

Nov. 10, 1931.

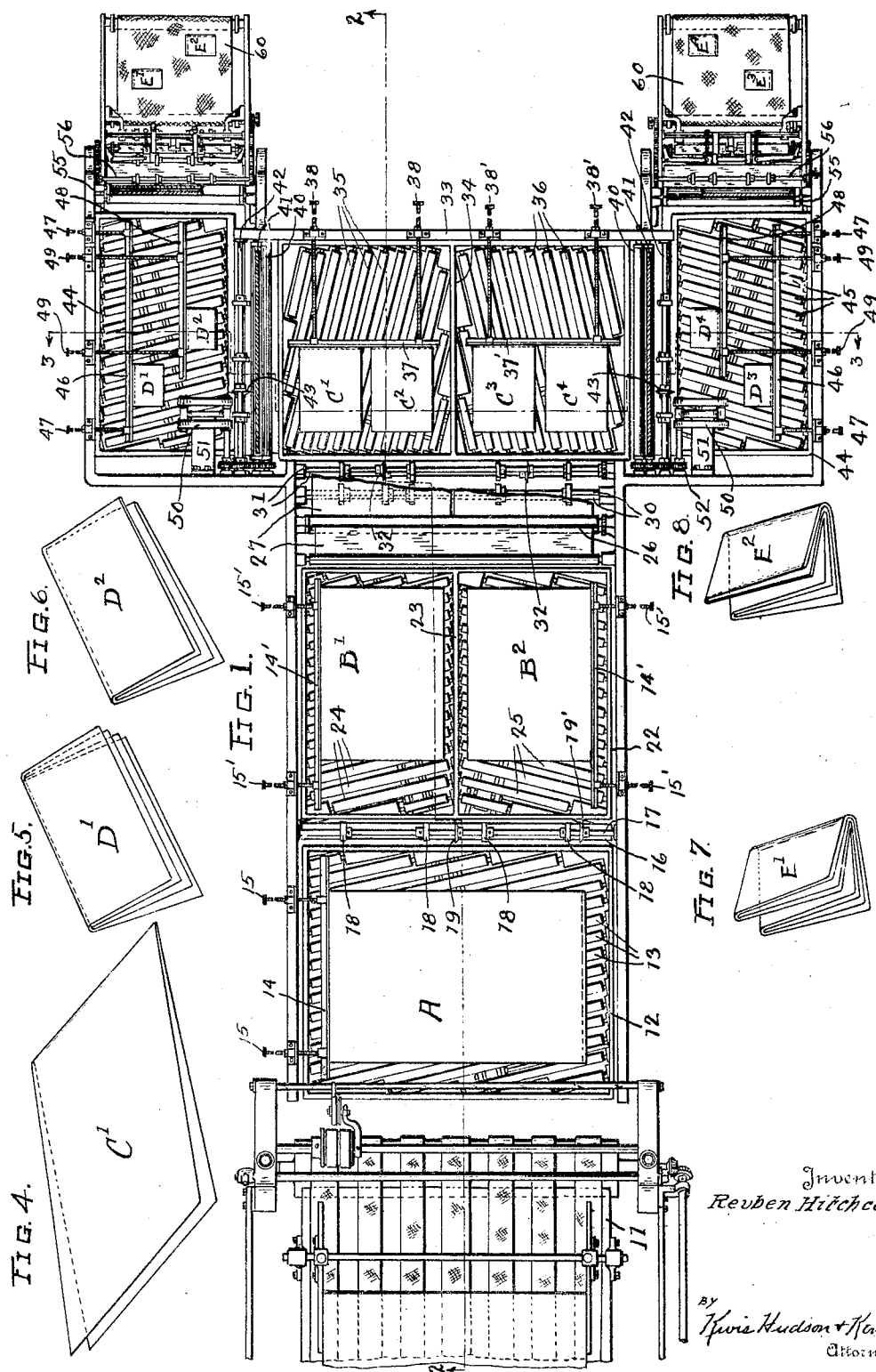
R. HITCHCOCK

1,831,245

MACHINE FOR PRODUCING PAPER SIGNATURES

Filed May 31, 1928

4 Sheets-Sheet 1



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MACHINE FOR PRODUCING PAPER SIGNATURES

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4 Sheets-Sheet 2

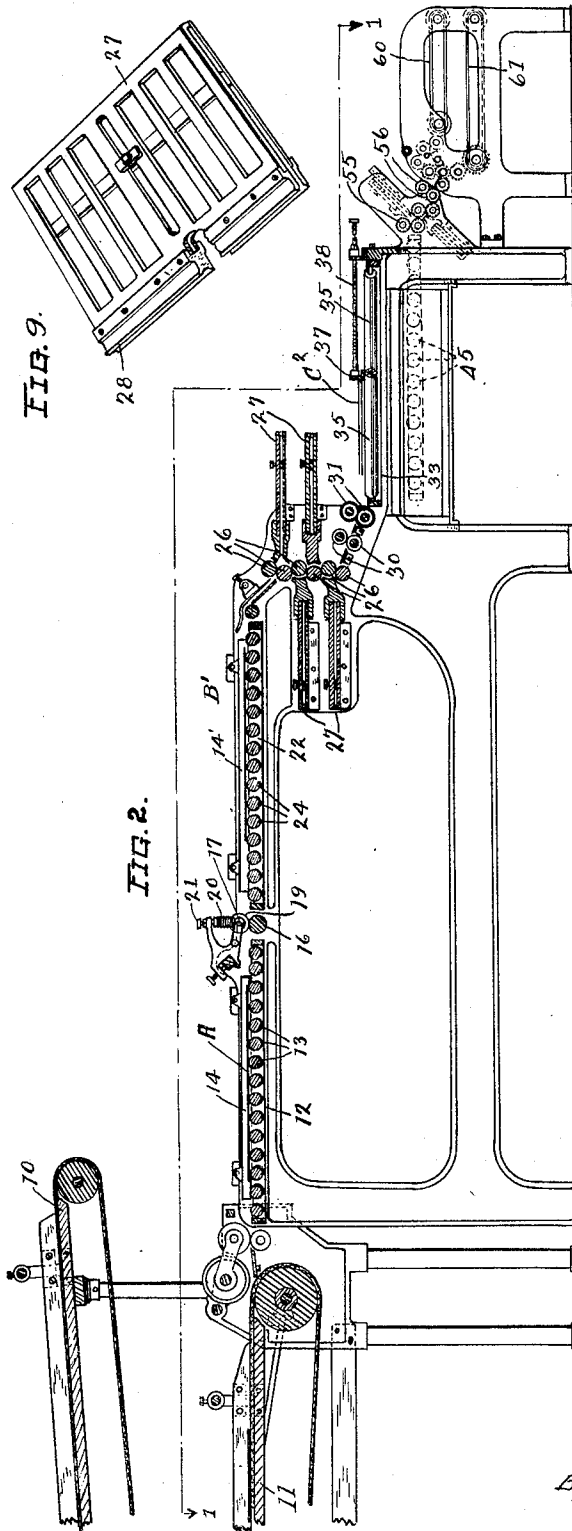


FIG. 9.

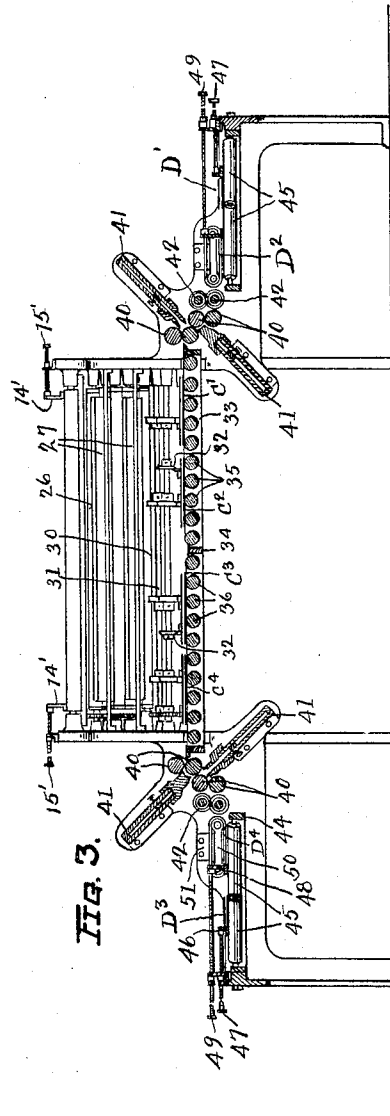
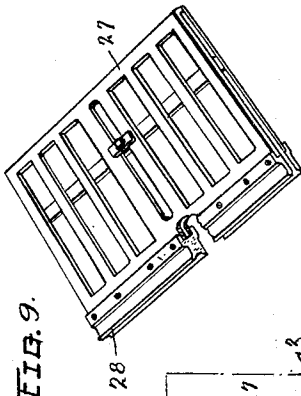


FIG. 3.

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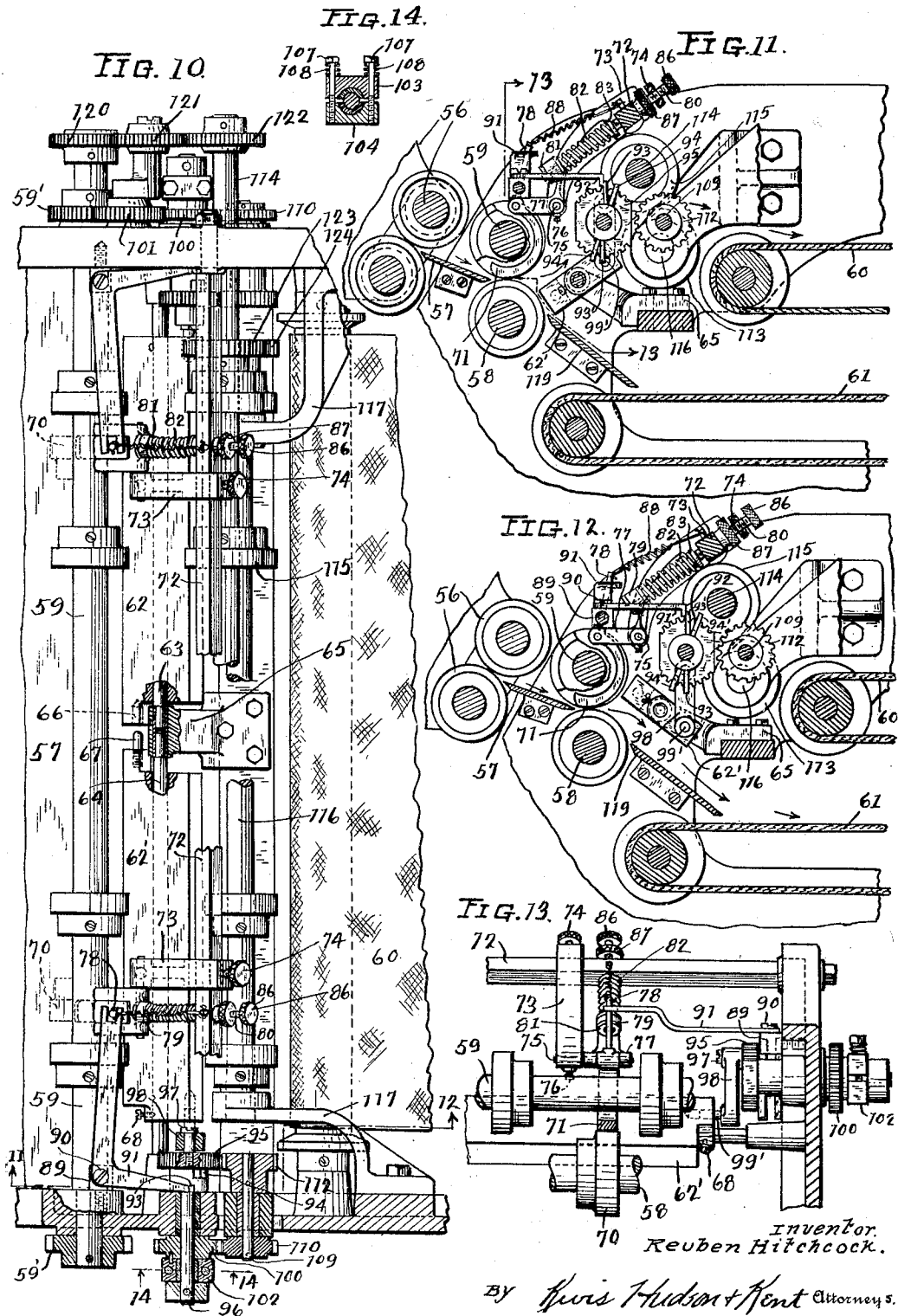
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

FIG. 15.

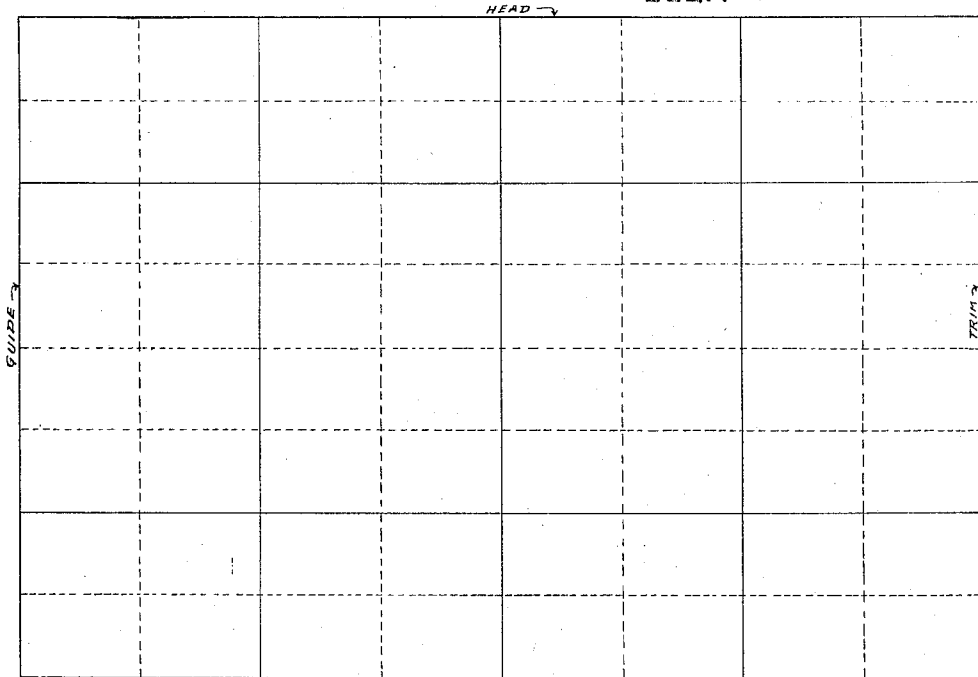
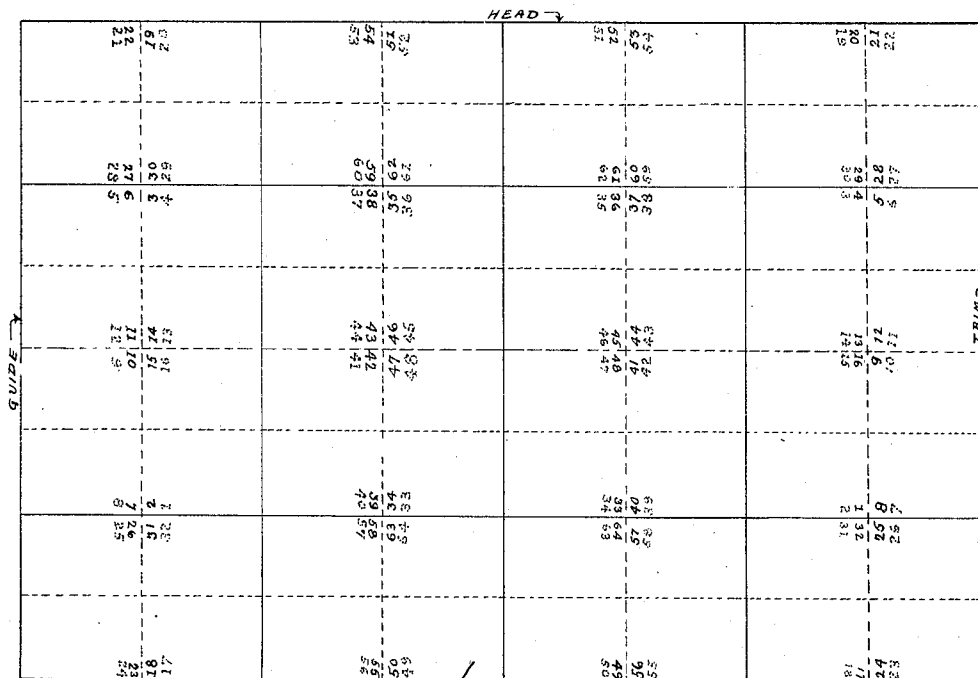


FIG. 16.



A

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UNITED STATES PATENT OFFICE

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MACHINE FOR PRODUCING PAPER SIGNATURES

Application filed May 31, 1928. Serial No. 281,657.

This invention relates to improvements in a machine for producing paper signatures, particularly for cutting and folding on one machine all of the signatures that may be printed upon large sized presses from sheets of maximum capacity.

Heretofore it has been customary to employ slitters in connection with printing presses of large capacity, in order to reduce the size of the sheets to the capacity of the folding machines available. For each printing machine operation, therefore, there are two or more folding machine operations. Obviously, the labor expense and the original equipment expense may be decreased by the use of a folding machine which can accommodate the full size sheets coming from the printing presses.

One of the objects of the present invention, therefore, is the provision of a machine capable of handling in a single operation the cutting and folding of signatures printed upon large size sheets such, for instance, as those having the dimensions of approximately 44" x 66", from which eight 16 page signatures or four 32 page signatures of average size may be made.

Another object is the cutting and folding of large size sheets along lines such that it becomes feasible to cut and fold eight 16 page or four 32 page signatures from a single sheet, and to separately collect and stack the corresponding signatures of each sheet.

A further object is the provision of a method and machine which will permit the slitting and folding of eight 16 page signatures regardless of whether the printer has employed the "work and turn" form or the "sheetwise" form.

A further object is the provision of a fold section having sheet deflectors adapted to close a portion only of the mouths of the fold plates, so that sheets entering the fold section side by side may be reversely folded.

A further subsidiary object is the provision of a feed table adapted to receive two sheets delivered by a slitter and to space the sheets apart and guide them in parallel paths.

Another object is the provision of a single sorting and stacking mechanism which is

capable of adjustment to handle either two or four separate signatures.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which—

Fig. 1 is a plan view of a complete paper handling machine embodying my invention, a fragment of a sheet feeder being shown in cooperative relation therewith. The plane of the view of this figure is indicated by the line 1—1 of Fig. 2;

Fig. 2 is an elevational view, partly in section, upon the line 2—2 of Fig. 1;

Fig. 3 is a transverse sectional elevation taken substantially on the line 3—3 of Fig. 1;

Fig. 4 is a perspective view of a folded division of the original sheet containing one-fourth of the paper of the sheet;

Figs. 5 and 6 are perspective views of the folded pieces obtained by cross folding and cutting into two parts, one of the divisions illustrated in Fig. 4;

Figs. 7 and 8 are perspective views illustrating the signatures obtained by imparting a further fold to the pieces illustrated in Figs. 5 and 6, respectively;

Fig. 9 is a perspective view of a fold plate, half of the mouth of which is closed by a feed deflector, as used in the first fold section of the machine;

Fig. 10 is a fragmental plan view on a larger scale, with some parts in section, of the signature sorting mechanism employed in connection with the invention;

Figs. 11 and 12 are fragmental sectional views taken substantially on the line 11—11 of Fig. 10, illustrating one of the moving deflectors or "flippers" in its two extreme or operative positions;

Fig. 13 is a vertical sectional view taken substantially on the line 13—13 of Fig. 11, some of the parts being broken away;

Fig. 14 is a detail sectional view on the line 14—14 of Fig. 10;

Fig. 15 is a diagrammatic view illustrating the lines of cuts and folds which may be

employed in producing eight 16 page signatures from a sheetwise form; and

Fig. 16 is a similar view illustrating the arrangement of pages which may be employed on a sheet to be cut and folded along the same lines for producing eight 16 page signatures from a work and turn sheet.

Similar reference characters refer to like parts throughout the views.

In Figs. 1 and 2 I have illustrated one end of a sheet feeder comprising an upper feeding table 10 and a lower feeding table 11, each provided with endless traveling belts, this feeder being of the general character of that described in patent to Tufts No. 1,635,197. The feeder will not be further described herein as it forms no part of the present invention, that is to say, any other suitable type of feeder might be substituted.

Sheets of paper are delivered from the feeding table 11 onto a feed table 12 comprising diagonally arranged rollers 13 driven by suitable means so as to cause travel of the sheets forward and toward the left, as viewed from the rear or feed end of the machine. The table is provided with a guide bar 14 mounted for adjustment by means of screws 15. The diagonal arrangement of the rotating rollers 13 causes the guide edge of the sheet to contact with the guide bar 14 and to be directed in a straight course thereby.

Beyond the delivery end of table 12 and adapted to receive sheets therefrom are a pair of feed rolls, the lower roll 16 of this pair being preferably cylindrical, while the upper roll comprises a shaft 17 carrying rubber surface wheels 18. The shaft 17 also carries slitting cutters or circular knives 19, 19', the cutter 19 being located centrally for cutting the original sheets into two parts and the cutter 19' being located near the side of the machine opposite guide 14 for trimming the rough edge of the paper to a line in exact parallelism with the guide edge thereof. As indicated in Fig. 2, but omitted from Fig. 1 for the sake of clearness, the shaft 17 may be resiliently pressed toward the roll 16 by coil springs 20 adjustable as to pressure by means of screws 21.

Beyond the feed rolls just described, and preferably upon the same level with table 12, there is a feed table 22 having a central longitudinal division bar 23. On each side of this division bar the table carries a set of diagonally arranged driven rollers 24, 25, the rollers of each set having bearing in the outer side pieces of the table and in the central division bar 23. Along both outer sides of the table 22 there are guide bars 14' adjustable inwardly and outwardly by means of screws 15'. The rotation of the rollers 24 and 25 carries the half sheets thereon outward somewhat as well as forward, and hence the sheets on the table contact with the guide

bars 14' in their forward travel and are thereby directed in straight parallel paths.

Beyond the delivery end of table 22 I locate a fold section of the buckle fold type, consisting of a series of rolls 26 and a series of fold plates 27. These rolls and plates are of generally conventional form, but the sheet deflectors 28 used upon the fold plates extend but half-way across them. Two such deflectors may be employed upon each plate so as to deflect sheets delivered from both sides of the table 22, or one deflector only may be employed on a plate, as shown in Fig. 9, so that one sheet is deflected while the other is permitted to enter the plate. Where the latter arrangement is followed in the first fold plate the next succeeding plate is generally oppositely arranged as to deflectors, so that the sheets moving side by side on table 22 are reversely folded, that is, the upper surface of one of them is folded inwardly and the upper surface of the other is folded outwardly. Any suitable means may be employed for mounting the deflectors 28 in operative position.

Paper, upon leaving the last pair of rolls 26 of this folded section, is grasped by rubber wheels on feed rolls 30 and thereby delivered into feed rolls 31. The shafts of this latter pair of feed rolls carry slitting cutters or knives 32 properly positioned to divide the two sheets passing through these rolls into four parts. These four parts drop onto a cross feed table 33.

The table 33 is provided with a transverse centrally arranged division bar 34. On either side of the division bar 34 there are driven rollers 35 and 36, respectively, which are adapted to produce travel of the sheets thereon in opposite transverse directions. Each portion of the table 33 is provided with a guide bar 37 and 37', respectively, these bars being adjustable in a direction crosswise of the table by means of screws 38, 38'.

Those portions of the machine which are located beyond the two ends of the table 33 are duplicates, except for the fact that they are rights and lefts. Consequently, a description of one will serve for both.

Paper leaving an end of the table 33 enters the cross fold section, comprising rolls 40 and fold plates 41 of conventional form. As is customary in this type of machine each plate may be closed against the admission of sheets passing through the section by means of a deflector. The number of plates in this section may be varied to suit conditions, but as a rule two plates, as shown, will be sufficient, as it is generally not desirable to impart more than one fold at this point, and the two plates will permit of making this fold in either direction as desired.

After traversing the second fold section just described, the paper enters feed rolls 42 which are equipped with adjustable and re-

movable slitting knives 43. The feed table 44 located beyond the feed rolls 42 is adapted to handle either sheets received from table 33 in single file or sheets delivered side by side from the table 33, as when the knives 43 are employed. The table is equipped with a set of diagonal driven rollers 45 and a side guide bar 46, the latter being adjustable by means of screws 47. The table is also equipped with a readily removable auxiliary guide bar 48, adjustable by means of screws 49, and a tape conveyor 50 mounted upon a removable bracket 51, the tapes of this conveyor being positively driven in any desired manner, as by means of the train of gears 52. The conveyor 50 is above the level of the rollers 45 and is adapted to convey sheets from the feed rolls 42 over a portion of the table 44 onto the rollers 45 beyond the line of the guide bar 48.

At the delivery end of the table 44 there is a third fold section, generally indicated by the reference numeral 55, which is parallel to the first named fold section. The section 55 preferably contains two fold plates of conventional form, either or both of which may be closed by means of sheet deflectors. The deflectors used in this section preferably extend entirely across the fold plates in the conventional manner, but obviously half length deflectors, such as those illustrated in Fig. 9, may be employed if desired.

Upon leaving the fold section 55 the paper enters a pair of feed rolls 56 which deliver it onto a plate 57 and thence between feed rolls 58, 59. The latter rolls constitute part of a double sheet or signature sorting mechanism, either side of which is adapted to function independently of the other to deflect alternate signatures onto upper and lower stacking belts 60 and 61, respectively, or the two mechanisms may be locked together to function as a unit where the signatures delivered by sheet rolls 56 travel in single file only.

Referring now to Figs. 10 to 14, inclusive, it will be observed that there are a pair of movable deflector elements or flippers 62, 62' mounted in alignment. These flippers are mounted upon rock shafts 63, 64, respectively, which have bearing at their outer ends in the frame of the machine and at their inner ends in an intermediate bracket 65. The flipper 62 is provided at its inner end with a socket 66 which is adapted to receive a pin 67 carried by the inner end of the flipper 62'. The flipper 62' may be slid longitudinally upon its shaft 64 after the set screw 68 has been loosened so as to permit pin 67 to enter socket 66 in order to lock the two flippers together. The parts may be held in this position by again tightening the set screw 68. When the pin 67 and socket 66 are disengaged the two flippers are free to operate independently of each other. Each flipper has its own operating mechanism which is set in motion by the travel of sheets

or signatures therethrough, but when the two flippers are locked together the mechanism at one end operates both flippers as a unit.

The precise individual deflecting or flipper mechanism does not enter into the present invention, but the form illustrated will be described somewhat in detail in order to provide a complete disclosure of the invention. This mechanism is described and claimed in my copending application, Serial No. 263,891, filed March 22nd, 1928.

The wheels 70 on shaft 58 have unyielding metallic surfaces for cooperation with the shoes 71 that are actuated by the paper passing over the wheels 70, this being the means for setting in motion the flipper shifting mechanism. The shifting of the flippers 62, 62' from the position illustrated in Fig. 11 to that illustrated in Fig. 12 and vice versa serves to guide the signatures passing in contact with the flippers into two different courses.

A bar 72 of rectangular cross section is fixed in the frame. A bracket 73 is mounted upon the bar 72 and held in position by means of a set screw 74. A pintle 75 is fixed in the bracket 73 by means of a set screw 76, and projects laterally from the bracket to support for pivotal movement a bell crank 77. A horizontal arm of the bell crank 77 is bifurcated for the reception and pivotal mounting of the crescent-shaped shoe 71, heretofore mentioned, from the upper end of which projects a pin 78.

The upright arm of the bell crank 77 is provided with an inclined head 79 which is perforated for the reception of a stem 80 that is slidable to a slight extent in the head 79, and has a collar 81 which is fixed thereon for limiting such sliding movement in one direction. Sliding movement in the opposite direction is limited resiliently by a coil spring 82 surrounding the stem 80 and bearing at one end against the head 79 and at the other against a collar 83 fixed upon the stem 80. The upper end of the stem 80 is threaded in the bar 72 and is provided with a knurled head 86 by means of which it may be turned, and with a knurled lock nut 87. By virtue of this arrangement the pivot point for the shoe 71 may be adjusted accurately and held positively against downward movement, but has the capability of yielding slightly whenever an unusually thick sheet of paper tends to raise the shoe 71.

In order to hold the shoe 71 in the normal position illustrated in Figs. 11 and 12 and to return it to this position after being swung upon its pivot by a sheet or signature passing through the rolls 58, 59, I connect the upper end of the pin 78 with the fixed bar 72 by a tension spring 88.

In one wall of the frame above the shaft 59 I mount a stud 89 having a square head. A pivot pin 90 is threadedly mounted in the

stud 89. On this pin 90 a bell crank lever 91 is pivotally mounted to swing horizontally through a small angle. The long arm of this lever has a bifurcated end which straddles the pin 78, by means of which motion is imparted to the lever whenever the shoe 71 swings upon its pivot. The short arm of the lever 91 has a downturned lip 92 which is adapted, when in the position illustrated in Fig. 10, to engage finger 93 or 93' and when in its shifted position to engage finger 94 or 94'.

The action of spring 88, above mentioned, is limited by the fact that the bell crank 91 can swing no further, in response to the pull of spring 88, than the position indicated in Fig. 10.

The four fingers 93, 93', 94 and 94' are rigidly mounted in the hub of a mutilated gear 95 which is keyed to a shaft 96 that is journaled in one side wall of the frame. A stud 97 is threaded into the gear 95 near the periphery thereof and constitutes a crank upon which is pivotally mounted one end of a link 98, the opposite end of which is pivotally connected with a pin 99 or 99' that is attached to the flipper 62 or 62', as the case may be, near one corner thereof.

A gear 100 is loosely mounted upon the shaft 96 outside the frame and is continuously driven from gear 59' by means of an interposed idler 101. The gear 100, however, is pinned to a friction clutch 102 mounted upon the shaft 96. This clutch is shown in detail in Fig. 14. It consists of two blocks 103 and 104 provided with curved friction pieces shaped to fit the shaft 96, the two blocks being resiliently drawn together by studs 107 acting through coil springs 108, it being evident that the degree of friction exerted upon the shaft may be controlled by the adjustment of the studs 107.

Adjacent the shaft 96 there is also journaled a short shaft 109 carrying a gear 110 which meshes with and is driven by the gear 100. The gear 110 and the shaft 109, therefore, rotate continuously. On the inner end of the shaft 109 there is keyed a gear 112 which is adapted to mesh with the teeth of gear 95 when the toothed portions of the latter are in a position to permit such intermeshing.

Between the opposite walls of the frame I mount a shaft 114 carrying feed rolls 115. A second shaft 116 is supported in bearings carried by brackets 117 extending inwardly from the frame on each side. This latter shaft carries feed rolls 113 cooperating with the feed rolls 115. These rolls are adapted to receive sheets directed upwardly by the deflector 62, 62', when in the position of Fig. 11, and to deliver them onto the slowly moving stacker belt 60. When the deflector 62, 62' is in the position of Fig. 12 on the other hand, the sheets are guided downwardly by the underside of deflector 62, 62' over a

fixed deflector plate 119 onto the slowly running stacker belt 61.

The drive for the shaft 114 may come from shaft 59 through a train of gears 120, 121, 122, the latter gear being pinned to the shaft 114. Shaft 116 may be driven from shaft 114 by gears 123 and 124 inside the machine frame as shown near the top of Fig. 10.

In Figs. 15 and 16 I have shown in a diagrammatic manner the method that I follow in cutting and folding a 128 page sheet on my machine. In these figures the full lines indicate the cuts made in the sheet and the dotted lines indicate the folds. The sheet is divided by the cuts into four sections each having 16 pages and into eight sections each having 8 pages, the machine being adjusted and operated to fold together these eight page sections in pairs, thereby producing eight 16 page signatures from a single sheet. Fig. 15 is intended to represent a 128 page sheet of the sheetwise form. The paging may be varied more or less, and is not indicated in the figure.

Fig. 16 is similar to Fig. 15, but illustrates a paging which may be employed in connection with my method of cutting and folding where the work and turn form of sheet is used. In this figure the page numbers on the upper side of the sheet are shown in full lines and those on the lower side of the sheet in dotted lines. This form of sheet, as is well known in the art, produces two half sheets of 64 pages each.

In Fig. 1 I have shown at A a sheet of large size capable of being divided and folded into eight 16 page or four 32 page signatures of average size. B', B² represent two half sheets obtained by cutting in two the sheet A. C', C², C³ and C⁴ represent four quarter sheets, each having a single fold, formed by first folding and then cutting in two each of the half sheets B', B². D', D², D³ and D⁴ represent sections of one-eighth of the full size of the original sheets and are formed by folding and then cutting in two each of the two quarter size sheets C², C³, while E', E², E³ and E⁴ represent complete signatures formed by folding and cutting in two each of the quarter size sheets C' and C⁴ and then folding them again. It will be noted that sections D² and D⁴ as well as the signatures E² and E⁴ are each in one piece, while the sections D' and D³ and the signatures E' and E³ are each in two pieces folded together.

Operation

Assuming first that it is desired to cut and fold a 128 page work and turn sheet, such a sheet may be delivered to the table 12 from the feeder table 11. The rollers 13 immediately carry the sheet over against the guide bar 14, and the sheet travels forward along that guide bar through the feed rolls 16, 17, 120

being cut in two by the slitting knife 19 and trimmed by the knife 19'. The two half sheets are then deposited upon the table 22, the rollers 24 carrying sheet B' to the left and the rollers 25 carrying sheet B² to the right, the edge trimmed by the cutter 19' constituting a square edge parallel to the guide edge of the sheet A for contact with the guide bar 14' on the right side of the table 22, while the original guide edge of half sheet B' runs upon the guide bar 14' at the left of the table. The two half sheets B' and B², therefore, travel forwardly upon the table 22 side by side and in exact parallelism.

It is necessary that the upper surface of the half sheet B' be folded inwardly while the upper surface of the half sheet B² must be folded outwardly. Consequently, the first fold plate of the first fold section is arranged with a deflector on the right-hand side only, that is to say, reversely to the arrangement illustrated in Fig. 9. The second fold plate of the same section is arranged with a deflector on the left-hand side only, as shown in Fig. 9, and the two remaining fold plates each have deflectors extending entirely across the same. Hence, half sheet B' has one inward fold imparted to it and half sheet B² has one outward fold imparted to it, in this fold section.

Both of the half sheets B', B², emerge at substantially the same time from this first fold section and pass through feed rolls 30 and 31. The cutters 32 on the latter rolls slit the folded half sheets B' and B² into the four quarter sheets C', C², C³, C⁴, and the latter are all deposited onto table 33 simultaneously, or substantially so. Their motion is stopped by the guide bars 37, 37', and transverse motion is imparted to them by the rollers 35 and 36, C' and C² moving toward the left in single file and C³ and C⁴ moving toward the right also in single file.

The quarter sheet C' enters the cross fold section comprising rolls 40 and fold plates 41 and has an inward fold imparted to it. Immediately after it leaves this fold section it enters feed rolls 42 where it is slitted into two parts by the cutters 43. The quarter sheet C² following along an instant later passes through the same folding and slitting operations. The folded and severed parts of quarter sheet C² become the sections D' and D², the section D' passing over tape conveyor 50 and the section D² passing directly onto the rollers 45 of table 44. D² is stopped by guide bar 48 and begins its travel forwardly on the table. D', which has a slightly greater distance to travel across the table, comes to a stop against guide bar 46 a trifle later, and hence its travel along the table 44 is somewhat delayed with respect to that of section D².

The two sections of quarter sheet C' which preceded the sections D', D² entered the final fold section 55 one at a time and were each

given an inward fold, thereby becoming finished signatures E' and E². E², being somewhat in advance, was the first to enter the feed rolls 56, pass over the plate 57 and enter the rolls 58, 59. We will assume that the flipper 62' and its associated parts at that time were in the positions illustrated in Fig. 11. The forward edge or fold of the signature then swings the roller end of shoe 71 to the right. The pin 78 of the shoe consequently moves to the left and draws the bell crank lever 91 away from the position illustrated in Fig. 10 to a position where the lip 92 of the bell crank lever is opposite the finger 94. The lip 92, therefore, disengages finger 93 and permits the shaft 96 to be turned a short distance counter-clockwise, that is through gear 100 and friction clutch 102, until the lip 92 engages finger 94, when the shaft 96 is again stopped. The shoe is held in its tilted position until the rear edge of the signature leaves the rolls 58, 59. The forward edge of the signature is by that time traveling over the flipper 62', and an instant later is grasped by the rolls 114, 116. As soon as the lower end of the shoe 71 is free of the signature the spring 88 swings the shoe back into its normal position. At the same time the pin 78 swings the bell crank 91 back into the position of Fig. 10. Thereupon the lip 92 disengages the finger 94 and the shaft 96 is again rotated counter-clockwise through the intermediacy of the gear 100 and friction clutch 102. The rotation of the shaft 96 tends to continue through a little less than 180°, that is until the finger 93' comes into contact with the lip 92 and the lever 91.

However, I provide additional means for insuring a positive mechanical drive after the movement is started by the friction clutch connection between gear 100 and shaft 96. This means consists of the gears 110 and 112 and the shaft 109. In the normal position of the parts one of the flattened sides of the gear 95 is adjacent the teeth of gear 112. The movement of gear 95 through a slight angle, represented by the angle between fingers 93 and 94, is not sufficient to cause the teeth of gear 95 to come into mesh with those of gear 112. However, when the lever 91 has swung back again to the position of Fig. 10 and disengaged finger 93, the clutch mechanism turns the gear 95 again counter-clockwise and immediately one series of teeth in the gear 95 begins to mesh with the teeth of gear 112. The gear 112 has a continuous positive mechanical rotation and, consequently, it imparts a positive mechanical rotation to the gear 95 until the other flat side of that gear comes opposite the gear 112.

The rotation of the gear 95 through substantially 180° causes the crank pin 97 to turn from its upper center position, illustrated in Figs. 11 and 13, to its lower center position illustrated in Fig. 12, thereby forcing down-

wardly link 98 and swinging the flipper 62' to the position shown in Fig. 12. This shifting of the deflector occurs in the interval between the instant the rear edge of the signature E² leaves the rolls 58, 59 and the instant the forward edge of the succeeding signature (that is the one corresponding to the section D²) begins to be engaged by these rolls. Consequently, when the second signature advances through the rolls the flipper 62' is in position to guide the signature downwardly against the guide plate 119 and thence onto the lower belt 61.

If it be assumed that the flipper 62 is also in the position illustrated in Figs. 11 and 13, when the signature E' passes this flipper, that signature also will be directed upwardly and onto the same belt conveyor 69 as the signature E², the two rows of signatures on the belt being spaced apart sufficiently to prevent any possible intermingling. The two sections E' and E² do not pass through the flipper mechanism at the same time and, therefore, it is necessary to operate the two flippers 62 and 62' independently. It will be noted also that these mechanisms are not timed with respect to other operations performed upon the machine, but that they are controlled entirely by the travel of the signatures themselves.

When the signatures corresponding to sections D' and D² approach the sorting mechanism, the flippers 62 and 62' are in the position illustrated in Fig. 12, and these signatures therefore are deflected onto the lower belt conveyor 61, their passage through the sorting mechanism causing the resetting of the flippers to the position of Fig. 11 ready for the next succeeding pair of signatures. The movements of the parts are the same for each operation except for the fact that the link 98 moves downwardly in one operation due to the movement of the crank pin 97 through one-half revolution from upper center to lower center, and upwardly in the next succeeding operation due to the movement of the crank pin 97 through the upper half of its revolution.

The quarter sheets C³ and C⁴ are acted upon in a manner similar to that described with respect to quarter sheets C' and C² except that the second and third fold sections on the right-hand side of the machine are set to fold the upper surface of the paper outwardly instead of inwardly.

The belt conveyor 50 and the guide bars 48 are made removable, so that when the printing on the quarter sheets C' and C² is identical the signatures coming from each side of the machine may be stacked in two piles instead of four. Under such circumstances the slitters 43 may or may not be used. When the machine is thus set up for single file travel of paper sections along the table 44, and par-

ticularly if the signatures are wider than one of the flippers 62, 62', I loosen the set screw 68 and slide the flipper 62' inwardly, causing the pin 67 to enter the socket 66 and the crank pin 99 to be withdrawn from engagement with flipper 62' after which I again tighten the set screw 68. The two flippers then function as one.

It will be obvious also that if the character of the printing upon the original sheet calls for such manipulation, the table 44 on one side of the machine may be arranged to carry paper sections in single file, while that on the opposite side is arranged for signatures traveling in two parallel paths, the sorting mechanism on the two sides being adjusted accordingly.

It will be obvious further that while the machine is particularly adaptable for handling 128 page sheets, the number of pages may be either increased or decreased and properly cut and folded by changes in the number of folding or cutting operations, or both.

When a 128 page sheetwise form is to be handled on the machine the fold plates throughout will usually be set the same on both sides of the machine although, as will be appreciated, the paging of the sheets will affect the direction in which the folds are to be made, and it is quite possible to use the same machine set up for both sheetwise and work and turn forms if the sheetwise forms are printed with this object in mind.

The drawings and description herein have been made somewhat specific in order to fully disclose the invention in one of its forms, but I desire it to be understood that such disclosure is primarily illustrative in character and is not to be construed as limiting the invention.

Having thus described my invention, I claim:

1. In a paper handling machine, adapted to slit sheets during the movement thereof, a feed table onto which the divisions of said sheets are deposited, parallel guides at the outer sides of said table, and means for causing the divisions of the sheets to travel along the guides.

2. In a paper handling machine, adapted to slit sheets parallel to the direction of feed thereof and to trim the sheets along the rough edge in a line parallel with the said slit, a feed table onto which the divisions of said sheets are deposited, parallel guides at the outer sides of said table, and means for causing the guide edge of one division and the trimmed edge of the other division of each sheet to travel in contact with the guides.

3. In a paper handling machine, a feed table adapted to receive two sheets side by side at one end of the table, said table comprising two sets of diagonally arranged conveyors each adapted to receive one of said sheets, each conveyor being adapted to move the

sheets thereon forwardly and toward the sides of the table, and parallel guides at the sides of the table.

4. In a paper handling machine adapted to trim the sheets along one edge as they move through the machine, a feed table divided longitudinally into two sections, said table comprising two conveyors one on each side of its division line, each conveyor being adapted to direct sheets outwardly as well as forwardly, guides along the sides of the table, and means for driving said conveyors.

5. In a paper handling machine, a feed table divided longitudinally into two sections, said table comprising two conveyors one for each of said sections, each conveyor being adapted to direct sheets outwardly as well as forwardly, guides along the sides of the table adjustable inwardly and outwardly, means for driving said conveyors, and means for delivering two sheets side by side onto the intake end of said table.

6. In a machine of the class described, means for feeding sheets in a plurality of parallel paths, means for diverting the sheets in each path into one of a corresponding number of parallel paths arranged side by side at an angle with respect to said first-named paths, and means for stacking alternate sheets in each of the second-named paths separately.

7. In a machine of the class described, means for feeding sheets in a plurality of parallel paths, a conveyor arranged at right angles to the said paths adapted to receive the sheets therefrom, means for stopping the said sheets in their movement crosswise of the conveyor, said conveyor having different longitudinal sections or portions each adapted to receive the sheets from one of said paths, and means for stacking separately alternate sheets traveling in each of said longitudinal sections.

8. In a machine of the class described, means for feeding sheets in a plurality of parallel paths, a conveyor arranged at right angles to said paths adapted to receive the sheets therefrom, and a plurality of spaced fences arranged transversely of said paths above the surface of said conveyor, each fence being adapted to stop the movement of the sheets in one of said paths and guide their movement in a separate course upon said conveyor, and means for stacking separately alternate sheets traversing any one of said courses.

9. In a machine of the class described, sheet feeding means adapted to deliver side by side the sections of a slitted sheet, sheet conveying means operating in a transverse direction adapted to receive the individual sections of the sheet, means associated with said conveying means for causing the paths of movement of the individual sheets on said conveying means to be spaced apart, and

means for stacking separately alternate sheets in each of said paths of movement.

10. In a machine of the class described, sheet feeding means adapted to deliver side by side the sections of a slitted sheet, sheet conveying means operating in a transverse direction adapted to receive the individual sections of the sheet, means associated with said conveying means for causing the paths of movement of the individual sheets on said conveying means to be spaced apart, and means located beyond the delivery end of said conveying means and controlled by the sheet movements for directing into different courses sheets traversing one of said paths of movement.

11. In a machine of the class described, means for feeding sheets in a plurality of parallel paths, means for diverting sheets in each path into one of a corresponding number of parallel paths arranged side by side at an angle with respect to said first-named paths, a sheet flipper at the delivery end of one of said second-named paths, said flipper being adapted to assume a plurality of different positions, whereby the sheets moving in said path may be directed into a plurality of different courses, and means for moving said flipper from one position to another, said means being adapted to be set in motion by the travel of the sheets.

12. In a machine of the class described, means for feeding sheets in a plurality of parallel paths, means for diverting sheets in each path into one of a corresponding number of parallel paths arranged side by side at an angle with respect to said first-named paths, independently functioning sheet flippers at the delivery end of each of said second-named paths, said flippers being adapted to assume a plurality of different positions whereby the sheets may be directed into a plurality of different courses, and means for moving said flippers from one position to another, said means being adapted to be set in motion by the travel of the sheets.

13. In a machine of the class described, means for feeding sheets in two parallel paths, means for diverting the sheets in each path into one of two parallel paths arranged side by side at an angle with respect to said first-named paths, independently functioning sheet flippers at the delivery end of each of said second-named paths, each of said flippers being adapted to assume two different positions whereby the sheets passing thereover may be directed into two different courses, means for moving said flippers from one position to the other, and a pair of superposed conveyors each adapted to receive the sheets from one course of both paths.

14. In a machine of the class described, a sheet feeding carrier adapted to provide travel of the sheets carried thereon either in a single path or in separate parallel paths,

a sheet deflector at the delivery end of said carrier having elements in alignment with said parallel paths adapted to assume independently a plurality of different positions, whereby the sheets in each path may be directed into a plurality of different courses, means for moving said elements independently from one position to another, and means for uniting said elements, whereby sheets moving in the single path aforesaid may be directed into a plurality of different courses.

15. In a machine of the class described, a sheet feeding carrier adapted to provide travel of the sheets carried thereon either in a single path or in separate parallel paths, a sheet deflector at the delivery end of said carrier having elements in alignment with said parallel paths adapted to assume independently a plurality of different positions, whereby the sheets in each path may be directed into a plurality of different courses, means for moving said elements independently from one position to another, said means being adapted to be set in motion by the travel of the sheets, and means for uniting said elements, whereby sheets moving in the single path aforesaid may be directed into a plurality of different courses, both elements then being actuated simultaneously by the sheets moving in the single path aforesaid.

16. In a machine of the class described, a sheet feeding carrier adapted to provide travel of the sheets carried thereon either in a single path or in separate parallel paths, a sheet deflector at the delivery end of said carrier having elements in alignment with said parallel paths adapted to assume independently a plurality of different positions, whereby the sheets in each path may be directed into a plurality of different courses, means for moving said elements independently from one position to another, a common intermediate bearing for said elements for locking said two elements together to function as a single deflector, whereby sheets moving in the single path aforesaid may be directed into a plurality of different courses.

17. In a machine of the class described, a sheet feeding carrier adapted to provide travel of the sheets carried thereon in separate parallel paths, a sheet deflector at the delivery end of said carrier having elements in alignment with said parallel paths adapted to assume independently a plurality of different positions whereby the sheets in each path may be directed into a plurality of different courses, and separate control means associated with each element adapted to be set in motion by each travelling sheet for shifting the corresponding element back and forth from one operative position to the other, each of said control means functioning independently of the other.

18. In a paper handling machine adapted to slit sheets parallel to the direction of feed

thereof, feeding rolls, a feed table adapted to receive sheets from said rolls, said table being divided longitudinally into two sections adapted to receive the two divisions of the slitted sheet, said table comprising two conveyors one on each side of its division line, each conveyor being adapted to direct sheets outwardly as well as forwardly, guides along the sides of the table, and means for driving said conveyors.

19. In a machine of the class described, a sheet feeding carrier adapted to provide travel of the sheets carried thereon either in a single path or in separate parallel paths, a sheet deflector at the delivery end of said carrier having elements in alignment with said parallel paths adapted to assume independently a plurality of different positions, whereby the sheets in each path may be directed into a plurality of different courses, means for moving said elements independently from one position to another, a common intermediate bearing for said elements having an external diameter no greater than the distance between the sides of said deflector elements, and means for locking said two elements together to function as a single deflector, whereby sheets moving in the single path aforesaid may be directed into a plurality of different courses.

In testimony whereof, I hereunto affix my signature.

REUBEN HITCHCOCK.