

May 17, 1927.

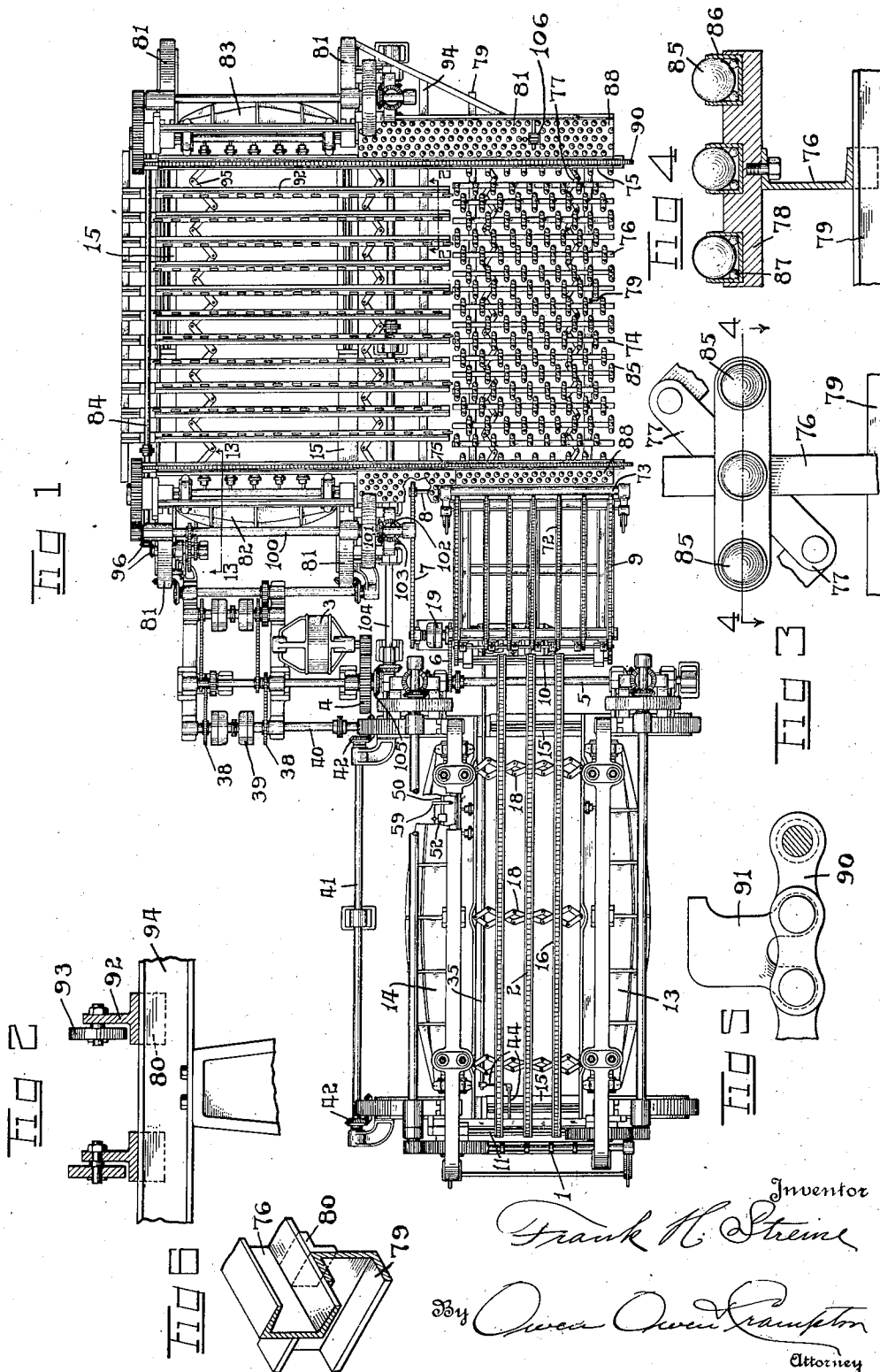
F. H. STREINE

1,629,233

AUTOMATIC PLATE AND SHEET TRIMMING AND SQUARING MACHINE

Filed March 16, 1925

8 Sheets-Sheet 1



May 17, 1927.

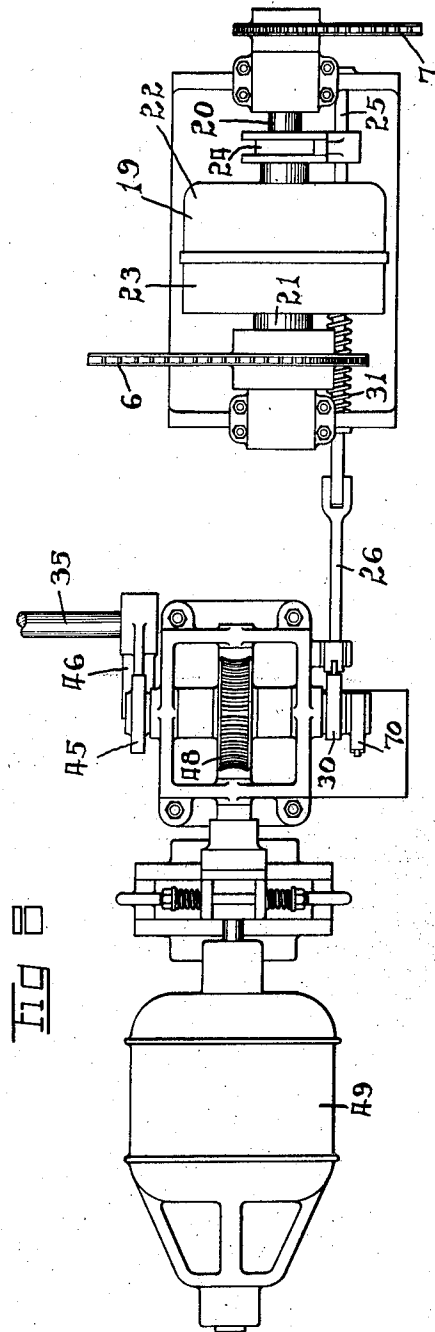
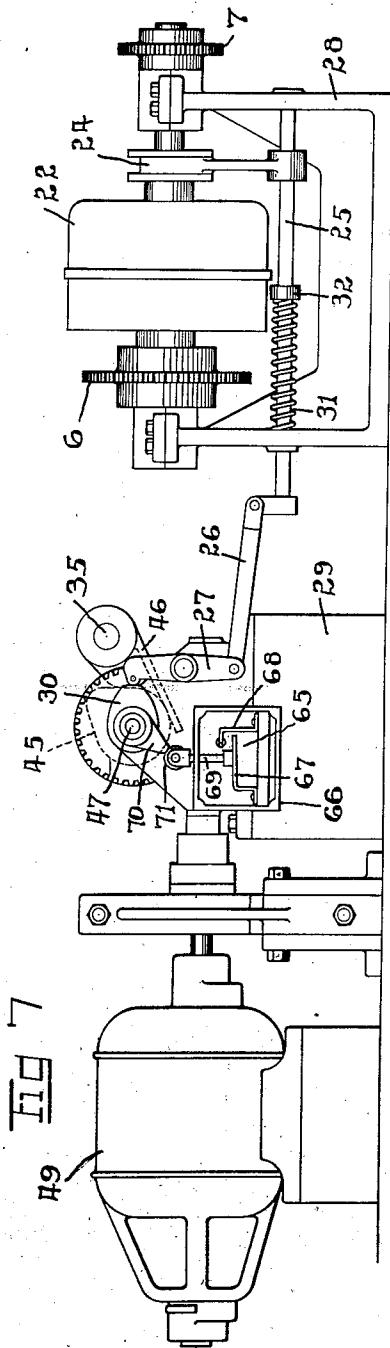
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AUTOMATIC PLATE AND SHEET TRIMMING AND SQUARING MACHINE

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8 Sheets-Sheet 2



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AUTOMATIC PLATE AND SHEET TRIMMING AND SQUARING MACHINE

Filed March 16, 1925

8 Sheets-Sheet 3

Fig 9

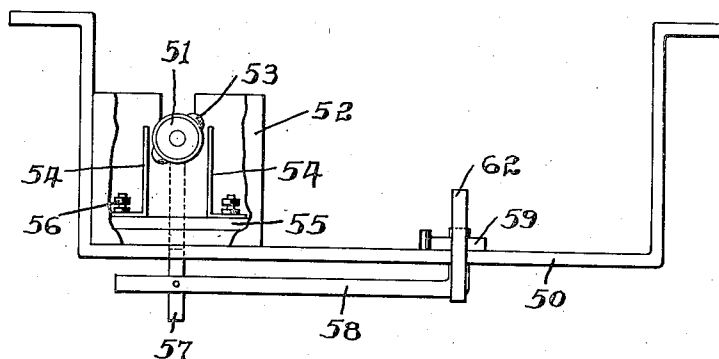
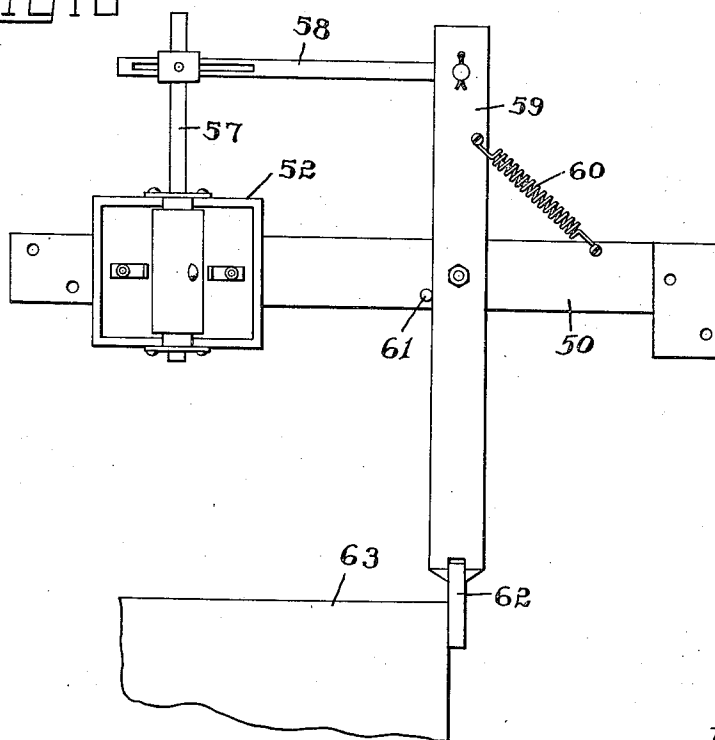


Fig 10



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1,629,233

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AUTOMATIC PLATE AND SHEET TRIMMING AND SQUARING MACHINE

Filed March 16, 1925

8 Sheets-Sheet 4

Fig 11

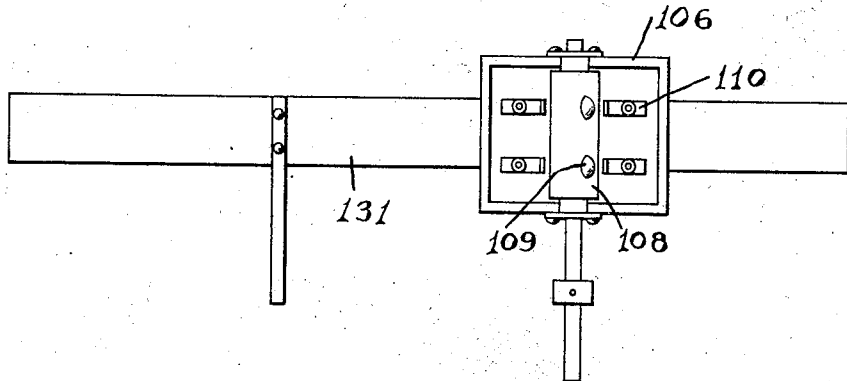
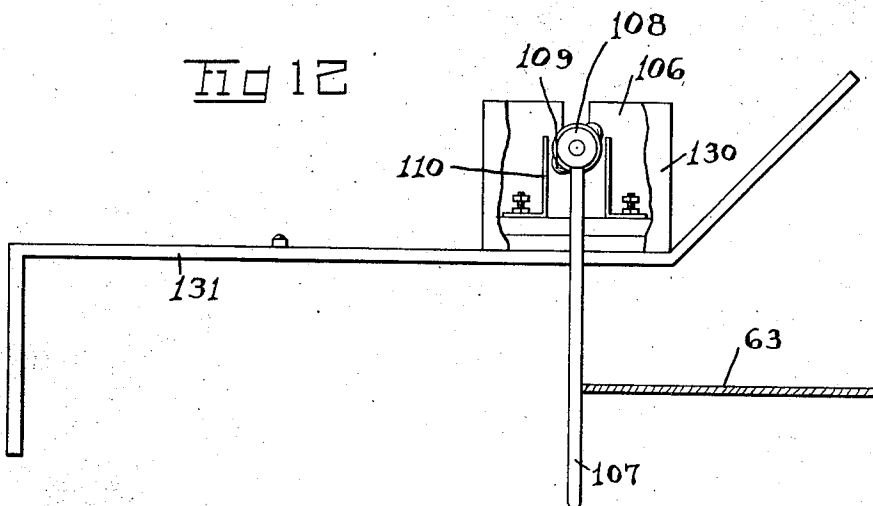


Fig 12



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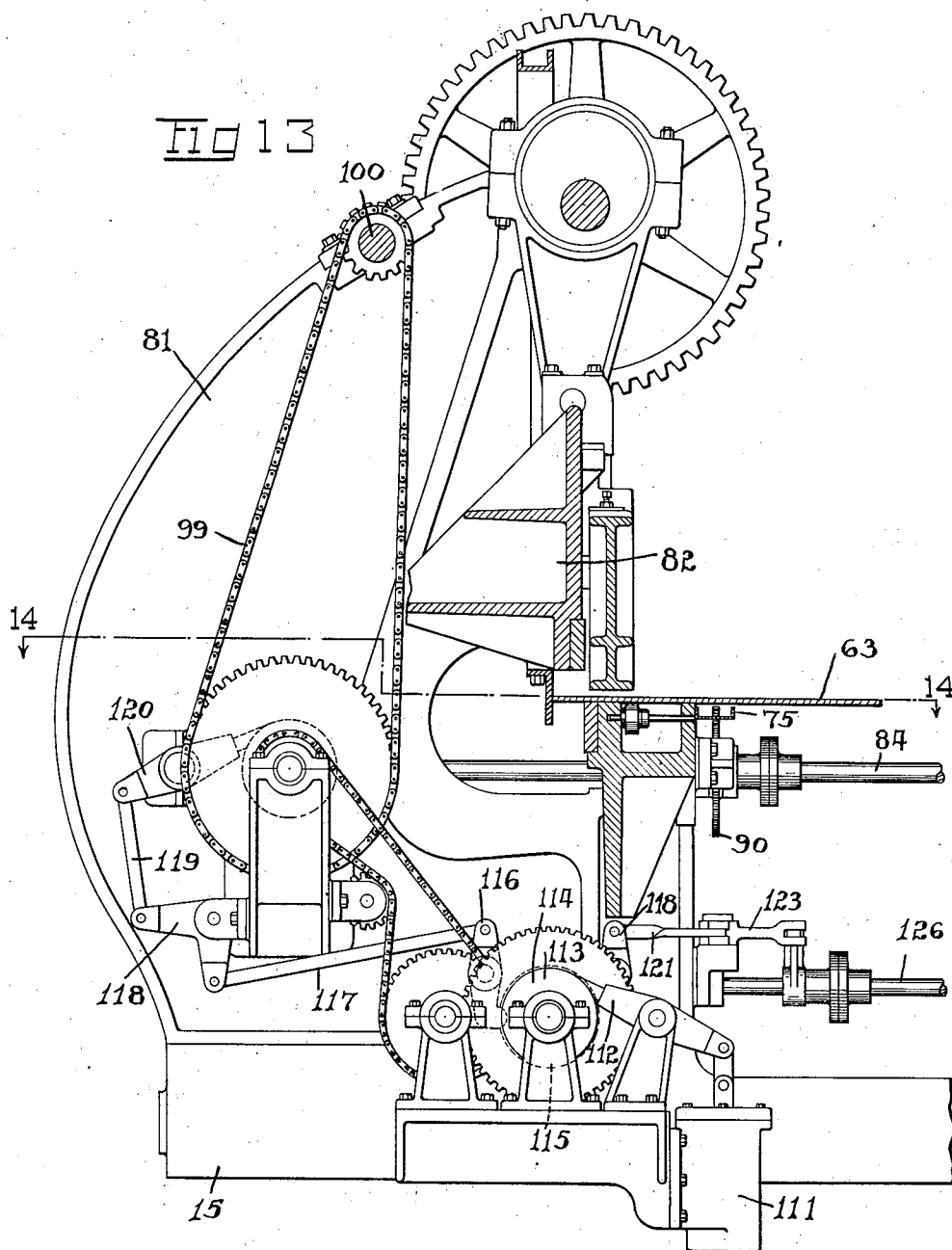
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AUTOMATIC PLATE AND SHEET TRIMMING AND SQUARING MACHINE

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8 Sheets-Sheet 5



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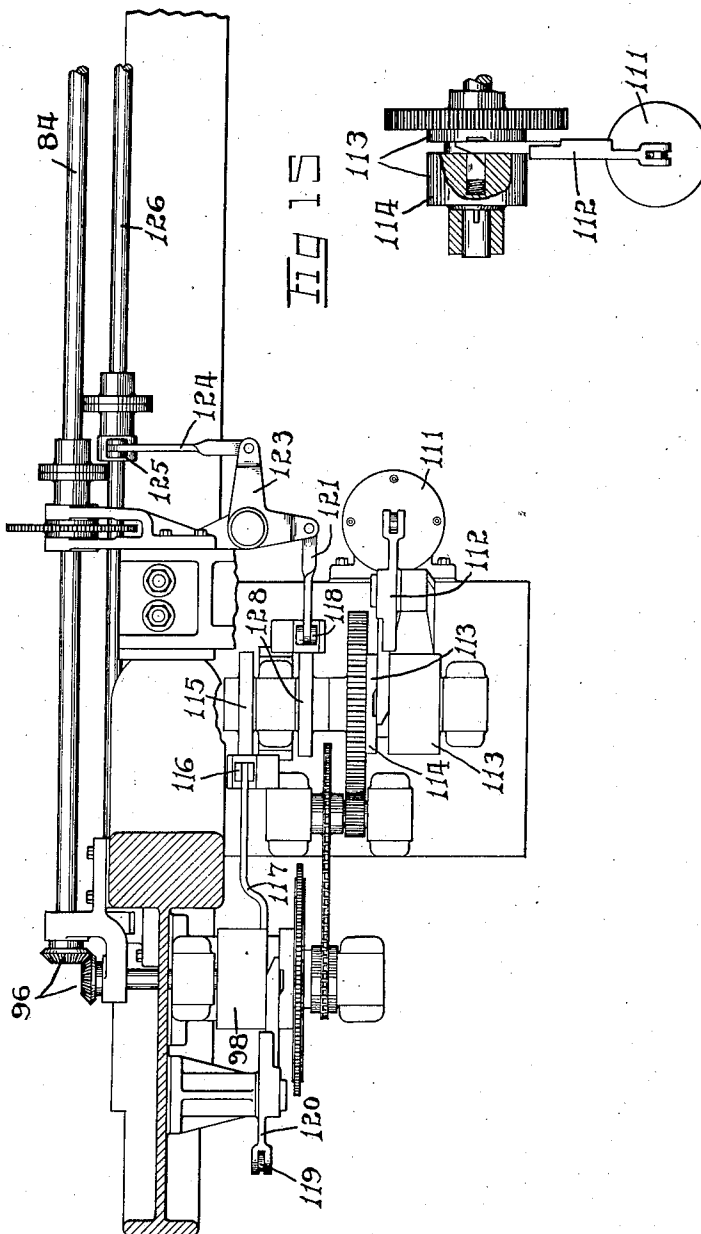
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AUTOMATIC PLATE AND SHEET TRIMMING AND SQUARING MACHINE

Filed March 16, 1925

8 Sheets-Sheet 6

Fig 14



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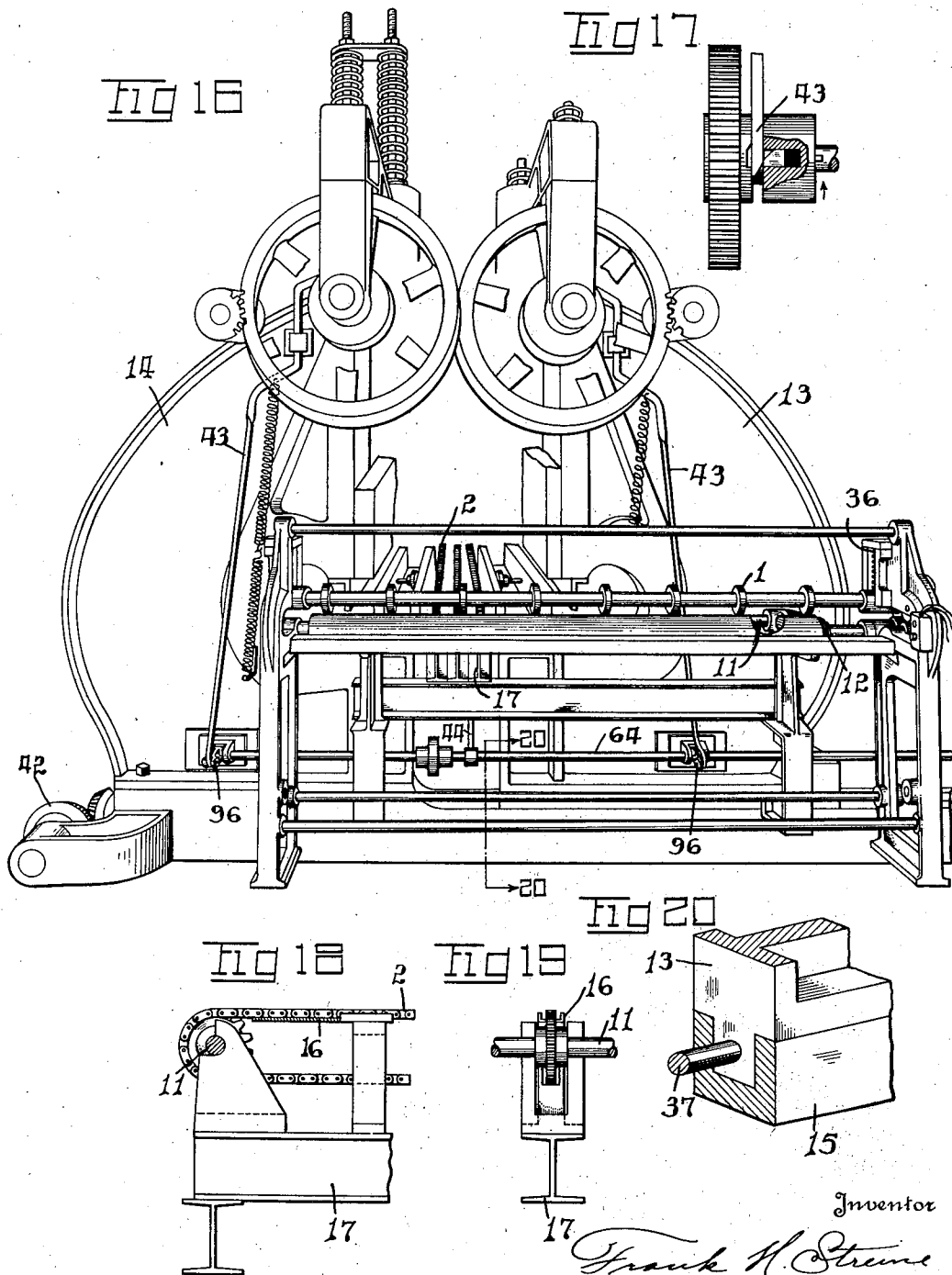
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AUTOMATIC PLATE AND SHEET TRIMMING AND SQUARING MACHINE

Filed March 16, 1925

8 Sheets-Sheet 7



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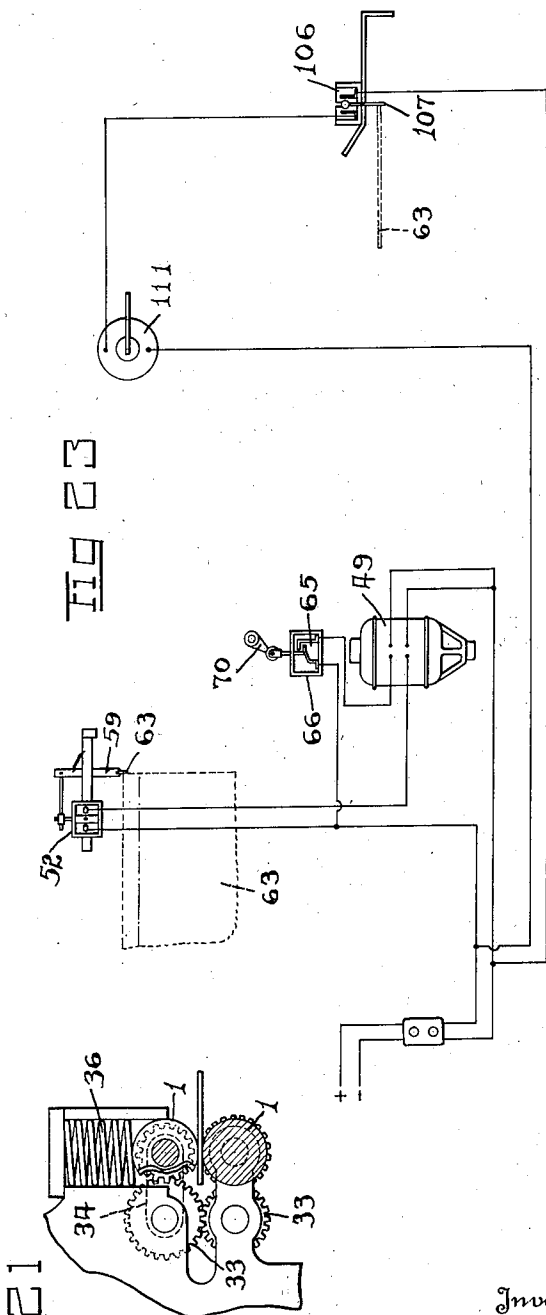
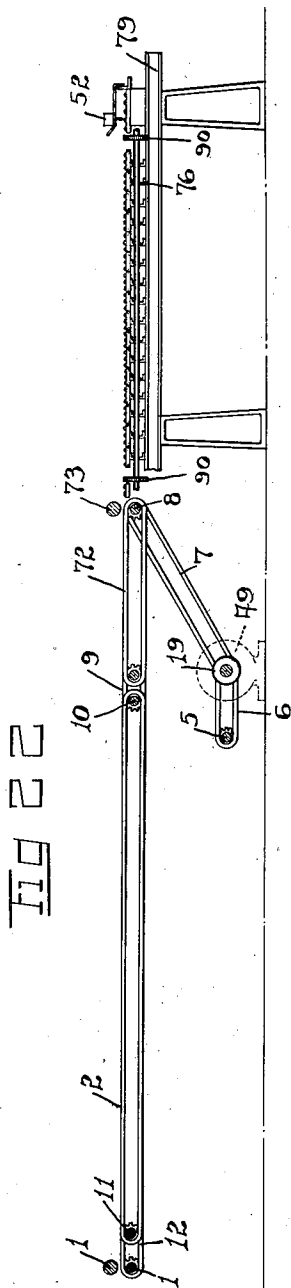
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AUTOMATIC PLATE AND SHEET TRIMMING AND SQUARING MACHINE

Filed March 16, 1925

8 Sheets-Sheet 8



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UNITED STATES PATENT OFFICE.

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AUTOMATIC PLATE AND SHEET TRIMMING AND SQUARING MACHINE.

Application filed March 16, 1925. Serial No. 15,925.

My invention has for its object to provide a machine for shearing the edges of plate and sheet metal to remove the raw edges produced in rolling the metal to sheet or plate form. The invention provides a means for shifting the plates or packs of sheets to position for shearing off the opposite raw edge portions and then shifting the plates or packs of sheets to position to perform the same shearing operation on the remaining pair of edge portions along lines that are at right angles to the shearing lines of the preceding cuts made on the plates or packs of sheets and then delivering the plates or packs of sheets from the machine.

In the rolling mill operations, ordinarily followed, the raw, "fish tail" edges are removed by indiscriminately cutting by the use of a shear, along first one side edge and then the other side edge, and then the end edges in succession. In so doing, the edges are not squared, since there is no means provided for guiding the operator in the manipulation of the sheet while it is being operated upon by the shear, except the eye and his general judgment as to location of the sheet relative to the shear. This results not only in the sheet being trimmed and formed with edges that are located at various angles that merely approximate 90°, but also it results in a great waste of material since the sheet will be located at various positions relative to the shears. Also subsequently the sheet must be squared and a somewhat more accurate shearing operation is performed upon the sheet to again trim metal therefrom to square the edges of the sheet. This results in handling the sheets twice, turning them manually from one position to another in each handling and also in an enormous loss of material. By my invention the packs of sheets or plates are merely fed to the machine and the machine operates to cut opposite side edges parallel and subsequently cut the end edges parallel and at right angles to the side edges, and then deliver the plates or packs of sheets from the machine. Thus double handling of the sheets and the enormous waste involved in the ordinary trimming of packs of sheets and plates are eliminated. In the preferred form of my invention the opposite side edges are formed by shearing the said metal along the shearing lines at opposite edges at one and the same time by means of right and left hand gate shears, that is, shearing devices that shear in the same direction from a common edge which prevents creeping and cambering of the metal commonly caused by rotary shears and also tapering and cambering commonly caused by single gate shearing operations. Furthermore, my invention provides a means for shearing from a single edge and along parallel edges which also prevents the shifting of the metal with respect to the shears. Thus my invention provides a means whereby the edges are cut on straight lines as distinct from curved lines, and consequently the edges of the sheets are squared one relative to the other.

The invention may be contained in trimming machines that vary in form and in structure and are designed and constructed for use in cutting sheets of different kinds of metal and of varied thickness, or packs of varied thickness. To illustrate and set forth an embodiment of my invention I have selected a structure containing my invention as an example of the different structures in which the invention may be embodied and shall describe it hereinafter. The structure selected for purposes of illustration, is shown in the accompanying drawing.

Figure 1 is a top view of the machine. Fig. 2 illustrates a broken view showing the automatically adjustable roller bed for supporting the plates or sheets used in a part of the machine shown in Fig. 1. Fig. 3 illustrates automatically adjustable ball bearing supports forming a part of the bed, but in another part of the machine. Fig. 4 is a view of a section taken on the plane of the line 4—4 indicated in Fig. 3. Fig. 5 illustrates a conveyor chain and a dog attached thereto which is used together with another conveyor chain having similar dogs for shifting the sheets through a part of the machine. Fig. 6 illustrates a perspective view of sliding and fixed cross bars used in a part of the supporting bed. Fig. 7 illustrates a side view of a sheet shifting mechanism and a gate shear controlling means for controlling the sheet and the shear in one part of the machine. Fig. 8 is a top view of the mechanism shown in Fig. 7. Fig. 9 is a side view of a main controlling switch for controlling the movements of the

sheet and of the shear. Fig. 10 is a top view of the controlling switch illustrated in Fig. 9. Fig. 11 is a top view of a switch for controlling the shifting and shearing mechanism of another part of the machine. Fig. 12 is a side view of the switch shown in Fig. 11. Fig. 13 is an end view of the shear and a side view of a sheet shifting and shear controlling mechanism. Fig. 14 is a sectional view of the shear and the mechanism shown in Fig. 13 taken on the plane of the line 14—14 indicated in Fig. 13. Fig. 15 illustrates parts of a conveyor controlling clutch. Fig. 16 illustrates the entering end view of the machine. Fig. 17 illustrates a clutch and driving gear. Fig. 18 illustrates a part of the conveyor bed. Fig. 19 illustrates an end view of the part shown in Fig. 18. Fig. 20 is a view of a section taken on the plane of the line 20—20 indicated in Fig. 16. Fig. 21 is an illustration of one feed roll controlling mechanism. Fig. 22 is a conventional diagrammatic illustration of the conveyor chains and the transfer supporting bed of the machine. Fig. 23 is a diagram of the circuit connections between the controlling mechanisms of the machine.

In rolling mills, where metal plates or sheets are produced, the metal is rolled either hot or cold and in the flattening operation of the metal the edges of the sheets and plates split and break to form serrations or irregular formations along the edges sometimes called "fish tails" and also the ends of the sheets and the plates, particularly, the following ends are drawn to irregular configurations or outlines in a manner well known in the rolling mill processes. When the metal is rolled thin to form sheets as distinct from plates, the sheets may be secured together for convenience of handling by a semi-welding operation along the edges to form packs of sheets and so that when the packs are trimmed to remove the irregularities of the edges of the sheets the welded areas of adjoining sheets are severed from the sheets, whereupon the sheets are liberated each from the other. In order that the raw edge portions may be removed from the plates or the packs of sheets, I have provided a shearing machine having shearing devices that will shear without crimping or bowing or distorting the metal and without twisting or turning the metal between pairs of shearing devices or curving the edges along either of the shearing devices. Hereinafter I shall refer to the packs of sheets and plates broadly as sheets or as sheet metal, unless I otherwise distinguish one from the other and by a shearing device I refer to a device that will shear and not a single shearing blade or element which in itself cannot perform a shearing operation. This latter is to avoid confusion with reference to the words "shears" or a

"pair of shears". These definitions have particular reference to the claims hereinafter appended.

The sheets may be placed upon a suitable table for convenience of feeding the sheets in succession to the machine. Particularly, where packs of the sheets are fed to the machine, leveling rolls may be used for straightening the sheets to eliminate the bulging in portions of the sheets. In the form of construction shown the sheets are fed to the feeding rolls 1 of the type well known in the art of sheet metal rolling operations. As the sheets are drawn between the rolls they ride upon the conveyor 2. The feeding rolls and the conveyor 2 are driven by any suitable driving means such as the driving motor 3. The motor 3 operates through the gear wheels 4 to drive the main drive shaft 5. The shaft 5 operates through chains 6 and 7 to drive the shaft 8. The shaft 8 operates the chains 9 and drives the shaft 10. The conveyor 2 is driven by the shaft 10 and actuates the shaft 11. The shaft 11 operates on the chains 12 to drive the feed rollers 1 that directs the sheet metal on to the conveyor 2.

The feed rollers 1 are geared to each other through the gears 33. The upper roller is supported on the arms 34 to allow for changes of thickness of the metal fed by the rollers. The upper rollers are spring pressed by springs 36 located in housings at the ends of the rollers. If desired the rollers may be in the form of a plurality of disks that engage the sheets along parallel lines.

On opposite sides of the conveyor 2 are located gate shearing devices 13 and 14 of the type well known in the art, which, however, are located face to face and have right and left hand shears, namely, shears that are so disposed that they will cut from a single sheet when located in position by the conveyor 2. Preferably the shears of the shearing devices are so located that they will cut from the leading end and at the same rate beginning at the same instant to prevent creeping or twisting of the metal. The shearing devices 13 may be adjusted one relative to the other. In the form of construction shown the shearing device 13 is adjustable to and from the shearing device 14. The adjusting means for the shearing device 13 may comprise the screw 37 that will draw the shearing device 13 over the base 15. The screw 37 is actuated by the main drive shaft 5 operating through the chains 38, the clutches 39, shafts 40 and 41 that are connected together by the miter gears 42.

The conveyor 2 is formed of a plurality of conveyor chains that move over sprockets located on the shafts 10 and 11. They move through channel bars 16 that rest upon the frame 17 and are connected together and to

the frames of the shearing devices 13 and 14 by means of the lazy tongs 18. The central portions of the links of the lazy tongs 18 are pivotally connected to the channel bars 16 while the ends of the lazy tongs are connected to the frames of the shearing devices 13 and 14 and so that when the shearing device 13 is drawn from the shearing device 14 by the operation of the screw 37 the chains that form the conveyor 2 will be proportionately distanced from each other and so as to substantially equally divide the distance between the shearing devices 13 and 14.

When the conveyor 2 has conveyed the metal a predetermined distance and so as to place the sheet in position between the shears of the shearing device, a controlling means is operated whereby the conveyor 2 ceases to move the sheet further between the shearing devices until after the shearing devices have operated. The conveyor 2, as heretofore stated, is driven by the shaft 10 which is driven by the main drive shaft 5 operating through the chains 6 and 7, the shaft 8 and the chains 9. The connection between the chains 6 and 7 is controlled by the clutch 19. The controlling means operated by the sheet controls the connection between the chains 6 and 7 by shifting one or more parts of the clutch 19. The clutch 19 is for connecting or disconnecting the shaft 20 and the sleeve 21, one of the members 22 of the clutch 19 being slip keyed to the shaft 20 while the other member 23 of the clutch 19 is connected to the sleeve 21, and when the parts 22 and 23 are drawn into frictional contact so as to frictionally engage one with the other, the parts of the clutch rotate together and consequently the chains 6 and 7 may be mechanically connected through the clutch 19, since the chain 6 is connected to the sleeve 21 while the chain 7 is connected to the shaft 20.

The clutch parts 22 and 23 are drawn together by means of the yoke 24 which is connected to the rod 25 which is in turn connected through a link 26 to a lever 27. The rod 25 is supported in a frame 28 located on a suitable part of the machine and the lever 27 is supported on the block 29, or other suitable part of the machine. The lever 27 is operated by a cam 30 to draw the rod 25 against the spring 31 which is located between a collar 32 and one end of the frame 28. When the lever 27 is released from the raised portion of the cam 30 the spring 31 operates to separate the clutch members 22 and 23 and disconnect the chains 6 and 7. During the period of disconnection of the chains 6 and 7, the conveyor 2 is at rest and consequently the chain is stationary. During the period that the lever 27 is thus released means is provided for operating the shearing devices to cut the side edges of the sheet. This is performed by means of suit-

able trips 43 that are connected to the shaft 35 through the arms 44 and the shaft 64 which is connected to the trips 43 by means of the arms 96. (Figs. 16 and 17.)

The shaft 35 is operated by means of the cam 45 which operates to actuate the arm 46 connected to the shaft 35. The cams 30 and 45 are located on the shaft 47 and consequently are timed so as to produce operations of the shaft 35 when the lever 27 is released from the raised portion of the cam 30, namely, during the time that the sheets are at rest. The cams 30 and 45 are operated by means of the worm gearing 48 that drives the shaft 47. The worm gearing is driven by the motor 49. The motor 49 is connected in a suitable circuit to periodically actuate the cam shaft 47 and to thus control the connection of the conveyor with the main driving motor 3 and the tripping of the shearing devices. Inasmuch as the motor 49 is required to operate only at the expiration of periods of predetermined and adjustable lengths, a means is provided for connecting the motor with the main circuit at the expiration of the said periods. Since the sheet metal must be positioned in the predetermined position, particularly according to its length, before the said edge portions are removed, the motor 49 is controlled by a switch that is operated by the sheets. Also since releasement of the switch after the operation of the shearing device is desired, the switch is preferably operated by that portion of the sheet which is subsequently severed from the sheet by one of the shearing devices, and so that upon the dropping away of the portion sheared off the switch will be released. Thus the control is shifted from the switch to a mechanism that controls the operation of the shearing device which provides for a complete operation of the shearing device at the end of each of the said periods and thus a complete cycle of operations of the machine is insured.

The switch used for controlling the conveyor and the shearing devices, is shown in Figs. 9 and 10. It is mounted on a suitable bracket 50 which may be secured to a part of the frame of the machine. A cylinder 51 is pivotally supported in a box 52 that is connected to the bracket 50. The cylinder 51 is provided with contacts 53 that are suitably connected together. A pair of spring contacts 54 are secured to the box 52 and electrically insulated from each other by means of the plate 55. The contacts 54 may be provided with suitable binding posts 56 for connecting the switch with a circuit. The cylinder 51 is provided with the crank formed by the bars 57 that are connected by means of the link 58 with a lever 59. Movement of the lever 59 will cause the cylinder 51 to oscillate and close the circuit between the contacts 54 by the contacts 53.

The lever 59 is pivoted to the bracket 50 and is resiliently returned by means of the spring 60 which normally holds the lever 59 against the stop 61 which is secured to the bracket 50 and thus normally retains the contacts 53 in an open position with respect to the contacts 54. When the lever 59 is moved from this normal position it closes the circuit through the contacts 54. The lever 59 is provided with a finger 62 that is located in the path of movement of an edge portion of the sheet 63 as it is conveyed through the machine and so that the edge portion which is to be severed by one of the shearing devices will engage the finger 62 to operate the switch to close the circuit of the motor 49 when the sheet 63 has reached the predetermined position with respect to the shearing devices. This closes the circuit of the motor 49 as shown in Fig. 23. The motor 49 then actuates the shaft 47 to disconnect the chains 6 and 7 and consequently discontinue movement of the sheet and subsequently to trip the shearing devices 13 and 14 through the operation of the shaft 35. As shown in Fig. 23 the motor is connected in a three wire circuit, the parts of the motor being connected to one of the mains whereby the movement of the cylinder 51 of the sheet controlled switch will connect one part of the motor 49 and when the edge portion of the metal is severed from the sheet that part of the circuit will be opened. The opening of the circuit by movement of the cylinder 51, however, does not occur until after the motor 49 has been actuated for a period of time, that is, until after the high portion of the cam 30 has passed the end of the lever 27, and after the cam 70 has released the roller 71 to close the switch 65 which completes the other part of the circuit through the motor. The motor continues to operate until the said other part of the circuit through the motor is opened. It is opened by means of the switch 65 which is located in a box 66 and is provided with a pair of contacts 67 and 68. The contact 67 is actuated by means of the rod 69 which is operated by the cam 70. When the cam 70 strikes the roller 71 located on the end of the rod 69 the cam pushes the rod down to open the switch 65 and consequently stop the motor at a point where the cam 70 holds the switch in an open position. Both of the circuits through the motor 49 are then open and consequently the motor 49 ceases to operate. The motor ceases its operation when the lever 27 has been moved to a position to close the clutch members 22 and 23 and thus the conveyor 2 again moves the sheet, the edge portions having been severed therefrom.

The sheet is then carried by the conveyor 2 from between the shearing devices 13 and 14 and is directed upon the conveyor 72,

which is driven by the chains 6 and 7 and the shaft 8 to which the chains of the conveyor 72 are connected. The conveyor 72 moves the sheet to the feed rollers 73. The feed roller 73 cooperates with the conveyor 72 to engage and move the sheet to the transfer table 74. The feed roller 73 is driven by the shaft 8 operating through gears similar to gears 33 shown in Fig. 21.

The transfer table 74 is formed of a plurality of bars 76 that are interconnected by links which with the bars 76 form an expansion or lazy tong device whereby the bars may be spaced uniformly each from the other according to the distance between the ends of the interconnected links 77. Cross pieces 78 are located on each of the bars 76. The bars 76 are slidable on the bars 79 that form a part of the frame of the machine and the bars 76 have lugs or small brackets 80 that engage the bars 79. This prevents any irregular formation of the general contour of the transfer table 74 due to difference in friction of the parts of the links that are pivotally connected to the bars 76. The ends of each series of the links 77 are connected to the frames 81 of the shearing devices 82 and 83 that are used to shear the ends of the sheets. The frames 81 are adjustable one relative to the other to provide for shearing the end portions of sheets of different lengths. Preferably the shearing device 83 is made adjustable relative to the supporting frame or base 15. Thus the shearing device 83 may be shifted by any suitable screw which will move the shearing device 83 away from the shearing device 82 and yet maintain the shearing blades or edges parallel in the same manner and by use of similar mechanism used for shifting the shearing device 13 by means of the screw 37 as described above. As the shearing device 83 is drawn from the shearing device 82 the ends of the chain of links 77 are drawn from each other with the result that the bars 76 are separated from each other distances that are proportionate to the distances that the shearing device 83 is drawn from the shearing device 82 to produce uniform support throughout the sheet notwithstanding the adjustments that may be made by the shifting of the shearing device 83.

The transfer table 74 is provided with a plurality of balls 85 that are supported on the cross pieces 78. The balls 85 may be supported in cups 86 in which are located ball bearing rings 87 so that the balls 85 may rotate in any direction as the sheet is placed by the conveyors on to the transfer table 74 and then moved therefrom. Also the plates 88 located at ends of the table 74 may be secured to the frames 81 and similar ball bearing cups 86 may be supported on the plates 88 so as to receive the end portions of the sheet.

When the sheet has been placed upon the transfer table 74 it is conveyed by means of the chains 90 and the dogs 91 between the shearing devices 82 and 83 where the ends of the sheets are trimmed. Thus the sheet is moved in a direction at right angles to the direction that it was conveyed by the conveyors 2 and 72 and between the shearing devices 82 and 83 that have shearing blades located parallel to each other and in lines that are at right angles to the shearing lines in which the edges of the shearing blades of the shearing devices 13 and 14 are located.

As the sheet is conveyed from the transfer table 74 it is uniformly supported throughout its area by means of the bars 92 that are provided with the rollers 93. The bars 92 are supported on the bars 94 that form parts of the supporting frame of the machine. The bars 92 are maintained in their proportionately spaced relation by means of the links 95 which are pivoted at their centers to the bars 92 and are interconnected to form a chain that is connected at its ends to the frames 81 of the shearing devices 82 and 83. The bars 92 are also provided with suitable lugs 80 that prevent endwise movement of the bars 92 relative to the cross bars 94, and consequently the chain of links 95 that interconnect the bars 92 form a lazy tong expansion for the proportionate disposition of the bars 92, as the frames 81 are separated one from the other. The chains 90 move in channel bars 75 and are driven by the shaft 84. The shaft 84 is connected to the main drive shaft 5 through the miter gears 96, the clutch 98, sprocket chain 99, shaft 100, miter gears 101, shaft 102, miter gears 103, shaft 104, miter gears 105, and the shaft 5, the main drive shaft. The dogs 91 are so disposed as to periodically engage the sheets and move them to positions such that the side edges formed by the shearing devices 13 and 14 will be at right angles to the cutting edges of the blades of the shearing devices, 82 and 83, and push the sheets between the shearing devices 82 and 83.

The sheet moves on to the table 74 until it passes from between the roller 73 and the conveyor 72. The movement of the conveyor chains 90 is controlled by a switch 106. The switch has an arm 107 that is engaged by the sheet to close the contacts of the switch when the sheet is delivered on to the table 74. The switch is formed of a cylinder 108 that has one or more contacts, such as the contacts 109 that are adapted to make contact with the spring contacts 110 when the cylinder is turned by the arm 107. This closes a circuit through a solenoid 111 which tilts the lever 112 which permits interengagement of the clutch parts 113 of the clutch 114. (Figs. 13 and 14). The clutch operates the cam 115 which in turn operates the lever 116, the link 117, the lever 118,

the link 119 and the lever 120 which permits the clutch 96 to complete the connection between the main drive shaft 5 and the chain drive shaft 84 which moves the conveyor chains 90 and causes the dogs 91 to engage and move the sheet between the shearing devices 82 and 83. The movement of the sheet continues until the cam 128 engages the lever 118 that operates through the link 121, lever 123, link 124, arm 125, to shaft 126 to which are connected tripping mechanisms to trip the shearing devices 82 and 83 in the same manner and with similar mechanisms that the shearing devices 13 and 14 are tripped by the trip shaft 64 referred to above. The shaft 126 operates the trip or clutches of the shearing devices 82 and 83 to cause the devices to trim the end edge portions of the sheet and to raise the shears to their normal positions as controlled by their trip clutches. The clutch 114 is constructed in the same way that the trip clutches of the shearing devices are constructed, that is, to cause a single revolution of the shaft connected to the driving means by the clutch. The clutch parts make a complete revolution before the lever 112 may again enter to disconnect the clutch parts and permit the sheet to remain in position while the shearing devices 82 and 83 are operating on the sheet. When a succeeding sheet is again moved on to the transfer table 74 and operates the switch 106, the conveyor chains 90 are again moved to convey the sheet from between the shearing devices and from the machine and to move the succeeding sheet to the shearing position.

The switch 106 is located in a box 130 which is supported on an elastic bar 131 having a sloping end adapted to guide the sheets so that their ends will strike the lever 107, and insure the operation of the switch.

I claim:

1. In an automatic sheet metal trimming machine, right and left hand shear devices located in horizontally spaced relation, means for feeding the sheet material between the shears and means operated by the moving sheet for discontinuing the operation of the feeding means and causing the operation of the shearing devices.

2. In an automatic sheet metal trimming machine, right and left hand shearing devices arranged in horizontally spaced relation for shearing opposite side edges of the sheet, a conveyor for moving the sheet between the shearing devices and into position for having its side edges sheared, means operated by the moving sheet for stopping the conveyor, means for causing the operation of the shears and for starting the conveyor in its operation when the shearing operation has been completed.

3. In an automatic sheet metal trimming and squaring machine, two pairs of shearing

devices, one pair of shearing devices for trimming the opposed edges of the sheets, the other pair of shearing devices for trimming the opposed ends of the sheets, a conveyor means for conveying the sheets successively between the pairs of shearing devices.

4. In an automatic sheet metal trimming and squaring machine, two pairs of shearing devices, one pair of shearing devices for trimming the side edges of the sheets, the other pair of shearing devices for trimming the ends of the sheets, a pair of conveyor means for conveying the sheets successively between the pairs of trimming devices, a pair of controlling means, one for causing the operation of the first pair of shearing devices and for controlling the movement of the conveying means that conveys the sheets between the said first pair of shearing devices, and the other controlling means for controlling the operation of the second pair of shearing devices and for controlling the conveying means that conveys the sheets between the last named pair of shearing devices.

5. In an automatic sheet metal trimming machine, a pair of shearing devices, means for conveying the sheets between the said shearing devices, a switch operated by the said sheet at a predetermined point in the movement of the sheet through the said shearing devices, a driving means for operating the said conveying means and the said shearing devices, an electric means controlled by the said switch for discontinuing the operation of the conveyor and connecting the shearing devices with the driving means.

6. In an automatic metal trimming machine, a pair of shearing devices, means for conveying the sheets between the said shearing devices, a switch operated by the said sheet at a predetermined point in the movement of the sheet through the said shearing devices, a driving means for operating the said conveying means and the said shearing devices, an electrically controlled clutch controlled by the said switch for discontinuing the operation of the conveyor and connecting the shearing devices with the driving means, and for subsequently delivering the sheet from the said shearing devices.

7. In an automatic sheet metal trimming and squaring machine, two pairs of shearing devices, one pair of shearing devices being located in lines parallel to each other and the other pair of shearing devices being located in lines parallel to each other and at right angles to the shearing lines of said first pair of shearing devices, and a conveying means for conveying the sheets between the pairs of the shearing devices.

8. In an automatic sheet metal trimming and squaring machine, two pairs of shearing devices, one pair of shearing devices being located in lines parallel to each other and at right angles to the shearing lines of the other pair of shearing devices, a conveying means for conveying the sheets between the pairs of the shearing devices, and means for controlling the conveying means for positioning the sheet during succeeding periods of operations of the shearing devices on the said sheets.

9. In an automatic sheet metal trimming and squaring machine, two pairs of shearing devices, one pair of shearing devices being located in lines parallel to each other and at right angles to the shearing lines of the other pair of shearing devices, a conveying means for conveying the sheets between the pairs of the shearing devices, and a controlling means for conveying the sheets between the pairs of shearing devices in succession and discontinuing the operations of the conveying means during the successive operations of the shearing devices on the said sheets.

10. In an automatic sheet metal trimming machine, a shearing device, an electrically operated conveying means for conveying the sheets to the shearing device, a switch for controlling the operations of the conveyor and of the shearing device and operated by the movement of the sheets and positioned to be engaged and released by the metal sheared from the sheet by one of the shearing devices.

11. In an automatic sheet metal trimming and squaring machine, a pair of gate shearing devices, and feeding means for conveying sheets between the shearing devices, the shearing blades of the shearing devices being supported for shearing in a direction coextensive with the direction of feeding movement of the sheets.

12. In an automatic sheet metal trimming machine, two pairs of shearing devices for cutting opposite side and end edges of a sheet, the shearing blades of each pair of shearing devices being supported to shear in a direction away from a single edge of the sheet.

13. In an automatic sheet metal trimming and squaring machine two pairs of shearing devices one pair of shearing devices for trimming the edges of the sheets, the other pair of shearing devices for trimming the ends of the sheets, means for adjusting the shearing devices of each pair relative to each other, and a conveyor means for conveying the sheets successively between the pairs of shearing devices.

In testimony whereof I have hereunto signed my name to this specification.

FRANK H. STREINE.