

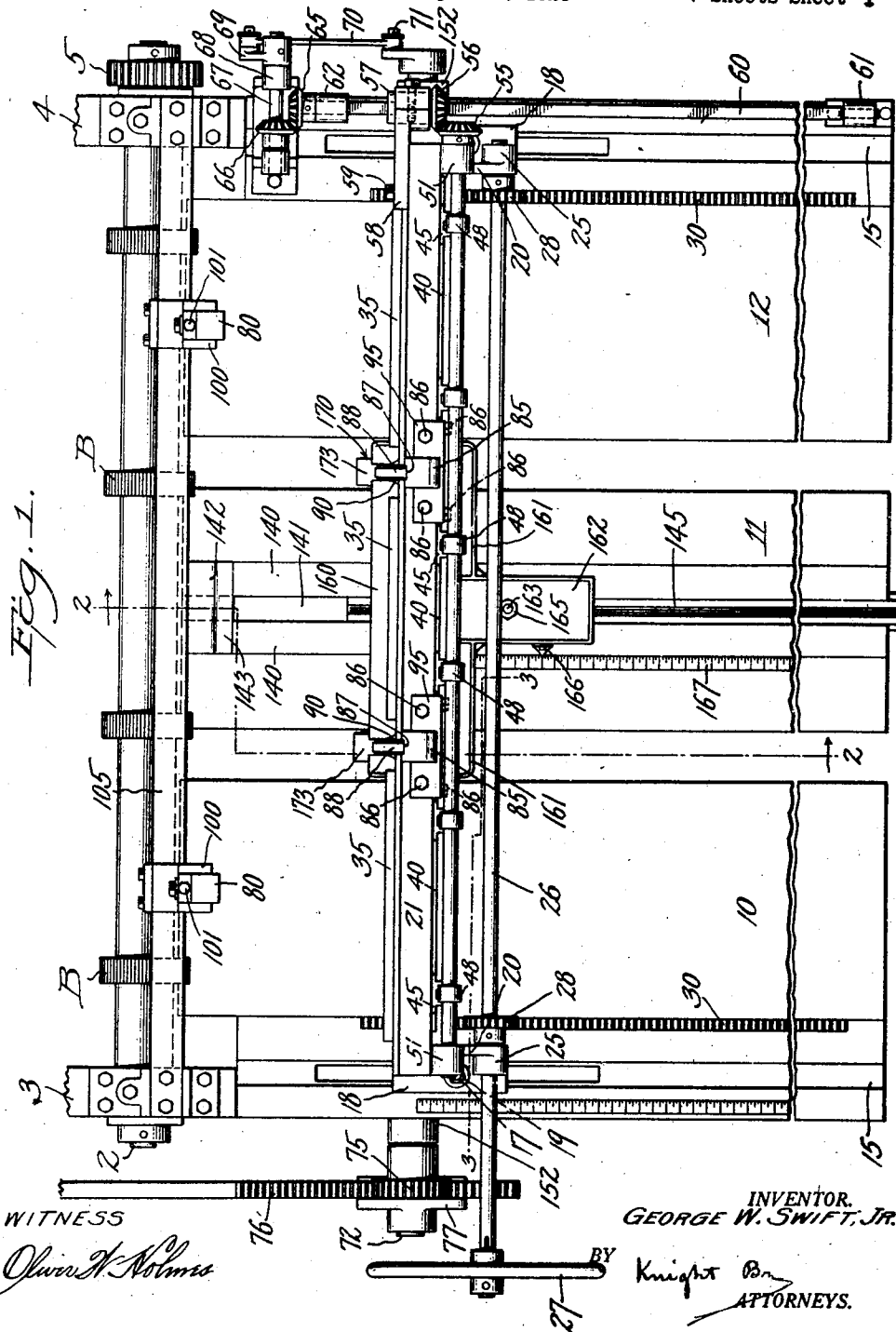
Sept. 27, 1927.

G. W. SWIFT, JR
SHEET FEEDING MEANS

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Filed April 9, 1926

7 Sheets-Sheet 1



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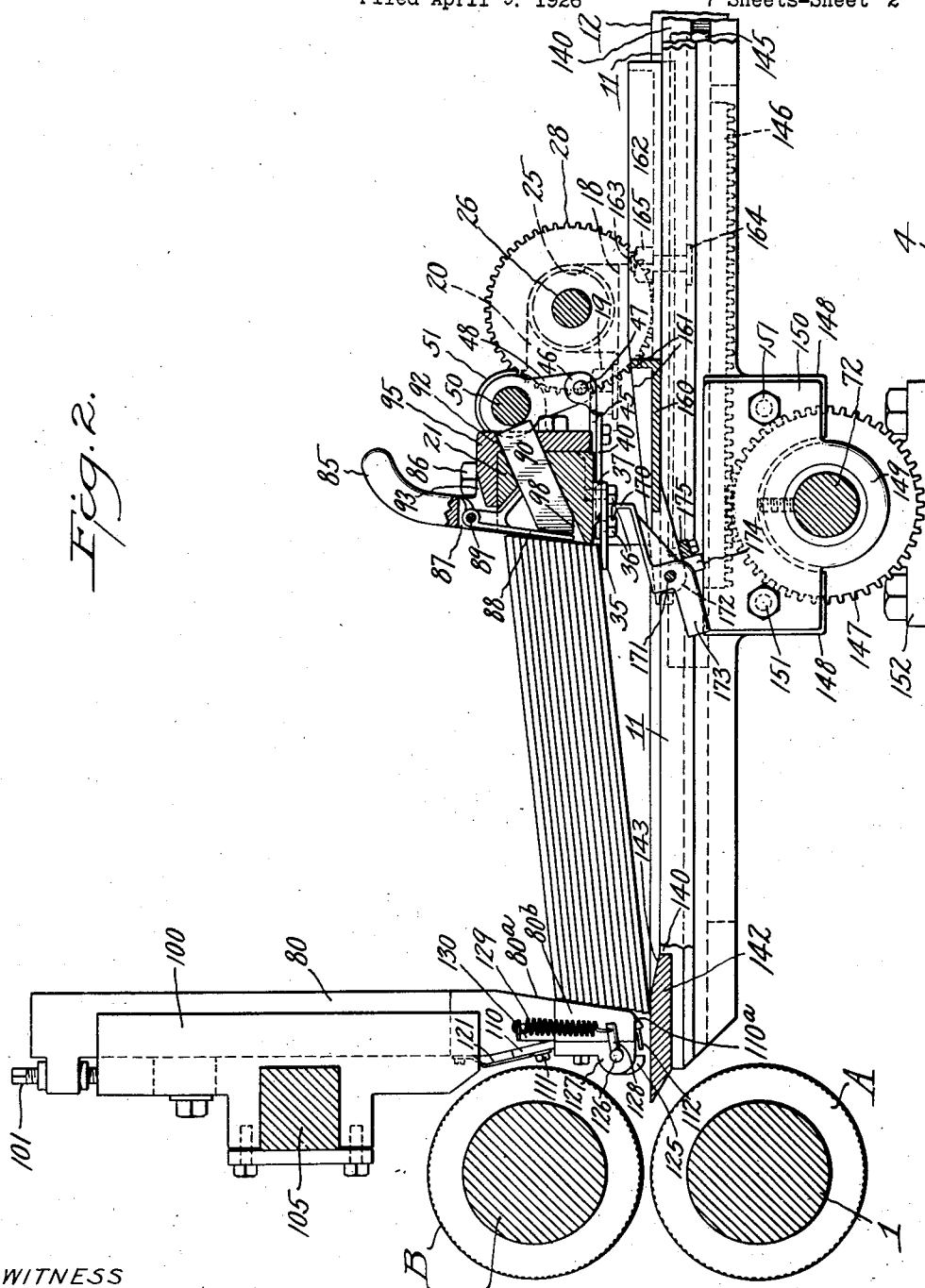
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SHEET FEEDING MEANS

Filed April 9, 1926

7 Sheets-Sheet 2

Fig. 2.



WITNESS

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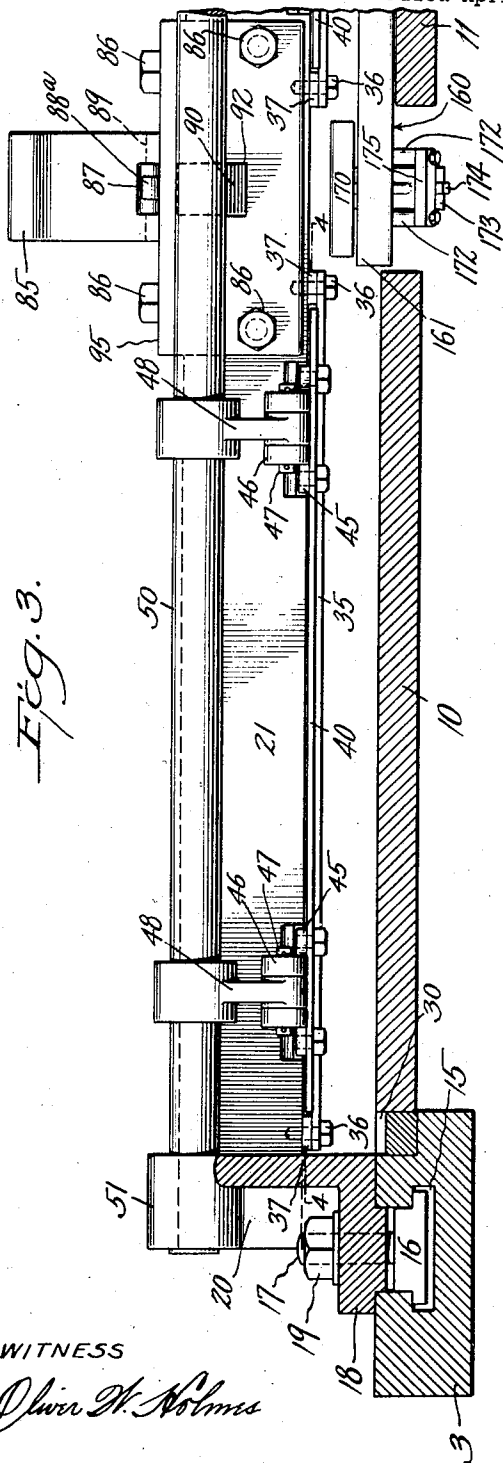
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G. W. SWIFT, JR

SHEET FEEDING MEANS

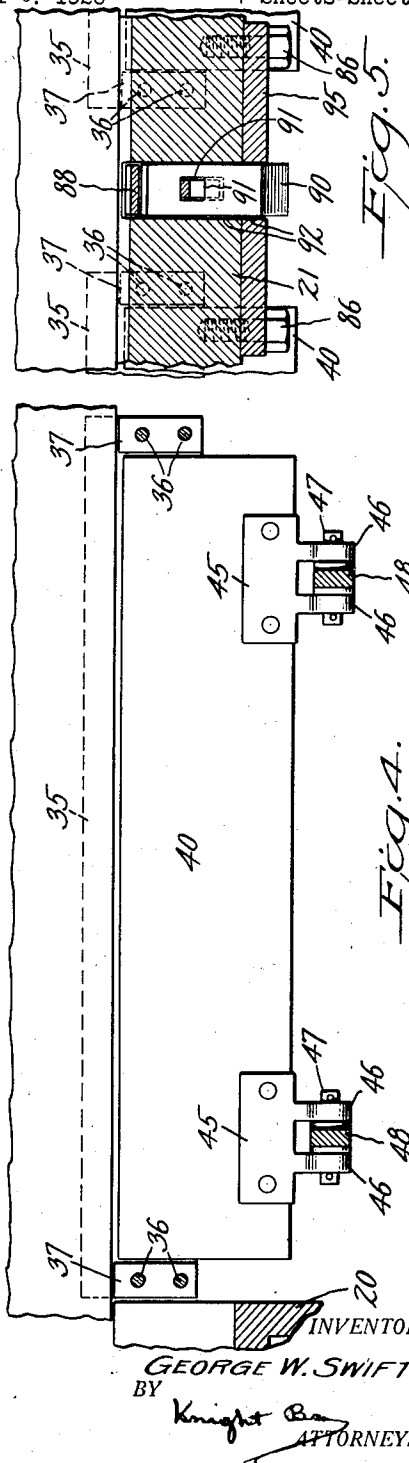
Filed April 9, 1926

7 Sheets-Sheet 3



WITNESS

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1,643,646

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SHEET FEEDING MEANS

Filed April 9, 1926

7 Sheets-Sheet 4

Fig. 7.

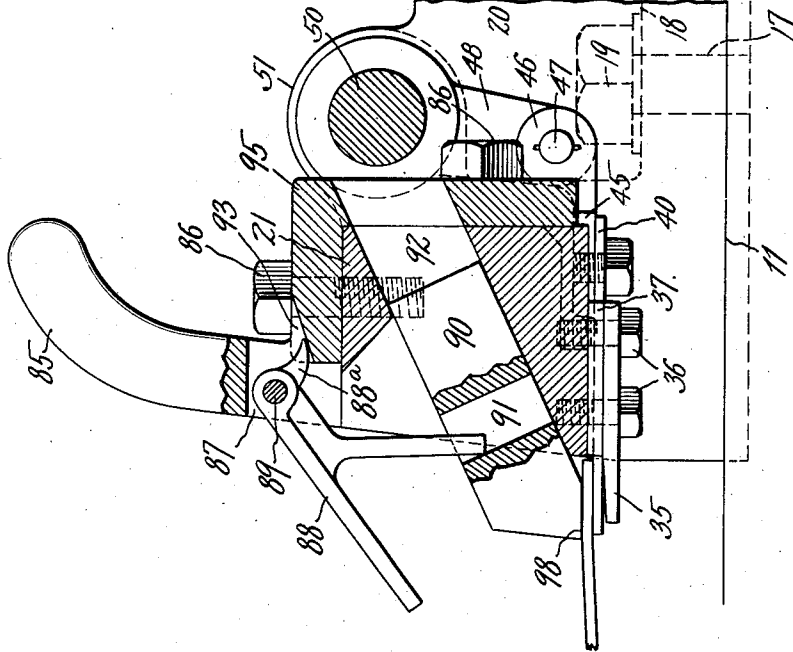
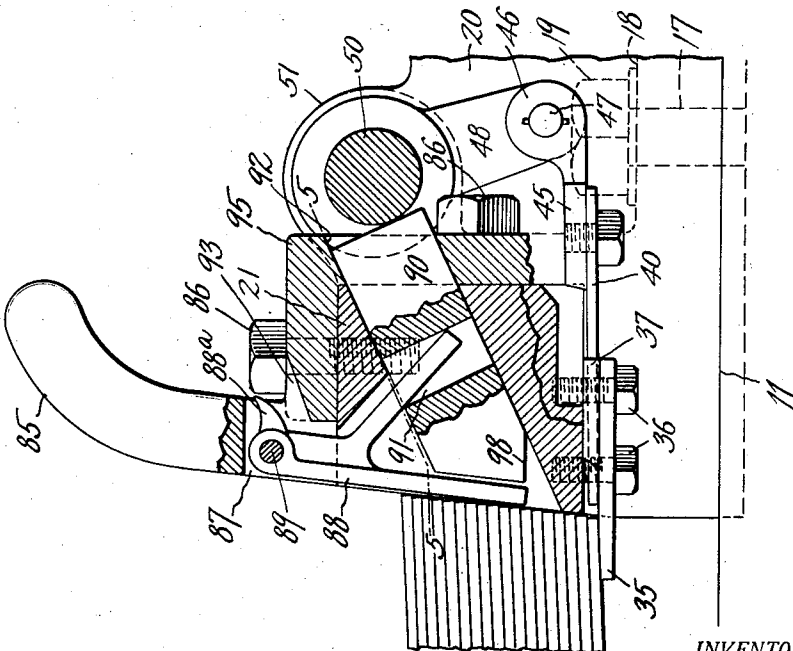


Fig. 6.



WITNESS

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1,643,646

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SHEET FEEDING MEANS

Filed April 9, 1926

7 Sheets-Sheet 5

Fig. 8.

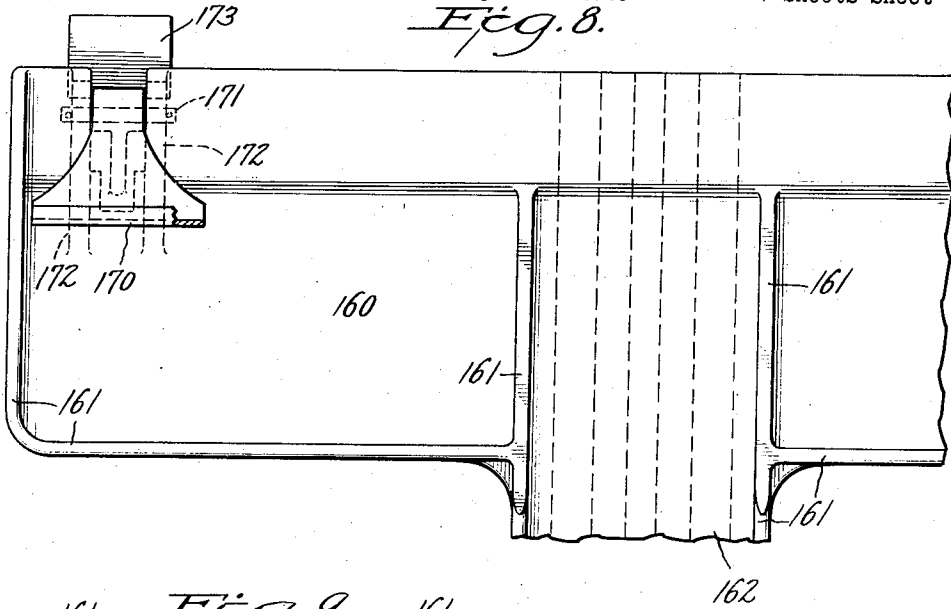


Fig. 9.

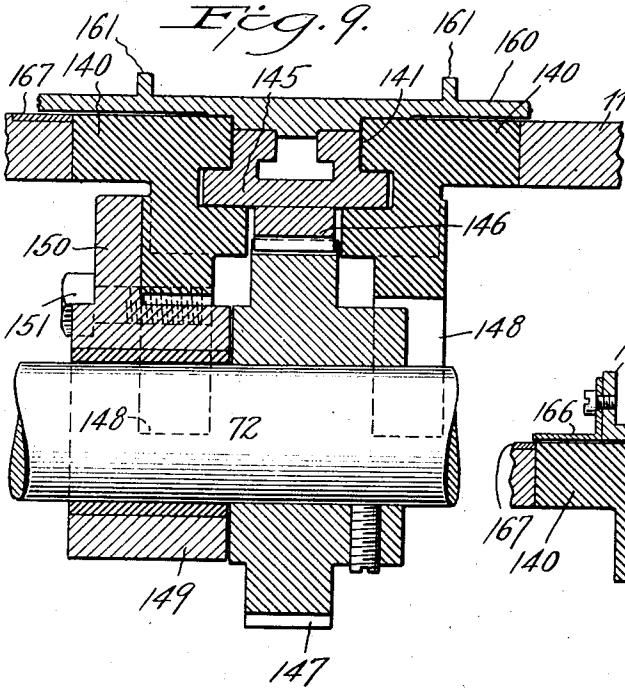
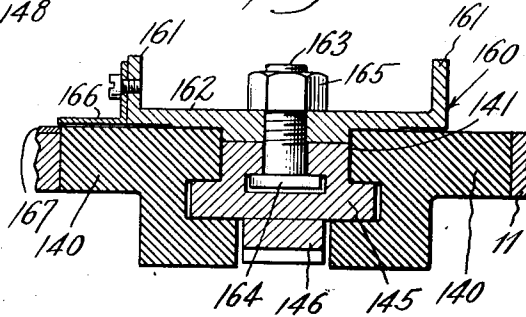


Fig. 10.



WITNESS

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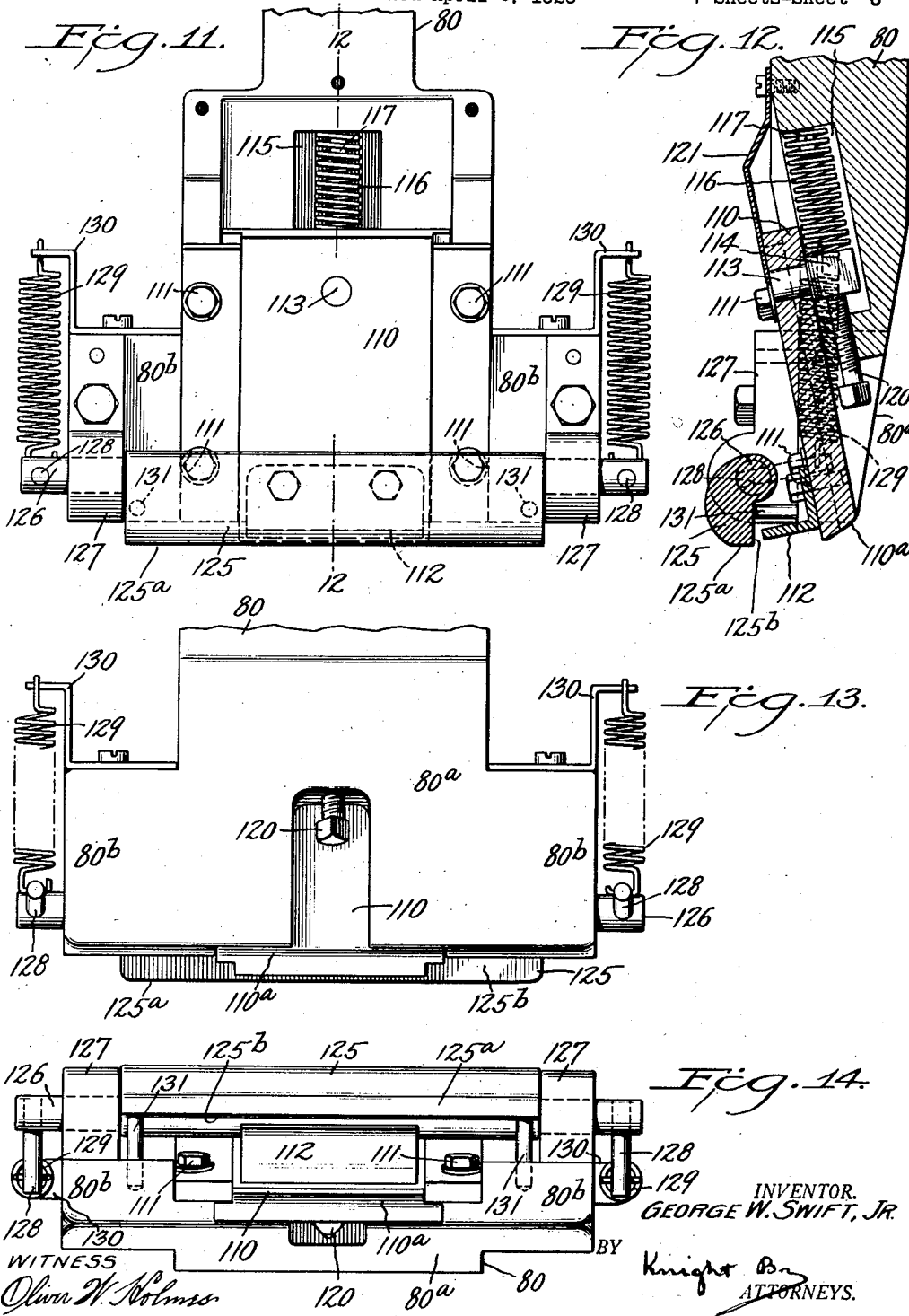
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G. W. SWIFT, JR

SHEET FEEDING MEANS

Filed April 9, 1926

7 Sheets-Sheet 6



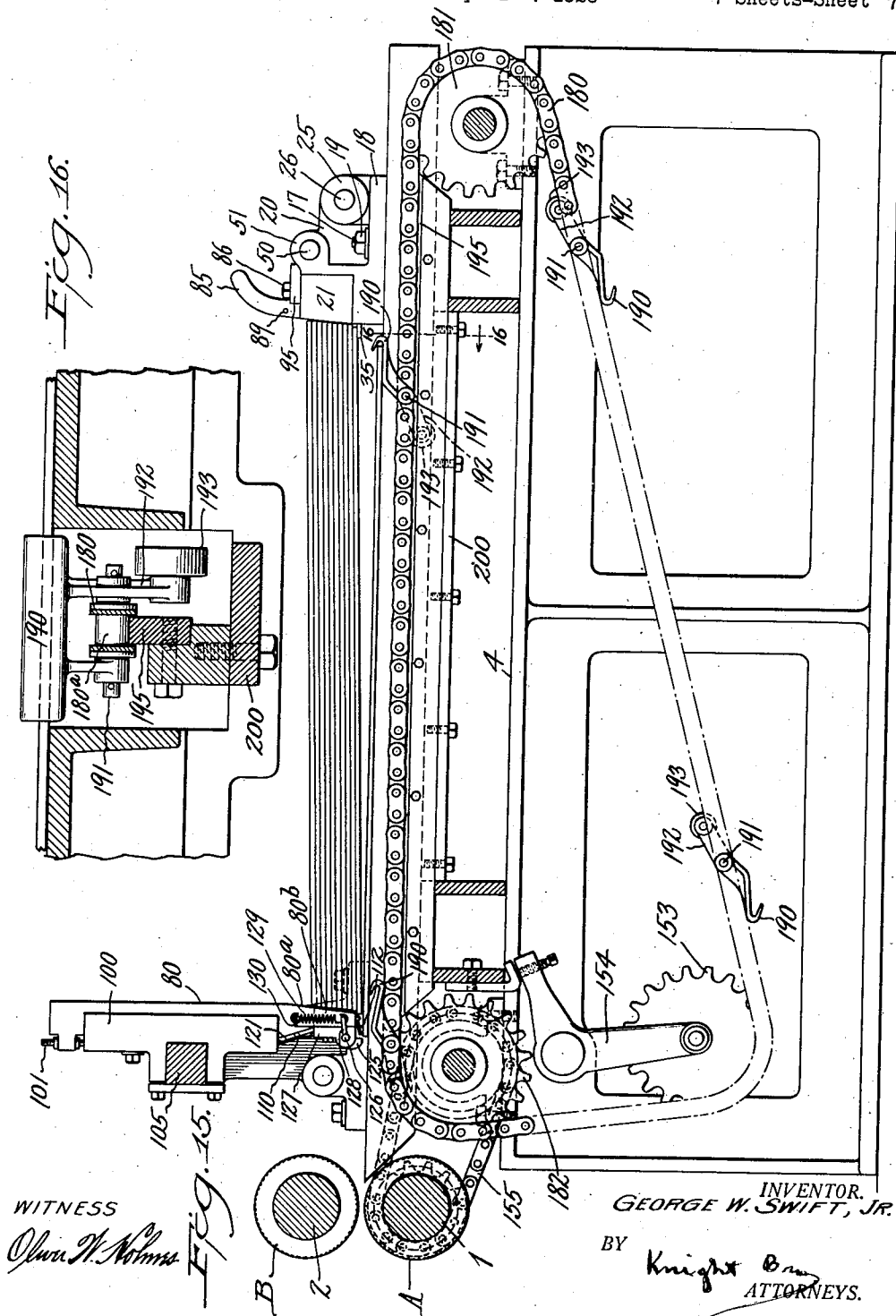
Sept. 27, 1927.

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G. W. SWIFT, JR
SHEET FEEDING MEANS

Filed April 9, 1926

7 Sheets-Sheet 7



Patented Sept. 27, 1927.

1,643,646

UNITED STATES PATENT OFFICE.

GEORGE W. SWIFT, JR., OF BORDENTOWN, NEW JERSEY.

SHEET-FEEDING MEANS.

Application filed April 9, 1926. Serial No. 100,909.

The present invention relates to improvements in the type of sheet feeding machines more especially applicable to feeding sheets or boards of stiff material such as cardboard, 5 faced corrugated board, etc., commonly used in the manufacture of boxes, cartons and other containers.

With this type of sheet or cardboard feeder difficulty is commonly experienced in 10 separating the successive sheets for accurate and rapid feeding and also from the curling, warping and other injury to the edges of the blanks or sheets; such imperfections in the sheet rendering it difficult and sometimes 15 impossible to feed the sheets from the machine. The type of feeding machine to which the present invention relates is commonly employed for feeding box blanks or sheets to slotting or blanking out machine.

20 The main purposes of the present invention are to improve the accuracy of separation of stiff boards or sheets from a pile or column and to provide feeding off devices which will surely engage the sheets even when curled, 25 warped or otherwise injured and further to guard against the movement of more than one sheet of board from the machine at one time.

In accomplishing these objects I have 30 devised a machine which will first be described with reference to the accompanying drawings and the novelty afterwards pointed out with more particularity in the annexed claims.

35 In said drawings:—

Figure 1 is a plan view of the preferred embodiment of the improved machine.

40 Figure 2 is a vertical longitudinal sectional view of the same taken on the line 2—2 of Figure 1.

Figure 3 is an enlarged detail transverse sectional view taken on the line 3—3 of Figure 1.

45 Figure 4 is a detail sectional plan view taken on the line 4—4 of Figure 3.

Figure 5 is a detail sectional view taken on the line 5—5 of Figure 6, and drawn to a slightly smaller scale.

50 Figures 6 and 7 are enlarged detail vertical sectional views of parts of the separating and pile controlling devices shown in Figure 2.

Figures 8, 9 and 10 are enlarged detail views of the main reciprocating feed carriage showing its mounting and operation. 55

Figures 11, 12, 13 and 14 are enlarged detail views of the calipering and controlling devices of the delivery throat, Figure 12 being a section on line 12—12 of Figure 11.

Figure 15 is a vertical longitudinal sectional view of a modified embodiment of the 60 present invention.

Figure 16 is a detail transverse sectional view taken on the line 16—16 of Figure 15.

Feeding machines of the type to which the 65 present improvements apply comprise a feed table or support over which sheets are fed, guides forming a hopper for supporting a pile or column of sheets above the table or support, means for successively separating 70 the sheets from the bottom of the pile or column, a delivery throat through which the sheets are passed, and feeding mechanism for engaging the successively separated sheets and passing them through the delivery 75 throat. In the embodiment of the improved machine shown in the accompanying drawing, the mechanism is illustrated as forming part of a slotting or blanking out machine of which A and B are knurled feed rollers 80 constituting the feed-in rolls of the slotting or blanking out machine and also the delivery rolls of the improved feeder. These co-operating rolls, A, B are mounted in spaced 85 relation upon the shafts 1 and 2 which are suitably journaled in machine side frames 3, 4, geared to operate in unison by a pair of intermeshing gears, one of which is shown at 5. These intermeshing feed shafts 1 and 2 are driven by any suitable means such as 90 by gearing with the slotting or blanking out machine of which they may form a part.

Any suitable feed table or platform may be provided between the side frames 3 and 4 in approximately the same horizontal plane 95 as the bite of the delivery rollers A, B. As shown in the accompanying drawings this feed table is formed in three spaced sections indicated at 10, 11 and 12, the sections 10 and 12 being in a common horizontal 100 plane while the intermediate section 11 is in a slightly lower horizontal plane and can better accommodate the carriage upon which the feeding off devices are mounted as will hereinafter be more fully explained. The 105 spacing between the table sections 10, 11 and 12 is to accommodate the feed dogs which will be later described.

The side frames 3, 4 have formed in their upper faces T-shaped slots 15 shown best in 110

Figure 3, in which engage the shouldered heads 16 of bolts 17 which pass through lateral guide flanges 18 of the side brackets 20 of an adjustable frame or carriage. Nuts 19 are threaded upon the bolts 17 clamping the side brackets in the desired adjusted position upon the machine side frames. These side brackets 20 are connected by a squared bar 21 extending from side to side of the machine and supporting above the table the rear guide frames and controlling devices of the pile or column of sheets, hereinafter described.

The side brackets 20 are provided with bearing arms 25 in which is journaled a hand operated shaft 26 carrying at one end a hand-wheel 27 and having keyed upon it adjacent bearing brackets 25, the gear wheels 28 which are in constant mesh with the rack bars 30, supported on the side frames 3 and 4 along side of the table sections 10 and 12 respectively. By rotating the shaft 26 by hand-wheel 27, the carriage 20, 21 and the parts carried thereby can be moved longitudinally of the machine to increase or decrease the distance of the carriage from the delivery throat. It will be understood that before such adjustment of the carriage can be effected, the nuts 19 are loosened and after the adjustment has been made said nuts are again tightened up.

The carriage 20, 21 is provided with a pile supporting shelf projecting from the lower edge of bar 21 toward the delivery throat. This shelf in the preferred embodiment of the machine is made up of three horizontal plates 35 secured to the under face of bar 21 by means of set screws 36, and spaced from the under cutout face of bar 21 by means of spacers 37 through which set screws 36 also pass. These shelf plates 35, three in number in the machine as shown, are spaced from each other in the same vertical planes as the separations between table sections 10, 11 and 12, this spacing being also for the purpose of affording room for the proper operation of the feeding off dogs.

Separating pusher plates, three in number, indicated at 40, are mounted between the shelf plates 35 and the under face of the carriage bar 21, one of said pusher plates 40 being mounted upon each of said shelf plates 35. The spacers 37 are designed to afford proper clearance for the free operation of the pusher plates 40. Each pusher plate 40 has rigidly secured to rear edge two connector plates 45, each of which is provided with rearwardly presented bearing lugs 46 to which is pivotally connected at 47 the lower end of a rock arm 48. The rock arms 48, two for each pusher plate 40, are secured to a rock shaft 50 journaled in bearing lugs 51 of the carriage brackets 20 and extending from side to side of the machine. This rock

shaft 50 has keyed to one end a bevelled gear 55 meshing with a similar gear 56, slidably mounted upon a square shaft 60, presently referred to. Gear 56 has an extended bearing collar 57 which is embraced by a sectional bracket 58 secured to the face of the carriage bar 21 by bolts such as 59.

The square shaft 60 extends longitudinally of the machine above the side frame 4 and is journaled at its rear end in a bearing 61 which receives a cylindrical bearing end of shaft 60, and at its forward end in a bearing 62 embracing a cylindrical bearing portion of said shaft. The forward end of shaft 60 carries a bevel gear 65 in mesh with a similar gear 66 mounted upon a short cross shaft 67 journaled in bracket bearings 68 and carrying at its outer end a rock arm 69 connected through a link 70 with crank 71 fixed upon a shaft 72 which extends from side to side of the machine frame and is mounted in bearings hereinafter described. The end of shaft 72 opposite that carrying the crank 71 has keyed to it a gear 75 in mesh with a driving rack bar 76 which latter is supported by any suitable saddle or hanger indicated at 77. Rack bar 76 is driven by any suitable driving part of the machine, the driving connections being omitted from the drawings. The sheets are piled or stacked between the upright front guides 80 hereinafter more fully described and two or more rear guides 85 secured to the carriage cross rail 21 by bolts 86. These rear guides 85 incline slightly to the rear and are channelled in their inner faces as indicated at 87 to receive the inverted Y-shaped dogs or latches 88 pivotally mounted at 89. These Y-shaped members 88 rest normally entirely within the recesses formed in the rear guide members 85, with their outer arms in engagement with the rear edges of a pile of sheets and their inner arms resting in sockets 91 of the sliding weights 90. The guide members 85 are integral with angle bar brackets 95 which embrace the angular formation of the carriage frame bar 21. The bar 21 and the vertical web of brackets 95 have inclined channels 92 cut through them and communicating with or forming extensions of channels 87 referred to. The sheet engaging metal blocks 90 slide freely in the channels 92 and are formed with sockets 91 referred to for the reception of inner arms of members 88. The forward edge of each block 90 is cut off to rest just inside of the forward arm of member 88, while the lower inner edge 98 of block 90 is bevelled for the purpose of accurately engaging the face of the last two or three sheets upon the near exhaustion of the pile. The operation will later be more fully explained. The inverted Y-shaped members 88 are formed with curved heels 88* working in slots 93 of carriage bar 21 to limit the outward swing

of members 88 under the action of the sheet engaging weights 90 when members 88 are released by near exhaustion of the pile of sheets.

5 The front edge of the pile of sheets rests upon the forward portion of table sections 10 and 12 against the lower inclined faces 80^a of the vertical guides 80. These guides 80 are vertically adjustable in the channelled rear faces of brackets 100 which are trans-
10 versely adjustable upon a frame bar 105. 101 are adjusting screws mounted in guide members 80 and engaging brackets 100 for adjusting the width of the delivery throat between the lower ends of guides 80 and the
15 delivery end of the table or platform. In the drawings two sets of front guides 80 are shown arranged at equal distances from the central vertical longitudinal plane of the machine although it will be understood that
20 any desired number of these guides may be employed.

The lower end of each of the front guides 80 carries two yielding sheet engaging and controlling devices which are sup-
25 ported directly above the delivery end of the feed table or platform and form therewith the controlling delivery throat. One of these devices comprises a vertically sliding
30 plate 110 mounted in the forward recessed face of guide member 80 and confined therein by guide plates 110 secured by bolts 111. The lower edge of plate 110 is bevelled off at 110^a adjacent to the lower inclined guide
35 face 80^a and secured to the forward face of plate 110 is a short section of an angle bar 112 projecting away from the inclined face 110^a. Plate 110 is engaged by a pin 113 carried by a slide block 114 operating in a chan-
40 nel 115 of bar 80, said block 114 being normally pressed downwardly by an expansion spring 116 retained in place by a lug 117 engaging the upper end of the spring. The
45 block 114 rests upon the upper end of an adjusting screw 120 threaded through the recessed lower end of bar 80. By adjusting the screw 120 the spacing of the lower end of gauge plate 110 from the feed table can be adjusted to a nicety. 121 is a cover plate
50 secured over the upper end of the channel or recess in which the gauge plate 110 operates, said plate 121 overlapping the upper end of plate 110. It will be observed that the
55 guideway for plate 110 is inclined forwardly from the plane of feed to facilitate the action of front edge of a sheet of cardboard upon the inclined edge of 110^a in raising the gauge plate 110 against the action of the spring 116.

60 Mounted in front of the gauge member 110 is an eccentrically supported semi-cylindrical calipering gate member 125. This member 125 has a flattened lower face 125^a presented toward the plane of feed of sheets and a ver-
65 tical face 125^b extending at right angles to the

plane of feed. Member 125 is mounted upon a bearing shaft 126 journaled in brackets 127 which are secured to the forward faces of the laterally projecting extensions 80^b of the lower end of guide members 80. 70 Pins 128 mounted in shaft 126 are engaged by springs 129 connected with angular brackets 130 to yieldingly hold the calipering member 125 in normal position. This normal position is determined by one or more
75 stop pins 131 projecting rearwardly from the vertical face 127^b and engaging the forward face of wing extensions 80^b. It will be understood that calipering member 125 is ad-
80 justed toward and away from the plane of feed with guide member 80 through the action of screw 101.

Cooperating with the sheet supporting and separating devices above described is em-
85 ployed a feed-off mechanism of any suitable form, but preferably constructed as shown in the drawings as will now be described.

Extending centrally through the middle table section 11 are the parallel separated
90 channel bars 140 providing between them a trackway 141 which is bridged at the delivery end of the table by a plate 142 having an inclined rear edge 143 and of proper
95 thickness to present its main upper surface in horizontal feeding plane of table sections 10 and 11. This bridging plate 142 serves to prevent the sagging of wide sheets be-
100 tween the supporting table sections 10 and 12.

Operating in the trackway 141 is a recip-
105 rocating channel bar 145 having secured to its lower face a rack bar 146 in constant mesh with a gear wheel 147 which is mounted upon the oscillating shaft 72 above referred to. The
110 rails 140 have downwardly projecting plates 148 cut out to loosely project around the hub of the gear 147 and the bearing 149 carried by face plate 150 secured to one of the plates 148 by set-screws 151. The shaft 72 is also
115 properly journaled at or near its ends in suitable bearings carried by the side frames of the machine, one of said bearings being indicated at 152, but said bearings being of usual construction are not shown in the
120 drawing.

160 is a relatively flat wide tray-like car-
riage strengthened by integral ribs 161 which are tapered from the rear toward the front to present unobstructed surfaces to the
125 sheets that are fed. This tray-like carriage is formed with a rear rectangular extension 162 through which projects a bolt 163 hav-
130 ing a shouldered head 164 which adjustably engages the T-shaped slot or channel in the upper face of the bar 145 above referred to. The nut 165 upon bolt 163 clamps the tray-
135 like carriage 160 in the desired adjusted position upon the bar 145 which carries the rack bar upon its lower face. The pointer member 166 secured to the tray extension
140

162 operates over a fixed scale 167 mounted along side one of the bars 140 for readily indicating the proper adjustment of the feed carriage 160 to suit the particular size of sheets to be operated upon.

In the forward edge of the tray-like carriage 160 are mounted two gravity feed dogs spaced transversely of the machine to operate beneath the rear pile guides 85 and sheet controlling devices 88 and 90. Each of the gravity feed dogs comprises a broad hook-like member 170 presented above the tray 160 and pivotally mounted upon a pin 171 carried in the under bracket flanges 172 and having a forwardly projecting weight 173 which normally tends to hold the hooks 170 elevated slightly above their supporting carriage 160. The weighted ends of the hooks carry lugs 174 which engage stops 175 secured to the bracket flanges 172 for limiting the elevation of the hooks upon the carriage.

A pile of cardboard sheets is arranged as shown in Fig. 2 with the forward edges of the sheets in contact with inclined faces 80^a of guides 80 and the rear edge of the sheets in engagement with rear guides 85 and members 88. The lowermost sheet of the pile rests at the front upon the feed table or platform and at the rear upon the shelf plates 35, the sheets being thereby supported in slightly inclined position with the rear higher than the front. By the described operating mechanism the pusher plates 40 move forwardly and push the lower sheet off of the shelf plates 35 causing the forward edge of the lower sheet to pass into the delivery throat. This lower sheet is thereafter engaged by feed dogs 170 and because of their arrangement and construction they have a wide range of action and are able to engage the sheets even when its rear edge is curled, warped or broken. The feed dogs are carried forwardly by their carriage pushing the sheet beneath the members 110 and 125 into the bite of delivery rollers A, B, which feed the separated sheet at an increased speed from the machine, while the carriage with the feed dogs returns to its initial position for feeding out the next sheet. It will be clear that the delivery feed carriage reciprocates forwardly and backwardly. After the first sheet starts from the machine the next succeeding sheet is pushed off the shelf plates 35 while the forward edge of said sheet rests upon the lower sheet in process of moving from the machine. This second sheet therefore engages the gauge plate 110 and raises it in its guideway because of the presence of a double thickness of sheets beneath the gauge. The pressure of the said spring pressed gauge 110 creates sufficient friction between said second sheet and the one being delivered by rollers A, B to cause the second sheet to

be pulled forwardly until its front edge engages the vertical faces 125^b of calipering members 125, in which position said second sheet will be arrested because the springs 129 of the caliper will be sufficient to resist the frictional engagement of the sheet being fed off. Said second sheet remains against the caliper until the first sheet is delivered, when it drops to the plane of the feed table or board and the feed-off dogs again come into action to move it forward for delivery and a succeeding sheet is pushed from the shelf plates by the pushers.

The calipering member 125 presents its abrupt face 125^b across the path of sheets to engage the leading edge of each sheet above the one resting in the plane of feed, it being understood that the guide member 80 is adjusted to present the lower face 125^a of the calipering member to provide just space enough for the thickness of one sheet to pass in the plane of feed. The slide 110 with bevelled lower edge 110^a and flange 112 being yieldingly mounted above the plane of feed serves the important purpose of threading the first sheet beneath the calipering member 125 and when raised by the presence of two thicknesses of sheets beneath it to apply sufficient pressure to the second sheet to ensure the friction with the lower sheet carrying the leading edge of the second sheet up against the abrupt face of calipering member 125. This member 110 also properly depresses the leading edge of each sheet as it drops from the rear edge of a sheet passing from beneath it and enters the calipering throat beneath member 125.

When a pile of sheets is placed in the machine between the front guides 80 and rear guides 85, the rear edges of the sheets will press rearwardly upon the members 88 and hold the weights 90 in rear position as shown in Fig. 6. The action of the weights also yieldingly presses members 88 against the rear edges of the sheets, slightly crowding them against the front piling guides 80. When there is a sufficient number of sheets in the pile the weight of the pile upon the rear edges of the bottom sheets will accurately hold down said rear edges for the effective engagement of the pusher plates in moving the sheets successively from the shelf plates 35. When the pile becomes sufficiently exhausted to lower the top beneath the end of member 88, said member will then be free to move from the position shown in Fig. 6 into the position shown in Fig. 7, thereby permitting the weight 90 to slide downwardly and forwardly in its guideway to present the lower bevelled face 90^a above and in engagement with the rear edge of the pile. When this action takes place it will be observed that the weights serve to hold down the rear edges of the remaining few sheets to ensure proper action of the

pusher plates 40. This action of the weights continues until the last sheet is removed by the pushers.

It will be understood that brackets 100 carrying guides 80 and other devices supported thereby can be adjusted transversely of the machine to best operate upon the particular width of sheet that is to be fed. In machines adapted for extra wide sheets it may some times be found desirable to employ more than two of the front guides 80 with the adjustable throat forming calipering devices and sheet controlling pressure members. Likewise it is sometimes desirable in providing the machine for handling wide sheets to have a greater number of the rear pile guides 80 and controlling weights 90 and members 88. The feeding off carriage with dogs 70 may also be duplicated for extra wide feeding machines.

It will be observed that by means of the hand wheel 27 the carriage 21 supporting the separating pusher devices, rear pile guides and controlling devices can be adjusted forwardly and backwardly upon machines to suit the length of the sheets that are to be fed. In this adjustment for different length of sheets, it will be understood that the gearing between the pusher operating shaft 50 and the squared driving shaft 60 permits said adjustment without interfering with the driving connections. The feed-off carriage with its feed dogs 170 can be adjusted longitudinally of the machine to produce the proper feeding stroke and cooperation upon sheets of different length.

In Figures 15 and 16 I have shown a slight modification of the improved machine in which the pile supports and sheet separating and controlling devices are the same as in the preferred form of machine above described. In this modified form of machine an endless chain delivery mechanism is provided in place of the reciprocating delivery feed above described. This endless feed chain in the form of a sprocket chain is indicated at 180 passing around sprocket wheels 181, 182 at opposite ends of the machine and a chain tightening sprocket wheel 153 mounted upon an adjustable bracket 154. The sprocket wheel 182 is driven by sprocket chain 155 from shaft 1 above referred to.

This endless sprocket chain 180 has pivotally mounted upon it at equally spaced points the broad feed hooks or dogs 190, each of which is journaled upon an extended pivot pin 191 and has a projecting heel 192 carrying an anti-friction roller 193. Beneath the pile of sheets is mounted a horizontal track bar 195 upon which the sprocket chain 180 runs between the supporting sprockets 181 and 182, the chain being provided with the usual anti-friction rollers 180^a between the links. Mounted be-

low and parallel with the trackbar 195 is a second trackbar 200 upon which the rollers 193 run for supporting the feed dogs or hooks elevated from the chain in position to engage the rear edge of a sheet that is pushed from the supporting shelf just prior to the arrival of a feed dog or hook. It will be understood that the two sets of feed chains 180 with feed dogs will usually be employed in the machine.

I claim:—

1. In a feeding machine, the combination of means for supporting a pile of sheets, means for separating individual sheets from said pile, means for feeding sheets from said pile, a calipering member mounted above the plane of feed of sheets, and forming a delivery throat in the plane of feed of sheets, and yielding means engaging sheets and exerting downward pressure thereon in rear of and adjacent to said calipering member for threading individual sheets beneath said calipering member and frictionally feeding adjacent sheets toward said calipering member.

2. In a sheet feeding machine, the combination of means for supporting a pile of sheets, means for separating individual sheets from said pile, and means for feeding sheets, with a calipering device arranged above the plane of feed and formed with a rearwardly presented abrupt sheet engaging face projecting at an angle to the plane of feed, and yielding sheet engaging means arranged adjacent to and in rear of said calipering device.

3. In a sheet feeding machine, the combination of means for supporting a pile of sheets, means for removing individual sheets from said pile, and means for feeding sheets with a yieldingly mounted calipering device arranged above the plane of feed and formed with a rearwardly presented abrupt sheet engaging face projecting at an angle to the plane of feed, and yielding sheet engaging means arranged adjacent to and in rear of said calipering device for producing friction between two sheets and causing the upper sheet to register against the abrupt face of the caliper while the lower sheet is delivered.

4. In a sheet feeding machine, the combination of means for supporting a pile of sheets, means for removing individual sheets from said pile, and means for feeding sheets, with an adjustably mounted member arranged above the plane of feed, a calipering device pivotally mounted upon said member and formed with an abrupt rearwardly presented sheet engaging face projecting at an angle to the plane of feed, a spring holding said calipering device in normal position, and yielding sheet engaging means arranged adjacent to and in rear of said calipering device.

5. In a sheet feeding machine, the combination of means for supporting a pile of sheets, means for removing individual sheets from said pile, and means for feeding sheets, with an adjustably mounted member arranged above the plane of feed, a calipering device pivotally mounted upon said member and formed with a rearwardly presented abrupt sheet engaging face projecting at an angle to the plane of feed, springs engaging said calipering device holding it yieldingly in normal position, a sheet engaging slide mounted upon said member adjacent to and in rear of said calipering device, and a spring acting upon said slide.
6. In a sheet feeding machine, the combination of means for supporting a pile of sheets, means for removing individual sheets from said pile, and means for feeding sheets, with an adjustably mounted member arranged above the plane of feed, a calipering device carried by said member, and a sheet engaging slide arranged adjacent to and in rear of said calipering device.
7. In a sheet feeding machine, the combination of means for supporting a pile of sheets, means for removing individual sheets from said pile, and means for feeding sheets, with an adjustably mounted member arranged above the plane of feed, a calipering device mounted upon said member, a sheet engaging slide arranged adjacent to and in rear of said calipering device, and a guide-way formed on said member supporting said slide.
8. In a sheet feeding machine, the combination of means for supporting a pile of sheets, means for removing individual sheets from said pile, and means for feeding sheets, with an adjustably mounted pile guide arranged above the plane of feed, a sheet calipering device mounted upon said pile guide, an inclined guide-way formed upon the lower part of said pile guide, adjacent to and in rear of said calipering device, and a yielding sheet engaging slide mounted in said guide-way and formed with a rearwardly presented bevelled lower end.
9. In a sheet feeding machine, the combination of means for supporting a pile of sheets, means for removing individual sheets from said pile, and means for feeding sheets, with an adjustably mounted pile guide arranged above the plane of feed, a sheet calipering device mounted upon said pile guide, an inclined guide-way formed upon the lower part of said pile guide, adjacent to and in rear of said calipering device, a sheet engaging slide mounted in said guide-way, a spring device pressing downwardly upon said slide, and an adjustable stop limiting the downward movement of said slide.
10. In a sheet feeding machine, the combination of a feed table, means for supporting a pile of sheets above said feed table including a shelf spaced above the feed table and supporting the rear of the pile in a higher plane than the front of the pile, a sheet pusher sliding upon said shelf at the rear of said pile for successively pushing the rear ends of the bottom sheets from said shelf to lower them from the pile to the feed table, and feed off mechanism operating over said feed table in the space beneath said shelf and comprising a movable carrier mounted below and independently of said sheet pusher and a feed dog mounted upon said carrier.
11. In a sheet feeding machine, the combination of a feed table, pile supports including front piling guides spaced from the feed table to provide a delivery throat, rear guides, and a shelf adjacent said rear guides spaced above the feed table and supporting the rear of the pile in a higher plane than the front of the pile, pushers operating above said shelf for pushing the bottom sheets forwardly and causing the rear edges thereof to drop from said shelf to the feed table, a feed-off carrier operating above said feed table, and counter weighted feed dogs pivotally mounted upon said carrier.
12. A bottom delivery sheet feeding machine having means for supporting a pile of sheets including guides engaging opposite edges of said pile, movable members mounted upon the guides in position to engage one edge of said pile, and means engaging said movable members and yieldingly pressing them against the edge of the pile.
13. A bottom delivery sheet feeding machine having means for supporting a pile of sheets including guides engaging opposite edges of said pile, movable members mounted upon the guides in position to engage one edge of said pile, and weights engaging said movable members and yieldingly pressing them against the edge of the pile.
14. In a sheet feeding machine, the combination of means for supporting a pile or stack of sheets, sliding weights mounted adjacent to said pile or stack, and movable members actuated by said weights and held thereby in engagement with the pile or stack.
15. In a sheet feeding machine, the combination of guides for a pile or stack of sheets, movable arms pivoted upon said guides and engaging the edge of said pile or stack, and sheet engaging weights movably mounted in said guides and operatively engaged by said movable members and normally held out of action thereby, said weights being adapted to move into engagement with the final sheets of the pile or stack when said movable members are released by the lowering of the pile.
16. In a sheet feeding machine, the combination of guides for a pile or stack of sheets, movable arms pivoted upon said

guides and engaging the edge of said pile or stack, guide-ways inclining toward the pile or stack, and sheet engaging weights movably mounted in said inclined guide-ways and operatively engaged by said movable members and normally held out of action thereby, said weights being adapted to move into engagement with the final sheets of the pile or stack when said movable members are released by the lowering of the pile.

10 17. In a sheet feeding machine, the combination of guides for a pile of sheets, a shelf supporting one edge of said pile, means for moving successive individual sheets from said shelf, a guide leading to said shelf, and a weight mounted to slide in said guide and engage sheets upon said shelf.

15 18. In a sheet feeding machine, the combination of guides for a pile of sheets, a shelf supporting one edge of said pile, means for moving successive individual sheets from said shelf, a guide-way leading to said shelf, a weight mounted to slide in said guide-way into engagement with sheets upon said shelf, and means engaging said weight and

normally restrained by engagement with the pile for holding said weight out of action.

19. In a sheet feeding machine, the combination of guides for a pile of sheets, a shelf supporting one edge of said pile, a pusher for moving successive individual sheets from said shelf, a guideway leading to said shelf, a weight mounted to slide in said guide-way into engagement with sheets upon said shelf, and movable means engaging said weight and normally restrained by engagement with the pile for holding said weight out of action.

20. In a sheet feeding machine, the combination of guides for a pile of sheets, a shelf supporting one edge of said pile, means for moving successive individual sheets from said shelf, a guide-way leading to said shelf, a weight mounted to slide in said guide-way into engagement with sheets upon said shelf, and a pivoted lever engaging said weight and normally restrained by engagement with the pile for holding said weight out of action.

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