Sept. 16, 1941. T. S. FITCHETT 2,256,244

PRINTER SLOTTER, COMBINED FULL ROLL, AND GATE CONTROL

Filed Jan. 14, 1941 4 Sheets-Sheet 1

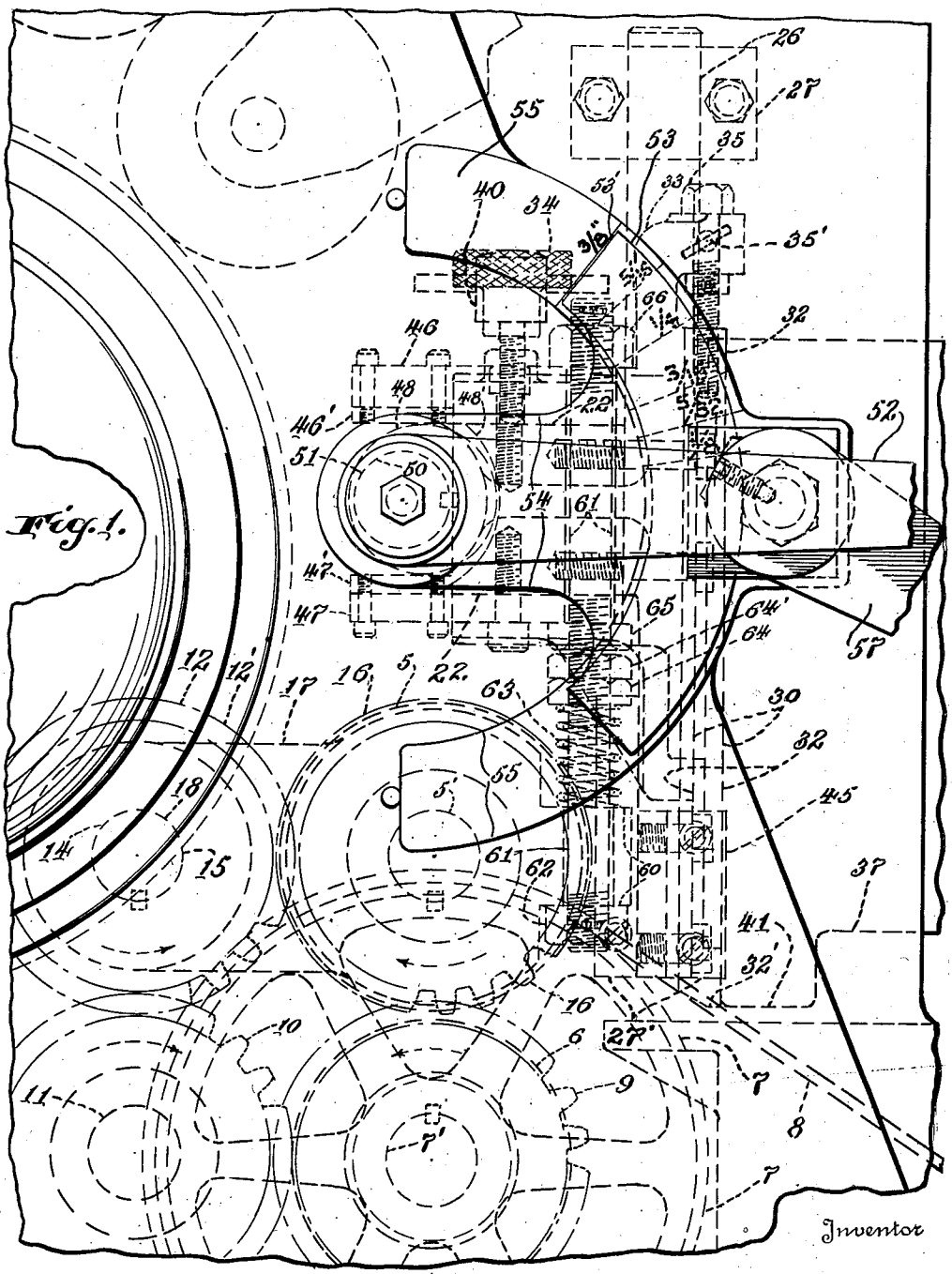


Fig. 1.

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Filed Jan. 14, 1941 4 Sheets-Sheet 2

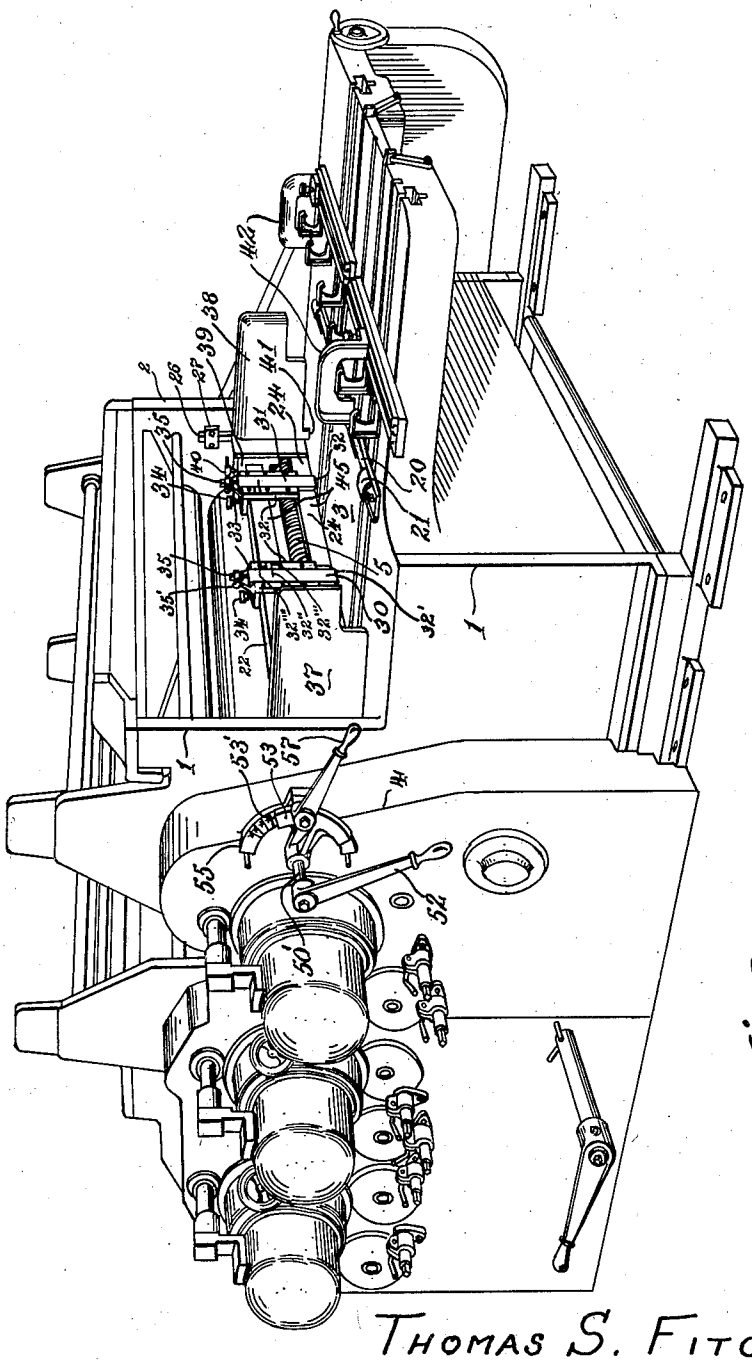


Fig. 2.

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PRINTER SLOTTER, COMBINED FULL ROLL, AND GATE CONTROL

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Fig. 3.

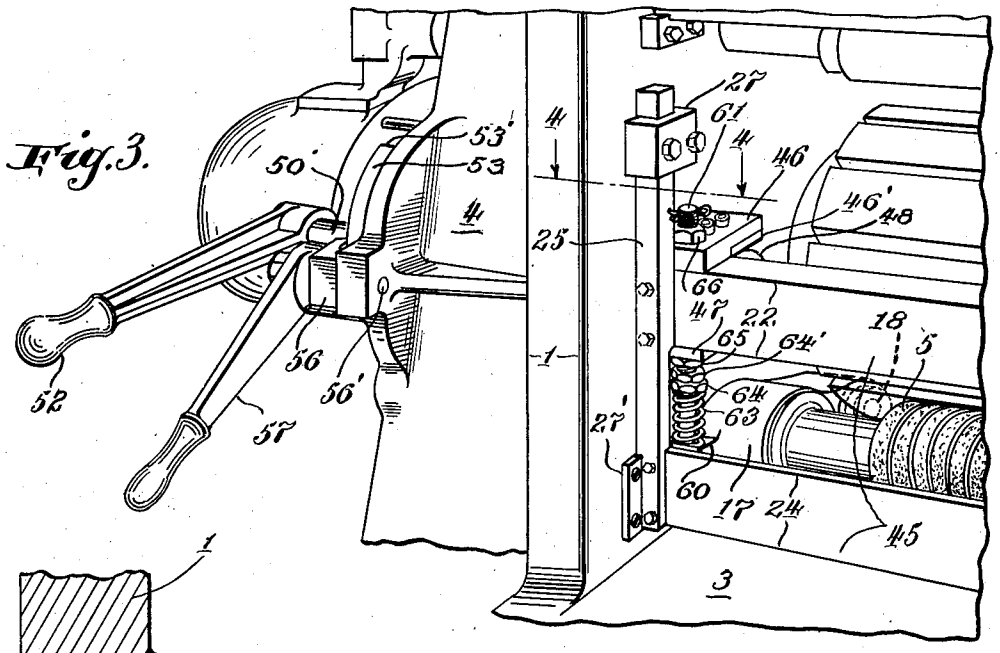
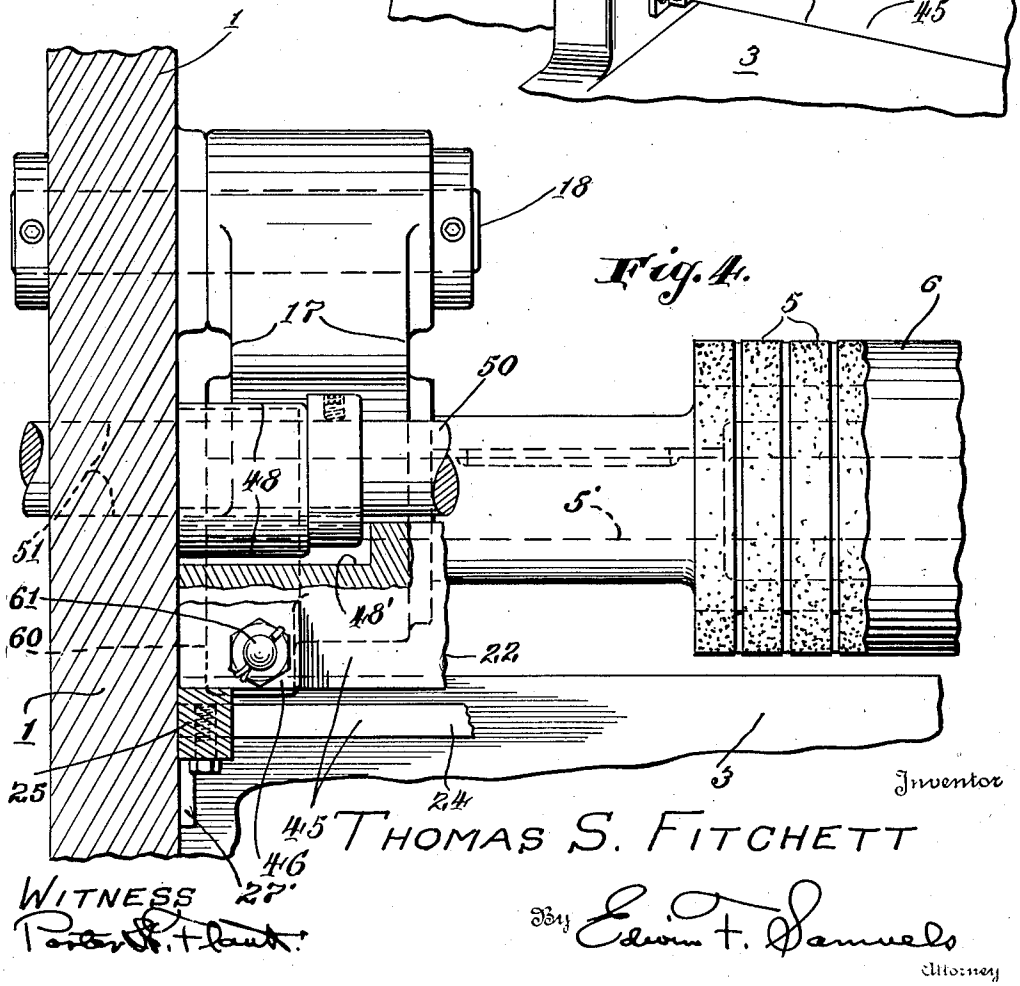


Fig. 4.



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Filed Jan. 14, 1941 4 Sheets-Sheet 4

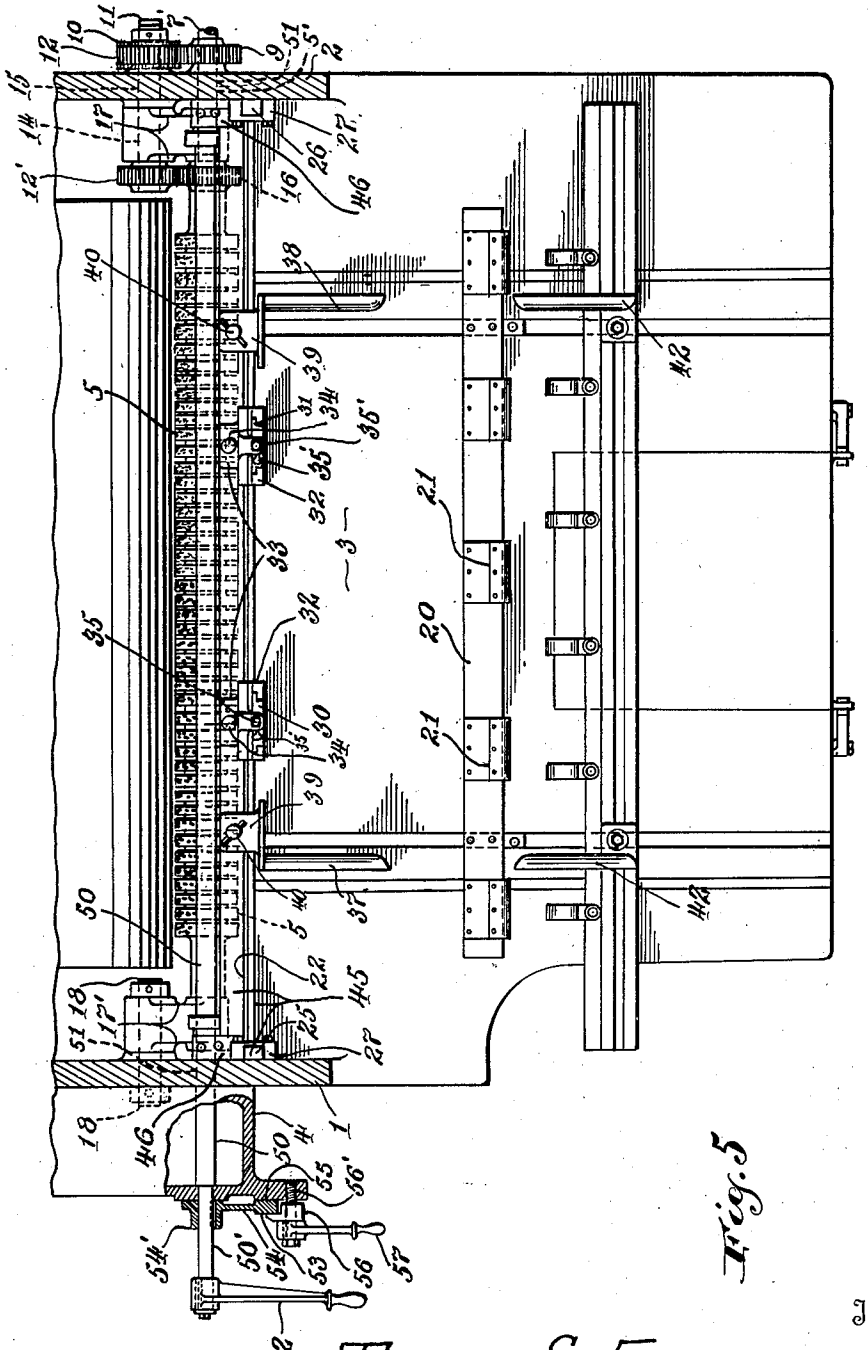


Fig. 5

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2,256,244

UNITED STATES PATENT OFFICE

2,256,244

PRINTER SLOTTER, COMBINED PULL ROLL, AND GATE CONTROL

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Application January 14, 1941, Serial No. 374,338

15 Claims. (Cl. 271—10)

The invention relates to printer slotters used for printing and slotting carton blanks which are usually of double face corrugated board or the like, corrugated board being most generally used for this purpose. This material comes in six different standard thicknesses, varying in actual measurement from one-eighth to three-eighths of an inch but designated by letter, AA indicates double double, ⅜ inch. On account of the use of these different thicknesses frequent adjustment of the machines to the thickness of material is required.

The use of any printer slotter involves a considerable overhead which includes initial cost, floor space, and a portion of the time of a skilled operator or mechanic. In connection with the latter item, it is important that the services of one mechanic be widely distributed to include supervision of and attendance to as many machines as possible.

In the operation of the modern machine of the printer slotter type comparatively high speeds are employed and the blanks are accelerated in a space of a few inches by the reciprocating feed and pull rollers from no speed to a speed of about one thousand feet per minute. The initial feeding of the blanks to the pull rollers is a positive operation performed by the reciprocating feed for the blanks and slippage at the pull rolls, due to too slight tension of the rolls would cause interference between the successive blanks with stoppage of the machine and consequent loss of time of the machine and the attendant and waste of material. On the other hand, too much tension between the rolls, i. e., too great compression, injures the corrugated board.

In order to limit the feed to a single blank at each reciprocation of the feed bar, the machines are provided at the rear of the feed table with a plurality of gates, spaced above the surface of the table by an interval corresponding to or slightly exceeding the thickness of the blanks being used. Thus both the gates and the pull rolls must be adjusted to each change of the blanks being fed to correspond to the change of thickness. This adjustment is in accordance with the existing practice usually performed separately as to each gate, and because of the high speed at which the blanks are presented and passed through the machine, it must be determined and maintained with extreme accuracy. With the types of machines in use it is necessary for the mechanic, when adjusting the gates, to see the bottom operative ends of the gates which are usually obscured by the ends of the blanks on the table, hence such changes of adjustment must be performed when the table is clear of blanks, and, if adjustment becomes necessary when a stack of blanks is on the machine they must be removed for this purpose. On account of the weight of the blanks, this often requires the combined efforts of two attendants and a corresponding loss of time.

Aside from the difficulties incident to obtaining access to the operative ends of the gates to determine the adjustment, separate adjustment of the pull rolls is also necessary. The adjustment of each gate in addition to the separate adjustment of one pull roll to conform to changes from one thickness of blank to another, requires a considerable amount of time and effort on the part of the mechanic skilled in this art and a corresponding expense. It is further to be noted that during this period the machine itself is necessarily idle involving a still further loss of efficiency of the plant.

A further interesting condition bearing on the subject of the adjustment of these parts is that the gates under the present practice are seldom adjusted with the desired degree of uniformity as to the spacing of the respective gates from the table and the adjustment of the gates in precise conformance to the adjustment of the pull rolls is also of more unusual occurrence.

Under these circumstances, the blanks tend to become displaced, stuck and injured in various ways resulting in a defective product and not infrequently in an extensive loss of time of the machine and the operator or in injury to the machine.

It is a matter of considerable interest that the adjustment of the grip of the pull rolls must correspond to the adjustment of the gates in changing from one thickness of corrugated board to another particularly with the comparatively thin material, but the change of adjustment of the gates as the thickness of the board increases may to considerable advantage be greater than the change of adjustment of the rolls, giving free passage of the thicker board. This is because in the gripping of the corrugated board to provide the rapid acceleration described the corrugated board is compressed and the rolls, being preferably resilient, are likewise compressed, and this adjustment must be accurate to give the proper grip to prevent slippage, and at the same time to avoid crushing of the board. On the other hand, the spacing of the gates from the table is determined by the condition that the gates must permit free passage of each over-lying

blank. Between these limits freedom of movement of the fed blanks and hence extra spacing of the gates from the table is of advantage as there is some variation in thickness of the blanks and some defects giving the effect of increased thickness at certain areas. One instance of such a defect is where the edges of the blanks are spread. An advantage of the present improvement is that this extra spacing of the gates is accomplished automatically as the rolls are adjusted to thicker material.

Advantages obtained by the improved construction which are regarded as of importance are that instead of two, three or even four adjustments, i. e., of the separate gates and of the respective ends of one pull roll, a single adjustment is provided whereby both gates and both ends of the pull roll are moved simultaneously by a single operation and in proper proportion, the extent of the adjustment required to conform the parts adjusted to the standard thickness of corrugated board being determined by an indicator on the outside of the machine. This indicator is closely related to the handle by which the adjustment is operated so that the extent of the adjustment can be closely observed by the operator in moving the handle. It is of importance that no observation or measurement by the operator of the actual position of the gates or of the rolls is necessary or even desirable. The importance of the saving thus accomplished is believed to be apparent.

In the accompanying drawings, I have illustrated so much of a printer slotter to which the invention has been applied as is necessary to a full comprehension of the nature and operation of the same.

In the drawings:

Fig. 1 is a fragmentary side elevation, on a relatively large scale, of the pull rolls and gates with the adjacent portions of the printer slotter looking from the left side of the machine as viewed by the operator facing the infeed end, the control or adjustment feature referred to being included.

Fig. 2 is a perspective view looking at the front or infeed end of the machine and the side of the same on the operator's left.

Fig. 3 is a perspective view looking from the front center of the machine outwardly and backwardly toward the left.

Fig. 4 is a horizontal section on the line 4—4 in Fig. 3 looking downwardly.

Fig. 5 is a plan view of the top pull roll, gates, feed table, etc., the frame being sectioned and broken away immediately above the top pull roll shaft for convenience of illustration.

Referring to the drawings by numerals each of which is to indicate the same or similar parts in the different figures, the machine as shown comprises side frames 1 and 2, feed table 3, at the front and gear housing 4 at the left side.

The top pull roll which is the one which, in accordance with the preferred form of the invention illustrated, is adjustable as hereinafter described, is indicated by reference character 5, and the co-operating bottom pull roll by reference character 6.

The pressure rolls, printing cylinders, slotting and scoring rolls back of the pull rolls may be in accordance with regular practice, and having no bearing on the present invention are not illustrated, a full illustration of a printer slotter suitable to the application of the invention being found in Patent No. 2,191,988 to Henry B. Greenwood. However, the mechanism of the invention may be applied to various types of printer slotters.

The lower pull roll 6 is mounted on the shaft 7' of a pulley 7 driven by belt 8, or said shaft 7' may be driven in any suitable manner. Shaft 7' has secured thereto a toothed gear 9 which meshes with a second toothed gear 10 on a shaft 11 directly back of the shaft 7'. This gear 10 in turn meshes with a toothed gear 12 mounted on the shaft 14 and secured thereto, said shaft 14 being above the shaft 11 and directly back of the shaft 5' on which the top pull roll 5 is mounted. The shaft 14 is mounted in bearing 15 shown in plan in Fig. 5. Said shaft 14 carries at its opposite end to that on which the gear 12 is mounted, i. e., at its left end, a second gear 12' which meshes with gear 16 mounted on the shaft 5' of the top pull roll 5 and secured to said shaft. Thus the gear 16 drives the top pull roll the adjustment of which is to be further discussed.

All of the gears 9, 10, 12, 12' and 16 are of the same size, having the same number of teeth so that the top pull roll 5 is driven at the same speed as the bottom pull roll 6.

The shaft 5' is mounted at its opposite ends in suitable bearings in swinging arms 17 and 17' shown in broken lines in side elevation in Fig. 1 and in top plan in Fig. 5. The arm 17 is mounted to swing about the shaft 14 and the arm 17' is similarly mounted on a stud 18 seated in the side frame 1 and in axial alignment with the stud shaft 14 which is seated in the side frame 2 on the opposite side of the machine. The stud 18 and the stud shaft 14 are relatively short, as shown, to prevent interference with the rolls. They are further so arranged as to carry the arms 17 and 17' on the inside of the frame members 1 and 2.

The stud shaft 14 and the stud 18 being in alignment the top pull roll 5 and its driving gear 16 and the shaft 5' on which the gear and top pull roll are mounted is swung about the center of the shaft 14 and incidentally of the stud 18 to move the pull roll 5 up and down in the adjustment of said pull roll relatively to the lower pull roll 6 and hence to the thickness of the corrugated paper blanks being operated upon. The structure described provides for said adjustment, the gears 12' and 16 remaining in normal mesh in any and all positions of the top pull roll 5 and its gear 16, maintaining the operative connection of both rolls 5 and 6 to and with pulley 7.

Reference has already been made to table 3 at the front of the machine which is intended to support the stacks of corrugated box blanks to be operated upon. This table is provided with a high speed reciprocating feed bar 20 having suitable fingers 21 for gripping the edge of the bottom blank to advance each bottom blank in turn into the grip of the pull roll. This feed motion is well known in this general type of machine, hence the mechanism for operating it is not fully illustrated.

According to the existing practice this feed bar 20 may be reciprocated at the rate of about three hundred strokes per minute.

At the rear of the table the machine is provided with upper and lower transverse bars 22 and 24 extending across the machine from one side frame 1 to the other side frame 2. These transverse bars 22 and 24 are connected together, in the form of the invention shown, by vertical uprights 25 and 26 at the opposite sides of the

machine. These uprights 25 and 26 lie flat against the respective side frames 1 and 2, being mounted to slide in upper and lower guides 27 and 27' at the left side of the machine secured to side frame 1 on the inner face of the same and identical guides similarly indicated at the other side of the machine and secured to the inner face of side frames 2. The lower guide at the right side of the machine is not apparent in any of the figures, it is, however, precisely similar to guide 27'.

Referring now to Figs. 2 and 5, the gates 30 and 31 are mounted in slide ways 32 secured to the upper transverse bar 22 by means of brackets 33 and clamping screws 34 so that they may, if desired, be slid along the transverse bars. The lower ends of the slide ways or guides 32 rest against the lower transverse bar 24.

The gates 30 and 31 are adjustable vertically by means of adjusting screws 35 swiveled in the brackets 33 and threaded into the upper ends of the gates 30, 31.

It will also be noted that the rear hopper sides 37 and 38 best shown in Fig. 5 are mounted on the top transverse bar 22 and secured thereto by means of brackets 39 and clamping screws 40.

It is of interest that hopper sides 37 and 38 move up and down with the adjustment of the gates as hereinafter described, the rear portion of the bottom edge at 41, Fig. 1 being on a level with the lower end 32' of the gates 30, 31.

As the gates must always be adjusted upwardly from the table by a distance equal to or greater than the thickness of the blanks being used, it is obvious that the bottom blank will always be free of the sides of the hopper, this gives increased freedom of feeding. As already pointed out, the cross bars 22, 24 and the vertical slide bars 25 and 26 to which the cross bars are secured, as best shown in Fig. 3, constitute a carrier 45 on which the gates 30, 31 are mounted and on which the rear hopper sides 37, 38 may also be mounted. The rear hopper sides 42, see Fig. 2, are mounted on the table as shown.

The carrier 45 mounted to slide up and down as best illustrated in Fig. 3, is provided at each end of said carrier immediately adjacent the corresponding side frames with follower arms in the form of upper and lower plates 46 and 47, see particularly Fig. 1, the upper plate 46 also being clearly shown in Fig. 3. In accordance with the details shown the arms 46 and 47 are secured to the top bar 22 being positioned by the upper and lower surfaces of said bar as in any suitable manner to co-operate with the eccentric to be described. These arms 46 and 47 are provided with bearing blocks 46' and 47'. These arms 46 and 47 and the bearing blocks 46' and 47' are duplicated on the opposite sides of the machine. The members 46, 47 are shown in Fig. 3 immediately adjacent the side frame 1, the opposite side of the mahcine being a duplicate of the portion shown in Fig. 3 as to these elements.

The bearing blocks 46' and 47' at each side of the machine which are preferably horizontal engage the upper and lower tangent points of corresponding eccentrics 48, see Figs. 1 and 4, it being noted in Fig. 1 that the transverse bar 22 is cut away at 48' to accommodate the eccentric.

The eccentrics 48 of which there are two, one on each side of the machine closely adjacent the side frames 1 and 2 are mounted on and secured to the transverse eccentric shaft 50 which extends across the machine from side to side being best shown in Figs. 4 and 5. This shaft is mounted in suitable bearings 51 in the said side frames and extends out through the gear casing 4 as best shown in Fig. 5.

The said eccentric shaft 50 is shown as of reduced diameter at 50' outside the casing 4 and has secured to its outer end an operating handle 52 shown in Fig. 5 and also shown broken away in Fig. 1. This shaft has secured to its outer portion as outside the casing, an arcuate indicator member 53, see Figs. 1 and 5, connected to the shaft by an arm 54 on a hub 54' on said shaft, and this indicator 53 slides over a stationary arcuate scale plate 55, best shown in Fig. 1, the indicator 53 being moved over the scale as the lever 52 is operated, turning the shaft 50.

It is important to note that the indicator 53 which is rigid with the shaft 50 is locked in position relatively to the arcuate scale 55 thus locking the entire adjustment by means of a clamping block 56 as shown in Fig. 5, to which pressure is applied by means of a screw 56' operated by clamping arm 57.

The operation of lever 52, rotating shaft 50, moves the carrier 45 up and down by the operation of the eccentrics 48 which eccentrics are in precisely uniform angular arrangement and alignment on and about shaft 50 which is supported in fixed bearings in the opposite side frames.

The eccentrics have a very slight throw possibly not more than three eighths to half an inch, the maximum useful motion of the carrier 45 and the gates 30, 31 being the thickness of the thickest blank to be operated upon.

The scale 55 is graduated in fractions of an inch or other units, the respective graduations indicating the positions of the gates suitable to operation upon corrugated board of these respective thicknesses, i. e., when the gates are in desired position for operating on board of any predetermined thickness the top edge 53' of the indicator 53 is on the corresponding graduation. These graduations may be marked with the thickness dimension corresponding to the thickness of the board or with any suitable character for this purpose or the graduations may be used alone.

It may be noted at this point that the board of the respective thicknesses is known more generally by arbitrary symbols than by the dimensions above given which are approximate rather than precise. The setting of the gates above the table 3 is not usually the exact thickness of the board but a slightly higher position found to be suitable to the operation on the thickness of the board indicated.

The top pull roll 5 or more particularly the shaft 5' thereof has been described as mounted in suitable bearings in the arms 17, 17' at the opposite ends of the machine which arms are pivotally mounted on the shaft 14 and stud shaft 18 seated in the opposite side frames in axial alignment, so that these arms swing about the center of the stud shafts 14 and 18. The stud shaft 14 carries the gears 12 and 12', by which latter gear, the gear 16 on the shaft 5' of roll 5 is driven, and hence said roll 5.

The arms 17 and 17' are provided each at its forward end with a lug 60, see Fig. 1. These lugs are suspended from or connected by bolts 61 to the transverse bar 22 at the corresponding ends of said bar. The upper end of one said bolt is shown at 61 in Fig. 3 where it extends upwardly

through the block or arm 46 which is mounted on the top of transverse bar 22.

These bolts 61, one in each end of the machine, have threaded on their lower end nuts 62 which bear directly against the lower surfaces of the lugs 60 and immediately above these lugs said bolts are enclosed within corresponding helical springs 63 which are compressed between the top surfaces of said lugs and corresponding abutment nuts 64 each of which is held in adjusted position by a lock nut 64'. In the form shown there is a nut 65 tightened up against the bottom of the transverse bar 22 or more particularly the arm 47 secured to the bottom surface of the same.

It will be noted in Fig. 1 that these bolts 61 are rather loosely related to the corresponding holes in the lugs 60. It will also be noted that the lever arm from the center of shaft 14 to the center of shaft 5' is considerably less than the lever arm from the center of shaft 14 to the bolts 61 and hence the vertical motion of the top pull roll 5 is less than that of the bolt and less than that of the carriage 45 and the top transverse bar 22 and hence less than the motion of the gates in adjusting.

It will be noted that the carriage 45 being moved to its lowest point before the blanks are placed on the table and before the machine is ready for operation, the gates 30, 31 may be adjusted by means of the screws 35 downwardly against the table 3 and suitably clamped by the lock screws 35' provided for this purpose. The gates can be thus brought into exact horizontal alignment of their lower ends with each other and in all subsequent adjustment they may be made to retain exactly the same relation.

In the operation of the machine a stack of blanks of a suitable thickness is placed on the table 3 between the hopper sides 37, 38 and 42, 42', the front edges of the blanks bearing against the gates 30, 31.

The relation of the pull roll 5 to the gates 30, 31 is then adjusted, usually by means of the nuts 62, nuts 64, 64', 65, 66, being used for more extensive adjustment. Springs 63 provide upward yielding of top pull roll 5, in response to the tightening of the nuts 62, holding the parts in adjusted position. The relation of the gates 30, 31, to the top pull roll can be determined in the initial adjustment of each machine. It will be noted that the operative relation of the top pull roll 5 to the gates 30, 31 which preferably have a standard position on the carriage, is determined by the adjustment of nut 62 on the tension member or bolt 61 which bolt may for long adjustments be adjusted relative to transverse bar 22, by nuts 65 and 66.

When these adjustments have been determined, the gates 30, 31 and their guideways 32 are preferably provided with mark 32'' on the gate and 32''', 32'''' on the guideways, whereby two positions of the gates may be indicated, the lower adjustment being for the regular quality of board of any thickness to which the carriage 45 is adjusted and the upper adjustment for occasional use with rough or poor quality board, operating at the same adjustment of the pull rolls and carriage. The gates can be moved from one said position 32'', 32''' to the other and back to the original position without loss of the predetermined relation of pull roll adjustment to gate adjustment.

The blanks of any particular weight of corrugated board or the like as AA corrugated board which is about three eighths of an inch thick having been placed on the table 3 with their front edges against the gates 30, 31, as aforesaid, and their side edges bearing on the sides 37, 38 and 42, 42 of the hopper which is adjustable for this purpose, the clamping arm 57 is moved to release the clamping block 56 by turning the screw 56'. The arm 52 is then moved to bring the upper indicating edge 53' of the indicator 53 against the 3/8'' mark on the scale arc 55 corresponding to the thickness of corrugated board to be used. In this way the gates 30, 31 each of them at exactly the same level are brought immediately to the proper adjustment for admitting to the pull rolls 5 and 6, a single line of blanks of this thickness to be fed successively by the reciprocating feed bar 20 and fingers 21. By the same motion of the arm 52 the upper roll 5 of the pull rolls 5, 6 is moved to exactly the correct position relatively to the lower roll 6 for gripping and advancing these blanks with the necessary degree of acceleration and without gripping the blanks with such great tension as to injure them. The arm 57 and screw 56' are then operated to clamp the indicator, and the shaft 50 which controls the position of the gates and the upper pull roll.

When the quantity of blanks to be run of the thickness for which adjustment has been made has been passed through the machine, and blanks of another thickness are to be run, the machine is instantaneously adjusted by releasing the gripping or clamping block 56 by way of the operating handle 57. The handle 52 is then turned to bring the indicator 53 to the adjustment indicated on the scale arc 55 as corresponding to the thickness of the board now selected to be run. This brings instantaneously the two gates and the pull roll 5 to exactly the proper adjustment. The arm 57 is then operated to clamp indicator 53 and the shaft 50, the gates 30, 31 and the upper pull roll 5 in the new position of adjustment while the next set of blanks of the particular thickness for which adjustment has been made is passed through the machine.

If it is desired to operate on rough or ragged blanks the gates 30, 31 can be moved by means of screws 35 to the upper adjustment indicated by gage marks 32'' and 32'''', and when the better quality of smooth blanks are to be operated upon the gates can be returned to normal position by reversing the operation of screw 35.

It is of interest that the pull roll carriers or arms 17, 17' are directly connected to the gate carriage 45 at both ends of the pull roll and at both sides of the machine by an adjustable tension member as indicated and that the eccentrics 48 on shaft 50 are mounted in rigidly supported bearings at the opposite sides of the machine. These eccentrics which operate the carriage 45 are thus rigidly supported on and located adjacent the opposite side frames and each eccentric engages a bearing block rigidly secured to the carriage 45, being in the form of machine shown, supported on the upper transverse bar 22 which is rigidly connected at both ends to the uprights 25 and 26 which are mounted in twin slides 27 and 27' rigidly and directly secured to the opposite side frames.

The features described are subject to rearrangement and variation of design the important accomplishment of the invention being the pro-

vision of an absolutely accurate adjustment of the gates, proportionate to and in exact correspondence with a simultaneous and corresponding adjustment of the pull rolls, the combined adjustment or control of the pull roll grip and the spacing of the gates being operated by a single control and locked by a single clamping mechanism. It is also of interest that the said adjustments are preferably proportionate rather than exactly equal. The pull roll requires arcurate adjustment to determine the tension applied to the blanks without crushing the blanks and it is of advantage to increase the spacing of the gates from the table more rapidly than the spacing of the rolls is increased as it gives freedom of movement of the blanks of the thicker variety without danger of double feeding as more specifically pointed out in the preamble.

By thus providing an instantaneous and simultaneous and extremely accurate adjustment of the pull rolls and gates in direct correspondence each to and with the other, a very considerable loss of time of the mechanical attendant and a corresponding loss of time of the machine and the factory space and hence a considerable expense formerly incident to separate adjustment of the individual elements is saved, and further various difficulties, loss of efficiency of the machine and delays due to improper adjustment, displacement of and destruction of blanks and the like are avoided because of the elimination of the various inaccuracies of the adjustment of gates and rolls which have resulted from the separate manual adjustment of these members as previously practiced.

I have thus described a single embodiment of my invention the description being specific and in detail in order that the manner of constructing, applying, operating and using the invention may be fully understood, however, the specific terms are used descriptively rather than in detail, the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a machine of the type described having a feed table, gates, co-operating upper and lower pull rolls and a reciprocating feed, a carriage above the table and having the gates secured thereto, the gates having means for adjustment relatively to the carriage toward and from the table means for adjusting the carriage toward and from the table to give a corresponding adjustment of the gates, moving carriers for the top roll bearings and means connecting the carriers to the carriage whereby the adjustment of the gates by moving said carriage gives a corresponding and similar adjustment of the top roll providing for gripping and advancing by the rolls of the blanks of the thicknesses to which the gates are adjusted.

2. In a printer slotter having a feed table for a stack of blanks, a reciprocating feed and a pair of co-operating pull rolls for advancing and accelerating the blanks, gates spaced upwardly from the table for limiting the feed to a line of single blanks taken successively from the bottom of the stack, a carriage on which the gates are mounted, guiding means whereby the carriage is confined to an upright path, the upper pull roll having bearings with carriers therefor mounted to move on a predetermined approximately upright path whereby said pull roll is movable toward and from the lower pull roll to vary the grip of the rolls, means adjusting said pull roll carriers and pull roll relatively to said carriage whereby the pull rolls are caused to grip in operative relation the blanks of the thickness operatively passed and controlled by the gates, means for adjusting the carriage on its path moving the movable pull roll and said gates simultaneously and in correspondence with each other, giving a plurality of positions of adjustment, in each of which the gates operatively control and pass, and the rolls grip in operative relation blanks of a predetermined thickness, each said position of adjustment providing for treatment of blanks of a different thickness.

3. In a printer slotter having a feed table for a stack of blanks, a reciprocating feed and a pair of co-operating pull rolls for advancing and accelerating the blanks, gates spaced upwardly from the table for limiting the feed to a line of single blanks taken successively from the bottom of the stack, a carriage on which the gates are mounted, guiding means whereby the carriage is confined to a predetermined path, one pull roll being movable and having bearings with carriers therefor mounted to move on a predetermined approximately upright path whereby said pull roll is movable toward and from the other pull roll to vary the grip of the rolls, means determining the relation of said pull roll carriers and movable pull roll and of said gates relatively to said carriage whereby the pull rolls are caused to grip in operative relation the blanks of the thickness operatively passed and controlled by the gates, means for adjusting the carriage on its path moving the movable pull roll toward and from the other pull roll in the direction of gripping by said rolls, and moving said gates, toward and from the table, simultaneously and in correspondence with each other, giving a plurality of positions of adjustment in each of which the gates operatively control and pass, and the rolls grip in operative relation blanks of a pre-determined thickness, each said position of adjustment providing for treatment of a different known thickness of blanks and a scale for indicating said positions of adjustment said scale being readable in terms of the thickness of the blanks to which the rolls and gate are adjusted at each said position, means for changing and adjusting the relation between said movable roll and said gates, and means for clamping said adjustment and said carriage and hence said movable roll and said gates in adjusted position.

4. In a printer slotter having a feed table for a stack of blanks, a reciprocating feed and a pair of co-operating upper and lower pull rolls for advancing and accelerating the blanks from said stack, gates spaced above the table for limiting the feed to a line of single blanks taken successively from the bottom of the stack by said reciprocating feed, a carriage on which the gates are mounted extending transversely above the table and having upright guides and means for adjusting said carriage along said guides, the upper of said rolls having carriers in which its bearings are mounted, said carriers being in the form of pivotally controlled arms for guiding and supporting the upper roll on a short path which is approximately vertical, means for driving said upper pull roll in all positions on said path, means for connecting said arms to said carriage to move therewith, said roll bearings being between the pivot and said connection whereby the mo-

tion of the gates is greater than that of said upper roll.

5. In a printer slotter having a feed table for a stack of blanks, a reciprocating feed and a pair of co-operating upper and lower pull rolls for advancing and accelerating the blanks from said stack, gates spaced above the table for limiting the feed to a line of single blanks taken successively from the bottom of the stack by said reciprocating feed, a carriage on which said gates are mounted, said carriage extending across the machine and having vertical guides on the respective side frames, the upper pull roll having carriers in which its bearings are mounted to move toward and from the lower roll, means for driving the upper pull roll in all positions on said path, means for connecting the said carriers to said carriage to move therewith and with the gates, means for adjusting the upper pull roll relatively to said carriage and to the lower roll into operative gripping relation with blanks of the thickness passed by the gates said latter connecting and adjusting means being on both sides of the machine and means on the respective sides of the machine for moving the carriage on its path and adjusting means for operating said moving means simultaneously to move the carriage along its path, moving said upper roll and said gates simultaneously and in correspondence with each other, to each of a set of positions of adjustment, in which the rolls operatively engage and the gates operatively control the blanks, the different positions being adapted to different standard thicknesses of blanks and clamping means for clamping said carriage and gates and said upper roll simultaneously in each position of adjustment and means for indicating said positions of adjustment.

6. In a printer slotter having a feed table for a stack of blanks, a reciprocating feed and a pair of upper and lower co-operating pull rolls for advancing and accelerating the blanks, and gates spaced above the table for limiting the feed to a line of single blanks taken successively from the bottom of said stack by said reciprocating feed, a carriage above the table on which said gates are mounted in predetermined relaton to the table said carriage and gates being movable on a path extending toward and from the table, one said pull roll having movable carriers for its bearings whereby it is mounted for movement toward and from the other roll in the direction of the gripping action of said rolls, means for driving said movable roll in its various positions on said path, means for adjusting the movable roll and the gates relatively to the carriage and into operative relation to a blank of a thickness to be operated on by the machine, and means connecting the movable pull roll to said carriage to move in direct correspondence therewith, means for adjusting said carriage along its said path to move simultaneously the movable pull roll and gates in close correspondence with each other to a number of predetermined positions of adjustment for operative engagement with blanks of a corresponding number of different thicknesses and means for clamping said carriage and roll and gates in each of said positions.

7. In a machine of the type described for feeding corrugated paper blanks, a table for supporting a stack of blanks, a reciprocating feed and pull rolls for advancing and accelerating the blanks, gates spaced above the table for limiting the feed to a line of single blanks taken from the bottom of the stack by said feed, a carriage above the table on which the gates are mounted, said carriage having guides secured to the opposite side frames whereby the carriage is confined to an upright path, a drive gear for the upper pull roll pivotally mounted carriers for the bearings of said upper pull roll mounted to swing in substantially vertical direction about the axis of said gear, a cam shaft extending across the machine and having bearings in the opposite side frames, eccentrics on said shaft adjacent said side frames, and bearing means on said carriage at each side of the machine engaging said eccentrics, means connecting said carriers to said carriage at each side of the machine at a point on the opposite side of the bearing of said pull roll from the center of said drive gear, adjusting means whereby the rolls are caused to grip in operative relation the blanks to which the gates are adjusted and means for adjusting said carriage moving the movable roll and said gates simultaneously toward and from the other pull roll and said table respectively, and in correspondence, the motion of the gates being in excess of that of the movable roll.

8. In a machine of the type described, having a table for a stack of blanks and a reciprocating feed, a pair of co-operating pull rolls and gates spaced above the table to limit the passage of blanks to a single blank advanced at each reciprocation of the feed, a carriage for the gates to which the gates are secured, said carriage being above the table, movable carriers for the bearings of one pull roll providing for motion of said roll in the direction of gripping toward and from the other roller of said pair, means for moving the carriage and the gates thereon toward and from the table and means connecting the carriers to said carriage whereby the movable roll approaches the other of said pair as the gates descend and is retracted from said other roll as the gates are raised providing a series of positions of adjustment of said rolls and gates to blanks of different thicknesses.

9. In a machine of the type described, having a table for a stack of blanks and a reciprocating feed, a pair of co-operating pull rolls, and gates spaced above the table to limit the passage of blanks to a single blank advanced at each reciprocation of the feed, a carriage for the gates to which the gates are secured, said carriage being above the table, movable carriers for the bearings of one pull roll providing for motion of said roll in the direction of gripping toward and from the other roller of said pair, means for moving the carriage and the gates thereon toward and from the table and means connecting the carriers to said carriage whereby the movable roll approaches the other of said pair as the gates descend and is retracted from said other roll as the gates are raised providing a series of positions of adjustment of said rolls and gates to blanks of different thicknesses and means whereby the motion of the movable roll is caused to be less than that of the carriage and gates.

10. In a machine of the type described, having a table for a stack of blanks and a reciprocating feed, a pair of co-operating pull rolls and gates spaced above the table to limit the passage of blanks to a single blank advanced at each reciprocation of the feed, a carriage for the gates to which the gates are secured, said carriage being above the table, movable carriers for the bearings of one pull roll providing for motion of said

roll, in the direction of gripping, toward and from the other roll of said pair, means for moving the carriage and the gates thereon toward and from the table and means connecting the carriers to said carriage whereby the movable roll approaches the other roll of said pair as the gates descend and is retracted from said other roll as the gates are raised, providing a series of positions of adjustment adapted to blanks of different thicknesses and a single clamping means for locking the carriage and gates and the movable roll in each adjusted position.

11. In a machine of the type described, having a table for a stack of blanks and a reciprocating feed, a pair of co-operating pull rolls and gates spaced above the table to limit the passage of blanks to a single blank advanced at each reciprocation of the feed, a carriage for the gates to which the gates are secured, said carriage being above the table, movable carriers for the bearings of one pull roll providing for motion of said roll in the direction of gripping toward and from the other roll of said pair, means for moving the carriage and the gates thereon toward and from the table and means connecting the carriers to said carriage to move therewith whereby the movable roll approaches the other of said pair as the gates descend and is retracted from other said roll as the gates are raised, providing a series of positions of adjustment to blanks of different thicknesses, said connection of the roll carrier to the carriage providing a motion of the roll slightly less than that of the carriage and gates whereby the gates and rolls are maintained in exact operative relation at all times to blanks of the same thickness.

12. In a machine of the type described, having a table for a stack of blanks and a reciprocating feed, a pair of co-operating pull rolls and gates spaced above the table to limit the passage of blanks to a single blank advanced at each reciprocation of the feed, a carriage for the gates to which the gates are secured, said carriage being above the table, movable carriers for the bearings of one pull roll providing for motion of said roll in the direction of gripping toward and from the other roll of said pair, means for moving the carriage and the gates thereon toward and from the table and means connecting the carriers to said carriage to move therewith whereby the movable roll approaches the other of said pair as the gates descend and is retracted from said other roll as the gates are raised providing a series of positions of adjustment to blanks of different thicknesses, said connection of the roll carrier to the carriage providing a motion of the roll slightly less than that of the carriage and gates whereby the gates and rolls are maintained in exact operative relation at all times to blanks of the same thickness, and clamping means for locking the carriage and gates with the movable roll in each adjusted position, and indicating means for said respective adjustments.

13. In a machine of the type described having a table, pull rolls, a reciprocating feed and gates, a carriage on which the gates are mounted, pivotally mounted carriers for the top pull rolls, means for moving the carriage to adjust the gates and means connecting said carriers to the carriage at a point of greater radius about said pivot than the radius at which the pull roll is mounted whereby said latter pull roll moves with the gates but to a less extent.

14. In a machine of the type described having a table, pull rolls, gates and a reciprocating feed, a vertically adjustable carriage for said gates, hopper sides supported on said carriage and having their bottom edges normally in a horizontal plane approximately the plane of the lower ends of the gates, whereby the hopper sides are normally spaced upwardly from the table by a distance approximately equal to the spacing of the gates from the table, providing for free advance of the bottom blank of a stack on said table.

15. In a machine of the type described having a feed table, gates spaced above the table, co-operating upper and lower pull rolls and a feed for removing blanks from the bottom of a pile on the table and advancing them beneath said gates which limit the blanks advanced to a line of single blanks, a carriage above the table and having the gates mounted thereon, means for adjusting said carriage toward and from the table to give a corresponding adjustment of the gates, moving carriers for bearings of one pull roll and means connecting said carriers to the carriage whereby the adjustment of the gates by moving said carriage gives a corresponding and similar adjustment of said pull roll providing for gripping and advancing by the rolls of the blanks of the thicknesses to which the gates are adjusted, said carriers being mounted to swing on an approximately vertical arc, a drive gear concentric with said arc and a drive gear on said roll meshing with said concentric gear whereby the drive of said roll is continuous and uniform in all positions of adjustment.

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