type sheet piling machine which is mounted on a support adjustable longitudinally of the machine and which comprises an L-shaped main frame with the long leg thereof disposed horizontally for reciprocating movement on track forming rollers on the support and with the short leg disposed vertically for mounting a bumper pad against which sheets are thrown for piling below the conveyor, and a force-absorbing fluid cylinder on the support having the piston thereof connected to the frame for cushioning the movement caused by the sheets striking the vertical face of the bumper pad. The bumper pad arrangement includes a relatively wide one-piece pad member for use during normal nonstagger piling which is adapted to be removably mounted on the vertically disposed short leg of the L-shaped frame in overlying relation to a multisection bumper pad assembly which is employed for stagger piling, the latter comprising top side pad sections and a center pad section which is mounted on a movable carriage forming frame arranged to be moved in a vertical path and then in a horizontal path defined by tracks on the main frame so that it may be moved upwardly for a substantial distance and then swung into a horizontal, out-of-the-way position where it will not interfere with the passage of sheets over the top of the bumper structure, with the side pad sections being moved to a retracted, nonoperative, out-of-the-way position upon movement of the center pad section to the horizontal position.



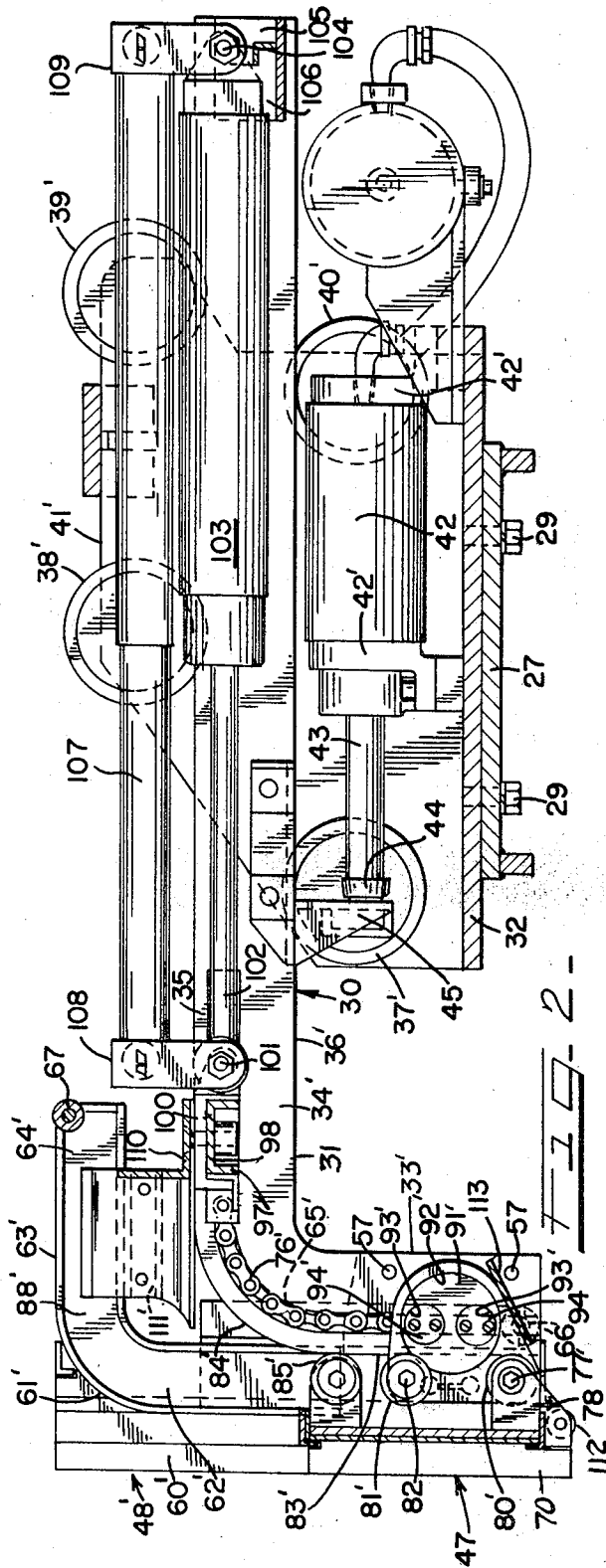
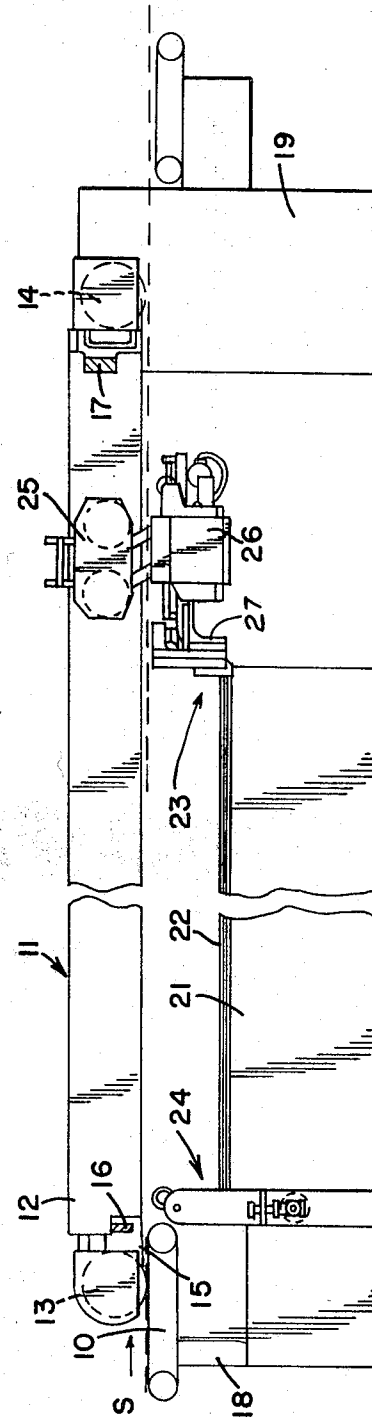
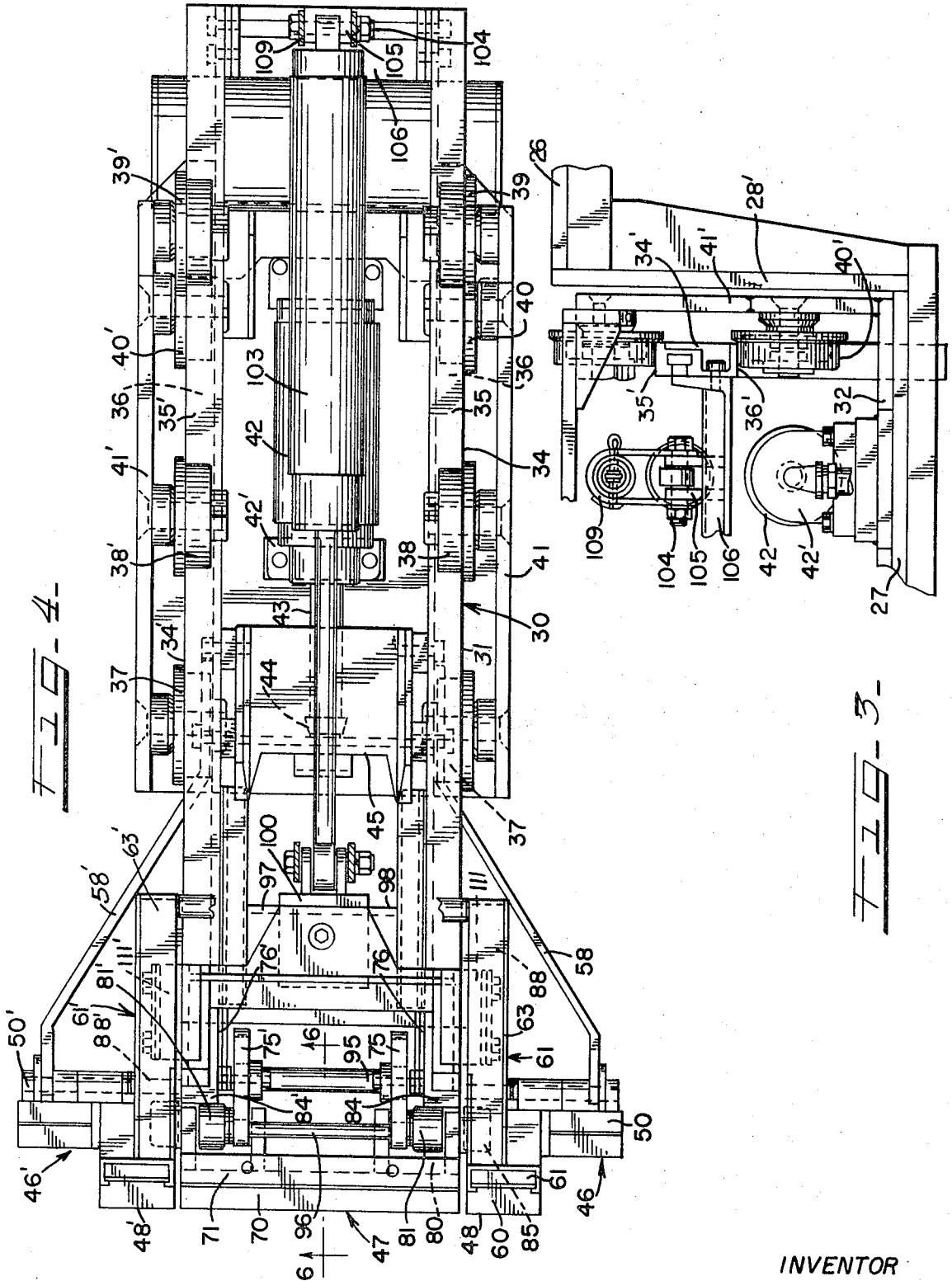


Fig. 1

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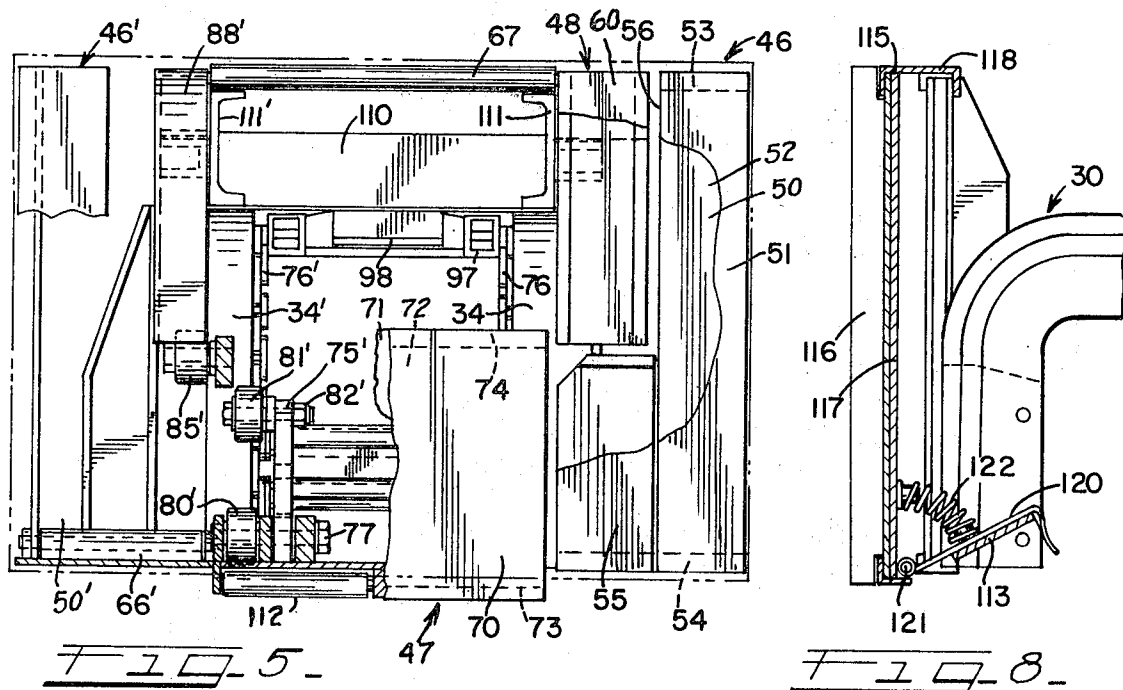
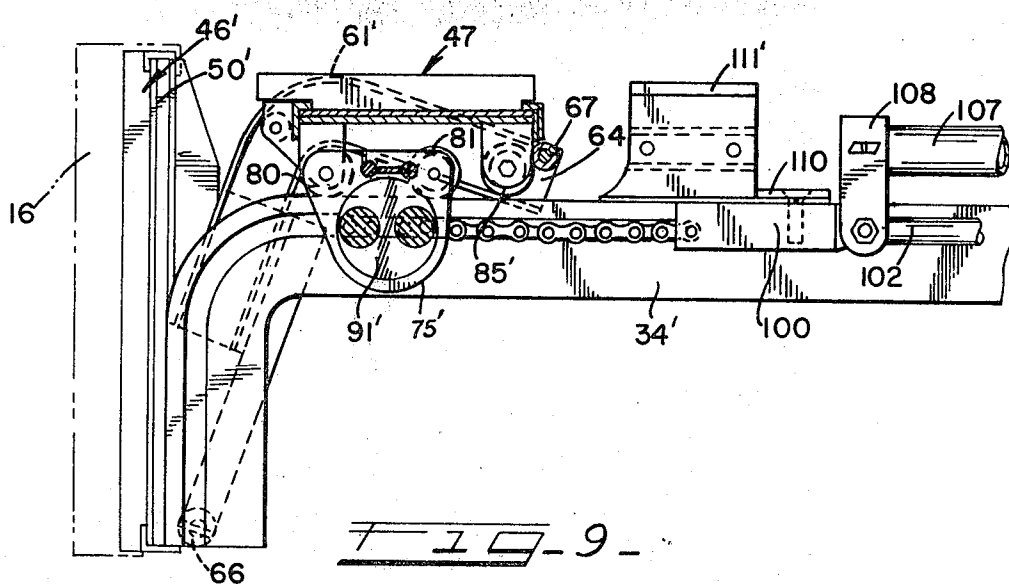
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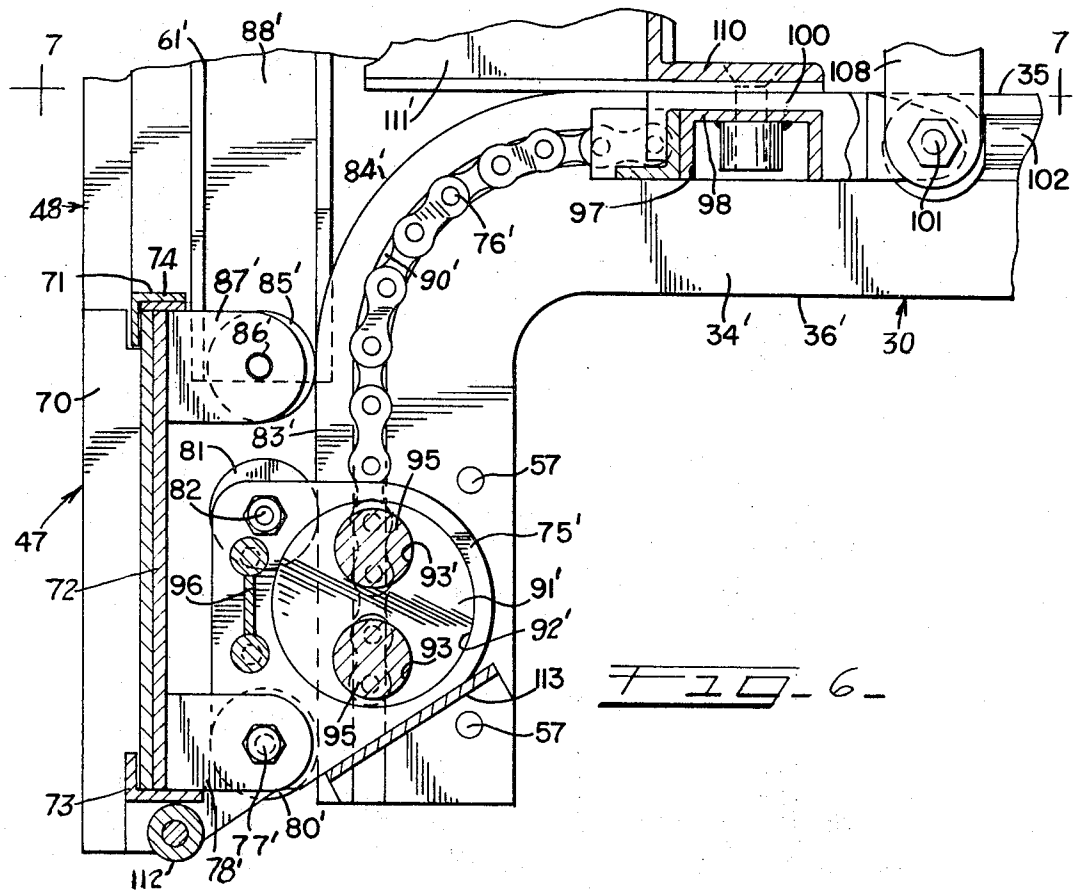


FIG. 6

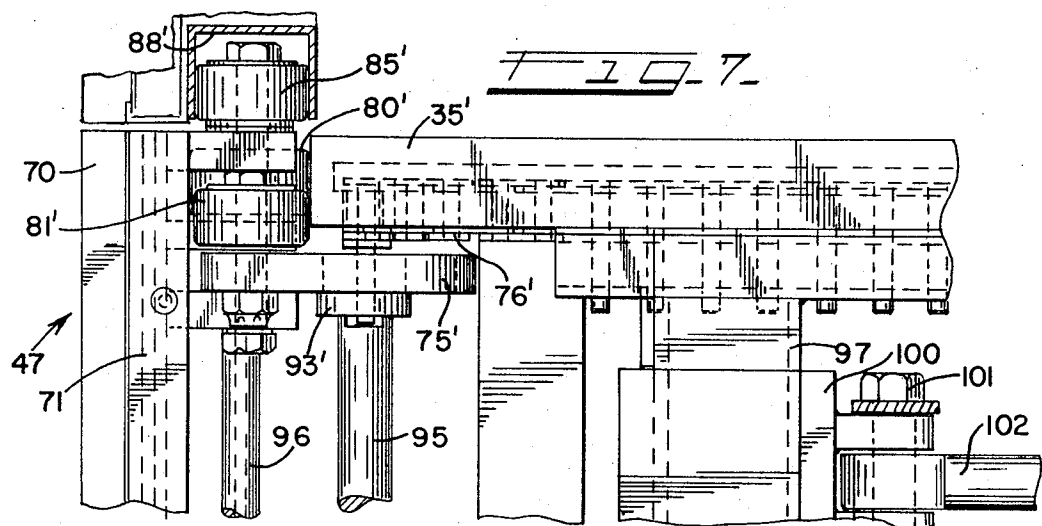
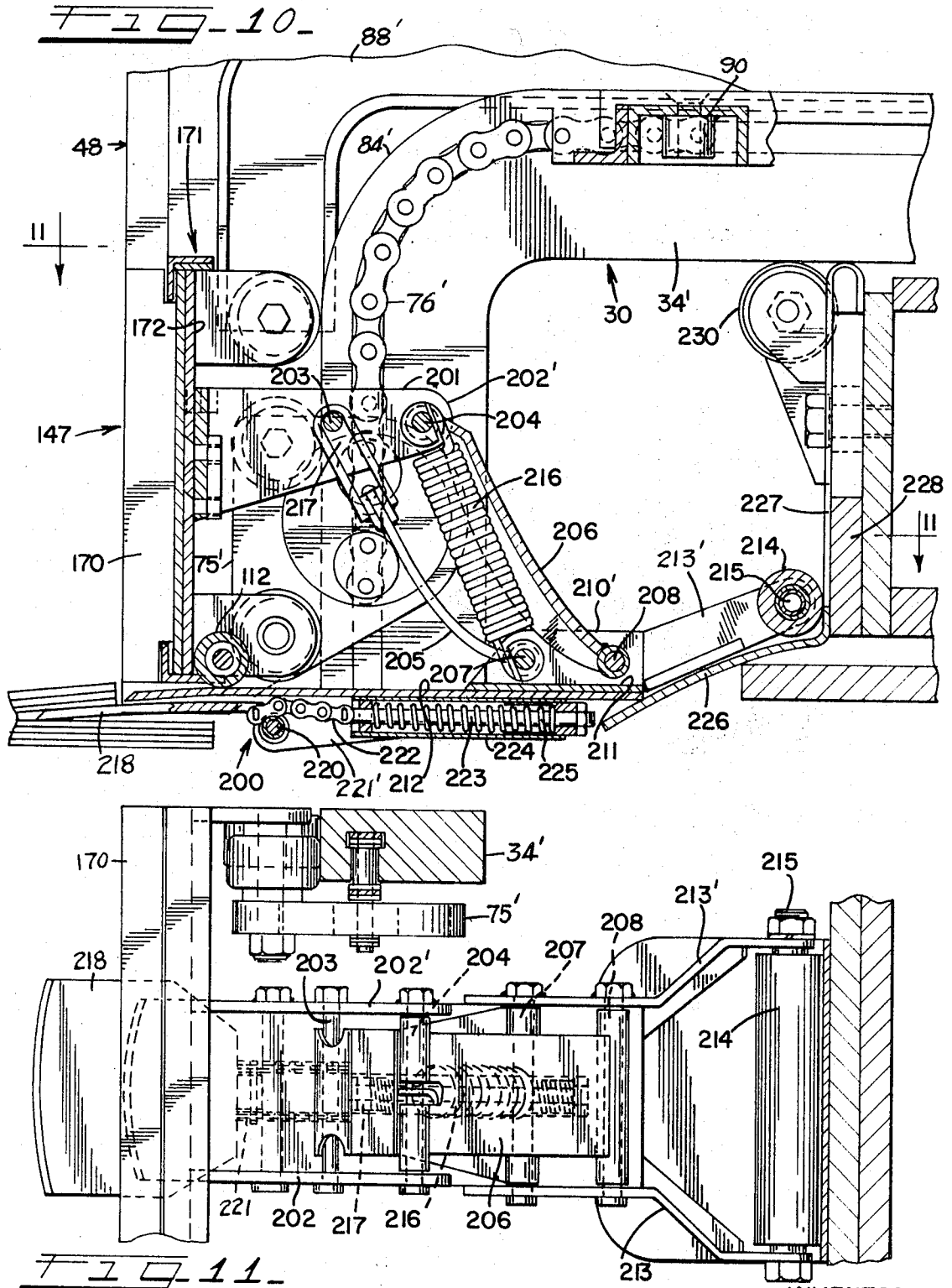


FIG. 7

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SHEET PILER WITH STAGGER STOP MECHANISM

This invention relates to apparatus for piling sheets and is more particularly concerned with a sheet piler machine of the overhead conveyor-type having incorporated therein improved mechanism for enabling the sheets to be arranged in stagger relation in the pile.

Sheet-handling apparatus has heretofore been developed for advancing metal sheets to a piling area with the sheets carried on an overhead magnetic conveyor which is operated to release the sheets at the proper time for deposit in a piling area beneath the same. End stop and back stop mechanisms are provided in such machines at opposite ends of the piling area for engagement by the leading and trailing edges of the sheets so as to guide the same while they settle by gravity onto the pile with their edges brought into vertical alignment. In some instances it is desirable to pile the sheets in groups of a predetermined number, arranged in staggered relation, so as to facilitate removal of the sheets from the machine, enabling the operator to more readily grasp a number of the sheets for removal at one time from the pile. Piler mechanisms with arrangements for stagger piling of the sheets in groups of a predetermined number are disclosed in Buccicone U.S. Pat. No. 2,918,852, dated Dec. 29, 1959; and U.S. Pat. No. 3,020,810, dated Feb. 13, 1962. The mechanisms in these machines operate satisfactorily in piling operations in which all of the sheets are deposited on a single pile. However, in some operations, it is desirable to employ a number of piling machines arranged in alignment so as to enable sheets to be piled in a number of different piles with some of the sheets passing through one or more of the machines. This has necessitated the development of end stop mechanisms which will not interfere with the sheets which are to be passed through the machine. One end stop mechanism of this type is disclosed in Buccicone U.S. Pat. No. 3,256,011, dated Jun. 14, 1966, wherein the stop mechanism is suspended beneath magnetic rail units which constitute an overhead conveyor and provision is made for moving the entire stop mechanism out of the path of the sheets when it is desired to pass the sheets in the machine. In another piler machine which is disclosed in Buccicone U.S. Pat. No. 3,369,806, dated Feb. 20, 1968 an end stop mechanism is provided which is constructed and positioned so that it will not interfere with the passage through the machine of any sheets which it is not desired to place in the pile. The end stop mechanism in this machine incorporates a stagger piling feature which may be used when desired. A general object of the present invention is to provide a sheet-piling machine of the aforementioned type having an improved end stop mechanism incorporated therein which need not be moved to enable sheets to be passed through the machine when desired and which has an improved arrangement for handling the sheets when they are to be arranged in staggered relation on the pile.

It is a more specific object of the invention to provide in a sheet-piling machine having an overhead sheet-carrying conveyor and associated stop mechanisms for arresting the movement of the sheets and guiding the same as they are released by the conveyor and dropped by gravity onto a pile wherein the end stop mechanism is constructed and arranged so that it may be employed for stagger piling, if desired, while it is at all times disposed below the pass line and selected sheets may be passed through the machine without requiring any repositioning of the end stop mechanism.

It is another object of the invention to provide an improved sheet-piling machine having incorporated therein an overhead conveyor which receives the sheets from a processing line and advances them either through the machine or into position for deposit by gravity on the support beneath the same and end stop and back stop members positioned below the pass line which are engaged by the leading and trailing edges, respectively, of the sheets released from the conveyor for piling and which are so constructed that they may be operated, when desired, to guide the sheets into final position on the pile with the sheets arranged in predetermined, staggered relation.

It is a further object of the invention to provide a mechanism for handling metal sheets wherein the sheets are advanced by an overhead magnetic conveyor to a piling area and dropped by gravity onto the top of a pile, which mechanism includes an end stop device for guiding into predetermined position the leading edges of the sheets which are to be deposited on the pile, with the end stop device including a removably mounted, single unit bumper pad assembly for normal nonstagger piling operations and a sectional bumper pad assembly for stagger piling operations, with the main section of the latter mounted on a carriage which is adapted to be moved, from a lower position where it presents a vertical face of substantial height for engagement by the leading edge of each successive sheet, to an upper inoperative position where it is horizontally disposed so that in both operative and inoperative position the mechanism remains below the pass line and does not interfere with the passage of sheets which it is not desired to drop on the pile and with the path of straight vertical movement being such that maximum height of the vertical sheet engaging face thereof is obtained.

It is another object of the invention to provide in a sheet-piling machine an end stop bumper arrangement which may be employed for either normal or stagger piling wherein a bumper pad which is adapted to be employed for normal piling is mounted on the end stop frame so that it may be removed to expose a stagger bumper pad assembly which includes a center pad section mounted for movement from a lower position where it presents a vertically disposed sheet engaging face to an upper horizontal out-of-the-way position and side pad sections which present an upward and lateral extension of the vertical face of the center section when the latter is in operative sheet engaging position and which side pad sections are retracted to an out-of-the-way position when the center pad section is withdrawn to the nonoperative position, whereby the sheets will at all times engage a pad surface which is disposed in a vertical plane.

Another object of the invention is to provide in a piler an end stop mechanism having a stagger-piling device which incorporates a stagger lip to prevent the front edge of the sheet from going under the stagger bumper.

A further object of the invention is to provide in a piling machine an end stop mechanism which includes a stagger-piling device wherein side bumper sections are provided so as to fill side and top portions of the stop area during stagger piling and present a surface in the same plane as the stagger pad face and thereby insure that the leading edges of the sheets will drop free of the stagger pad.

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

FIG. 1 is a side elevation of a sheet piler having incorporated therein mechanism embodying the principal features of the invention, the view being partly schematic and portions being broken away or omitted;

FIG. 2 is a partial longitudinal, vertical section to an enlarged scale, and with portions of the carriage for the stagger end stop mechanism in side elevation;

FIG. 3 is a partial end elevation showing the end stop mechanism of FIG. 2;

FIG. 4 is a plan view, with portions broken away, showing the end stop mechanism of FIG. 2;

FIG. 5 is an end elevation, partly in section and with portions broken away, showing the sheet-engaging end of the apparatus;

FIG. 6 is a partial, longitudinal, vertical section showing a part of FIG. 2 to an enlarged scale;

FIG. 7 is a fragmentary section taken generally on the line 7-7 of FIG. 6, to an enlarged scale;

FIG. 8 is a fragmentary longitudinal, vertical section;

FIG. 9 is a view, similar to FIG. 2, showing the stagger-forming pad assembly in retracted position;

FIG. 10 is a view similar to FIG. 2 showing a stagger bumper assembly with an associated lip arrangement; and

FIG. 11 is a partial, longitudinal section, taken on line 11-11 of FIG. 10, showing the stagger bumper assembly only.

The apparatus which is illustrated in the drawings and which embodies the principal features of the present invention is an improvement on the apparatus disclosed in Buccicone U.S. Pat. No. 3,369,806. The present apparatus is particularly designed for use in combination with rail-type magnetic conveyors of a character disclosed in Buccicone U.S. Pat. Nos. 2,600,475, dated Jun. 17, 1952; 2,642,174, dated Jun. 16, 1953; and 3,229,805, dated Jan. 18, 1966. It is understood, however, that it is not intended to limit the mechanism herein disclosed for use with magnetic rail-type conveyors but it is contemplated that it could be used with any other type of overhead conveyor where it is desirable to be able to pile the sheets in staggered relation.

In the apparatus illustrated in FIG. 1 of the drawings, where a single piler mechanism is shown, the metal sheets *S* are received, from a shear or other equipment in a processing line, on the conveyor 10 which delivers or feeds the sheets to the entry end of an overhead magnetic-type conveyor 11, the latter comprising a plurality of transversely spaced, raillike conveyor units 12. Each rail unit 12 includes a pair of longitudinally spaced sheaves 13 and 14, at least one of which is power driven, and a sheet carrying endless belt or belts 15 extending around the sheaves. The conveyor rail units 12 are supported at their opposite ends on crossbeams 16 and 17 which are suitably mounted on end support frames 18 and 19, respectively. Each rail unit 12 contains a plurality of magnet assemblies (not shown) which are adapted to hold the sheets *S* against the underside of the belts 15 so that the belts can advance the sheets toward the right in FIG. 1. A suitable control means is provided for the magnet assemblies so as to cause the sheets to be held against the lower run of the belts 15 while they are advanced towards the right and permit the sheets which it is desired to be deposited in a pile beneath the conveyor to be released at the proper time to drop onto the pile. Sheets which are to pass through the conveyor are permitted to continue and pass out of the piler at the exit forming right end thereof. The particular control mechanism employed will depend upon the type of magnet assembly embodied in the conveyor rail unit 12.

A lifter or vertically adjustable table 21 is provided beneath the conveyor 11 on which the sheets *S* are supported as they are accumulated in a pile. An end stop mechanism 23 and a back stop mechanism 24 are arranged on the machine in longitudinally spaced relation beneath the conveyor 11. The back stop mechanism 24 is supported in fixed position on the end frame 18 at the trailing end of the table or lift 21 while the end stop mechanism 23 is mounted for movement longitudinally of the conveyor so as to adjust the machine for piling sheets of different lengths. The mechanisms thus far described, except for the end stop mechanism 23, are not, per se, part of the present invention but can be of any standard or desired construction and, therefore, are not shown or described in detail. Suitable magnetic rail-type conveyor units with which the present invention may be employed are described in the prior patents referred to above and these patents may be resorted to for details not herein described. The rail units 12 may incorporate either electromagnetic assemblies or permanent magnet assemblies with suitable controls for providing the magnetic force which is desired.

The end stop mechanism 23 and the back stop mechanism 24 are spaced in a horizontal direction, when the machine is used for stagger piling, so that the normal distance between their oppositely disposed vertical faces or bumper pads is greater than the dimension of the sheets in the same direction in order that the sheets may be arranged in staggered relation in the pile. The stop mechanisms are so constructed and operated that one end of the sheets in each group or tier is positioned adjacent the face of the main bumper pad of one of the stop mechanisms, while the other end thereof is spaced from the face of the main bumper pad at the other stop mechanism a sufficient distance, generally 1 or 2 inches, to enable the handler to position his fingers beneath

the edge of the uppermost group or tier of sheets at one end of the pile. The back stop mechanism 24 is positioned and arranged so that the sheets may enter the machine from the conveyor 10 and advance beneath the conveyor 11. Clearance is provided for moving the sheets without any interference across the top of the back stop when it is desired to pass the sheets through the machine.

The end stop mechanism 23 (FIG. 1) is mounted on an overhead supporting carriage 25 which is movable lengthwise of the conveyor 11 and which may be in the form of a transversely extending frame carried in longitudinal track formations and having a suitable adjusting mechanism, for example, as shown in U.S. Pat. No. 3,256,011. The carriage 25 supports a horizontally disposed transversely extending frame 26 with a bottom plate 27 (FIGS. 2 and 3) suspended between depending side frame plates 28, 28'. The frame 26 is of sufficient width to accommodate the widest sheet which the machine is designed to handle. The end stop mechanism 23 is removably mounted, as a unit, on the top face of the bottom plate 27, and is held in place by bolts 29. The mechanism 23 comprises a bumper stop frame 30 (FIGS. 2 and 6), which is generally L-shaped when viewed in side elevation (FIG. 2), with a long leg 31 extended in a horizontal plane and supported for horizontal reciprocating movement in spaced relation above a base plate 32 and with the short leg 33 thereof extending downwardly at the side or edge of the plate 32 which faces in the direction of the entrance end of the conveyor 11. The bumper frame 30 includes laterally spaced, parallel side frame members 34 and 34' which are generally rectangular in cross section and provide top and bottom rail forming surfaces 35, 36 and 35', 36' which constitute tracks for riding on flanged wheels 37, 37', 38, 38', 39, 39', 40 and 40'. The wheels on each side are disposed in the arrangement shown and rotatably mounted in parallel, laterally spaced, support plates 41 and 41' which are upstanding from opposite side edges of the base plate 32.

A cushion-forming air cylinder 42 is mounted on suitable end support brackets 42' on the base plate 32 between the two vertical plates 41 and 41' with the piston 43 thereof extending horizontally and having an end cap 44 positioned to engage a depending bumper bracket 45 on the bumper frame 30. The bracket 45 is L-shaped when viewed in side elevation with one leg thereof depending below the bottom surfaces 36, 36' of the frame members 34 and 34' and in the path of the piston 43. The other leg of the bracket 45 is bolted or otherwise secured between the side frame members 34 and 34'.

A plurality of bumper pad assemblies, five in number, are carried on the forward end of the frame 30, the latter constituting the main supporting frame for the pad assemblies. The pad assemblies are arranged so that a pair of outermost pad assemblies 46 and 46' (FIG. 4) are in fixed relation relative to the main support frame 30, with vertically disposed faces which are adapted to be engaged by the leading edges of the sheets for one piling sequence, while the center pad assembly 47 and the adjoining pair of top pad assemblies 48, 48' are movable on the main frame 30 into and out of position where the sheet-engaging pad faces are disposed in a vertical plane a predetermined distance forwardly of the plane of the sheet-engaging faces of the pad members 46, 46', for the other piling sequence required for staggering the groups of sheets in the pile.

The bumper pad assemblies 46 and 46' (FIGS. 2, 4 and 5) are supported in transverse alignment and in a fixed vertical plane outboard of the main frame side members 34 and 34' on vertically disposed pad support or frame members 50 and 50' which are mounted at the forward end of the bumper main frame 30. Each of the pad assemblies 46 and 46' comprises a two section pad mounted on its exposed front face which is of material suitable for engagement by the leading edges of the sheets as they are projected against the same. Preferably, this and the other sheet-engaging pads employed are of polyurethane mounted on steel-backing plates. Since the pad assemblies 46 and 46' and their supporting frames are of identical construction, except for being rights and lefts, only one of

these assemblies will be described in detail with corresponding parts of the opposite one being identified by the same numerals primed. Also, all the pads are detachably mounted on their supporting frames in the same manner except for the direction in which they are slid into place.

The pad assembly 46 comprises an outer face pad section 51 and metal-backing plate 52 with the pad 51 cut or recessed at the top and bottom edges to receive the overhanging guide and retaining flange on top and bottom angles 53 and 54, and with the pad and backing plate held in place as a removable or detachable unit by a cotter pin or other suitable fastener. The outer pad section 51 extends the full height of the front face of the bumper stop assembly but terminates below the pass line for sheets which are carried through the machine. An inner pad section 55 extends approximately half the height of the outer pad section 51 at the bottom of the supporting frame 50 below a rectangular opening or recess 56 cut in the upper inner corner of the support frame 50 which provides clearance for movement of the pad assembly 48. The pad support frame 50 is attached by bolts 57 to the bottom portion of the vertical leg 33 of the main frame 30 and a brace 58 extends from a point intermediate the top and bottom of the support frame 50 to the side frame member 34 so as to hold the support frame 50 rigid with the main frame 30.

The pad assembly 48 comprises sheet-engaging pad 60 and pad support frame 61 with the latter mounted on the one generally vertical leg 62 of an angular bracket 63 which has its other leg 64 extending generally horizontal above the side frame member 34 of the main supporting frame 30. The vertical leg 62 and the pad support frame member 61 are mounted on the upper end of an inverted L-shaped bracket 65 which has its lower end swingably mounted on a pivot pin 66 supported at the bottom of the outboard pad support frame 50. The end of the horizontal leg 64 is connected by a crossbar 67 with the corresponding assembly on the opposite side of the main frame 30.

The center pad assembly 47 which is mounted for movement between an operative position where it presents a vertical face for engaging the sheets (FIG. 6) and an inoperative position (FIG. 9) where it is in a retracted out-of-the-way location, comprises the face pad 70 and a carriage forming support frame 71 which comprises a base plate 72 and associated bottom and top angle bars 73 and 74 for mounting the sheet-engaging pad 70 on the face thereof. The frame 71 is pivotally connected along the bottom margin (FIG. 2) to a pair of laterally spaced, parallel, side plate members 75 and 75' of generally triangular shape, which are in turn connected to the end portions of a pair of pull chains 76 and 76' by means of which the pad assembly 47 is moved. The sideplate members 75 and 75' extend in parallel planes normal to the plane of plate 72 and are pivotally mounted on small pivot shafts 77 and 77' mounted in support brackets 78 and 78' along the bottom back margin of plate 72. The shafts 77 and 77' support a pair of bottom rollers 80 and 80' which are located outboard of the plate members 75 and 75'. A companion pair of top rollers 81 and 81' are mounted in generally vertical alignment with the respective bottom rollers 80 and 80' on small shafts 82 and 82' at the top corners of the sideplates 75 and 75'. Both pairs of rollers 80, 80' and 81, 81' ride on the track forming front edges 83 and 83' on the front leg portions of the main frame 30 which edges 83 and 83' are connected by round track portions 84 and 84' with the top edges or faces 35 and 35' of the side frame members 34 and 34'. A third pair of rollers 85 and 85' are mounted outboard of the side edges of plate 72 on shafts 86 and 86' which are secured in brackets 87 and 87' at the upper corners of the plate 72. The rollers 85 and 85' are positioned to ride in tracklike channels 88 and 88' in the inner faces of the support brackets 61 and 61' which carry the pad assemblies 48 and 48'.

The frame 71 is connected to the ends of pull chains 76 and 76' which ride in tracks 90 and 90' on the inside faces of the legs 34 and 34' of the main frame 30. The chains 76 and 76' are connected to the sideplates 75 and 75' of the frame 71 by

means of circular plates 91 and 91' which are rotatably mounted in circular apertures 92 and 92' in the sideplates 75 and 75'. Each of the plates 91 and 91' has two circular recesses 93 and 93' in which small circular plates 94 and 94' are rotatably mounted with each of these plates 94 and 94' connected to link pins on the pull chain. The plates 91 and 91' on each side are connected by a crossbar 95 with the corresponding plates on the opposite side of the frame 71. A brace-forming crossbar 96 also extends between the sideplates 75 and 75'. The chains 76 and 76' are connected by a U-shaped cross frame 97 having a bight forming crossbar 98 which extends between the chains 76 and 76' and which has an inverted U-shaped bracket 100 secured thereon with a pivot pin 101 for securing the same to the end of piston 102, the latter extending horizontally from the air cylinder 103 which has its rear end connected by pivot 104 to a bracket 105 on a cross frame member 106 extending between the main bumper frame side members 34 and 34' at the rear end thereof. A force-balancing spring member 107 is connected between brackets 108 and 109 extending upwardly of pivots 101 and 104. An angle member 110 is secured on the top of the crossbar 98 which is connected at opposite ends to slide block members 111 and 111' which are adapted to be positioned between the top faces of the side frame members 34 and 34' and the pad-supporting brackets 61 and 61' when the frame 71 is in the operative position, as shown in FIGS. 2 and 6, so as to hold the bracket members 61 and 61' in operative position for engagement of the sheets against the vertical faces thereof. The slide blocks 111 and 111' are retracted when the pad assembly 47 is moved upwardly to the out-of-the-way position as shown in FIG. 9 so as to permit the brackets 61 and 61' to swing about the pivots 66 and 66', swinging movement being effected by the pressure of the top rollers 85 and 85' on the frame 71 as they ride upwardly in the channels 88 and 88'.

The frame 71 carries antifriction rollers 112 at the bottom edge thereof. A cross plate or tie bar 113 connects the bottom ends of the main frame side members 34 and 34' which is inclined and forms a stop for the sideplates 75 and 75' in the lowermost position thereof.

In using the apparatus for stagger piling the frame 71 for the center pad assembly 47 is raised and lowered intermittently according to the number of sheets piled in each group. When frame 71 is in the lowered position, as in FIG. 2, the pad area against which the sheets strike comprises center pad 70 and the pair of top side pads 60 and 60', all of which present a striking surface in a common vertical plane. As the pile builds up the lift may not lower the pile fast enough and the center pad 70 will not be moved to the bottom of the frame 30 each time but will stop with the bottom resting on the margin of the topmost sheet previously piled. The arrangement provides for maximum vertical positioning or travel of the frame 71 before there is any tilting of the frame and its pad 70 toward the out-of-the-way position. When the frame 71 is moved to the out-of-the-way position (FIG. 9) the pads 60 and 60' are swung back out of the way and the sheets strike the pads 51, 55 and 51', 55' which are in a common vertical plane offset relative to the plane of pad 70 and which are rigid with the main bumper frame 30. The frame 30, of course, retracts against the force exerted by the air cylinder 42 when the sheets strike the face pads which are in operative, sheet-engaging position.

When straight piling is desired, an adapter pad unit 115 (FIG. 8) is provided which comprises a face pad 116 on a backing plate 117 with a top channel 118 and a latch arm 120 at the bottom which is hinged at 121 and urged by spring 122 into latching engagement with the crossbar 113 on the main frame 30 when the unit 115 is detachably positioned for operation on the frame 30, as shown in FIG. 8 and as indicated in phantom line in FIGS. 5 and 9.

Referring to FIGS. 10 and 11, there is illustrated a stagger bumper pad construction which includes a lip arrangement for cooperation with the center stagger pad assembly during the use of the latter in the piling of the sheets. Since the details of the main frame and parts of the stagger pad assembly are the

same as described in connection with the apparatus of FIGS. 1 to 9, those elements which have not been changed will be identified by the same numbers while corresponding elements which are not identical will be referred to by the same numeral plus 100.

In the apparatus of FIGS. 10 and 11, the center bumper pad member 170 is modified by decreasing the height or cutting away the bottom margin thereof to accommodate the lip assembly 200 while the brace members 95 and 96 (FIG. 4) are omitted and the pad support plate 172 is provided with a center U-shaped bracket member 201 having legs 202 and 202' which extend parallel with and which are spaced inwardly of the sideplates 75 and 75', the latter connecting the frame 171 to the chains 76 and 76'. Parallel cross rods 203 and 204 connect the bracket legs 202 and 202' and form pivot connections for parallel link members 205 and 206, the lower ends of which, as viewed in FIG. 10, are pivotally connected by cross rods 207 and 208 to the lip assembly 200. The cross rods 207 and 208 extend between the upstanding end flanges 210 and 210' of a bracket forming cross channel section 211 secured on a base plate 212. The end flanges 210 and 210' are extended in the direction away from the pad support frame 171 with the free ends of the extended portions 213 and 213' carrying a roller 214 mounted on a connecting cross shaft 215. A balancing tension spring 216 has its ends connected to the pivot rods 204 and 207 and the link 205 has a looped end providing a slot 217 for receiving the cross rod 203 so as to form a lost motion pivotal connection with the cross rod 203 enabling the assembly 200 to pivot during movement of the pad support frame 171 to an out-of-the-way position, the same as shown in FIG. 9. The base plate 212 extends at its forward end beneath the bottom of the pad support plate 172 and the lip member 218 is mounted on its lower face. The lip member 218 which, in operative position, extends beyond the front face of the pad member 170, is mounted to pivot on the cross-bar 220 which connects the extended end portions 221, 221' of parallel side wall members depending from the base plate 212. A small length of chain 222 connects the lip member 218 adjacent the pivot bar 220 with the end of a rod 223 which is slidably mounted in a housing 224, which housing is secured on the bottom face of the base plate 212. A spring 225 is mounted on the rod 223 so as to exert a longitudinal pull on the chain 222 which urges the lip member 218 in a clockwise direction about the pivot rod 220 while leaving the lip member free to pivot in the opposite direction when the stagger frame 171 is raised and the lip member 218 is pulled from beneath the margin of the sheets which have been piled upon it. The roller 214 at the rear of the lip assembly 200 rides on the bottom flange 226 of a bracket 227 which is supported on the front face of a crossmember 228 on the support frame 26. The bracket 227, which is shown, carries a roller 230 at its upper end which provides additional support for the side members 34 and 34' of the main bumper frame 30.

In the use of the apparatus as shown in FIGS. 10 and 11, the lip member 218, of course, extends beneath the margins of the sheets which are piled while the bumper pad 170 is down in position to engage the leading ends of the sheets. The support frame 171 will move rearwardly with the main bumper frame 30 when a sheet strikes it and the antifriction roller 112 will ride on the base plate 212 of the lip assembly. When the support frame 171 is raised, it pulls the lip 218 from beneath the sheets which have been piled on it and the whole assembly 200 pivots on the link bars 205, 206 as the frame 171 rises and moves into a horizontal position at the top of the main frame 30. The lip 218 is held by action of the spring 216 and roller 214 in a generally horizontal position during piling with the stagger bumper assembly 147 and remains in substantially the same position relative to the frame 171 as the latter moves into the out-of-the-way position on the top of the main bumper frame 30.

I claim:

1. In a machine for handling material in sheet form which comprises an overhead sheet-carrying conveyor supported at

a piling station and adapted to release the sheets for gravity deposit on a pile beneath the conveyor or to advance the sheets beyond the piling station, an end stop mechanism having the sheet-engaging face disposed below the path of sheets carried on the conveyor so as to arrest the forward movement of and guide onto a pile sheets which are released by the conveyor and drop in front of the end stop mechanism said end stop mechanism comprising a supporting frame, a main bumper frame mounted on said supporting frame for horizontal movement thereon in the direction of advance of the sheets, a bumper pad on said main bumper frame having a sheet-engaging face in a substantially vertical plane for engagement by the leading edges of sheets which are released for piling by said overhead conveyor, means for cushioning the horizontal movement of said main bumper frame, and a stagger bumper device mounted on said main bumper frame which includes a stagger bumper pad and a carriage-forming support therefor, said stagger bumper device being adapted to be positioned with the stagger bumper pad in a vertically extending, sheet-engaging position in front of the bumper pad on the main bumper frame, said stagger bumper pad being of a substantially lesser dimension in the vertical direction than the bumper pad on the main bumper frame, and means to move said carriage-forming support in a vertical and horizontal path to a nonoperative position at the top of said main bumper frame where the stagger bumper pad is disposed at a sufficient distance below the bottom face of said conveyor to permit sheets to be advanced by said conveyor beyond the piling station without interference, an auxiliary stagger bumper pad and a mounting frame therefor which is adapted to be positioned in a common plane with said stagger bumper pad and between the stagger bumper pad and the bumper pad on the main bumper frame, said auxiliary pad being of a height, when in sheet-engaging position, to extend above said stagger bumper pad to approximately the top of the bumper pad on the main bumper frame, and said mounting frame for said auxiliary pad being movably supported on said main bumper frame so that it is retracted to a nonoperative position when said stagger bumper pad is moved to a nonoperative position.

2. In a machine for handling sheets of material which comprises a sheet-carrying conveyor supported at a piling station and operable to release sheets for gravity deposit on a pile beneath the conveyor or to advance the sheets beyond the piling station, an end stop mechanism mounted below the path of sheets carried on the conveyor so as to arrest the forward movement of and guide onto a pile sheets which are released by the conveyor and drop in front of the end stop mechanism, said end stop mechanism comprising a supporting frame, a main bumper frame mounted for horizontal movement on said supporting frame, a bumper pad on said main bumper frame which is adapted to be engaged by the leading edges of sheets released for piling by said overhead conveyor, means for cushioning horizontal movement of said main bumper frame, and a stagger bumper device movably mounted on said main bumper frame, said stagger bumper device including a stagger bumper pad and a carriage-forming support therefor which is adapted to be positioned so as to provide a vertically extending, sheet-engaging surface which is spaced in front of the bumper pad on the main bumper frame, said stagger bumper pad being of a smaller dimension in the vertical direction than the bumper pad on the main bumper frame when in operative position, and means to move said carriage forming support in a vertical and horizontal path to a nonoperative position at the top of said main bumper frame where it is a sufficient distance below the bottom face of said conveyor to permit sheets to be advanced by said conveyor beyond the piling station without interference, a supplemental stagger bumper pad which is adapted to be positioned in the plane of said stagger bumper pad and between the stagger bumper pad and the bumper pad on the main bumper frame, said supplemental pad being of a height, when in sheet-engaging position, to extend between the stagger bumper pad and the bumper pad on the main bumper frame, and a mounting frame for said supplemental

pad which is movably mounted on said main bumper frame so that it is adapted to be retracted to a nonoperative position when said stagger bumper pad is moved to a nonoperative position.

3. In a machine as set forth in claim 2, and means connecting said supplemental stagger pad-mounting frame with said stagger pad support whereby said supplemental stagger pad is moved to a nonoperative position by movement of said stagger pad support.

4. In a machine as set forth in claim 2, and said bumper pad which is mounted on said main frame having an L-shape and said supplemental stagger pad being arranged in the space resulting from said L-shape which is located between the top portion of the movable stagger bumper pad and the vertically disposed leg of the pad which is mounted on said main frame.

5. In a machine as set forth in claim 4, and said stagger bumper pad and said supplemental stagger bumper pad providing, when in sheet-engaging position, vertically disposed sheet-engaging pad faces in a common plane which is offset forwardly of the plane of the sheet-engaging face of the bumper pad which is on said main bumper frame.

6. In a machine as set forth in claim 2, and a removable bumper pad unit having a face pad and supporting structure for detachably mounting on the sheet-engaging face of the bumper pad which is on said main bumper frame so as to overlie the same and enable the end stop mechanism to be used for normal nonstagger piling operations.

7. An end stop bumper structure for an overhead conveyor-type sheet piling machine which is mounted on a support adjustable longitudinally of the machine, which end stop structure comprises an L-shaped main frame with the long leg thereof disposed horizontally for reciprocating movement and with the short leg disposed vertically for mounting a bumper pad against which sheets are thrown for piling below the conveyor, track-forming rollers on the support on which said long leg rides, and a force-absorbing fluid cylinder on the support having the piston thereof connected to said main frame for cushioning the movement caused by the sheets striking the vertical face of the bumper pad, the bumper pad arrangement including a multisection bumper pad assembly adapted to be employed for stagger piling, the latter comprising a center pad section which is mounted on a movable carriage-forming frame arranged to be moved in a vertical path and then in a horizontal path, said main frame having tracks on the legs thereof defining said paths so that said center pad section may be moved upwardly for a substantial distance and then swung into a horizontal, out-of-the-way position where it will not interfere with the passage of sheets over the top of the bumper structure, and top side pad sections movably mounted on said main frame and having sheet-engaging face pads in the plane of the center pad section and extending above the same when said center pad section is in sheet-engaging position, said top side pad sections being moved to a retracted, nonoperative, out-of-the-way position upon movement of the center pad section to the horizontal position.

8. An end stop bumper structure as set forth in claim 7, and

said side pad sections being mounted on movable portions of side frames which are mounted on said main frame so as to be held in fixed relation relative to said center pad section when the center pad section is in sheet-engaging position.

9. An end stop bumper structure as set forth in claim 7, and said side pad sections being mounted on side frames which extend at least the full height of the vertically extending leg of said main frame.

10. An end stop bumper structure as set forth in claim 9, and said side frames having face pads disposed outboard of said side pad sections which are in a vertical plane offset relative to the face pad of said center pad section in the direction of said force-absorbing cylinder.

11. An end stop bumper structure as set forth in claim 10, and said outboard face pads being generally L-shaped with the long leg thereof on the outside and extending approximately the full height of the vertical leg of said main frame.

12. An end stop bumper structure as set forth in claim 7, and said carriage for said center pad section having guide rollers mounted thereon which ride in the tracks on the legs of said main frame.

13. An end stop bumper structure as set forth in claim 12, and certain of said guide rollers being mounted on plates which are pivoted to said carriage.

14. An end stop bumper structure as set forth in claim 7, and said carriage for said center pad section having a connection with said side pad sections so as to move said side pad sections to retracted position when said center pad section is moved to nonoperative position.

15. An end stop bumper structure as set forth in claim 14, and said connection comprising track formations on said side pad sections and cooperating rollers on said center pad section.

16. An end stop bumper structure as set forth in claim 12, and a fluid cylinder mounted on said support frame and having a chain connecting the piston thereof with said carriage for said center pad section for moving said carriage between operative and nonoperative positions.

17. An end stop bumper structure as set forth in claim 16, and a weight balancing device connecting said carriage and said main frame.

18. An end stop bumper structure as set forth in claim 7, and a stagger lip assembly mounted on said carriage for said center pad section with a pivoted lip member which is adapted to extend beneath the edges of sheets which are guided onto the pile by the center pad section when said center pad section is in operative position.

19. An end stop bumper structure as set forth in claim 18, and said stagger lip assembly being connected to said carriage by a pair of parallel links and having means for holding the lip member in a generally horizontal position as the carriage moves upwardly in said vertical path.

20. An end stop bumper structure as set forth in claim 19, and said parallel links having an associated balancing spring member with one of said links having a lost motion connection with said carriage.

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