Feb. 13, 1940. W. W. DAVIDSON 2,190,416

FOLDING MACHINE

Filed June 4, 1938 5 Sheets-Sheet 1

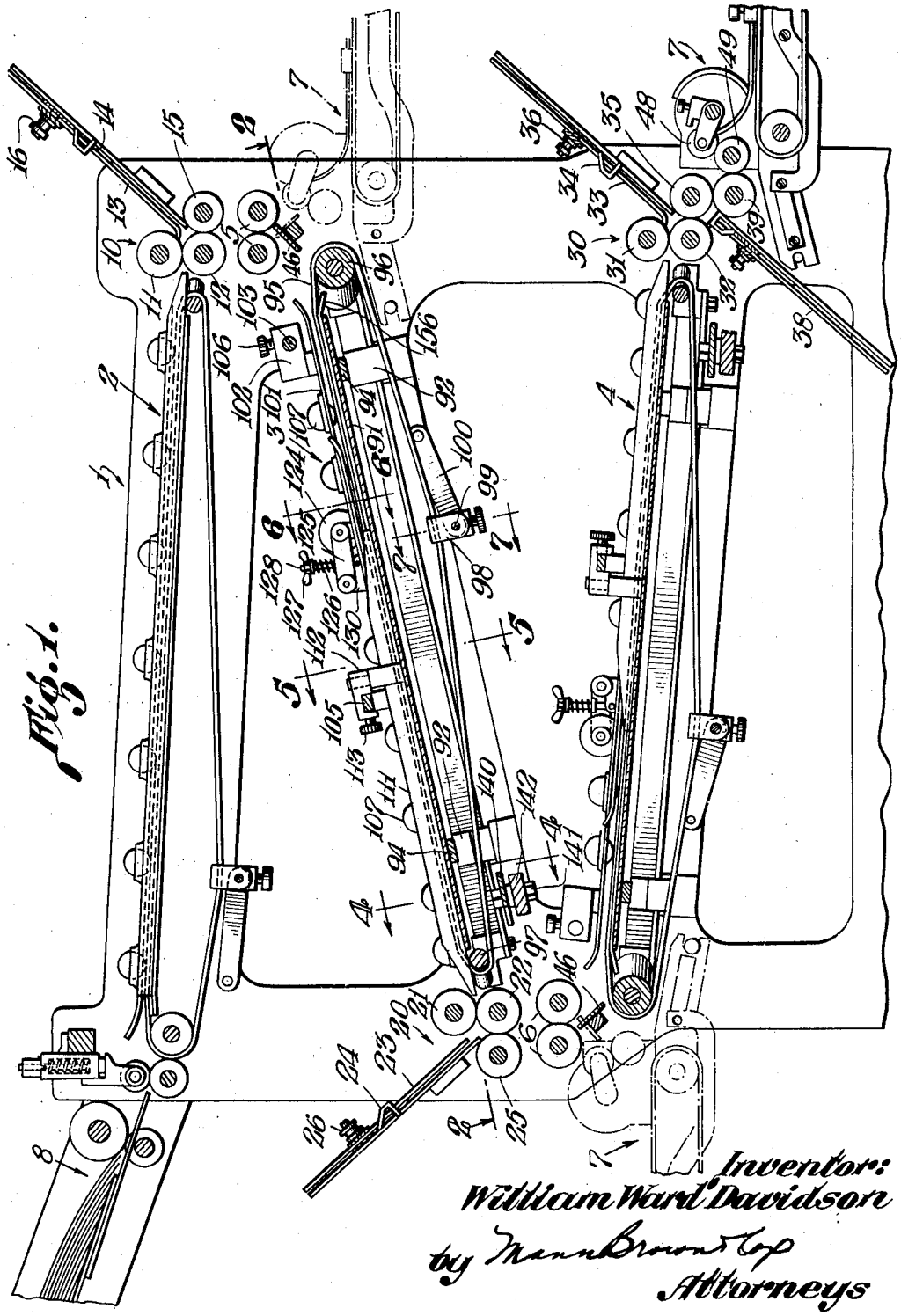


Fig. 1.

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by Mann Brown & Cop
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Feb. 13, 1940. W. W. DAVIDSON 2,190,416

FOLDING MACHINE

Filed June 4, 1938 5 Sheets-Sheet 2

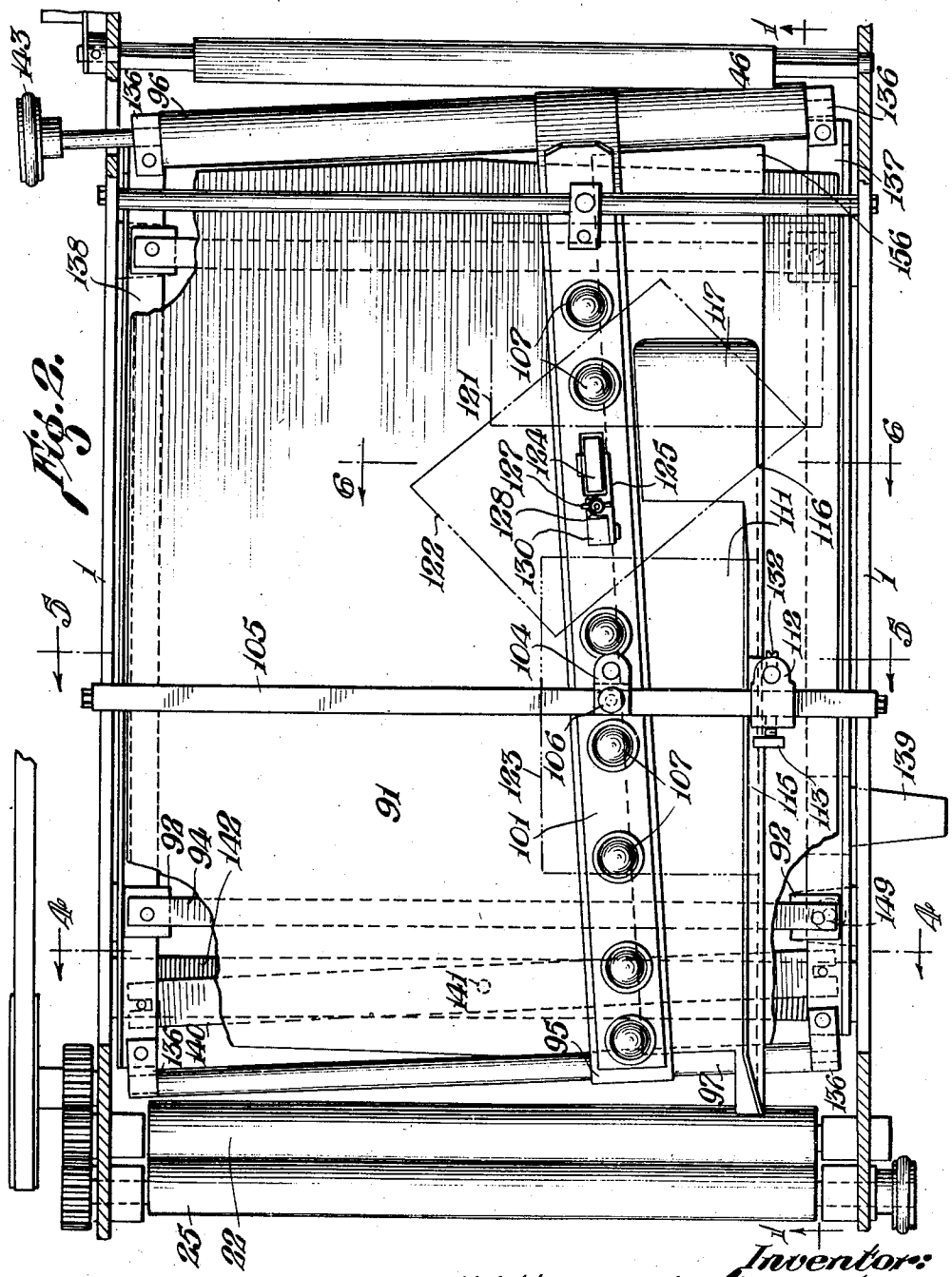


Fig. 2.

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Feb. 13, 1940. W. W. DAVIDSON 2,190,416

FOLDING MACHINE

Filed June 4, 1938 5 Sheets-Sheet 3

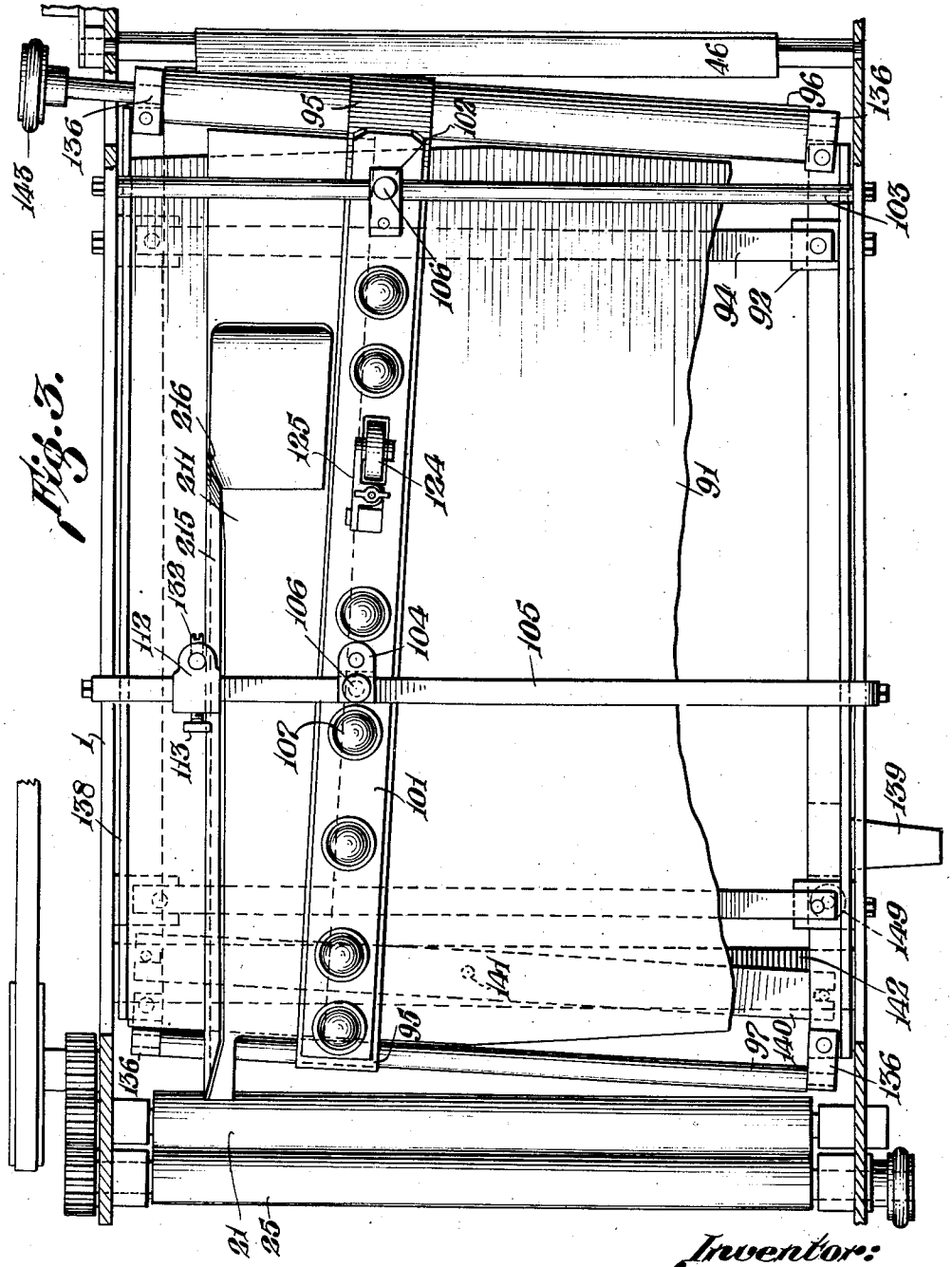


Fig. 3.

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Feb. 13, 1940. W. W. DAVIDSON 2,190,416

FOLDING MACHINE

Filed June 4, 1938 5 Sheets-Sheet 4

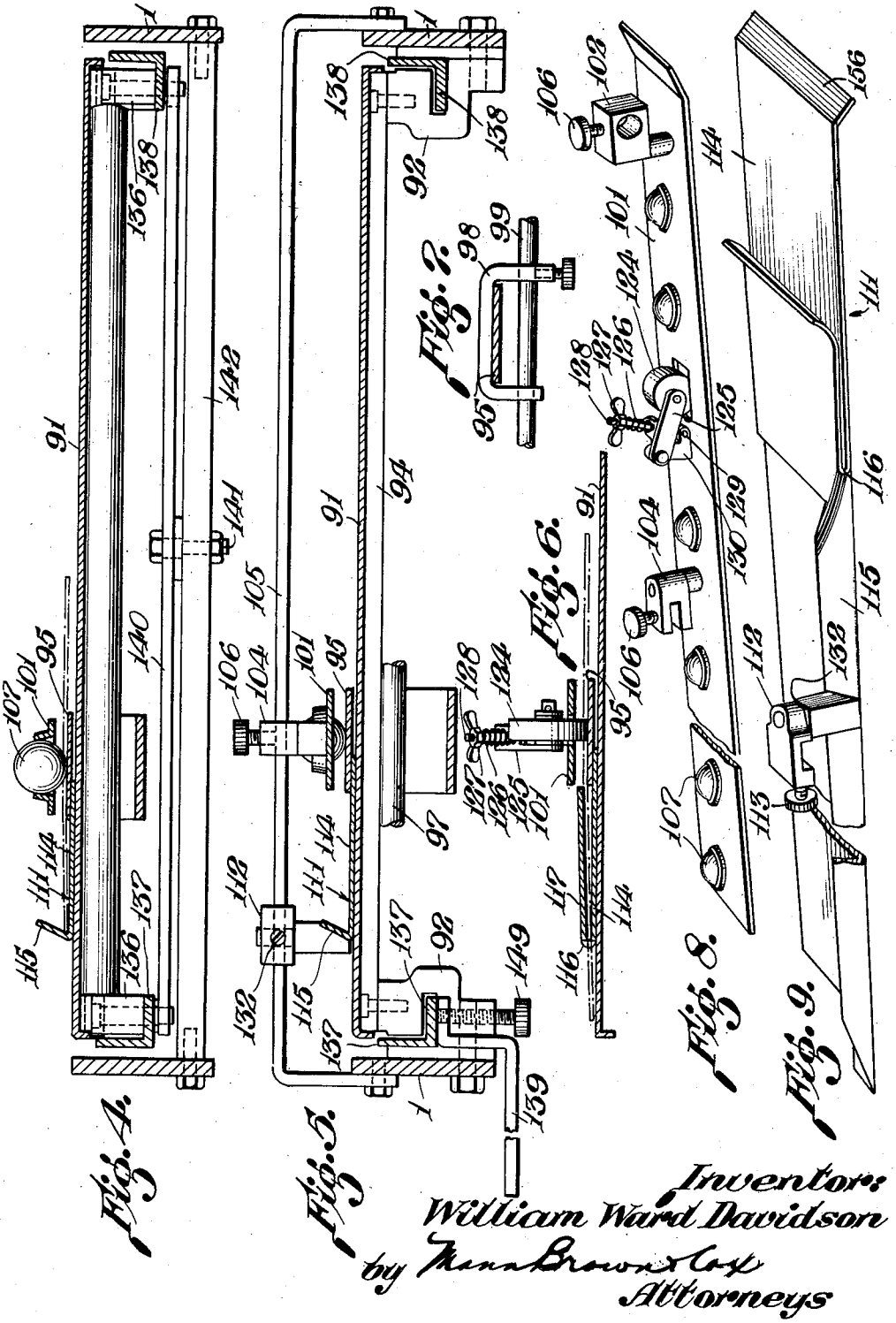


Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

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Feb. 13, 1940. W. W. DAVIDSON 2,190,416

FOLDING MACHINE

Filed June 4, 1938 5 Sheets-Sheet 5

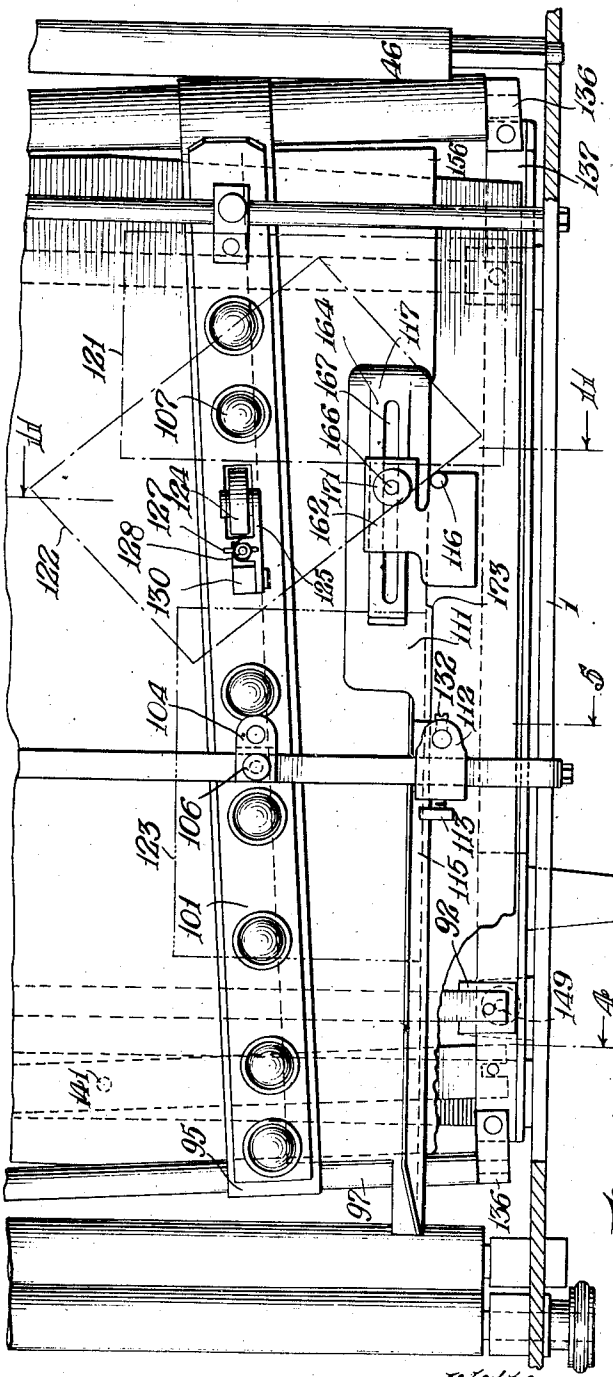


Fig. 10.

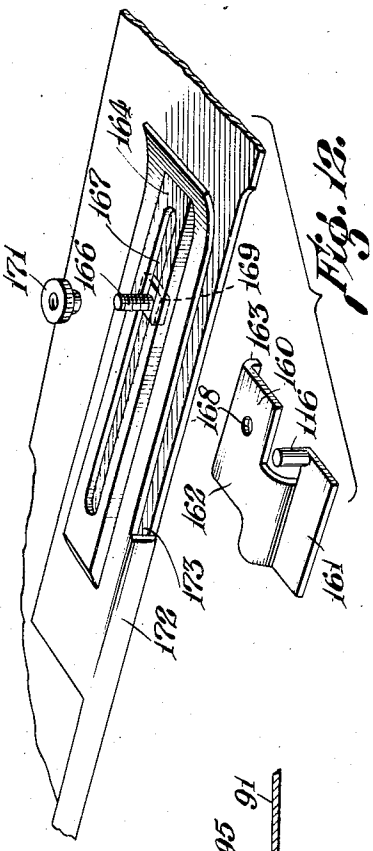


Fig. 12.

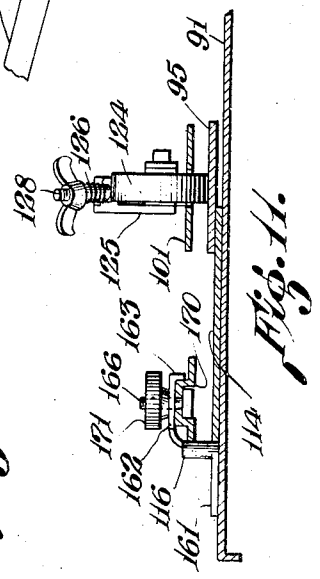


Fig. 11.

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Patented Feb. 13, 1940 2,190,416

UNITED STATES PATENT OFFICE

2,190,416

FOLDING MACHINE

William Ward Davidson, Evanston, Ill., assignor to Davidson Manufacturing Corporation, a corporation of Illinois

Application June 4, 1938, Serial No. 211,852

4 Claims. (Cl. 271—49)

This application is a continuation in part of my earlier application on Folding machines, filed May 2, 1938, Serial No. 205,571.

In printing plants handling a variety of types of work the provision of folding machines which will meet all of the requirements has been a severe problem. The folding to be accomplished may vary all the way from a single fold, as in letters, pamphlets and the like, to a complicated series of folds some in one direction and some in another, such as may be used in folding forms of many pages for books. The folding of book sections varies widely depending on the number of pages and the manner of binding.

In the past a single machine capable of performing various series of folds including folds in different directions has been extremely complicated and has necessarily included many folding units which would lie idle most of the time, when running simpler folds. To have the equipment available for a wide variety of folds requires large and bulky machines. The costs of such machines have been so high and their space requirements so great that only large concerns have been able to buy them. In general, the size and cost of the machines has been necessitated largely by lack of flexibility. In my prior Patent No. 1,620,444 I disclosed one manner of obtaining flexibility, consisting in the provision between two folding units of a conveyor for carrying the sheet from one unit to the other, together with means for turning the sheet 90° or not turning it at all at will. In its illustrated form the present invention uses this combination in improved form, preferably with a second conveyor capable of turning the sheet and with a delivery table or stacking unit which may be attached adjacent to any folding unit so that the sheet may be ejected from the machine at the earliest possible moment, thus reducing the number of idle folding units which the completely folded sheet must pass and the number of adjustments which must be made to cause the sheet to pass all the way through the machine without being further folded. Further simplification is secured by providing a simplified form of conveyor table capable of turning the sheet in either direction.

It is very important that the conveyor table be capable of turning the sheet in either direction since this will multiply the variety of folds that can be accomplished by the complete machine. Of course, it is not only necessary that the sheet be turned in either direction but in each instance it must be accurately registered as to its angular position so that the succeeding fold will be at exactly 90° to the preceding fold. From the commercial standpoint it is of course desirable that the conveying table be convertible to turn the sheet in either direction with great ease, and that its cost shall not be greatly increased to this end.

From the foregoing it is evident that an object of the present invention is to provide a conveyor table which in carrying the sheet from one folding unit to another can turn the sheet in either direction and accurately register it for the succeeding fold, and which is easily changed over from one function to another, although designed to be relatively inexpensive in cost.

Another object of this invention is to so correlate the pressure of the traction devices, the lateral position of the traction devices with respect to the side guide, and the longitudinal position of the turning means with respect to the traction devices that the machine operates reliably upon and without damaging in any way the paper stock of a given weight and quality, and to provide means for changing the relationship of these elements so that paper stock of other weight and quality may be acted upon with equal reliability and freedom from damage.

Further objects and advantages of the invention will appear as the description is read in connection with the accompanying drawings, in which

Fig. 1 is a vertical longitudinal sectional view taken through the machine approximately on the line 1—1 of Fig. 2, the stacking unit being fragmentarily shown in one position in full lines and in two alternative positions in dotted lines;

Fig. 2 is a fragmentary sectional view taken approximately on the line 2—2 of Fig. 1, showing the top of the turning table with a sheet of paper shown in dotted lines in three positions;

Fig. 3 is a view similar to Fig. 2 but showing the machine arranged for turning the paper in the opposite direction;

Fig. 4 is a transverse sectional view taken approximately on the line 4—4 of Figs. 1 and 2;

Fig. 5 is a similar view taken approximately on the line 5—5 of Figs. 1 and 2;

Fig. 6 is a fragmentary sectional view taken approximately on the line 6—6 of Figs. 1 and 2;

Fig. 7 is a fragmentary view showing the adjustable belt guide and tightener taken on the line 7—7 of Fig. 1;

Fig. 8 is a perspective view of the pressure strip for pressing the paper against the conveyor belt to insure proper movement of the paper;

Fig. 9 is a similar view of the paper guide which the paper strikes and along which it slides;

Fig. 10 is a view corresponding to Fig. 2, showing means for adjusting the longitudinal position of the turning stop with respect to the pressure roll;

Fig. 11 is a sectional view taken on the line 11—11 of Fig. 10, and

Fig. 12 is an exploded perspective view of the adjustable turning stop and associated mechanism.

A preferred embodiment of the invention has been shown in the drawings and will hereinafter be described, all as required by sec. 4888 of the Revised Statutes, but the appended claims are not to be limited by the specific disclosure unless required by the prior art.

As seen in Fig. 1, the entire folding machine may be supported by a frame 1 and, briefly stated, includes a feed table indicated more or less diagrammatically at 2, a conveying and turning table indicated as a whole by the numeral 3, a second conveying and turning table indicated as a whole by the numeral 4, with folding units 10, 20 and 30 positioned at the end of each table, scoring rolls 5 and 6 adjacent to the folding units 10 and 20, and with an ejecting and stacking unit 7 optionally positioned adjacent any folding unit to receive the folded sheet therefrom.

Folding units

Although the folding units may be of any type, that illustrated is the buckle type and it is similar at all positions. The reference numerals begin with 11 in unit 10, 21 in unit 20, and 31 in unit 30, the last digits being the same for like parts. The paper is fed to the folding unit 10 from the table 2 on which it is placed either by hand or more commonly by an automatic feeding device 8. The construction of the folding units is seen best in Fig. 1, the feeding and folding rolls being numbered 11, 12 and 15. The rolls 11 and 12 first receive the paper and feed it into the buckle chute 13, which it enters freely until it strikes the paper stop 14 which stops the forward edge of the paper. Since the feeding action of rolls 11 and 12 continues, the paper necessarily buckles into the space between rolls 12 and 15. The buckled sheet is thus caught by these two rolls and drawn in between them to crease the buckled sheet and thus complete the fold. The position of the fold is determined by the position of the paper stop 14 which may be adjusted by loosening the clamping nut 16. The two rolls 12 and 15 continue to draw the paper down between them, drawing it out of the buckle chute 13 and feeding it to the next unit of the machine, or an adjacent buckle chute if one is provided. Thus, in the case of a double folding unit such as the unit 30 the rolls 32 and 35 may feed the sheet into a second buckle chute 38. This second buckle chute, together with rolls 35 and 39, makes a fold parallel to that made by the associated buckle chute 34.

After the first fold the sheet passes from the rolls 12 and 15 to the scoring rolls 5, one of which may be grooved or formed of rubber to receive a blade-like member on the other. It may be observed that the scoring is not necessary before the first fold but is usually desirable for subsequent right-angle folds to insure a smooth fold of the already folded paper. If there is to be no subsequent right-angle fold, the scoring rolls may be separated or moved to one side so as not to score.

Deflectors

Below the scoring rolls 5 and below each but the last folding unit is a deflector 46 for directing the paper in the desired direction away from the folding unit. These deflectors 46 are shiftable between the position shown in full lines and that shown in dotted lines. In the full-line position the deflector guides the folded sheet toward the next folding unit or, more specifically, onto the conveyor and turning table 3 or 4. When a deflector 46 is in the dotted line position it guides the folded sheet directly to the ejector rolls 48 and 49 which will then have been moved with the stacking unit 7 to the position shown in dotted lines adjacent the deflector 46 in question. It is evident therefore that the machine may be adjusted to eject the folded sheets immediately after they leave any one of the three folding units. In other words, if the sheet is to be folded only once, it may pass through the folder 10 and then immediately to the stacking unit 7. If it is to be folded twice, it may pass through the first two folders 10 and 20 and then immediately to the stacking unit 7.

Conveying and turning tables

If more than one fold is desired in the sheet the deflector 46 below scoring rolls 5 will be set as shown in full lines in Fig. 1 to guide the folded sheet onto the conveying and turning table 3 which will feed the sheet to the second folding unit or, more specifically, to the rolls 21 and 22 thereof. It it is desired that the fold formed by this second folding unit be at right angles to the first fold, this can be accomplished by turning the sheet through 90°. According to the present invention the turning of the sheet is accomplished by an improved form of table. The table includes a table top 91 which may be supported from the frame 1 in any suitable manner as by brackets 92 and bar 94, seen best in Fig. 4. A feed belt 95 slides over table top 91, being driven by roll 96. The belt passes around an idler roll 97 at its lower end and may be tightened and positioned laterally of the table by tightener and guide 98, which, upon loosening screw 98', may be slid along rod 99 carried by pivoted links 100.

The folded sheet is passed onto the belt 95 from the deflector 46 and is carried under a traction plate 101 which is positioned by bracket 102 sliding on bar 103 and bracket 104 (Fig. 7) sliding on bar 105. The traction plate is positioned directly over the belt 95 wherever the belt may be positioned by belt guide 98 and is secured in this position by set screws 106. The traction plate 101 may be provided with any means such as the marbles 107 for pressing the sheet against the belt 95 with relatively little friction, so as to insure the proper movement of the sheet by the belt.

Resting on the table top 91 and preferably extinding under the belt 95 is a paper guide 111 seen in Fig. 9. This paper guide is positioned properly with respect to the belt 95 and traction plate 101 by a clamp 112 secured at any position on the bar 105 by a set screw 113. The paper guide 111 includes a bottom plate portion 114 on which the sheet slides and an edge guiding flange 115 along the inside of which the edge of the sheet slides after the sheet is turned. The edge guide 115 terminates in its upper end with a shoulder 116 forming a turning stop beyond which is an extension 117 which forms a guide over the sheet to insure that the sheet properly engages the shoulder 116. Of course, a sepa-

rately mounted spring finger could serve in place of the extension 117.

In Fig. 2 three positions of the paper sheet being turned are shown in dotted lines. At 121 the sheet has been dropped onto the belt 95 and is being moved forwardly by it toward the shoulder 116. At 122 the sheet has struck the shoulder 116 which stops one end of the sheet and the belt 95 has carried the other end of the sheet forwardly, thus turning the sheet. At 123 the belt has turned the sheet through 90° and has carried it beyond the shoulder 116. The lateral inclination of the belt 95 is now pressing the sheet against the edge guiding flange 115, thus insuring the accurate lateral position of the sheet and also insuring that it is turned to exactly 90°. To be sure that the sheet does not jam or slide off of its proper course, a pressure roller 124 supported from the traction plate 101 by spring urged arm 125 may be provided to press the paper firmly against the belt 95.

The position of the roller 124 is quite important. It has been found that for a particular weight and quality of paper (or other stock that is being operated on by the folding machine) there is a definite position of the roller 124 with respect to the shoulder 116 for turning the paper with the greatest reliability, accuracy and freedom from damage.

It will be observed that if the sheet rotates freely about the point 116 that portion under the roller 124 is always moving in a direction perpendicular to a line extending between the shoulder 116 and the roller 124. If the roller rotates in this same direction there will not need to be any lateral slippage either between it and the sheet or between the sheet and the shoulder 116. From this standpoint the theoretical ideal position for the roller 124 would be slightly lower (to the left in Fig. 2) than the position shown so that its axis would exactly pass through the shoulder 116, the inclination of the roller being the same as the inclination of the belt. However, for ordinary stocks of paper, including medium weight stock and heavier stocks, it is satisfactory if the paper is engaged in the bite between the roller 124 and the belt 95 at the time that it strikes the shoulder 116, so as to insure the continued proper movement of the paper after it strikes the shoulder 116. For this reason the roller 124 may be positioned slightly in advance of the theoretical position mentioned without adversely affecting the turning of the sheet and without in any way damaging it.

For practical purposes the roller 124 is so close to the theoretical position that the slippage between the sheet and the shoulder 116 during the turning of medium grade and heavier stock is negligible.

Another important consideration with respect to the roller 124 is that its pressure on the sheet be exactly regulated. It will be evident that the sheet must twist under the roller 124 and hence the tension should be low enough to permit this twisting action without buckling the sheet. On the other hand, there is appreciable friction between the sheet and the other parts of the table, and the pressure of the roller 124 should be sufficient to overcome this friction safely in turning the sheet. Furthermore, the pressure necessary and safe varies according to the nature and thickness of the sheet. For this reason the pressure of the roll should be adjustable minutely or with infinitesimal variations. This is accomplished by the construction seen best in Fig. 8, in which the pressure is applied to arm 125 by spring 126, the tension of which may be adjusted by a thumb screw 127 threaded on a bar 128 which is pivoted at 129 to the post 130 to which the arm 125 is pivoted.

The roller 124 could be made of conical shape with its axis intersecting the bottom of the stop shoulder. This would eliminate the necessity of slippage between the roller and the turning sheet and hence would decrease the necessity for fine adjustment of the presusre of roller 124.

After the sheet is turned, the inclination of the conveyor belt 95 thrusts it against edge guide 115 so that it is accurately alined for feeding to the folding unit 20. The angular position of the edge guide 115 (and of the entire paper guide 111) may be adjusted upon loosening the set screw 132. Ordinarily the edge guide will be set to extend exactly perpendicularly to the rollers 21 and 22 as indicated by suitable markings on the clamp 112 and the pin 133 extending therethrough.

Reversed turn

For some folding effects it is desirable to turn the sheet in the opposite direction from that illustrated in Fig. 2. This may be accomplished as seen in Fig. 3 by providing a paper guide 211 similar to the paper guide 111 but positioned on the opposite side of the machine and by changing the belt 95 and traction plate 101 to position them near and incline them toward the paper guide 211. The guide strip 101 may be shifted for this purpose by loosening the set screws 106. The belt 95 may be positioned laterally by sliding the belt guide 98 along on its supporting shaft 99 after loosening screw 98'.

In order to incline the belt 95 in the opposite direction, as shown in Fig. 3, it is necessary to reverse the angular position of the rolls 96 and 97 carrying this belt. To this end the rolls 96 and 97 are journaled in bearing blocks 136 which are pivoted to slide bars 137 and 138 and hence may be called swivel bearings. As seen best in Fig. 5, the slide bars are supported by and slide with respect to bracket 92. A handle 139 may be rigidly secured to the slide bar 137 and extend outwardly from the frame 1 to facilitate shifting the slide bar 137. The slide bar 138 is operated in synchronism with the slide bar 137 by means of a lever 140 pivoted by a pin 141 to the cross bar 142 of the frame 1 so that when the slide bar 137 is moved in one direction the slide bar 138 is automatically moved in the opposite direction. Any suitable means may be provided for securing the slide bars 137 and 138 in the adjusted position as, for example, the set screw 149 which is threaded through the bracket 92 adjacent to the handle 139, and which, when advanced upwardly, bears against the slide bar 137. The belt 95 is driven by a drive belt 143. The belt 143 should, of course, be driven from a position equidistant from the two positions of the pulley on roll 96 to permit the reversing of the angularity of the rolls 96 and 97 as already described, and so that the belt will be tight in both positions.

The lower feeding table 4 may be substantially the same as the feeding table 3 already described, although for some purposes it need not be reversible to turn the sheet in either direction at will.

Additional folding units

Although the folding units 10 and 20 have each been illustrated as only a single folding

unit, it should be understood that additional folding units may be provided at each position if desired. For example at either or both of units 10 and 20 there may be two or more folders. Such multiple folding units are well known and therefore need not be specifically described. The arrangement of such multiple folding units should be such as to cause the sheet to pass through all sections thereof to form two or more parallel folds in the sheet or to skip all but one of the sections so as to form only one fold in the sheet at this position.

Operation

When a flat sheet is fed along the table 2 to rolls 11 and 12, these rolls feed the sheet into buckle chute 13 until it strikes the paper stop 14, after which the sheet buckles and is caught between folding rolls 12 and 15 which feed the folded sheet between the scoring rolls 5 unless intervening folders are provided in connection with folding unit 10. If the sheet is to be further folded, the deflector 46 below folding unit 10 is set in the position shown in full lines and the sheet passes onto the belt 95 which carries it along under the guide strip 101 and the guide extension 117.

If the next fold is to be at right angles to the preceding fold, one end portion of the paper strikes shoulder 116 which stops this end of the paper, causing the paper to be rotated through 90° as it is carried on by the belt 95, against which the paper is pressed firmly by the roller 124. After the sheet has been turned it is properly lined up for the next operation by being pressed against the edge guiding flange 115 due to the lateral inclination of the belt 95 in that direction. If the second fold is to be parallel to the first fold, the sheet is not turned on the table 3. Turning may be avoided by replacing the sheet guide 111 with a plain sheet guide which does not have a roller 128 or stop 116, but instead has the edge guide 115 extending the length of the table 3. If the sheet guide 111 is retained, the machine may be adjusted to cause the paper to strike the edge guide 115 after it has passed the stop 116. It will be understood of course that the feed table 2 will have an edge guide or jogger for determining the lateral position at which the sheet starts through folding unit 10 and hence its initial lateral position on the table 3.

If it is desired, on account of subsequent folding operations, that the sheet be turned 90° but in the opposite direction from that illustrated in Fig. 2, this can easily be accomplished. The thumb screw 149 is released, and the handle 139 is shifted to the left from the position seen in Fig. 2 to the position seen in Fig. 3 thereby reversing the inclination of the rolls 96 and 97 so that the belt 95 will be inclined toward the right of the direction of the sheet movement instead of toward the left. The sheet guide 211 will then be placed on the right-hand side of the machine and the corresponding guide 111 removed from the left-hand side of the machine. Next, the belt 95 will be shifted to the proper position as seen in Fig. 3 with respect to the sheet guide 211. This is accomplished by loosening the thumb screw 98' and sliding the belt guide 98 along the rod 99. Finally, the traction plate 101 is shifted from the position seen in Fig. 2 to the position seen in Fig. 3 directly over belt 95 in its new position. The various thumb screws will of course be tightened to hold the parts in their new positions. Now when a sheet is delivered onto the belt 95 it will be carried without turning until its end strikes stop shoulder 216, at which time the belt 95 in cooperation with the roller 124 will rotate it as illustrated in Fig. 3 about the stop shoulder 216 until it has been turned 90°, at which time it will strike the edge guide 215 and be accurately alined by said edge guide and held in the desired lateral position until it is delivered to the rolls 21 and 22.

One important feature of the invention is its simplicity, which is especially important in view of the necessity for adjusting the machine to turn the sheet in either direction or carry it without turning it. The use of a single belt 95 contributes to this simplicity. When a single belt is used, however, it is necessary that the traction exerted by the belt on the sheet be enough to drag the sheet along the stationary table top 91 and the sheet guide 111 or 211. To obtain this traction the marbles 107 are provided at frequent intervals along the traction plate 101 to press the sheet against the belt, and at the point where the greatest traction is needed the roller 124 is provided. The use of a single belt is advantageous inherently in that it eliminates the possibility of the corners of the sheet catching on other belts as the sheet is turned. To prevent the leading edge of the sheet from catching on table top 91, roll 95, or roll 22, the sheet guides 111 and 211 are constructed to extend close to the rolls 96 and 22 and the table top 91 is made V-shaped at its ends so that the rolls 95 and 96 can fit closely thereto. There is no possibility of the sheet's catching on the flat portion 114 of the sheet guide 111 (or 211) since its longitudinal edge lies under the belt 95 and its end is depressed at 156 adjacent the roll 96. Because of serving as an extension of the table this flat portion 114 may be called a supplemental table top.

These folding machines are sometimes operated at very high speed. The result is that the sheets will strike the edge guide 115 with considerable speed and hence with appreciable momentum. This momentum tends to make the sheets bounce away from the edge guide and such bouncing would of course be disastrous to perfect registry of the sheet for subsequent folds if the effects of the bouncing were not overcome. However, the marbles 107 in the lower part of the traction plate 101 which press the sheet onto the belt 95 are effective to substantially eliminate this bouncing of the sheets, by which is meant that if any bouncing occurs it is so slight that the belt returns the sheet to the edge guide 115 immediately and before it reaches the bite of the rolls 21 and 22. It is of course very important in a high speed folding machine that the sheets be turned and fed to the next folding unit with absolute dependability. There is no chance to make corrections for errors on individual sheets, and, if one sheet jams, a large number of sheets may be spoiled. The combination of the various features described produces this highly desirable dependability.

The belt 95 now feeds the paper to the folder rolls 21 and 22 of folding unit 20 by which the sheet is fed into chute 23 until it strikes paper stop 24, at which time it buckles and is caught between rolls 22 and 25. Subsequent conveying or conveying and turning operations and subsequent folding operations are similar to those already described and therefore need not be described in detail. The various features described in connection with table 3 are embodied in the table 4 illustrated so that it will turn the sheets

with equal dependability when such turning is desired.

Modified form

A modified form of the invention is shown in Figs. 10 to 12 inclusive, in which the lateral alignment of the shoulder 116 and pressure responsive device 124 may be adjusted for handling different stocks of paper or other material.

In this embodiment of the invention the shoulder 116 is in the form of an upstanding lug which is rigidly attached to a stop bracket 160, adjustably supported on the arm 117, associated with the side guide 111. The arm 117 in this instance is somewhat narrower than it is in the embodiment of the invention shown in Figs. 1 to 9 inclusive, in order that the belt 95 and traction plate 101 may occupy a position somewhat closer to the side guide 111, the latter being adjustable along the cross bar 105.

There is an advantage in having the side guide 111 as close as possible to the belt 95 and traction plate 101 when the table is being used for turning sheets, and particularly is this so with the lighter stocks of paper.

The stop bracket 160 is punched from sheet steel and has a runner 161 that rests on the table top 91 and is slidable along its surface. The bracket also has a raised portion 162 provided with a marginal flange 163, which cooperates with a raised portion 164 on the arm 117 to guide the position of the bracket as it is moved along the arm 117. The curved portion 165 of the bracket rides along the outer margin of the arm 117 to assist in maintaining the bracket in proper alignment. The bracket may be adjustably clamped in any desired position with respect to the arm 117 by means of a stud 166 that extends through an elongated slot 167, in the upstanding portion 164 of the arm 117 and an opening 168 in the bracket 160. The stud is provided at its lower end with a square head 169 adapted to travel in the groove 170, formed on the underside of the arm 117, and at the other end with a thumb screw 171, which clamps the bracket in the desired position.

It should be noted that the guiding edge 172 of the side guide 111 is cut back to a point 173 to allow for the full adjustment of the bracket 160. It should also be observed that the inner margin of the lug 116 is in alignment with the inner face of the guiding edge 172.

By recessing the head 169 of the stud 168 there is no opportunity for the sheet to become caught and thereby interfere with the proper operation of the machine.

For relatively light, flimsy paper stock, such as news print, the turning of the sheet in a satisfactory manner is best accomplished by having the stop 116 clamped in a position which is slightly forward (i. e., to the right in Fig. 10) of the pressure device 124. The same result could be accomplished by having the pressure device 124 mounted so that it is capable of adjustment relative to the stop 116. For stock of this quality the side guide 111 is preferably positioned relatively close to the conveyor tape 95, the exact distance to be determined somewhat empirically. Also the pressure exerted by the roller 124 on the paper should be relatively light as compared with the pressure which may satisfactorily be used with heavier stock, and this adjustment is accomplished by manipulation of the wing nut 127. Even for light stock, however, the pressure exerted by the roller 124 is substantially greater than that exerted by the traction marbles 107.

Since it is important for the stop 116 to be somewhat in advance of the normal lateral alignment when the sheet turning mechanism is operating on light weight stock, and since this position of the stop is satisfactory for heavier and better quality stocks, it is preferable to fix the stop in the advanced position with respect to the pressure device 124, in the event that, for some reason, the adjustability of the stop is omitted.

I claim as my invention:

1. The method of turning a sheet of relatively light material through an angle of substantially 90° as it is being moved by a conveyor in a substantially horizontal plane, which consists in permitting the leading edge of the sheet, adjacent to one corner, to strike a positive stop, and then, after the sheet begins to turn about the stop by the continued action of the conveyor, and while the leading edge of the sheet is still in contact with the stop, apply an increased turning force to the rotating sheet and concurrently therewith supporting the sheet on a surface which permits the light weight sheet to turn without becoming caught and which surface is further characterized by the absence of any shoulder that is capable of catching or fouling the corner of the sheet that is diagonally opposite the stop while said corner is moving laterally away from the stop during the turning movement of the sheet, whereby the sheet is assured of making a complete turn but by reason of the relatively lighter force with which the sheet strikes the stop, the danger of buckling the sheet at the stop is minimized.

2. The method of turning a sheet of relatively light material through an angle of substantially 90° as it is being moved by a conveyor in a substantially horizontal plane, which consists in permitting the leading edge of the sheet, adjacent to one corner, to strike a positive stop, and then, after the sheet begins to turn about the stop by the continued action of the conveyor, and while the leading edge of the sheet is still in contact with the stop, apply an increased turning force to the rotating sheet at a point in close proximity to the point at which the sheet strikes the stop and concurrently therewith supporting the sheet on a surface which permits the light weight sheet to turn without becoming caught and which surface is further characterized by the absence of any shoulder that is capable of catching or fouling the corner of the sheet that is diagonally opposite the stop while said corner is moving laterally away from the stop during the turning movement of the sheet, whereby the limited stiffness of the sheet is used advantageously to prevent crumpling of the sheet while it is being turned.

3. In a sheet turning and conveying mechanism adapted to handling paper stock of both light and heavy grade, a conveyor table, a sheet conveying means for moving a sheet along the table, a stop interposed in the path of the sheet for turning it through an angle of approximately 90°, a pressure device associated with the conveying means and positioned approximately in lateral alignment with the stop for assisting in the turning of the sheet, said conveyor means being constructed and arranged to provide a free and unobstructed path for the turning of the sheet said path being characterized by the absence of any shoulder that is capable of catching or fouling the corner of the sheet that is diagonally opposite the stop while said corner is moving laterally away from the stop during the turning movement of the sheet, means for adjusting the

alignment between the stop and the pressure device whereby the stop may be positioned in advance of the pressure device when the machanism is operating on relatively light sheets, and in alignment when the mechanism is operating on relatively heavy sheets, and means for adjusting the pressure exerted on the sheet by the pressure device whereby said pressure may be made substantially less when the mechanism is operating on relatively light sheets than it is when operating on relatively heavy sheets.

4. In a sheet turning and conveying mechanism adapted to handling paper stock of both light and heavy grade, a conveyor table, a sheet conveying means for moving a sheet along the table, a stop interposed in the path of the sheet for turning it through an angle of approximately 90°, a pressure device associated with the conveying means and positioned approximately in lateral alignment with the stop for assisting in the turning of the sheet, said conveyor means being constructed and arranged to provide a free and unobstructed path for the turning of the sheet said path being characterized by the absence of any shoulder that is capable of catching or fouling the corner of the sheet that is diagonally opposite the stop while said corner is moving laterally away from the stop during the turning movement of the sheet, means for adjusting the alignment between the stop and the pressure device whereby the stop may be positioned in advance of the pressure device when the mechanism is operating on relatively light sheets, and in alignment when the mechanism is operating on relatively heavy sheets, means for adjusting the pressure exerted on the sheet by the pressure device whereby said pressure may be made substantially less when the mechanism is operating on relatively light sheets than it is when operating on relatively heavy sheets, and means for adjusting the pressure device to any desired distance from the stop within given limitations.

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