June 2, 1931. L. F. CLAUSING 1,808,019

MACHINE FOR BENDING CORRUGATIONS IN METAL

Filed April 15, 1929 3 Sheets-Sheet 1

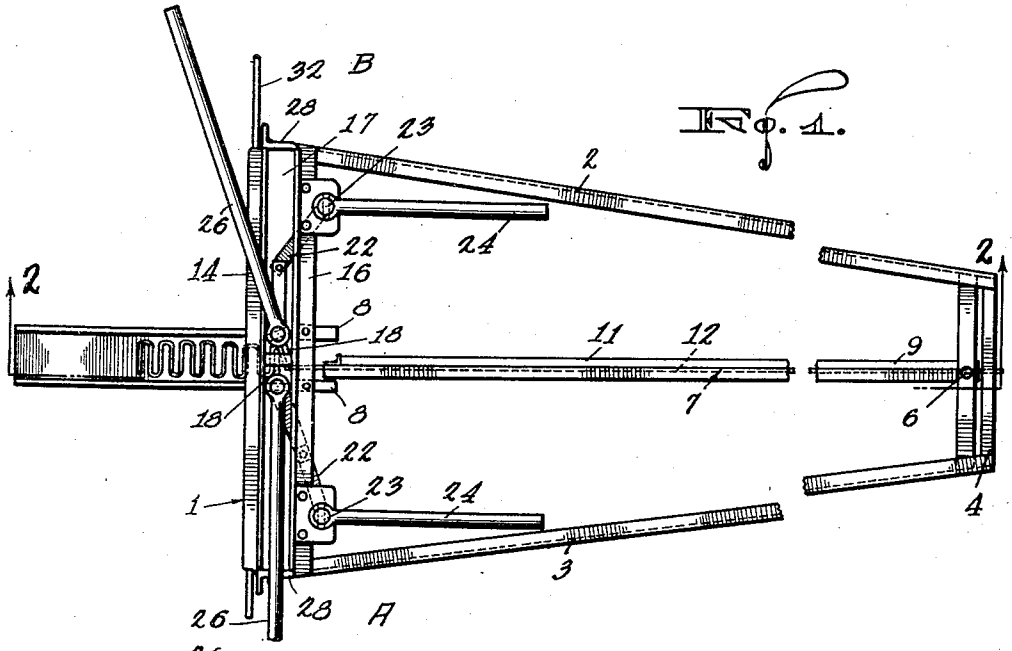

Fig. 1.

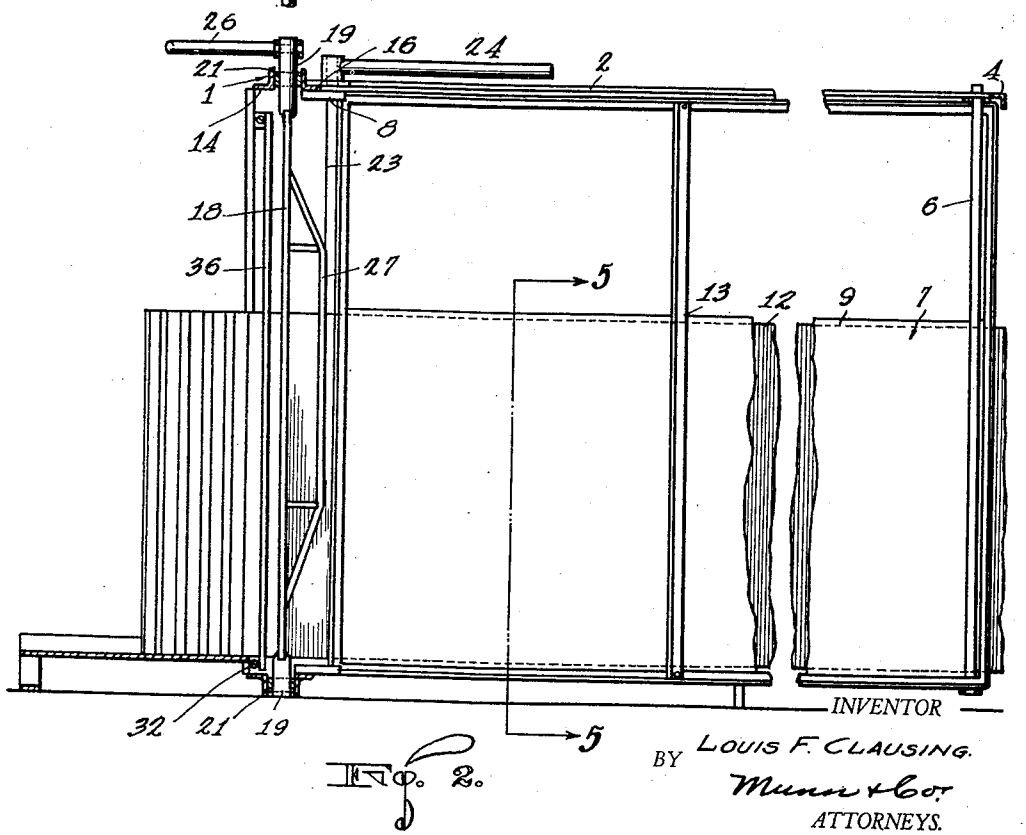

Fig. 2.

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MACHINE FOR BENDING CORRUGATIONS IN METAL

Filed April 15, 1929 3 Sheets-Sheet 2

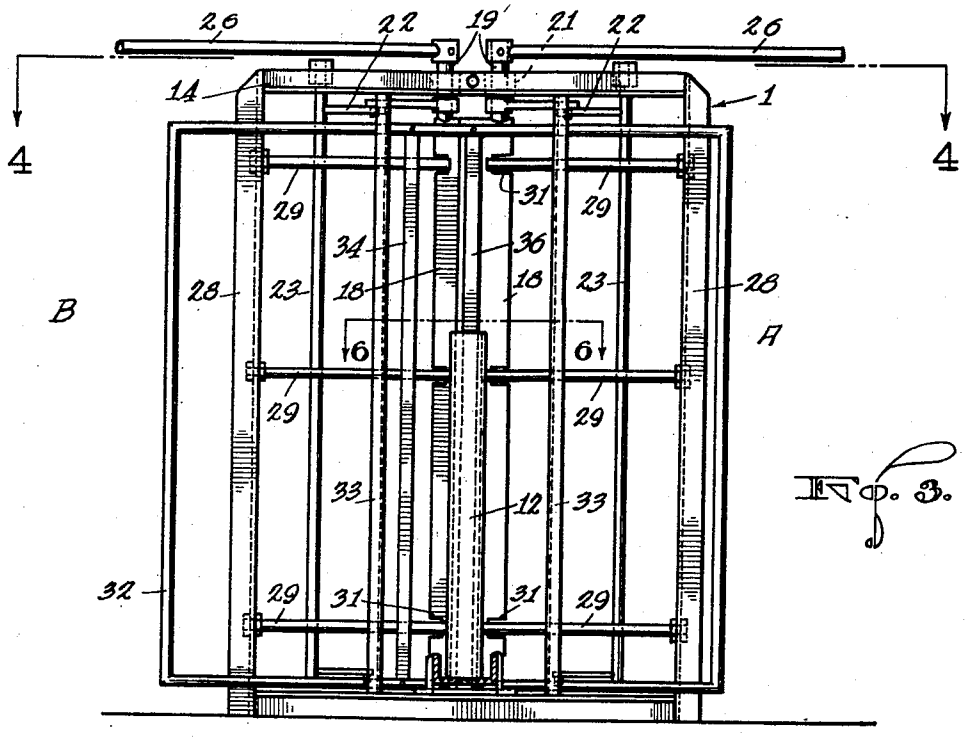

Fig. 3.

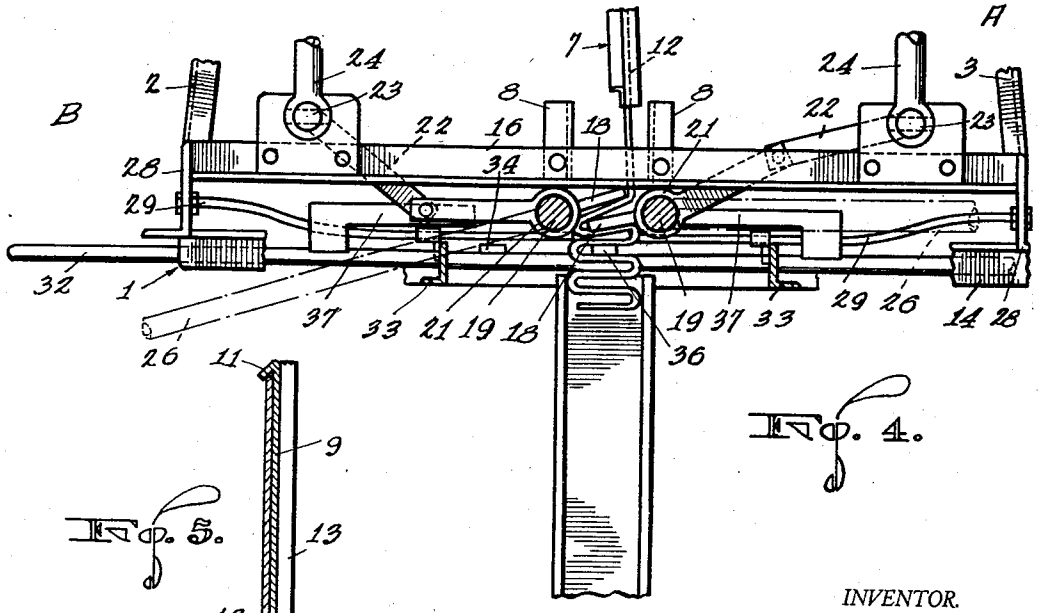

Fig. 4.

Fig. 5.

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MACHINE FOR BENDING CORRUGATIONS IN METAL

Filed April 15, 1929 3 Sheets-Sheet 3

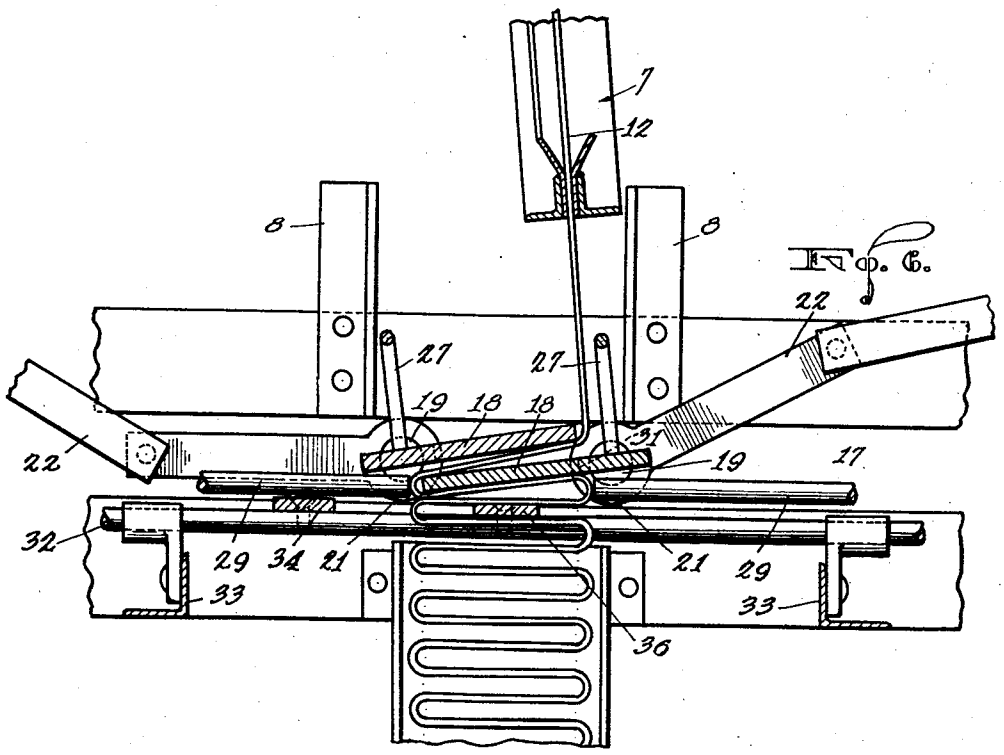

Fig. 6.

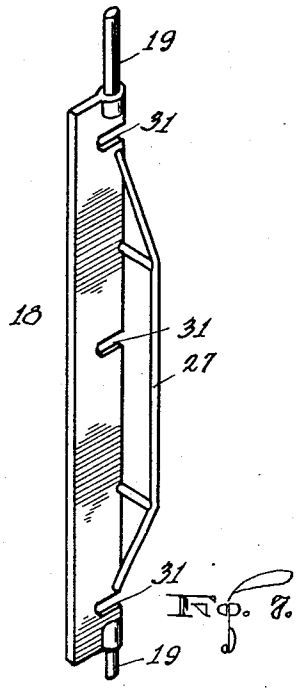

Fig. 7.

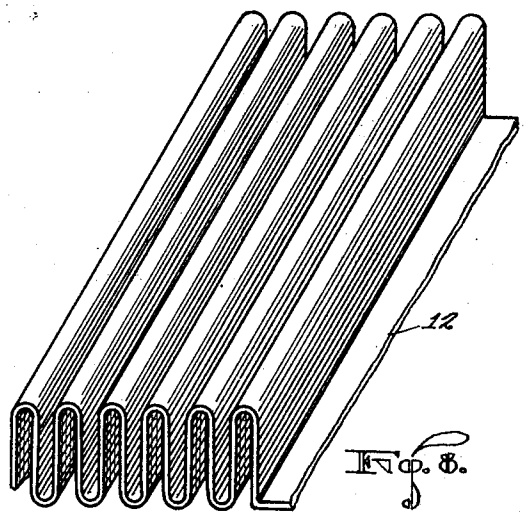

Fig. 8.

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UNITED STATES PATENT OFFICE

LOUIS F. CLAUSING, OF BURLINGAME, CALIFORNIA, ASSIGNOR TO ROYAL METAL WORKS, OF SAN FRANCISCO, CALIFORNIA, A COPARTNERSHIP CONSISTING OF LOUIS F. CLAUSING AND MAX SCHWARTZ

MACHINE FOR BENDING CORRUGATIONS IN METAL

Application filed April 15, 1929. Serial No. 355,270.

The present invention relates to improvements in means for bending corrugations into sheet metal, and its principal object is to provide a novel means for corrugating sheet metal where the corrugations are so deep and close that the corrugations cannot be made by ordinary means, as, for instance, by registering rolls. Where the corrugations are comparatively shallow, they may be easily made by forcing the sheet metal between two rolls intermeshing like gear wheels, but where the corrugations are deep and close, this method cannot be used, since the teeth necessary for producing the corrugations would interlock and would prevent movement of the roll altogether.

In the present invention, a convenient means is disclosed for bending corrugations of any desired depth into sheet metal, the operations being preferably carried on by hand.

Further objects and advantages of my invention will appear as the specification proceeds.

The preferred form of my invention is illustrated in the accompanying drawings, in which:

Figure 1 shows a top plan view of my invention;

Figure 2 a vertical section taken along line 2—2 of Figure 1;

Figure 3 a front view of my machine;

Figure 4 a horizontal section taken along line 4—4 of Figure 3;

Figure 5 a detail section of a guide taken along line 5—5 of Figure 2;

Figure 6 an enlarged horizontal section taken along line 6—6 of Figure 3;

Figure 7 a perspective detail view of a bending blade used in my device; and

Figure 8 a perspective view of corrugated sheet metal as formed by my device.

While I have shown only the preferred form of my invention, I wish to have it understood that various changes or modifications may be made within the scope of the claims hereto attached, without departing from the spirit of the invention.

In its preferred form, my invention comprises a suitable framework, preferably tapered from front to rear in plan, as shown in Figure 1, and comprising, in its principal features, a front frame 1, two side frames 2 and 3, and a rear frame 4, these frames being upright, of any suitable construction, and joined at the corners. In close proximity to the rear frame 4 and on the center line of the entire framework, there is mounted a vertical rod 6, to which is secured a guide 7 extending forwardly along the center line of the framework so as to be capable of lateral motion, the front end of the said guide being limited in its lateral motion by two stops 8 extending rearwardly from the front frame. This guide is shown in cross-section in Figure 5 and consists of a sheet of metal, indicated at 9, having its upper and lower ends 11 bent downward and upward, respectively, so that the sheet 12, which is to be corrugated, may be supported thereby. The guide may be suitably reinforced by one or more angle-irons, shown at 13.

The front of the framework consists of two parallel frames 14 and 16, forming between the same a guideway shown at 17 in Figure 1. The sheet of metal to be worked on is guided by the guide 7 to cross the guideway 17 between the two stops 8 and is bent into corrugations while crossing this guideway.

For bending the corrugations into the sheet metal, I provide two blades 18, one of which is shown in detail in Figure 7, the blades being substantially of the same height as the framework and presenting spindles 19 at the top and bottom, these spindles being revolvably mounted in bearings 21, which latter are slidable in the upper and lower guideways 17, so that each blade may be moved forward and backward—that is, toward and away from the sheet to be corrugated.

For moving each blade in its guideway, I use toggle joints 22, one at the top and one at the bottom, each consisting of two links, one of which is fixed to a vertical shaft 23 adapted to be operated by means of a handle 24. Referring to Figure 1, it will be seen that either one of the blades indicated at 18 may be moved away from the sheet of metal to be corrugated by a movement of the handle 24 toward the sheet and may be moved to-

ward the sheet to be corrugated by a movement of the handle 24 away from the sheet.

Each of the blades 18 has a handle 26 fixed thereto, so that each blade may be turned in its bearing by operation of the handle 26. Each blade is suitably reinforced by bracing elements 27.

The two front frames are spaced from one another by means of angle-irons 28, and these angle-irons support a number of rods 29, three being shown on each side in Figure 3, these rods extending into the guideway almost to the center thereof and being bent to form suitable abutments for corrugations formed in the sheet metal as will more clearly appear in the description of the operation of the device. During certain movements of the blades, these rods are accommodated in slots 31 formed in the blades.

In addition to the two stationary frames forming the guideway 17, there is provided a movable frame 32 passing in front of the guideway 17 and supported with freedom of sliding motion in uprights 33 forming part of the front frame.

This latter movable frame has near its center two spaced vertical bars 34 and 36 made to enter the corrugations already formed at a certain period for temporarily arresting forward movement of the corrugated metal.

This frame is operated to move back and forth in front of the guideway 17 by the blades 18, which, when moved away from the sheet metal, bear on brackets 37 fastened to the movable frame 32.

The operation of the device will probably be best understood by reference to the plan view in Figure 1 and the horizontal sections of Figure 4 and Figure 6. In all three views, the same situation is presented. A number of corrugations have already been formed, and a section of the sheet is still in the guide 7. One of the blades 18 is shown as being confined between the two flanges of the last corrugation formed, while the other blade bears against the outer flange of the last corrugation. The two bends of the last two corrugations bear against the abutments 29, and the handles are in the position indicated in Figure 1.

The operation of the device requires two men standing on opposite sides of the device, each operating two handles. A complete cycle requires six major operations. Calling the two operators, A and B, standing at the places indicated in Figure 1, a complete cycle of operations may be described as follows:

1. A pushes the handle 24 toward the center, thereby withdrawing his blade 18 from the last corrugation. This movement is carried to its extreme end, so that the blade 18 is practically at the outer end of the guideway 17, and when this position has been reached, the operator turns the handle 26 to the left, as viewed in Figure 1, so that the blade now occupies a position at right angles to the guideway 17.

In moving to the outer end of the guideway, the blade has also, through its engagement with the bracket 37, (see Figure 4), pushed the frame 32 over to A's side, which causes the bar 36 to be withdrawn from the third to the last corrugation, (see Figure 6), and has caused the bar 34 to enter the second to the last corrugation, squeezing its way between the two corrugations shown as touching in Figure 6.

2. Now B operates his handle 26 by urging the same to the right, as shown in Figure 1, whereby his blade 18 is made to complete the last bend which, in the drawing, is shown as only partly completed, so that now B's blade 18 occupies a position at least parallel with the guideway and probably slightly inclined in the opposite direction. It should be noted that during this operation, the bar 34, urged into the second to the last fold during operation number 1, holds the last corrugation against forward travel and allows the bending operation to be performed.

3. Operator A now pulls his handle 24 backward into the position shown in Figure 1, whereby the blade is advanced again and comes in contact with the last bend. It should be observed that during this forward movement, the blade still is in a transverse position, so as to lie flat against the last bend at the end of its movement. During this forward movement, the slots 31 in the blade allow the three abutments 29 to be cleared. At the end of its forward movement, the transverse blade is in line with the inner ends of the abutments 29 and pushes against the last bend formed for properly positioning the same in case it should have become slightly disaligned during the previous operation.

When the end of the forward movement has been reached, A turns the handle 26 so as to force a new bend into the material, this motion being only partly executed for the time being because the presence of the other blade prevents a complete execution of the turning movement, as will appear from the drawings.

At the end of these three operations, the situation shown in Figure 1 is completely reversed and it is now up to B to make the next move.

4. B pushes his handle 24 toward the center, thereby withdrawing his blade from the corrugation, and after the end of this movement has been reached, he turns his handle 26 to the left, (see Figure 1), thereby causing the blade to assume a transverse position relative to the guideway 17. During the outward movement of the blade, the frame 32 is shifted to B's side, so that the

bar 34 is withdrawn from its corrugation and the bar 36 is drawn into the next corrugation.

5. A completes the turning movement of his blade by operation of the handle 26.

6. B pulls the handle 24 for advancing the blade toward the last bend in the corrugation, and upon arrival at that point, initiates the turning movement of the blade by drawing the handle 26 toward himself.

At this time, a complete cycle of operations has been performed and all the parts are back in their original position.

In actual practice, these operations may be performed very quickly by proper co-operation of skilled workmen, and to give a clearer picture, the operations may be more summarily described as follows:

1. A pushes handle 24 toward the center, then turns 26 to the left.

2. B completes turning movement of his handle 26.

3. A pulls handle 24 toward himself and initiates turning movement of handle 26.

4. B pushes handle 24 toward the center and pushes handle 26 to the left.

5. A completes turning movement of handle 26, and

6. B pulls handle 24 toward himself and initiates turning movement of handle 26.

I claim:

1. A device for corrugating a sheet of metal or the like, comprising means for mounting the sheet and blades pivoted adjacent the sheet on opposite sides thereof for successively bending the sheet in opposite directions when the blades are turned on their pivots.

2. A device for corrugating a sheet of metal or the like, comprising means for mounting the sheet with freedom of sliding motion and blades retractably pivoted adjacent to the sheet and on opposite sides thereof for corrugating and advancing the sheet as the blades are alternately turned against the sheet and withdrawn.

3. A device for corrugating a sheet of metal or the like, comprising means for mounting the sheet with freedom of sliding motion, blades pivoted on opposite sides of the sheet, means for moving the blades toward and away from the sheet, and means for turning the blades on their pivots.

4. A device for corrugating a sheet of metal or the like, comprising means for mounting the sheet with freedom of sliding motion, blades pivoted on opposite sides of the sheet, means for moving the blades toward and away from the sheet, means for turning the blades on their pivots for bending corrugations into the sheet, and stationary abutments for the last corrugations formed for preventing lateral shifting of the work.

5. A device for corrugating a sheet of metal or the like, comprising means for mounting the sheet with freedom of sliding motion, blades pivoted on opposite sides of the sheet, means for moving the blades toward and away from the sheet, means for turning the blades on their pivots for bending corrugations into the sheet, and means for arresting movement of the sheet during the bending operation.

6. A device for corrugating a sheet of metal or the like, comprising means for mounting the sheet with freedom of sliding motion, blades pivoted on opposite sides of the sheet, means for moving the blades toward and away from the sheet, means for turning the blades on their pivots for bending corrugations into the sheet, and means for arresting movement of the sheet during the bending operation, the latter means being associated with the blade-moving means so as to be operated thereby.

7. In a device of the character described, means for successively bending corrugations into a sheet of metal beginning from one end thereof, and a guide for feeding the sheet into said means, the said guide being pivoted at its far end so as to allow the feeding end of the guide to shift back and forth as corrugations are bent into the sheet.

8. In a device for corrugating a sheet of metal, means for supporting the sheet, a blade, means for advancing the same toward the sheet including means for locking the blade in its advanced position in adjacent relation to the sheet, and means for turning the blade into the sheet for bending the latter.

9. In a device for corrugating a sheet of metal, a guide for supporting the sheet on edge with freedom of sliding motion, a guideway arranged transversely to the guide, and means movable in the guideway for bending corrugations into the sheet and for drawing the sheet through the guideway.

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