

Oct. 14, 1952

O. CONRAD

2,613,719

EJECTING MEANS FOR MACHINES FOR MAKING FRAMES

Filed March 16, 1950

4 Sheets-Sheet 1

Fig. 1.

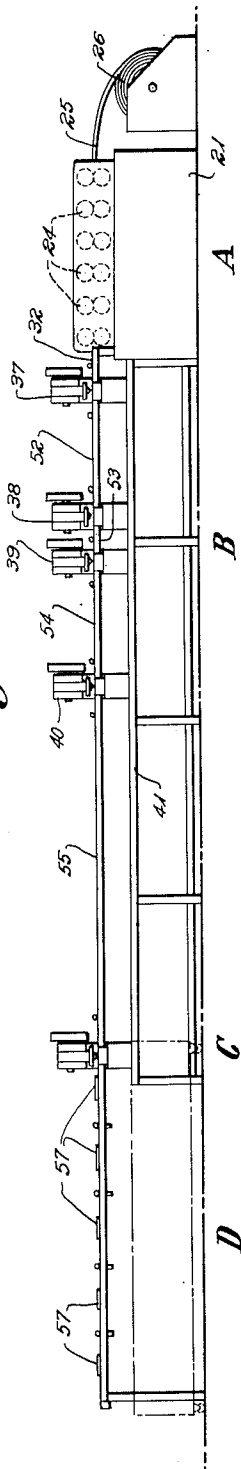
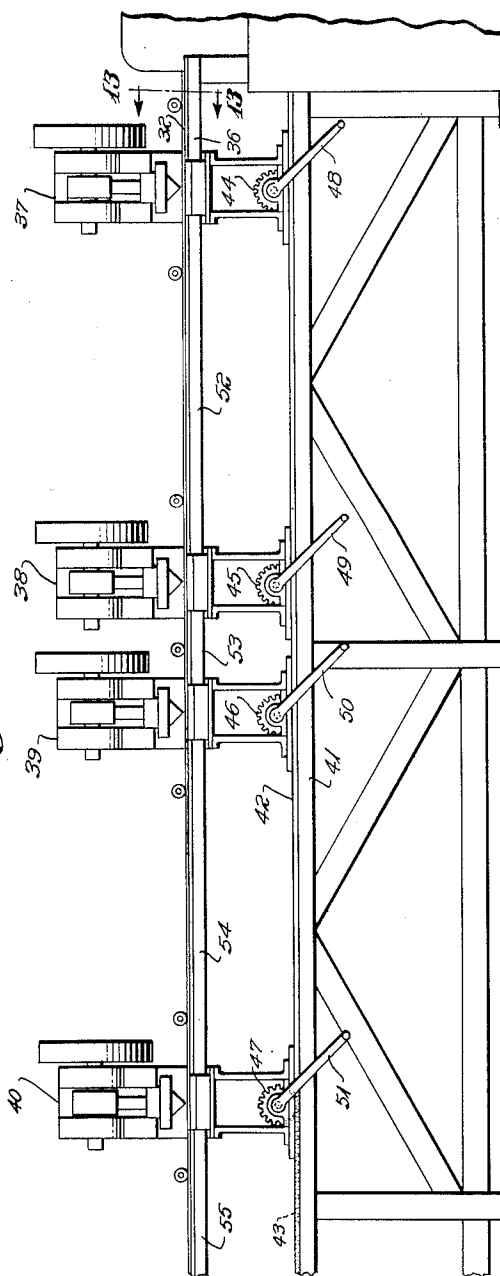


Fig. 2.



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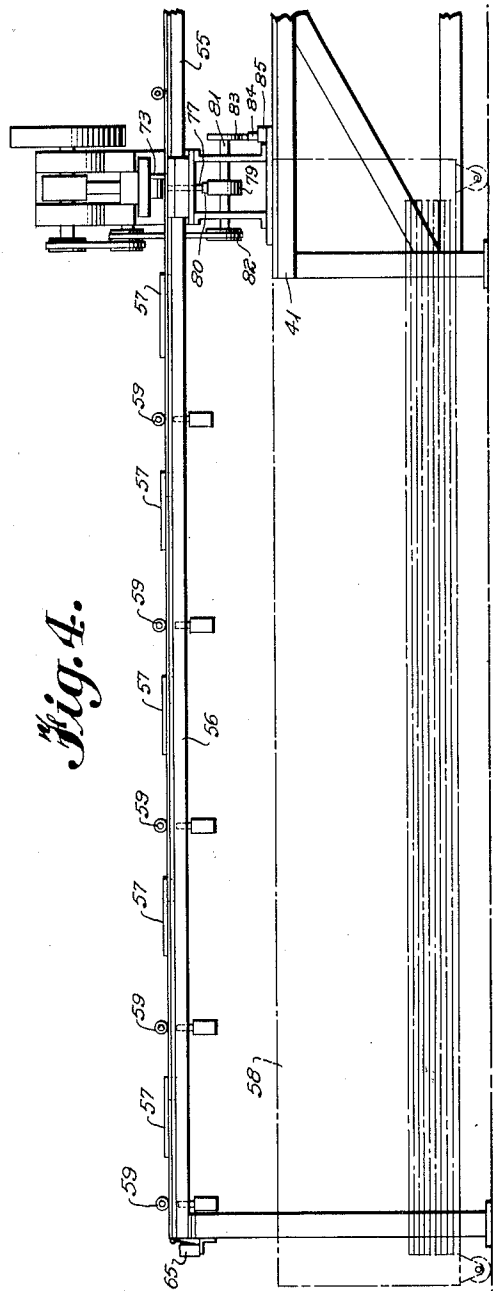
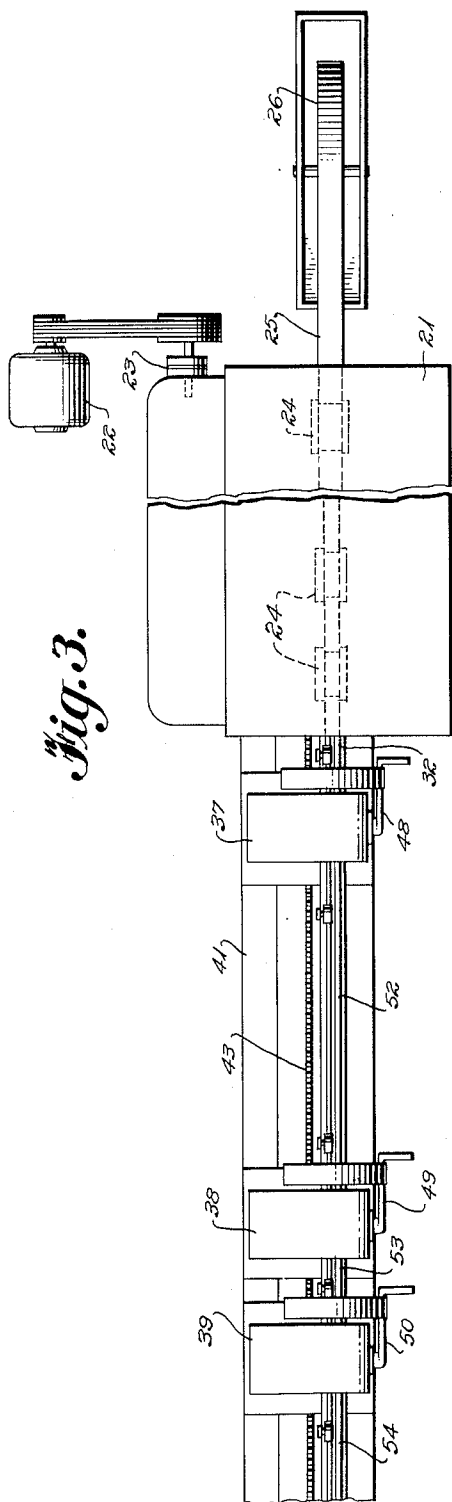
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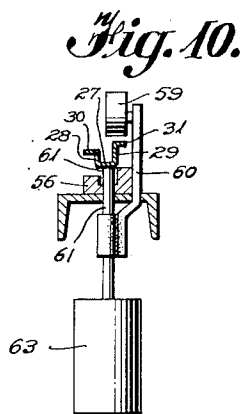
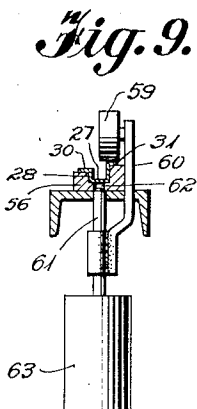
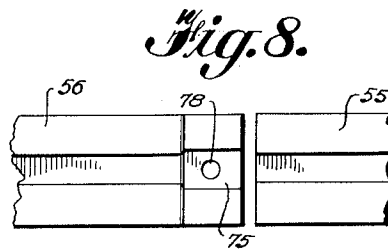
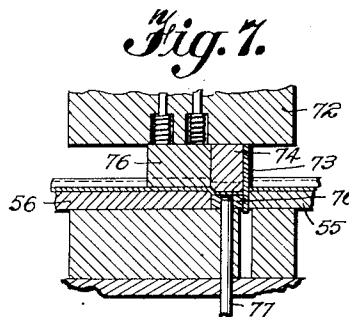
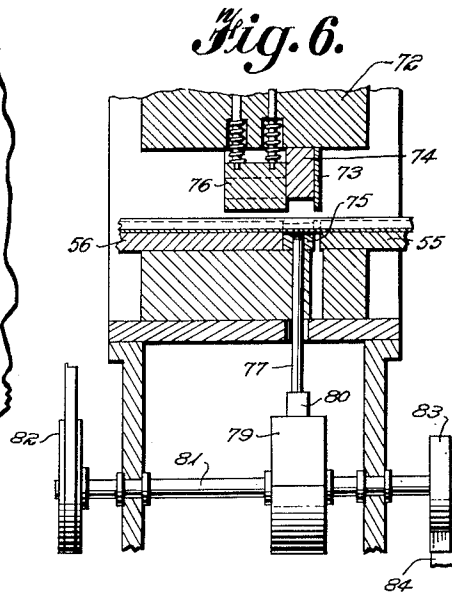
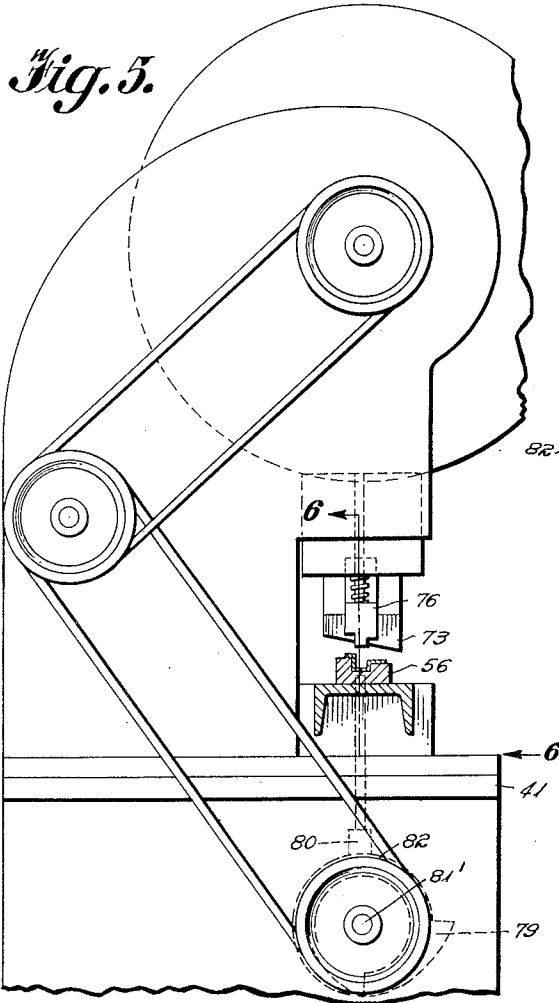
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Fig. 11.

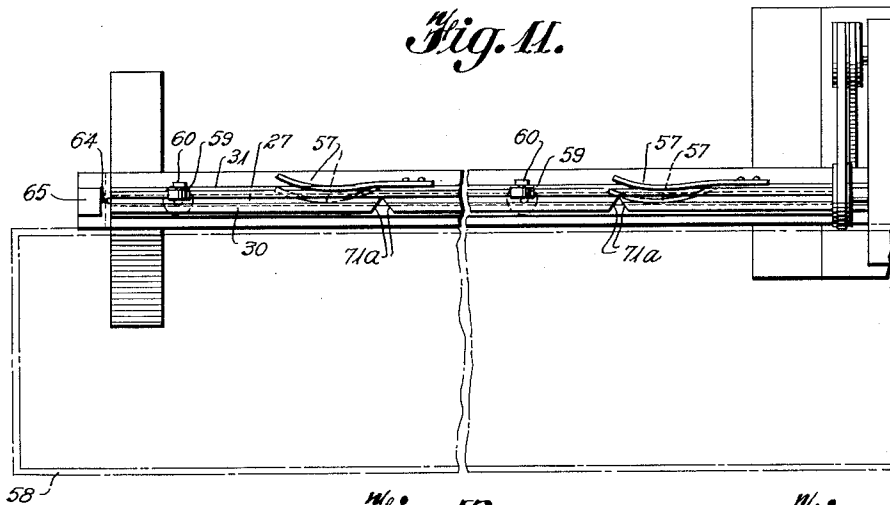


Fig. 12.

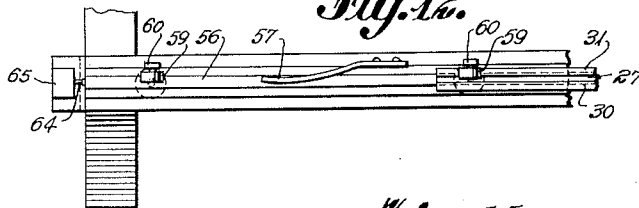


Fig. 13.

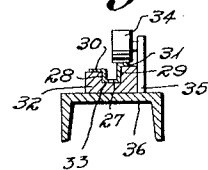


Fig. 14.

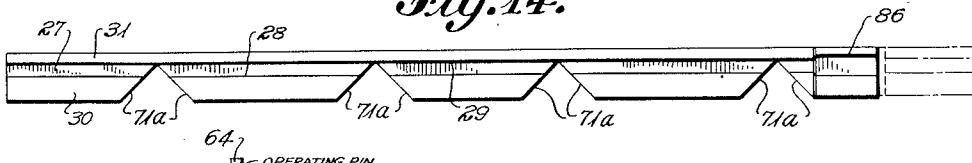
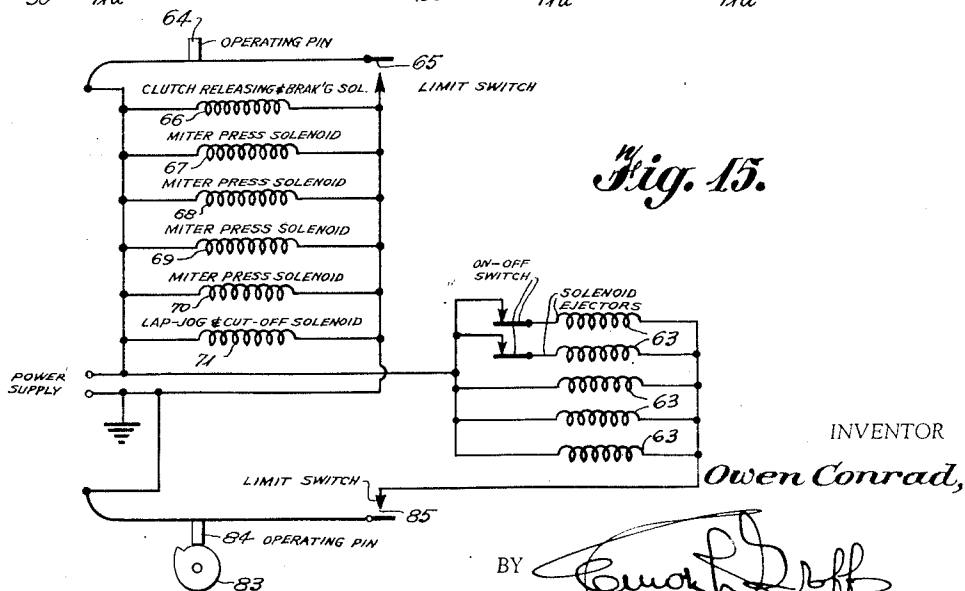


Fig. 15.



UNITED STATES PATENT OFFICE

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EJECTING MEANS FOR MACHINES FOR
MAKING FRAMESOwen Conrad, Miami, Fla., assignor to Metal
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Application March 16, 1950, Serial No. 150,073

4 Claims. (Cl. 153—2)

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This invention relates to the manufacture of frames and is more particularly concerned with the provision of a machine for fabricating a frame by a plurality of automatic operations.

The general object of the invention is the provision of such a machine which is capable of receiving a continuous strip of flat metal, form it into a desired section, miter it at specific points, cut it into strips of given length and lap jog one end of each strip, whereby it is ready for assembly.

The machine of this invention is especially adapted to the manufacturing of screen frames of the hollow type in the form of a channel and in which the corners of the frames are provided by mitering cuts through a portion of the channels. At these mitered points, the uncut portions of the channels are bent at right angles, hence providing a rectangular frame, the ends of which are secured together by any suitable means.

Another object of the invention is to provide a machine of the type mentioned which will perform all the operations referred to above wholly automatically by the provision of automatically controlled devices.

A further object of the invention is to provide such a machine which can be adapted to fabricate various sizes of screen frames.

A still further object of the invention is to provide a machine which will automatically eject the frame strips after they have been mitered, cut to length and lap jogged.

These and other objects and advantages of the invention will be apparent from the following description considered together with the accompanying drawing, in which:

Figure 1 is a diagrammatical front elevational view of an embodiment of the invention;

Figure 2 is a front elevational view of the mitering section of the machine;

Figure 3 is a plan view of a portion of the mitering section and of the rolling mill, the latter being partly broken away;

Figure 4 is a front elevational view of the cut off and lap jog unit together with the ejector unit;

Figure 5 is a side view of the cut off and lap jog unit partly in section;

Figure 6 is a section along the line 6—6 of Figure 5;

Figure 7 is a duplication of the upper portion of Figure 6 with the ram of the cut off and lap jog unit in its lower position for lap jogging;

Figure 8 is a top plan view of the lap jog die;

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Figure 9 is a cross sectional view through the track of the ejector unit showing the normal position of the strip therein;

Figure 10 is a view similar to Figure 9 with the strip in the process of being ejected;

Figure 11 is a top plan view of the ejector section with a part thereof broken away;

Figure 12 is a plan view of the end portion of the ejector section showing the position of members thereof as the strip moves there-through;

Figure 13 is a section along the line 13—13 of Figure 2;

Figure 14 is a plan view of a length of strip as it appears after being ejected from the machine; and

Figure 15 is a wiring diagram of the electrical elements of the machine.

Referring with more particularity to the drawing in which like numerals designate like parts, the embodiment illustrated comprises, in general, four inter-connected and co-ordinating sections, namely, the rolling mill section A, the mitering section B, the cut off and lap jog section C and the ejector section D.

The rolling mill section A comprises generally any suitable type of rolling mill 21 driven by an electric motor 22 through an electrically operated clutch and braking unit 23. Such units are well known to the art and need not be described here in detail.

The rolling mill, which is provided with the usual deforming rolls 24, receives flat metal stock 25, such as aluminum or aluminum alloy, in the form of a continuous strip or ribbon from a reel 26 mounted adjacent the input end of the rolling mill. For the purpose of this invention, it is preferred that the rolling mill be of the type which transforms the flat stock continuously into the shape of a channel having a web 27 at the bottom, a shorter leg 28 along the front, and a longer leg 29 along the rear, said legs having outward flanges 30 and 31, respectively, the flange 31 being substantially narrower than flange 30. See Figure 13.

The continuous strip thus deformed is fed through a track 32 having a recess 33 along the top and being so proportioned as to receive the strip. The thus deformed continuous strip is held in slidable engagement with the track by means of hold down rollers 34 in contact with the top of the flange 31 and held in this position on brackets 35 secured to the back of the track 32. The track 32 is supported in position by any suitable means such as on an inverted channel

36 extending from the delivery end of the rolling mill.

From this point the deformed strip proceeds through the mitering section B of the machine. This section of the machine comprises a series of aligned mitering presses, one for each corner of the final frame. Four mitering presses 37, 38, 39 and 40 are illustrated in the drawing for use in manufacturing a rectangular frame. These mitering presses are identical to each other and are spaced apart at intervals corresponding to the position of the corners of the frame to be formed. The presses are supported on a longitudinal platform or table 41 on a guide track 42. Parallel to said tracks 42 there is disposed a rack 43 which meshes with pinions 44, 45, 46 and 47 rotatably carried by said mitering presses, respectively. Said pinions are each connected to cranks 48, 49, 50 and 51, respectively, whereby, when any of said cranks is rotated, it causes displacement of its corresponding mitering press along the track 42. By these means the mitering presses may be disposed in any desired relative positions with respect to each other so as to produce frames of different sizes.

When the mitering presses are set in the positions desired, they are connected by means of upper guide tracks 52, 53 and 54 similar to the track 32 and in alignment therewith and with the dies of the mitering presses. By these means a continuous path is provided for the strip after it emerges from the rolling mill.

Spaced from the last miter press 40 on the platform 41 is the cut off and lap jog unit C which is also connected by a guide track 55, similar to the others described, to the said mitering press 40. The operation of said cut off and lap jog unit will be more fully described hereinafter.

The ejector section of the machine comprises a length of track 56 similar to the previously described tracks but which, in addition, is provided with ejector devices. These ejector devices operate to elevate the cut strip out of the track and then to discharge it bodily out of the machine. The latter is accomplished by means of a plurality of leaf springs 57 which are biased against the rear flange 31. In normal position, when the strip is elevated, the tension in said springs forces the strip forwardly across the top of the track and out of the machine, whence they are collected, such as in a portable bin or receptacle 58.

In the ejector section, the hold down rollers 59 are vertically movable. They are each carried at the top of a gooseneck 60 the bottom of which is secured to an ejector pin 61 beneath the track 56. Each ejector pin 61 is adapted to operate in a vertical aperture 62 through the bottom of the track 56. The bottom of the ejector pin is secured to the movable core of a solenoid 63. The distance between the bottom of each roller 59 and the top of its corresponding ejector pin 61 is somewhat greater than the height of the channeled strip. In the normal position, the relationship between the ejector pins, hold down rollers and frame section is as appears in Figure 9, the rollers bearing directly against the top of the rear flange 31 of the channeled strip and there being a small gap between the top of the ejector pins 61 and the bottom of the strip. When the solenoids 63 are energized, the ejector pins 61 are elevated in their apertures 62. This causes the rollers 59 to move upwards away from the rear flange 31 of the channeled strip to free said strip from contact with the rollers. As the

ejector pins continue to move upward, they contact the web 27 of the strip and push it upward and out of the track 56. When it has cleared the track the leaf springs 57, which engage the rear flange 31 of the strip under tension, force it out of the machine. When the solenoids 63 are de-energized, the ejector pins and hold down rollers drop back into normal position.

In operation, the flat metal stock 25 is fed to the rolling mill 21 where it is bent in the shape of a flanged channel and emerges from the delivery end of the rolling mill onto the guide track 32. The rolling mill is powered intermittently by the motor 22 through the clutch and braking unit 23. A cycle of operations would begin with the strip extending continuously through the machine, including the miter section B, the cut off and lap jog section C and the ejector section D, where the end thereof would be in contact with and press against the operator 64 of a limit switch 65. At the instant the operator 64 is thus actuated, operation of the rolling mill 21 is arrested by means of a solenoid 66 (see Fig. 15) which operates the clutch and braking unit 23. This has the effect of preventing further movement of the strip through the machine. At the same time the miter press solenoids 67, 68, 69 and 70, as well as the solenoid 71 of the cut off and lap jog unit are energized which causes the rams of said presses and unit to be actuated downward. The action of the miter presses are to cut out V-shaped notches 71a in the strip through the web 27, shorter leg 28 and flange 30 leaving the longer leg 29 and its corresponding short flange 31 unsevered, substantially as shown in Figure 14.

The ram 72 of the cut off and lap jog unit carries a transverse cutter 73 which extends somewhat below the lap jog punch 74 and adjacent thereto so that the strip is first severed before the lap jog punch comes into contact with the cut end to produce the lap jog in cooperation with the die 75 beneath it. As it may be seen from Figures 6, 7 and 8, the lap jog punch 74 and its cooperating die 75 operate to spread the channel downwardly and outwardly at the cut end of the strip an amount just sufficient to allow it to receive in a nesting relationship the opposite end of the strip. The ram 72 is provided with the usual spring biased stripper 76 to release the die 75 and the cutter 73 on their upward movement from the strip. As the ram 72 proceeds upward, following such release, a pin ejector 77 is moved upwardly through a vertical aperture 78 in the die 75 under the action of a cam 79 and cam follower 80. The cam 79 is mounted for rotation on a shaft 81 which is driven by any suitable means as illustrated by the belt and pulley gearing 82 connected to a convenient source of power (not shown). The shaft 81 also carries another cam 83 which engages the operating pin 84 of a limit switch 85 which controls the flow of current from a suitable source of power to the solenoids of the ejector unit. Excitation of these solenoids has the effect of elevating the severed portion of the strip from the ejector track which action is simultaneous with the elevation of the severed end of the strip by the ejector pin 77 of the cut off and lap jog unit following which the severed strip as a whole is discharged into the receptacle 58. At this point the operator 64 of the switch 65 is released which, through the solenoid 66, causes the rolling mill to start again until the new end of the

strip moves through the ejector section and contacts the operator 64, whereupon a new cycle of operations begins.

The finished strips that are collected in the receptacle 58 are carried to the bending department where they are bent at the mitered points. The strips before bending have the appearance illustrated in Figure 14, one end 85 being lap jogged. When the strip is bent to form the frame as indicated above, the ends will overlap each other on one side. The frame is completed by nesting the other end in the lap jogged end 86 and spot welding the two ends together or securing them by any other suitable means desired. The frame is then ready to be provided with the usual screening or other material.

If it is desired to change the size of the frames to be made, the guide tracks 22, 52, 53, 54 and 55 are removed and the miter presses are re-located relative to each other and to the cut off and lap jog unit C. This is accomplished by turning the cranks 48, 49, 50 and 51. When the miter presses are in their new positions they are again connected together with guide tracks of new lengths. Also the limit switch 55 is moved to a new position closer to or farther away from the cutter 73 depending upon whether the frame is to be larger or smaller than the previous one.

I claim:

1. In combination with a channel-like track adapted to support a channel-like strip, a plurality of hold down rollers adapted to engage the top of the strip while supported on the track, brackets rotatably carrying said rollers, ejector pins at the bottom of the track, said track having apertures therethrough to slidably receive said pins, said pins being connected to said brackets, the distance between the top of the pins and the bottom of the rollers being greater than the height of the strip and means for raising said pins in said apertures to abut the strip and elevate it above the track, whereby the rollers will also be elevated above and out of contact with the strips.

2. In combination with a channel-like track adapted to support a channel-like strip, a plurality of hold down rollers adapted to engage the top of the strip while supported on the track, brackets rotatably carrying said rollers, ejector pins at the bottom of the track, said track having apertures therethrough to slidably receive said pins, said pins being connected to said brackets, the distance between the top of the pins and the bottom of the rollers being greater than the height of the strip, means for raising said pins in said apertures to abut the strip and elevate it above the track, whereby the rollers will also be elevated above and out of contact with the strips, and means for urging the strip laterally relative to the track and rollers.

3. In combination with a channel-like track adapted to support a channel-like strip, a plu-

ality of hold down rollers adapted to engage the top of the strip while supported on the track, brackets rotatably carrying said rollers, ejector pins at the bottom of the track, said track having apertures therethrough to slidably receive said pins, said pins being connected to said brackets, the distance between the top of the pins and the bottom of the rollers being greater than the height of the strip, means for raising said pins in said apertures to abut the strip and elevate it above the track, whereby the rollers will also be elevated above and out of contact with the strips, and resilient means for urging the strip laterally relative to the track and rollers.

4. In combination with a channel-like track adapted to support a channel-like strip, a plurality of hold down rollers adapted to engage the top of the strip while supported on the track, brackets rotatably carrying said rollers, ejector pins at the bottom of the track, said track having apertures therethrough to slidably receive said pins, said pins being connected to said brackets, the distance between the top of the pins and the bottom of the rollers being greater than the height of the strip, means for raising said pins in said apertures to abut the strip and elevate it above the track, whereby the rollers will also be elevated above and out of contact with the strips, and a plurality of leaf springs secured to the track, said springs being disposed so as to resiliently abut one side of the strip and urge it laterally relative to the track.

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