May 27, 1958 O. L. ERVIN 2,836,242

LOCATOR

Filed Oct. 7, 1955 2 Sheets-Sheet 1

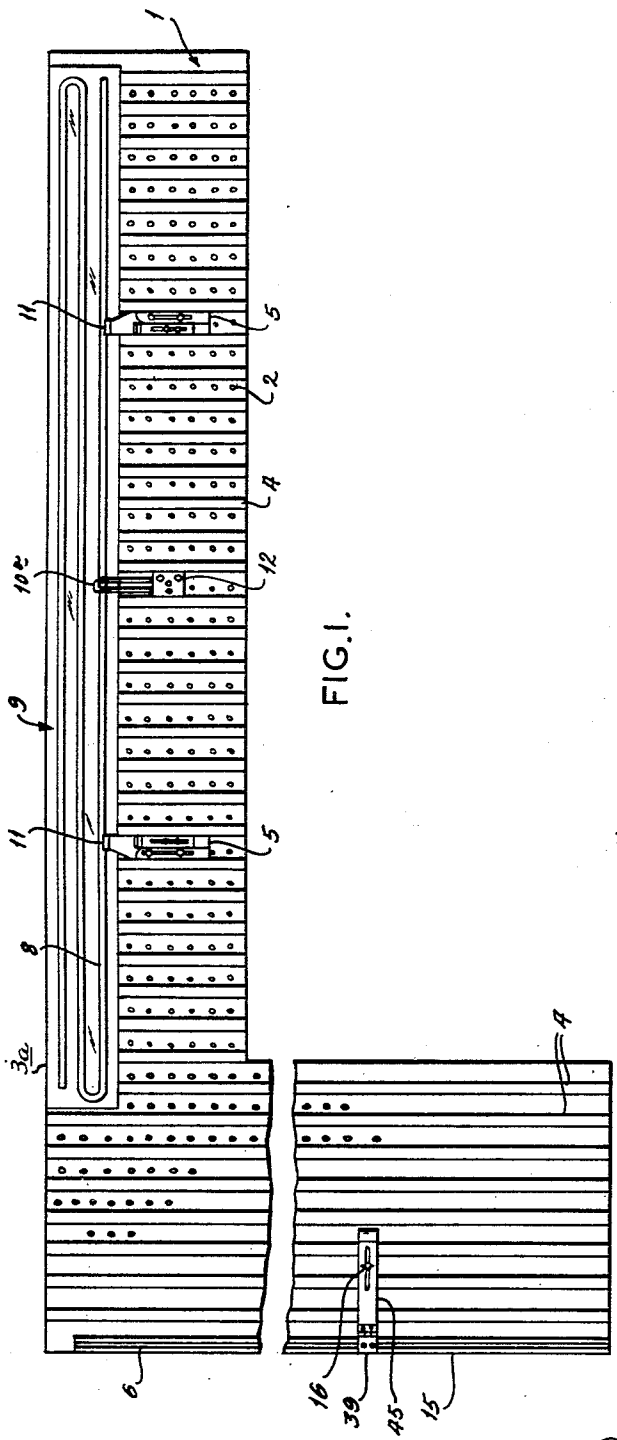


FIG. 1.

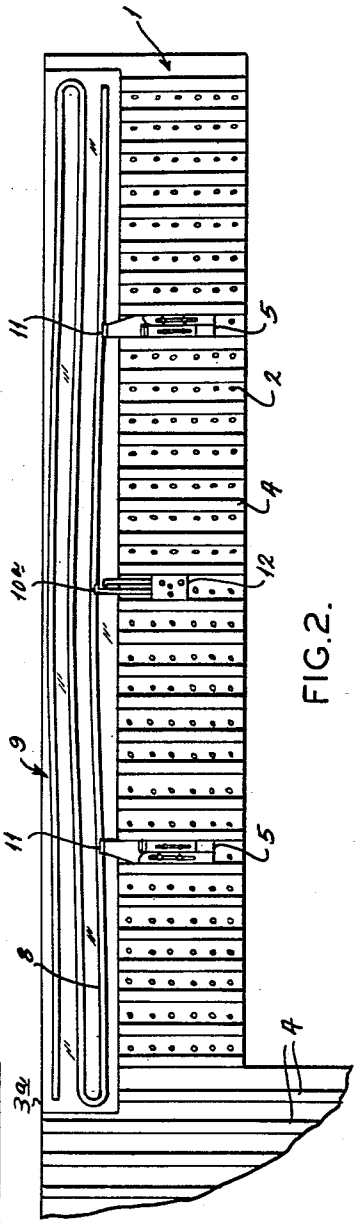


FIG. 2.

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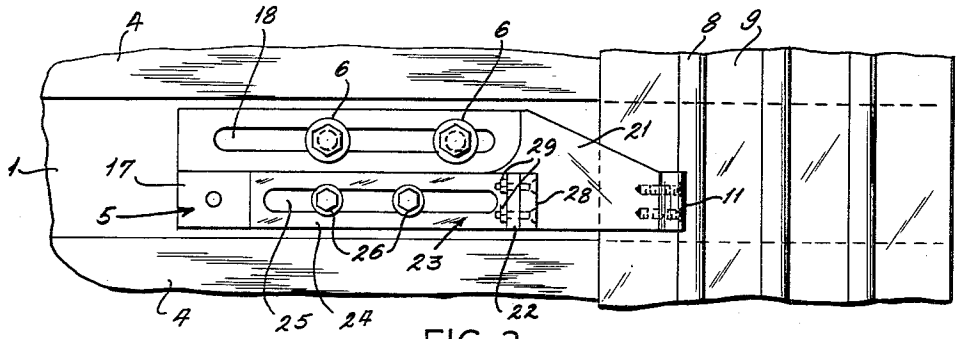


FIG. 3.

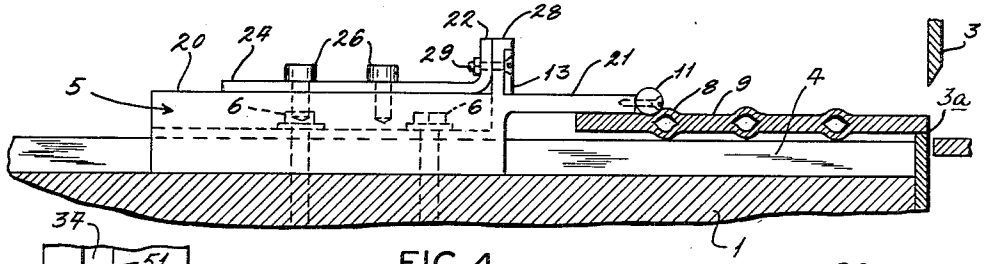


FIG. 4.

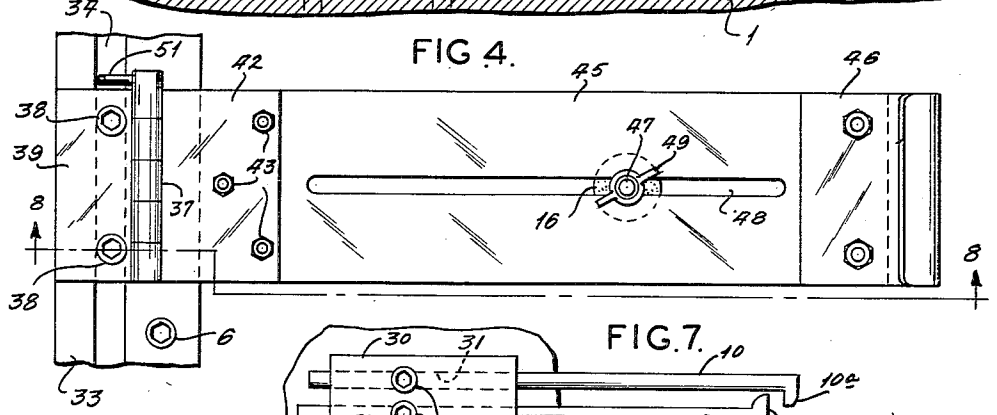


FIG. 7.

FIG. 5.

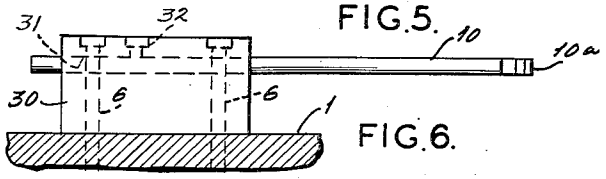


FIG. 6.

FIG. 8.

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LOCATOR

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Application October 7, 1955, Serial No. 539,113

12 Claims. (Cl. 164—59)

This invention relates to locators and more specifically to a device for locating sheet metal parts on a shear bed during fabricating operations.

In trimming the edges of sheet metal parts it has been necessary to change the locators on the shear bed each time a different portion of the sheet is to be cut. This not only entails time in changing the position of the locators but it also necessitates the operator of the machine handling each unit two, three, or four separate times, which is also time consuming. In some cases the surface of the sheet may be provided with a raised configuration such as corrugations or the coils or conduits of a heat exchanger of the type described in U. S. Patent 2,690,003. The raised configuration may, on the other hand, be merely a feature of decorative design. Usually some particuar portion of the surface configuration must be positioned relatively precisely with respect to the edges of the sheet. Often it is necessary that an edge of the sheet be sheared to compensate for deviations in the configurations, and it is not economical to perform a separate operation of measuring the deviation to determine if it is within allowable tolerances prior to the shearing operation.

With a view to overcoming these difficulties and objections it is the primary object of this invention to provide a locating and gauging device which minimizes the time and motion required by the operator of the shear in trimming the sheet metal parts. Another object of this invention is to provide a shear locating assembly which is conveniently arranged to permit rapid trimming of the sheets with a minimum of manipulation of the sheet by the operator. Another object of this invention is to provide a locating and gauging device which permits the operator of the shearing machine to gauge critical features of the sheet and accurately shear the sheet in one operation. Another object of this invention is to provide a locating device which will permit all cuts to be completed on one sheet without first resetting the locators, and without setting aside the sheet and commencing cutting operations on a second sheet. Another object of this invention is to provide a locating device which is easy to set up. Another object of this invention is to provide a locating device which will minimize the effect of deviations in the raised surface configurations on the sheet. Further objects and advantages will become apparent from the description and accompanying drawings in which:

Figure 1 is a plan view illustrating an embodiment of the invention showing the bed of the locating device with a sheet metal workpiece in place in the right hand or side gauging locator, and with the end locator shown on the left hand portion of the bed;

Figure 2 is a plan view of the side gauging locator shown in Figure 1, but showing a sheet with a cambered conduit in place in the locator;

Figure 3 is a plan view of one of the dual abutment members of the side gauging locator shown in Figures 1 and 2;

Figure 4 is an elevation view of the dual abutment member shown in Figure 3;

Figure 5 is a plan view of the camber gauge member of the side gauging locator shown in Figure 1;

Figure 6 is an elevation view of the camber gauge member shown in Figure 5;

Figure 7 is a plan view of the end locator shown in Figure 1; and

Figure 8 is an elevation view, partially in section, of the end locator of Figure 7.

In the embodiment shown a shear bed is provided with a plurality of rows of equally spaced threaded holes perpendicular to the shear cutting blade. The camber gauge and the side gauging locators are attached to the bed by bolts threaded into these holes. The side gauging locator is utilized in trimming the sides of the sheet and in conjunction with the camber gauge in gauging the camber of the sheet. The locator has two dual abutment members, each dual abutment member having two abutment elements, the similar elements of each member being used together to locate the opposite side edges of the sheet relative to the cutting blade. The first pair of abutment elements engage a tube wall or other protuberance on the surface of the sheet. The dual abutment members are positioned on the shear bed so that any arching or camber in the configurations on the sheet which is used in positioning the sheet will be minimized. A camber gauge is positioned intermediate the dual abutment members of the side gauging locator so that the operator may visually gauge the camber of each sheet immediately prior to the cutting operation after the sheet is positioned for trimming the first side edge. When the first side is cut the sheet is reversed and the cut edge is brought into engagement with the second pair of abutment elements and the second side edge is trimmed off. The cutting blade may be of any conventional type; for example, as shown in Figure 4, a guillotine type blade is suitable.

The bed of the shear is also provided with an end locator adjacent the side gauging locator to permit the shearing operation to be completed without setting aside the sheet. The end locator comprises an elongated side edge guide bolted to the shear bed and perpendicular to a suitable cutting blade. Bolted to this guide is a hinged locator arm which is raised to permit the workpiece to be inserted. The locator arm is then lowered over the sheet and an abutment on its lower surface engages a tube wall or other protuberance on the surface of the sheet. One of the previously sheared sides is maintained in contact with the side edge guide and the end is cut off. The sheet is then reversed in the end locator and positioned against the locator arm abutment as previously described, or alternatively against an abutment on a second locator arm if the first locator is not properly placed to engage a raised portion of the sheet or the previously cut end of the sheet, whereupon the other end is cut off.

The invention will be better understood from the following detail description:

The bed **1** of the shearing machine is L-shaped and is provided with a plurality of symmetrical spaced rows of threaded holes **2** and spaced wooden slats **4** perpendicular to a cutting blade **3**. The cutting plane of the blade **3** is substantially parallel to and adjacent the edge **3a** of the bed **1**. The dual abutment members **5**, shown in detail in Figures 3 and 4, are attached to one leg of the L-shaped shear bed by bolts **6** threaded into the holes **2**. Attached to the other leg of the L-shaped bed is an end locator **14** shown in detail in Figures 7 and 8. Centered between the dual abutment members is a camber gauge **12**, shown in detail in Figures 5 and 6, which is similarly attached to the shear bed by bolts **6**. The dual abutment members are spaced apart approximately

half the length of the sheet to be sheared off so that any arching or camber in the raised surface configuration use in locating the sheet will be minimized. For example, in Figure 2 the conduit 7 is cambered longitudinally. By spacing the dual abutment members 5 about one-fourth of the length of the sheet inwardly of the corner of the sheet this effect is minimized with respect to the sheet as a whole. Also, the arching assumes a more consistent configuration inwardly from the ends, especially in roll bonded sheets because the more central portion of the sheet is not subjected to the erratic fluctuations caused by the sheet entering and leaving the mill rolls. Referring again to Figure 1, the conduit 8 of sheet 9 is in alignment with the gauging ends 10*a* of the arms 10 of the camber gauge 12. However, referring to Figure 2, the camber in the conduit 7 is so great that it falls entirely outside the gauging portion 10*a* of the arms 10. This indicates to the operator that the workpiece should not be trimmed by this operation.

As shown in Figure 1 the conduit 8 engages the nylon lower bumpers 11 of the dual abutment members 5. After the first side has been trimmed, the sheet is reversed so that the newly cut end engages the nylon upper bumpers 13 and the second side is then trimmed. After the sides are trimmed the sheet is placed in the end locator 14. One of the newly sheared sides of the sheet abuts the longitudinal guide 15 and a preselected portion of the conduit 8 engages a bumper 16 on the underside of the hinged locator arm. One end of the sheet is trimmed and the piece is then reversed in the end locator and the second end is trimmed.

The wooden bottom slats 4 prevent damage to the surface of the sheet workpiece and aid materially in reducing noise. These slats also properly space the sheet relative to lower bumper 11 and end bumper 16.

Figures 3 and 4 show the details of the dual abutment members of the side gauging member, in this case the member on the right end of the shear bed 1 in Figures 1 and 2. The body 17 of the dual abutment members is provided with an elongated slot 18 which receives the adjusting bolts 6. This slot permits sliding adjustment of the dual abutment member perpendicular to the axis of the cutting blade. The surface adjacent the elongated slot 18 is recessed below the remainder of the top surface 20 of the body 17 to permit easier tightening of bolts 26. A flange 21 extends outwardly from the upper front end of the body. On the end of this flange is bolted, or otherwise secured, the nylon lower bumper 11 against which a portion of the coil 8, or other offset configuration, of the sheet 9 abuts. The edge portion of the sheet is received underneath this flange. The upper bumper 13 is secured to one leg 22 of an L-shaped bracket 23. The other leg 24 of this bracket is provided with an elongated adjusting slot 25. Adjusting bolts 26 pass through this slot and are threaded into the body 17, to facilitate longitudinal adjustment of the bumper 13 and the bracket 23 with respect to the locator body. The bumper element 13 is a thin sheet of nylon fitted into a recess in a backing plate 28. The nylon facing and backing plate are secured to the L-shaped bracket by bolts 29.

The camber gauge 12 is shown in Figures 5 and 6. The body 30 of the gauge is attached to the bed 1 of the shearing machine by bolts 6 which are threaded into the threaded apertures 2 in the shear bed. The arms 10 of the gauge pass through longitudinal holes 31 in the body 30 of the gauge and are fixed in any selected position by set screws 32. Each of these arms is provided with offset overlapping gauging portions 10*a*. After the camber gauge is secured to the bed 1 it is adjusted by loosening the set screws 32 and setting the gauging portion 10*a* of the arms 10 at the location where the center of the configuration or index mark which is to serve as the gauging index on the sheet will normally fall. The gauging portions 10*a* are then moved apart sufficiently to indicate the allowable tolerance. The set screws are tightened and the camber gauge is ready for use.

In adjusting the side gauging locator the dual abutment members 5 are first attached to the bed by bolts 6 with approximately one-half the length of the sheet to be sheared between these members. They are next adjusted transversely of the shear blade by loosening adjusting bolts 6 so that the lower bumpers 11 engage a portion of the coil 8 or other raised configuration on the sheet when the first edge to be trimmed is in proper position relative to the cutting blade. Bolts 6 are then tightened to fix the position of lower bumpers 11. It should be noted that it is not necessary that the index coil, or raised configuration 8 on the surface of the sheet be straight. It is merely necessary to set each dual abutment member so that the edge is trimmed in the proper place. Nor is it necessary that the camber gauge be in straight alignment with the dual locators.

Figures 7 and 8 show a plan and elevation view, respectively, of the end locator 14. The body 33 of this locator is attached to the shear bed 1 by bolts 6 which pass through holes in the body 33 and are threaded into the shear bed holes 2. The bolt holes in body 33 are equally spaced from the guiding edge of the body so that this edge will always be prependicular to the cutting blade. The body 33 extends the width of the bed and its top surface is provided with a vertical groove 34 having an enlarged base portion 35. Received in this groove are two nuts 36 having flat sides engaging the sides of the enlarged groove portion 35 to prevent rotation of the nut. A hinge 37 is bolted to the top surface of the body 33 by bolts 38 which are threaded into the nuts 36. The hinged leaf 39 has a special plate 40 secured to its bottom surface in any convenient manner as by welding and this plate has an offset 41 which snugly engages the walls of the groove 34 to prevent the hinge from turning relative to the body portion. Attached to the other leaf 42 of the hinge by bolts 43 passing through a plate 44 is a plastic locator arm 45. The arm is provided with a handle portion 46. A circular nylon bumper 16 is attached to the underside of arm 45 by a bolt 47 which passes through an elongated adjusting slot 48 in the arm and is provided with a clamping wing nut 49. The leaf 42 of the hinge is provided with an adjustable counterweight 50 which is secured on a shaft 51 attached to the leaf. Shaft 51 is fixed to hinge leaf 42 and may pass through the hinge pin to maintain the pin in place.

The body 33 of the end gauge is first bolted to the bed 1 of the shear. Since the rows of holes 2 are perpendicular to the cutting blade and the body holes are equidistant from the guiding edge of the body, the body 33 is perpendicular to the blade. The two hinge bolts 38—38 are loosened and the arm 45 is moved toward or away from the cutting blade to properly position the sheet with respect to the blade. The bolts 38 are then tightened and the device is ready for use. In operation the arm 45 is raised to permit insertion of the sheet 9 on the wooden slats 4. It is then lowered and a selected raised portion of the sheet is abutted against the nylon bumper 16.

The operation of the locator should be apparent from the above description. However, the invention does not reside solely in the individual locators but also in the relative arrangement of the locators, including the camber gauge. The relationship between the locators themselves is such that the operator may trim any given number of sheets with a minimum of bodily motion, thereby saving time, speeding the trimming operation and reducing cost. It should be noted that by attaching the side gauging locator to the leg of the L-shaped shear bed which is parallel to the cutting blade, and by attaching the end locator to the short leg which is perpendicular to the cutting blade, the time and motion required of the operator in trimming the four sides of a sheet is greatly reduced. The operator has merely to insert the sheet

to be trimmed into the machine and abut the index configuration on the sheet against the lower abutment 11. Simultaneously with the placement of the sheet in the locator the operator may determine if the sheet is within allowable tolerances by observing the alignment of a particular preselected portion of the sheet between the camber gauge arms. After trimming this edge it is merely necessary to reverse the sheet on the shear bed while abutting the newly cut edge against the upper abutment members 13 and trim the other side edge of the sheet. It should be noted that when the second side edge of the sheet is being trimmed, the sheet is merely resting on top and against the locator of the dual abutment members. After the second side edge is sheared, the operator places the second side edge of the sheet against the guiding surface of the body portion 15 of the end locator. The operator then lowers the arm over the sheet and brings the selected raised configuration on the sheet into engagement with the abutment 16 and trims off the end of the sheet. It is only necessary then to trim the other end of the sheet which the operator does by reversing the sheet in the end locator. The entire trimming operation is completed with a minimum of handling of the sheet. All motions of the operator are coordinated through the arrangement of the shear bed and locators so that the motion required by the operator is minimized and so that each succeeding motion follows naturally and harmoniously the preceding motion.

It is to be understood that although the invention is described with particular reference to a shearing machine it is equally adaptable to drilling or grinding operations, and other uses all of which are contemplated to fall within the scope of this invention. Although the bumpers herein referred to are described as being made of nylon, it is to be understood that they may be fabricated from any non-abrasive material such as leather or wood. Although the invention is set forth in detail in the foregoing, various changes may be made without departing from the spirit and scope of this invention and therefore, this invention is not to be limited to such details except as set forth in the appendent claims.

What I claim as my invention is:

1. In a trimming machine a work piece receiving bed and means on said trimming machine operable in a given plane to trim a work piece, a first locating means mounted on said bed for positioning an edge of said work piece to facilitate accurate trimming of said edge, a second locating means mounted on said bed for positioning a second edge of said work piece adjacent said first edge to facilitate accurate trimming of said second edge, said first locating means comprising abutment means substantially parallel to and adjacent said plane for locating the sheet to facilitate accurate trimming of the first said edge of said work piece, said second locating means having a body portion mounted on said bed, said body portion having a straight edge substantially transverse to said plane, an arm hinged to said body portion, said arm having work abutting means, the free end of said arm being nearer the first said locating means than said hinged end to facilitate transfer of said work piece from the first said locating means and insertion of said work piece in said second locating means by raising the hinged arm and abutting a side of said work piece against said straight edge portion of said body whereupon the arm may be lowered and a preselected portion of said work piece abutted abainst the abutting means on said arm to facilitate accurate trimming of said second edge of said work piece.

2. In a trimming machine a work piece receiving bed and means on said trimming machine operable in a given plane to trim a work piece, a first locating means mounted on said bed for positioning opposite side edges of said work piece to facilitate accurate trimming of said edges, a second locating means mounted on said bed for positioning an end edge of said work piece adjacent said first edges to facilitate accurate trimming of said end edge, said first locating means comprising abutment means substantially parallel to and adjacent said plane for locating the sheet to facilitate accurate trimming of the first side edge of said work piece, a second abutment means to receive said trimmed edge to facilitate accurate trimming of an opposite edge of said work piece, said second locating means having a body portion mounted on said bed, said body portion having a straight edge substantially transverse to said plane, an arm hinged to said body portion, said arm having work abutting means, the free end of said arm being nearer the first said locating means than said hinged end to facilitate transfer of said work piece from the first said locating means and insertion of said work piece in said second locating means by raising the hinged arm and abutting a side of said work piece against said straight edge portion of said body whereupon the arm may be lowered and a preselected portion of said work piece abutted against the abutting means on said arm to facilitate accurate trimming of said second edge of said work piece.

3. In a shear machine having a cutting blade, means fixed to said machine to locate and gauge a sheet to be sheared by the machine, said means comprising an L-shaped bed, one leg of said L-shaped bed being parallel to the cutting plane of said blade, locator means mounted on the said parallel leg for positioning a side edge of the sheet to facilitate accurate trimming of said side edge, a second locator means mounted on the other leg of the bed for positioning an end edge of the sheet to facilitate accurate trimming of said end edge, the first said locator means comprising a pair of abutment members, each member having first abutment means on an end adjacent said cutting plane for locating the sheet to facilitate accurate trimming of said side edge, a second abutment means on said member to receive said trimmed side edge to facilitate accurate trimming of a second side of said sheet, said second locator means having a body portion fixed to the second leg of said bed and substantially transverse to said cutting plane, an arm hinged to said body portion having work abutting means, the free end of said arm being nearer to the first said locator means than the hinged end to facilitate insertion of said sheet in said end locator by raising the hinged arm and abutting a trimmed side of said sheet against said body portion whereupon the arm may be lowered, and a preselected portion of said sheet abutted against the abutting means on said arm to facilitate accurate trimming of an end of the sheet.

4. In a trimming machine having a locating and guaging device comprising; a pair of locators fixed to a work piece receiving bed of said machine, said locators each comprising a body portion having a horizontal flange extending from the upper portion of an end of said body and bumper means attached to the outer end of said flange, a second abutting surface adjustably secured to the upper surface of each said body, said guaging device comprising means to guage the deformation in said work piece when said work piece is operatively positioned in said locators, said means comprising a body portion secured to said bed intermediate said locators and a pair of horizontal extending arms secured to said body portion, said arms having end guaging portions spaced apart longitudinally of the arms.

5. A locating and guaging device suitable for use with a fabricating machine having a bed, said device comprising a pair of locators having work abutting means to properly locate a work piece on said machine for trimming an edge of said work piece, means mounting said locators on said bed in spaced apart relationship, guaging means for overlying said work piece to indicate the degree of arching in said work piece, and means mounting said guaging means on said bed intermediate said locators.

6. The device of claim 5 wherein said machine is a trimming machine and said work abutting means properly

locates said work piece for trimming an edge of said work piece, and each locator has a second work abutting means for engaging said trimmed edge to properly locate an opposite edge of said work piece on said machine to facilitate trimming said opposite edge.

7. A locator comprising; a body, a first locating means comprising a horizontal flange extending from the upper portion of an end of said body and a second locating means secured to the top of said body, means for adjustably positioning said body on a machine work receiving bed to facilitate selective positioning of said first locating means with respect to said bed, and means to adjustably position said second locating means on said body to facilitate selective positioning of said second locating means with respect to said bed, independently of said first locating means.

8. A locator comprising; a body, a first locating means comprising a horizontal flange extending from the upper portion of an end of said body and a second locating means secured to the top of said body, means for adjustably positioning said body on the work receiving bed of a fabricating machine to facilitate selective positioning of said first locating means with respect to said bed, said means comprising; an elongated slot extending through said body to receive bolt means to be attached to said bed, and means to adjustably position said second locating means on said body to facilitate selective positioning of said second locating means with respect to said bed, independently of said first locating means, the last said adjusting means comprises an elongated slot through a portion of said second locating means and receiving bolt means threaded into apertures in said body.

9. A camber guage comprising a body portion, a pair of parallel holes passing through said body, an arm telescopically received in each hole, means releasably securing each said arm in its respective hole, and cooperating means on the free ends of said arms to gauge the degree of arching in a work piece, said means comprising, overlapping lateral extensions on the free ends of said arms to bracket therebetween a predetermined index mark on said work piece to indicate when the arching of said work piece is within acceptable tolerances.

10. An end locator for a trimming machine having a bed and trimming means on said trimming machine operable to trim a work piece in a given plane, said locator comprising; an elongated body portion having a straight edge substantially transverse to said plane, against which an edge of said work piece may be abutted, an arm substantially transverse to said straight edge and hinged to said body portion, means to facilitate selective adjustable positioning of said arm along the axis of said straight edge, and work piece abutting means secured on said arm to facilitate proper positioning a work piece with respect to said plane for trimming said work piece.

11. An end locator for a trimming machine having a bed and trimming means on said trimming machine operable to trim a work piece in a given plane, said locator comprising; an elongated body portion having a straight edge substantially transverse to said plane, against which an edge of said work piece may be abutted, an arm substantially transverse to said straight edge and hinged to said body portion, work abutting means secured on said arm to facilitate proper positioning of a work piece with respect to said plane for trimming said work piece, and means to selectively and adjustably position said work abutting means along an axis substantially transverse to said straight edge.

12. In a trimming machine having a bed and trimming means on said trimming machine operable in a given plane to trim a work piece, an end locator means, said means comprising; an elongated body portion having a straight edge substantially transverse to said plane and a slot substantially parallel to said straight edge, an arm substantially transverse to said straight edge and hinged to said body portion, said arm being longitudinally slidably mounted in said slot and means to facilitate selective adjustable positioning of said arm along the axis of said slot, work abutting means secured on said arm, and means to selectively and adjustably position said work abutting means along an axis substantially transverse to the first said axis.

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