

Jan. 4, 1938.

W. R. HULL

2,104,038

SHEET GAUGING DEVICE

Filed Sept. 6, 1935

3 Sheets-Sheet 1

Fig. 1

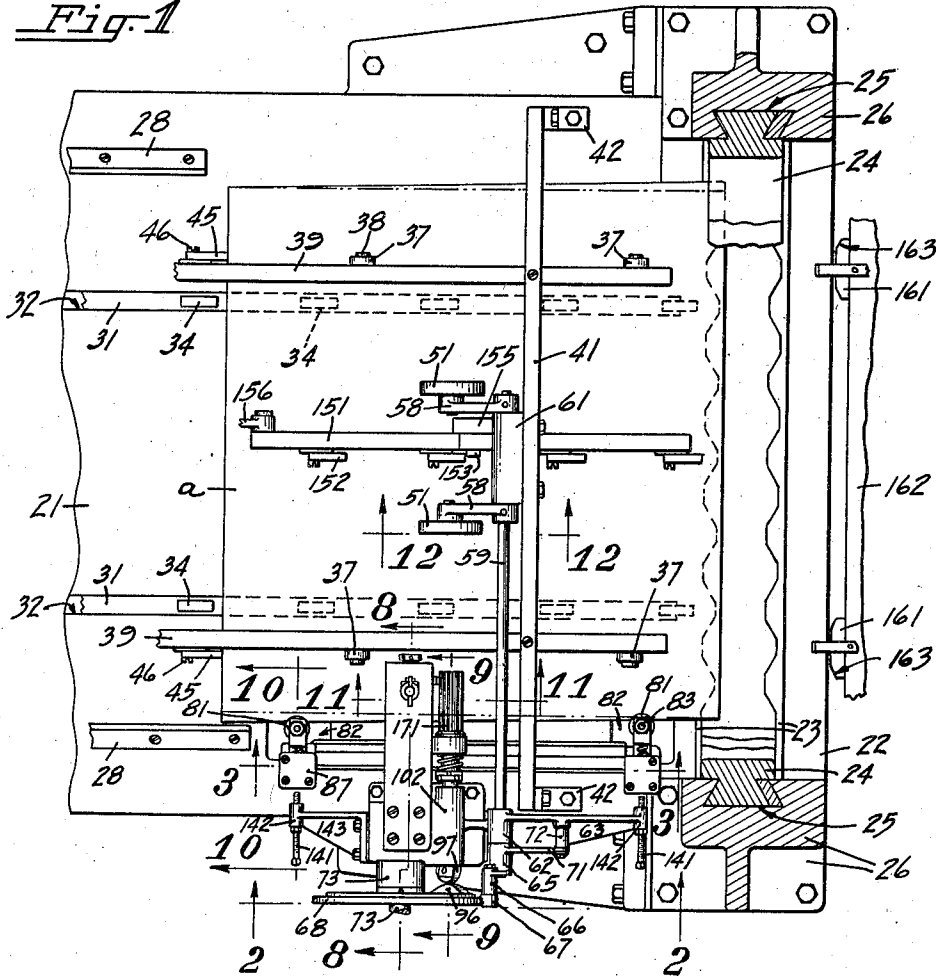
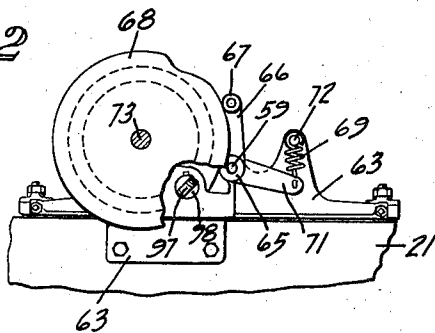


Fig. 2



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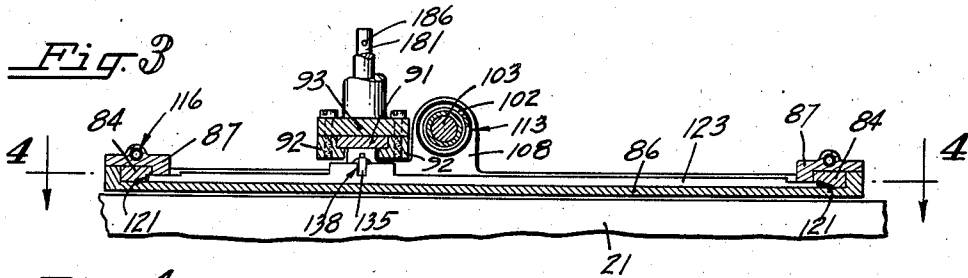
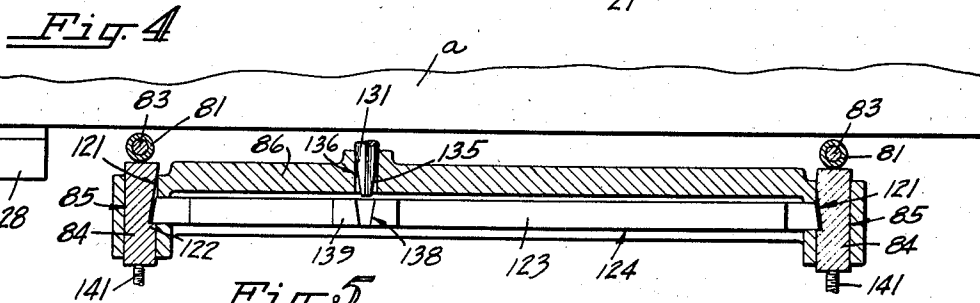
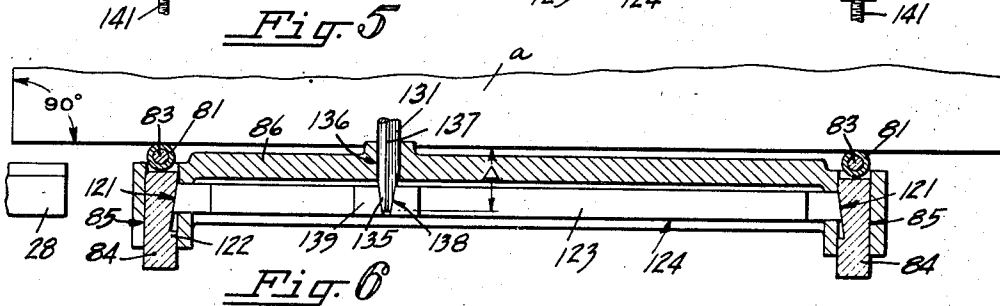
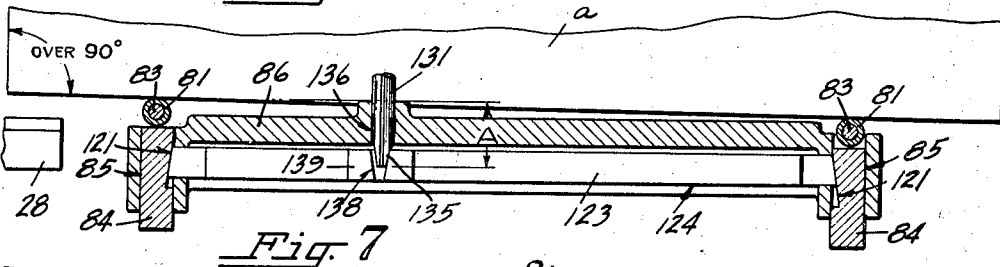
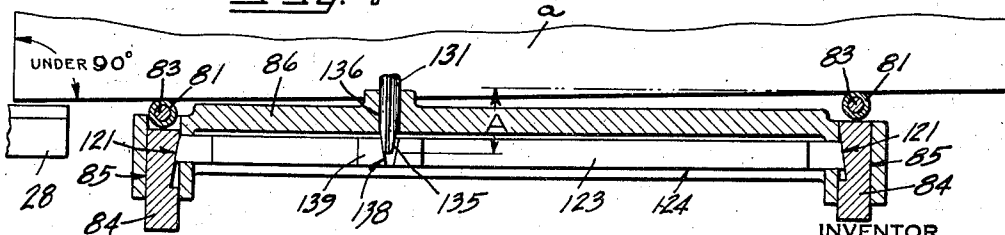
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2,104,038

SHEET GAUGING DEVICE

Filed Sept. 6, 1935

3 Sheets-Sheet 2



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2,104,038

SHEET GAUGING DEVICE

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Application September 6, 1935, Serial No. 39,494

14 Claims. (Cl. 164—59)

The present invention relates to sheet treating machines in which sheets are fed to work performing elements and has particular reference to gauging devices for locating the sheets in position relative to the work elements so that a maximum work area of the sheet will be presented with a minimum scrap allowance extending along one edge of the sheet.

An object of the invention is the provision, in a sheet treating machine adapted to feed sheets to work performing elements, of devices for locating either square or out-of-square sheets in a predetermined position relative to the work elements and prior to their being fed thereto so that the maximum work area of the sheet will be presented to the elements providing for a minimum scrap allowance along one edge of the sheet and leaving the over-run or surplus extending along the opposite edge of the sheet.

Another object is the provision in such a machine of gauging devices which operate to square up a sheet along one edge and against fixed gauges and to thereafter shift the sheet at right angles relative to the fixed gauges to locate the narrower end of an out-of-square sheet as well as to locate a square sheet at a predetermined position relative to the work elements in order in either case to present the maximum work area of that particular sheet.

Another object is the provision in such a machine of a gauging device which when moved into sheet shifting engagement with the sheet edge aligns with or conforms to the angularity thereof regardless of the degree of out-of-square of the sheet edge or the direction in which the out-of-square extends along that edge.

Still another object is the provision in a machine of this character of a self locking gauging device wherein the gauging members after being aligned with the sheet edge are locked in such aligned position against independent movement and thereafter move in unison with the sheet to shift it into proper position on the fixed gauges without throwing it out-of-square relative thereto.

A further object is the provision in such a machine of gauging devices which are adjustable as a unit for different sizes of sheets while maintaining a fixed relation between the gauging members and their locking instrumentalities.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying

drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of a shear press equipped with gauging devices embodying the instant invention, parts of the press being broken away;

Fig. 2 is a fragmentary side elevation of the press as viewed substantially along the line 2—2 in Fig. 1;

Fig. 3 is a fragmentary enlarged vertical section taken substantially along the line 3—3 in Fig. 1;

Figs. 4, 5, 6, and 7 are fragmentary horizontal sections of different positions of the gauging elements as viewed substantially along the line 4—4 in Fig. 3, Fig. 4 showing the gauging elements just prior to engaging an edge of a substantially square sheet, Fig. 5 showing them in engagement and in alignment with an edge of the same sheet and Figs. 6 and 7 showing the gauging elements in engagement and alignment with different out-of-square sheets illustrating the out-of-square of one sheet extending in an opposite direction from the other;

Figs. 8, 9, and 10 are fragmentary enlarged transverse sections taken substantially along the respective lines 8—8, 9—9, and 10—10 in Fig. 1; and

Figs. 11 and 12 are fragmentary enlarged longitudinal sections taken substantially along the lines 11—11 and 12—12 in Fig. 1, Fig. 12 showing the sheet feeding rollers in separated and inoperative position.

A preferred embodiment of the invention as disclosed in the drawings is adapted to a shear press which functions to cut a sheet of metal such as tin plate and the like into transverse strips of predetermined form and dimensions from which can ends are subsequently cut out. These strips have an undulating or scroll edge and are referred to as scroll strips in the can making art.

The instant invention comprises certain features of improvement on the mechanism illustrated in the M. L. Heald U. S. Letters Patent 1,846,330, issued Feb. 23, 1932 and covering Scroll shear device to which patent reference may be had for a fuller description of certain auxiliary parts of the shear press hereinafter described only in brief, these parts being well known in the art.

The scroll shear device or press comprises a horizontal table 21 (Fig. 1) one end of which is bolted to one side of a bed plate 22 which constitutes a part of the main frame of the press. The

bed plate supports a usual die mechanism, for cutting the strips from the sheets and may include a fixed lower die or work element 23 and an upper movable punch or work element 24. The punch slides up and down in slideways 25 formed in vertical brackets 26 which are bolted to the top of the bed plate at each end of the fixed die. Reciprocation of the punch in the slideways may be effected in any suitable manner in time with the other moving parts of the press.

Sheets *a* (Fig. 1) to be cut into strips are moved longitudinally across the table 21 in a step by step movement toward and in time with the movement of the work elements 23, 24. The sheets are guided during this travel by a pair of spaced parallel guide rails 28 which are secured to the top of the table adjacent opposite longitudinal edges thereof. This movement is effected by a pair of parallel and spaced reciprocating feed bars 31 which slide in unison in longitudinal grooves 32 cut in the top of the table.

Each feed bar is provided with a plurality of longitudinally spaced feed dogs 34 which successively engage behind the rear edge of the sheet on the forward stroke of the bars when the latter are reciprocated and thus move the sheet into a gauging position prior to feeding between the work elements 23, 24.

During this movement of the sheet it is held on the table against vertical displacement by rollers 37 (Figs. 1 and 12) mounted on studs 38 carried in a pair of spaced bars 39 which extend longitudinally over the top of the table above the path of travel of the sheets. One end of each bar is secured to a transverse beam 41 the ends of which are bolted to brackets 42 secured to the top of the table 21. The opposite end of the bars (not shown) may be supported in a similar manner.

In the first of the cutting positions the forward edge of the sheet overhangs the rear edge of the lower die element 23 as shown in Fig. 1. This is the trim cut position. While in this position and prior to being cut the sheet is aligned longitudinally and transversely of the cutting elements so that the maximum available work area of the sheet as a whole may be obtained. In other words the aligned sheet will be subsequently presented to the work elements so that cutting of the scroll strips will result in a maximum quantity of full size can end spaces in the total number of strips.

The sheet is first located and squared up lengthwise of its path of travel by being moved back against a pair of fixed or stationary gauge stops 45 (Fig. 1) which are carried on pivot studs 46 secured in each of the bars 39. These stops are pivotable in one direction only and permit only forward movement of the sheet as it passes under them.

The moving of the sheet back against the gauging stops 45 is effected by cooperating upper and lower rollers 51, 52 (Figs. 1 and 12) disposed above and below the sheet line. There are two lower rollers 52 spaced apart and mounted on a cross shaft 53 journaled at its ends in bearings 54 formed in the table 21. The shaft is continuously rotated by any suitable means to move the upper face of the rollers in a direction opposite to the travel of the sheet. These rollers extend into slots 55 cut through the table and are vertically placed so that the periphery of the rollers frictionally engage the bottom of a sheet to position it and then rotate against its bottom surface.

The upper rollers 51, of which there are two,

to correspond with the lower rollers 52, are located directly above the latter and are carried on studs 57. Each stud is secured in one end of an arm 58. The two arms are mounted on a transverse rock shaft 59 one end of which is carried in a bearing 61 which is bolted to the supporting beam 41. The other end of the shaft is carried in a bearing 62 formed in a bracket 63 (see also Fig. 2) which is bolted to the top and at one side of the table 21.

The rock shaft 59 is periodically rocked in time with the movement of the sheet, by a bell crank 65 (Figs. 1 and 2) secured on one end of the shaft and having an arm 66 which carries a cam roller 67. This roller is urged against an edge cam 68 (see also Fig. 8) by a coil spring 69. One end of the spring is hooked in the end of an arm 71 of the bell crank, while the opposite end of the spring engages over a pin 72 which is secured in the side of the bracket 63. The cam 68 is mounted on a continuously rotated horizontal shaft 73 which at one end is journaled in a bearing 74 formed in a goose-neck arm 75 of the bracket 63.

Rotation of the shaft 73 and cam 68 rocks the bell crank 65 and shaft 59 to raise and lower the rollers 51 which, when first brought into lower position, momentarily clamp the sheet between them and the rollers 52. It is at this time that the lower rollers 52 move the sheet back against the gauge stops 45 and this properly locates the sheet longitudinally and squares it up along its rear edge.

A compensating gauge device is located on one side of the path of travel of the sheet. It next functions to locate the sheet transversely of its path of travel. This compensating device comprises a pair of spaced rollers 81 (Figs. 1, 4, 5, 6, 7, and 10) which are adapted to engage the adjacent longitudinal edge of the sheet at points near its rear and forward ends. The rollers extend down into clearance recesses 82 formed in the top of the table 21 for this purpose.

Each roller 81 is independently movable relative to the sheet edge and is mounted on a vertical stud 83 which is held in the forward end of a slide 84. There are two of these slides and each one is freely carried in a transverse groove 85 formed at the ends of a movable cross head or frame 86 which is disposed longitudinally adjacent the path of travel of the sheet. Caps 87 bolted to the cross head confine the slides in their grooves against vertical displacement but permit them free horizontal movement towards and away from the sheet edge.

The cross head 86 is movably supported over the top of the table 21. A T-shaped lug 91 (Figs. 3 and 8) extends up from the top of the cross head and the upper end of the lug slides in a pair of L-shaped guides 92 which are bolted to the bottom of a bracket plate 93. The bracket plate is bolted fast at one end only this end of this plate being secured in a seat 94 (Fig. 8) which is formed in the arm 75 of the bracket 63. Its free end extends out over the top of the table and over the edge of a positioned sheet *a*.

The cross head 86 and parts carried thereon are at times moved bodily toward and away from the edge of the sheet by a cam 96 (Figs. 1, 8, and 9). This cam is formed on the back of the cam 68 and operates against a roller 97 which is mounted in an enlarged diameter end 98 of a shouldered rod 99. The rod is carried in a countersunk bore 101 formed in a boss 102 which may be an integral part of the bracket 63. Rod 99 is backed up by a coil spring 103 disposed within

the bore and located on the rod. This spring urges the roller against the cam while the rod is prevented from turning in its sliding seat by a feather 104 carried in the rod end 98 and having movement in a featherway 105 formed in the boss 102.

The inner end of the rod 99 is threaded where it extends beyond the boss 102 and is connected to the cross head 86 by a threaded adjusting sleeve 107. The sleeve is rotatably carried in a bearing 108 formed on the cross head and is restrained from longitudinal movement in one direction by an integral flange 109 which engages against one side of the bearing. On the other side of the bearing a coil spring 111 surrounds the sleeve and is compressed against the bearing, in a recess 112 formed therein, by lock nuts 113 which are threaded onto the end of the sleeve. This spring provides a means for absorbing any overthrow of the cam 96. Thus the cross head is yieldably and adjustably carried on the rod 99 and yet is movable with the rod when the latter is shifted by the cam 96.

Forward movement of the cross head 86 by the cam 96 brings the rollers 81 lightly into engagement with the sheet edge without moving the sheet. The hold down rollers 37 on the bars 39 (Fig. 1) hold the sheet firm during this operation. During this movement the cross head pushes each roller against the sheet edge through the resistance of an individual, light coil spring 115 (Fig. 10). One end of each spring is housed in a horizontal pocket 116 formed in its cap 87 just above the slide 84. The other end of the spring engages a vertical shoulder 117 of the slide.

In the initial movement of the cross head the two rollers 81 may both engage the edge of the sheet simultaneously, this being when a square edge is presented as illustrated in Figs. 4 and 5. One will engage the sheet edge before the other when the sheet is out-of-square. In the latter case the first roller upon contacting the sheet edge comes to rest but the cross head continues its movement bringing the second roller into sheet engagement. Figs. 6 and 7 show the position of the two rollers engaging an out-of-square sheet after this initial part of the cross head movement has brought the rollers into place.

Immediately following the time the two rollers 81 come into engagement with the sheet edge, both rollers and both roller slides momentarily remain stationary as the cross head 86 further advances. It is in this time interval that the slides and rollers are locked to hold their relative positions for the next increment of slide movement. If the sheet edge is not square one roller and its associated slide will be ahead of the other, but if the sheet is square the rollers and slides will be even. This locking feature will now be explained.

Each slide 84 is cut away along its inner face in an angular notch 121 (Figs. 4, 6 and 10). The slope of the side wall of this notch is approximately 10 degrees judged from the inner face of the slide and each notch terminates in a shoulder 122. A locking bar 123 is carried in the cross head 86 and is disposed in a transverse groove 124 cut in the upper face of the cross head. The ends of the locking bar are tapered to correspond with the angle of the side wall of the adjacent notch and at the time the first roller 81 engages the sheet edge and stops there is a slight end play between the locking bar and the slides.

The continued movement of the cross head, with one or both slides 84 at rest, carries the lock-

ing bar 123 forward of the stationary slide. This causes the locking bar end to move forward in the notch 121 of the stationary slide until the end strikes against the notch wall.

In the event that a square sheet is in the machine and the rollers 81 and their slides 84 are at rest in the same forward position the locking bar 123 moves centrally of the slides and the tapered ends of the bar engage the opposite notch walls at the same time.

In the event of gauging of an out-of-square sheet, where one roller 81 and its slide 84 is ahead of the other, (Figs. 6 and 7) the continued movement of the cross head 86 causes the tapered end of the locking bar 123 to first strike against the inclined face of the notch 121 of the rearmost or then stationary slide.

By reason of the angular line of engagement the locking bar as it continues to move forward is shifted sidewise in its groove until its opposite end strikes against the side wall of the notch of the other slide. In Fig. 6 where the right hand slide is in the rear, the bar 123 has been shifted toward the left. In like manner, the sheet in Fig. 7 which resulted in placing the right hand slide in the forward position has caused shifting of the locking bar 123 toward the right.

When all of the play is taken up between the ends of the locking bar and the slides all of these parts become wedged together as a single unit and the two rollers 81 thereupon remain in engagement with the edge of the sheet regardless of their relative forward or backward positions during the next step of cross head movement. The holding resistance of the rollers 37 on the sheet is now overcome and cross head, locking bar, slides, rollers and sheet move forward or transversely of the line of travel of the sheet *a*. This shifts the sheet transversely of the gauge stops 45 without otherwise changing its centralized position relative to the gauges 45.

Provision is made for stopping this transverse shifting of the sheet and the parts carried by the cross head 86 at a predetermined position, this position being automatically determined to bear a certain relation to the work elements 23, 24. This relation is such that, when the sheet is later successively presented to the working elements, the proper strips will be cut from the sheet with a minimum of waste scrap along the adjacent edge of the sheet, this being the edge which is then in engagement with the rollers 81. The amount of distance traveled will vary in accordance with the square or out-of-square condition of the sheet edge, but in any event this movement is only sufficient to properly align the sheet relative to the work element.

To effect stopping of the transverse movement of the machine an adjustable stationary wedge member 131 (Figs. 4 to 8) is provided. This wedge member is threaded at one end where it is held by a rotatable adjusting sleeve 132 carried in a depending bearing 133 formed on the free end of the plate 93. The sleeve is confined in its bearing by an enlarged head which is formed on one end and by locking nuts 134 threaded on the other end.

The outer end of the wedge member 131 is cut away along its sides into a tapered nose 135 which extends into a bore 136 formed in the T-shaped lug 91 of the cross head 86. A feather 137 carried in the wedge member extends into a featherway cut in the lug 91 and this construction prevents turning of the wedge mem-

ber during and following its adjustment. This adjustment will be further explained.

During the initial movement of the cross head and during the interval of aligning the gauge rollers 81 and slides 84 and when locking them in place the forward end of the wedge member is in front of the locking bar 123 as illustrated in Fig. 4. After the slides have been locked by the locking bar a tapered slot 138 cut in a boss 139 formed in the top surface of the bar 123 passes along the wedge end or nose 135 of the wedge member 131.

It is engagement of one or both of the walls of the tapered slot 138 with the walls of nose 135 that arrests further movement of the cross head 186 at the desired position. When so arrested the spring 111 (Fig. 9) yields, this spring being associated with the cam movement of the cross head, and the full travel of the rod 99 under the action of the cam 96 takes place without affecting the cross head movement.

If locking bar 123 is centrally located relative to the slides 84, (this being when a square sheet is in the machine) the nose 135 of the wedge member is centrally aligned with the center of the tapered slot 138 of the locking bar. In this case the final movement of the cross head 86 carries both tapered walls of the slot 138 into engagement with both tapered walls of the nose 135. This is illustrated in Fig. 5.

In the event that a sheet is out-of-square as shown in Fig. 6, the right hand wall of the slot 138 first comes into engagement with the right hand side of the nose 135 of the wedge member and this also brings the sheet to rest. It will be observed that the out-of-square sheet does not move as far in this transverse gauging movement as it did before because more clearance space must be allowed for the wider part of the angular edge.

In like manner, a sheet having an angular edge as illustrated in Fig. 7, causes the left hand wall of the slot 138 to first engage against the left side of the nose of the wedge member and here again the sheet stops moving, being in its proper gauged position. Here again the transverse movement of the sheet is less than it is in the case of a square sheet and for the same reason as stated in the preceding paragraph. This is the meaning of the previous reference to automatic gauging in accordance with the angularity of the sheet edge and is still further explained.

In the three cases illustrated the sheet is moved transversely only a distance which will permit obtaining the maximum work area for the whole sheet as it is cut up into strips by the work elements. The end of the nose 135 of the wedge member is always a definite distance, indicated by the letter A in Figs. 5, 6, and 7, from the first engagement of a roller 81 with the sheet edge. This insures that the proper strip length will be obtained from the sheet by the work elements for all of the cuts of the latter.

This predetermined positioning for a maximum work area may be further explained by the statement that a minimum scrap allowance is figured for the gauged edge of the sheet and this will now be referred to as the narrower edge of the sheet. Any overrun of the sheet beyond the actual space needed for cutting of the strips will come on the opposite edge of the sheet. Since this is a variable feature it is only necessary that the sheet be properly gauged along the one edge

to produce the narrow or minimum scrap allowance on that edge.

After locating the sheet the cross head 86 moves back, in order to withdraw the rollers 81 from the sheet edge and to unlock and reset the slides 84 so that these parts will be ready for the next gauging forward movement. The cross head carries the slides 84 back until each slide strikes against one end of an adjustable setscrew 141. There are two of these one for each slide and each setscrew is threaded into a boss 142. One boss 142 is formed integrally with the bracket 63, the other is a part of a sub-bracket 143 which is bolted to the bracket 63.

Each setscrew arrests further individual movement of its associated slide and as a slide comes to rest the other moving slide shifts the lock bar back into its neutral or central position. Stopping of the slides against the setscrews aligns or squares up the gauging rollers 81. It is during the return movement of the cross head 86 that the die elements 23, 24, first operate to trim the front edge of the now properly located sheet. The cross head remains in its retracted position for the other cutting actions on the sheet, that is while it is being moved forward and while it is being cut into strips.

An auxiliary feed device comprising a continuously reciprocating feed bar 151 (Figs. 1 and 12) advances the sheet for its different cuts by the work elements. The bar 151 carries a plurality of spaced feed dogs 152 which successively engage behind the rear edge of the sheet as the bar reciprocates and so pushes the sheet forward between the die or work elements.

The feed bar 151 is carried on headed studs 153 which extend through a longitudinal slot 154 formed in the bar. These studs are threaded into a side of a block 155 formed integrally with the rock shaft bearing 61. Back and forth movement of the bar on the studs is effected in any suitable manner as by a crank 156 which is secured to one end of the bar.

After each strip is cut the remainder of the sheet is fed forward for the next cut, the transverse location of the sheet being maintained while being so fed by auxiliary gauging instrumentalities. These comprise a pair of spaced stationary gauges 161 (Fig. 1) which are carried on a cross beam 162 suitably supported on the front of the machine. The gauges are formed with shaped edges 163 which are in alignment with the undulated contour of the die elements and which fit into undulations of the trimmed or cut edge of the sheet as the latter is fed into engagement with them. If a sheet moves out of alignment during its forward travel, these gauges shift the sheet transversely and back into its proper position. A more detailed description of such gauges may be found in the above mentioned Heald patent.

Provision is made for adjusting the compensating gauge device including the gauge rollers 81 for different sizes of sheets. This is effected by movement of the wedge bar 131 and cross head 86. For this purpose the cross head adjusting sleeve 107 and the wedge adjusting sleeve 132 are connected together for cooperative movement by a train of manually actuated gears.

The cross head sleeve 107 at one end is formed with elongated gear teeth 171 (Figs. 1, 9, and 11) which extend forward of the sleeve flange 109. Sleeve 107 is rotated through the medium of meshing idler gears 172, 173 which are mounted on studs 174, 175 carried in an arm 176 formed

on the wedge adjusting sleeve bearing 133 (see also Fig. 8). The first idler gear 172 meshes with the gear teeth 171, while gear 173 meshes with the idler gear 172 and with gear teeth 177 on the inner end of the wedge adjusting sleeve 132.

A bevel gear head 178 is formed on the inner corner of the sleeve 132 just on the side of the gear teeth 177, and meshes with a bevel pinion head 179 formed on the lower end of a vertical shaft 181 carried in a boss 182 on the bracket plate 93. A collar 183 formed on the shaft intermediate its end is rotatably seated in a recess 184 provided in the top of the boss 182 by means of which the shaft is vertically supported. A nut 185 is threadedly confined within the walls of the recess and this construction holds the shaft against displacement.

At its upper end, the shaft 181 carries a turn pin 186 which serves as a hand grip for turning the shaft. By this means the shaft may be manually rotated to revolve the various gears of the train just described and by means of such actuation the wedge adjusting sleeve 132 and the cross head adjusting sleeve 107 are moved. It is this rotation of the sleeves that adjusts the position of the cross head 84 and wedge member 131 to the die elements 23, 24.

A desired adjustment of the compensating gauge is maintained by a latch device comprising a flat spring 191 (Fig. 8), which is secured at one end by a screw 192 to the side of the boss 182, and which at its opposite end carries a latch pin 193. The latch pin extends through a clearance hole 194 in the boss and engages within one of a plurality of spaced notches 195 cut in the shaft collar 183. As long as the pin is engaged in a notch 195 the shaft is locked against turning. While adjusting the pin 193 is pulled out of its notch, the upper end of the spring 191 yielding sufficiently to permit free turning of the shaft 181.

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

I claim:

1. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, separately movable gauging members having a plurality of gauge contact points, and means for moving the contact points of said gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of the sheet for aligning them therewith.

2. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, separately movable gauging members, and means for moving said gauging members independently of one another in a direction crosswise to the line of feed and into engagement with the same side edge of the sheet for aligning them therewith and for thereafter moving said gauging members and the sheet to locate the maximum work area of the sheet laterally of the direction of feeding said sheet to said work elements.

3. In a machine for treating sheets, the com-

bination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, movable gauging members, means for moving said gauging members in a direction crosswise to the line of feeding and into engagement with the same side edge of the sheet for aligning them therewith and for thereafter moving said gauging members and the sheet a predetermined distance while in such alignment, and locking instrumentalities for holding said gauging members in said aligned position during the sheet locating movement.

4. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, separately movable gauging members, and means for moving said gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of the sheet for aligning them therewith and for moving said gauging members and the sheet a predetermined distance while in such alignment to locate the maximum work area of the sheet relative to said work elements prior to being fed thereto, said means thereafter retracting said gauging members to allow feeding of the aligned sheet.

5. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, fixed gauge members for locating the sheet in longitudinal direction, separately movable gauging members for locating the sheet in another or lateral direction, and means for moving said movable gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of said sheet for aligning them therewith and for thereafter moving them with the sheet a predetermined distance relative to and laterally of said fixed gauge members to locate the maximum work area of said sheet relative to said work elements.

6. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet longitudinally to said work elements, fixed gauge members arranged at the same side edge of the sheet for locating the sheet in a longitudinal direction, separately movable gauging members for locating the sheet in another or lateral direction, and means for moving said movable gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of said sheet for aligning them therewith.

7. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, fixed gauge members for locating the sheet in one direction, devices for moving the sheet into register with said fixed gauge members, separately movable gauging members for locating the sheet in another direction, and means for moving said movable gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of said sheet for aligning them therewith and for thereafter moving them with the sheet to locate the maximum work area of said sheet relative to said work elements.

8. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to

said work elements, separately movable gauging members, means for moving said gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of the sheet for aligning them therewith and thereafter moving said gauging members and the sheet in unison, and means for arresting the movement of said gauging members and the sheet to locate the latter relative to said work elements.

9. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, separately movable gauging members, means for moving said gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of the sheet for aligning them therewith and thereafter moving said gauging members and the sheet in unison, means for arresting the movement of said gauging members and the sheet to locate the latter relative to said work elements, and means for adjusting said arresting means so that a minimum scrap allowance is provided for along one edge of the sheet, leaving the entire available surplus extending along the opposite edge of the sheet.

10. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, separately movable gauging members, means for moving said gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of the sheet for aligning them therewith and for thereafter moving them with the sheet a predetermined distance while in such alignment to locate the maximum work area of the sheet relative to said work elements, and means for re-aligning said movable gauging members relative to each other for engagement with a subsequent sheet.

11. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, separately movable gauging members, means for moving said gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of the sheet for aligning them therewith and for thereafter moving them to locate the maximum work area of the

sheet relative to said work elements, and means for holding the sheet in a slip grip to substantially resist any movement while aligning said gauging members with its edge.

12. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, separately movable gauging members, means for moving said gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of the sheet for aligning them therewith and for thereafter moving them with the sheet to locate the maximum work area of the sheet relative to said work elements, and auxiliary feeding devices for feeding the located sheet into said work elements.

13. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, separately movable gauging members, means for moving said gauging members independently of one another in a direction crosswise to the line of feeding and into engagement with the same side edge of the sheet for aligning them therewith and for thereafter moving them with the sheet a predetermined distance while in such alignment for locating the maximum work area of the sheet relative to said work elements, and auxiliary gauging instrumentalities for maintaining the gauged position of the sheet while being fed by said feeding means.

14. In a machine for treating sheets, the combination of work elements for performing an operation thereon, means for feeding a sheet to said work elements, movable gauging means comprising a plurality of yieldable independently movable gauging members for engaging an edge of the sheet at spaced intervals therealong, means for moving said gauging members in a direction crosswise to the line of feeding and into engagement both with the same sheet edge to align them therewith and for thereafter moving said aligned gauging members and the sheet in unison, a locking bar interposed between said gauging members to lock them against independent movement after alignment with the sheet edge, and means for arresting the movement of the locked gauging members to locate the sheet in a predetermined position relative to said work elements.

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