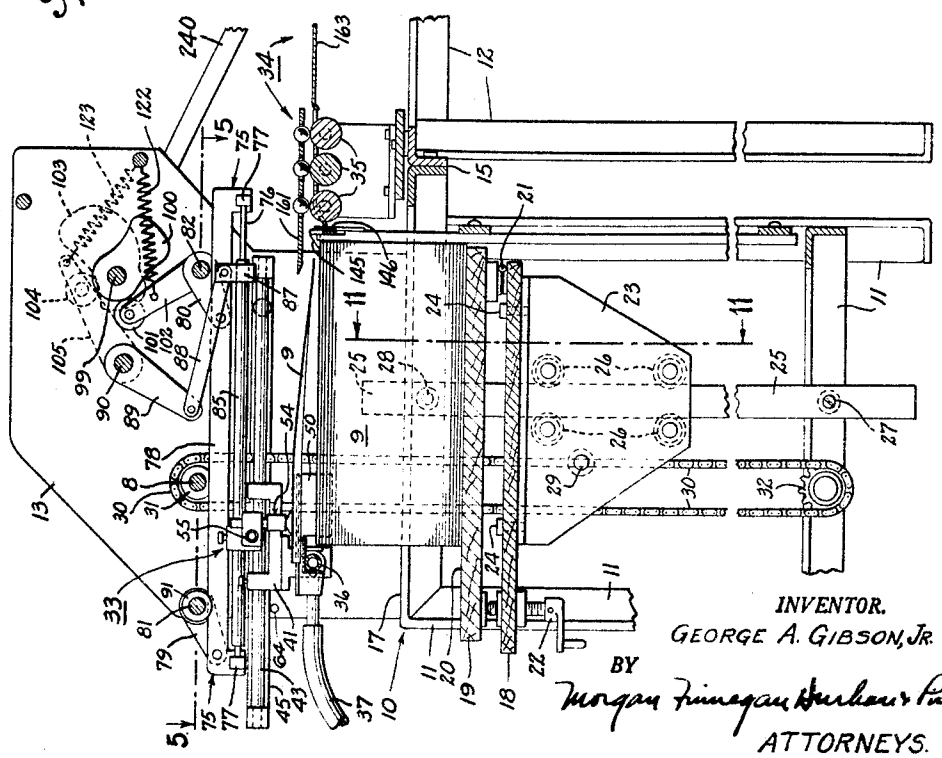
Dec. 1, 1959 G. A. GIBSON, JR 2,915,310

APPARATUS FOR FEEDING FLAT STOCK

Original Filed July 7. 1954 6 Sheets-Sheet 1

Fig. 1



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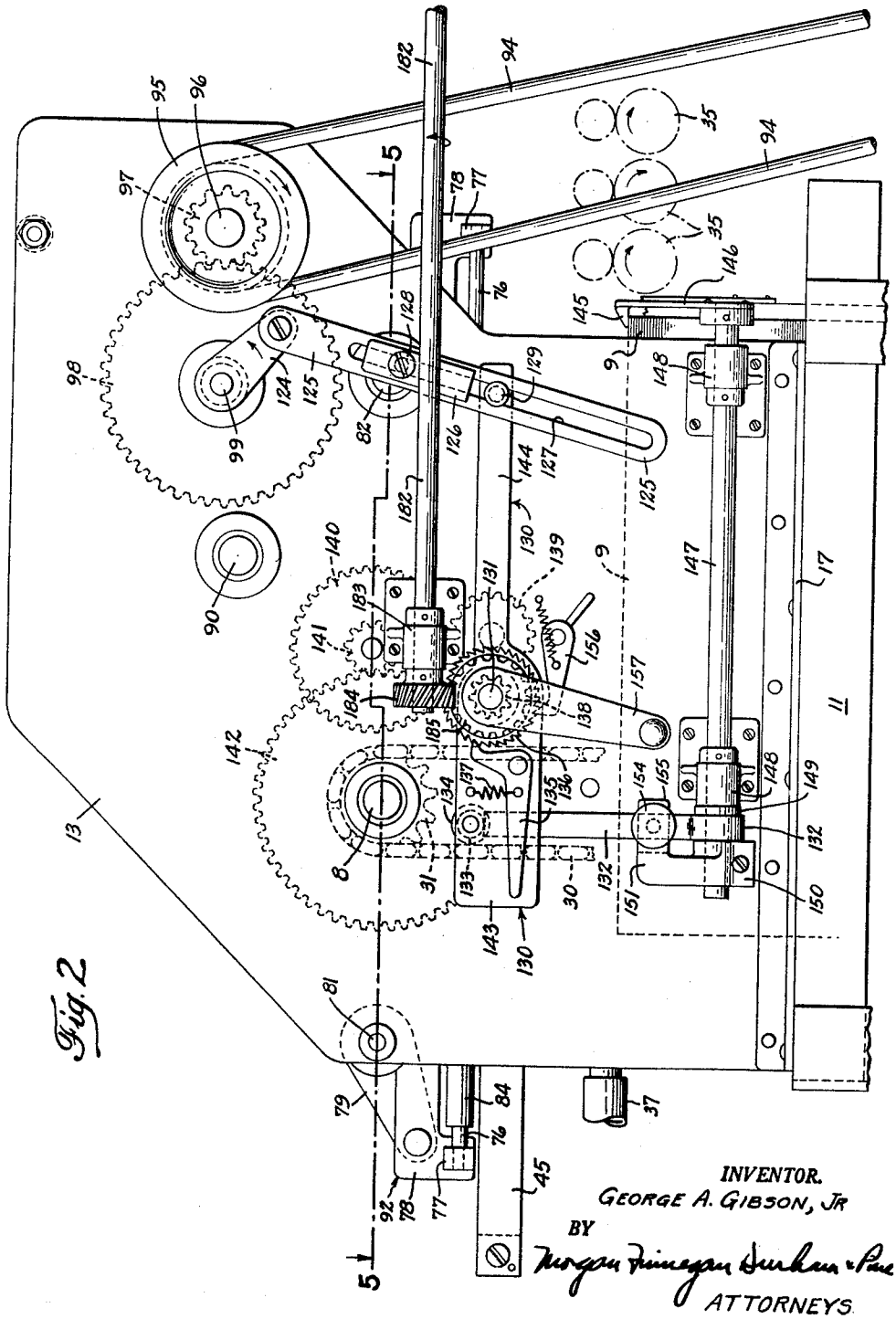


Fig. 2

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APPARATUS FOR FEEDING FLAT STOCK

Original Filed July 7, 1954 6 Sheets-Sheet 3

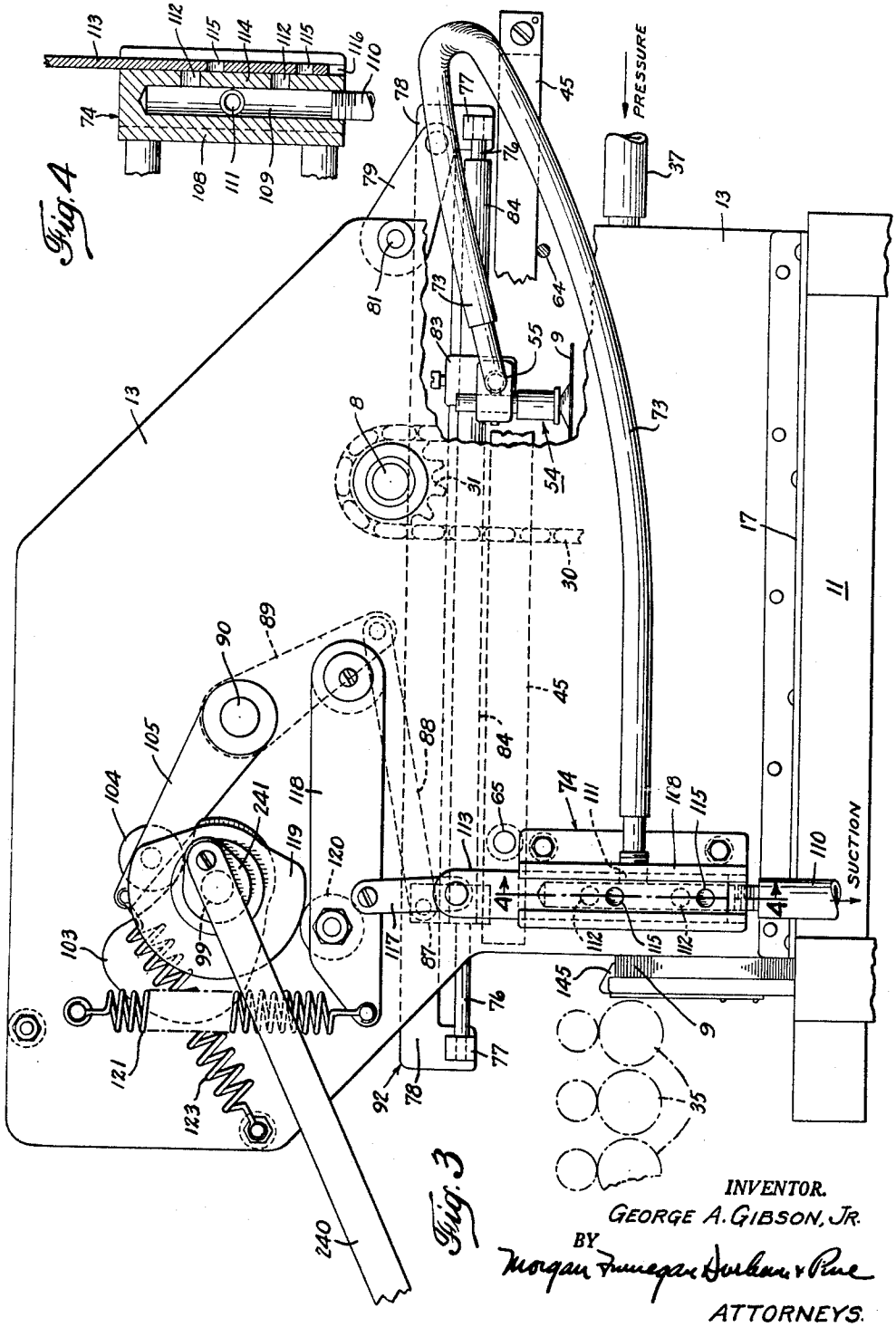


Fig. 3

Fig. 4

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APPARATUS FOR FEEDING FLAT STOCK

Original Filed July 7. 1954 6 Sheets-Sheet 4

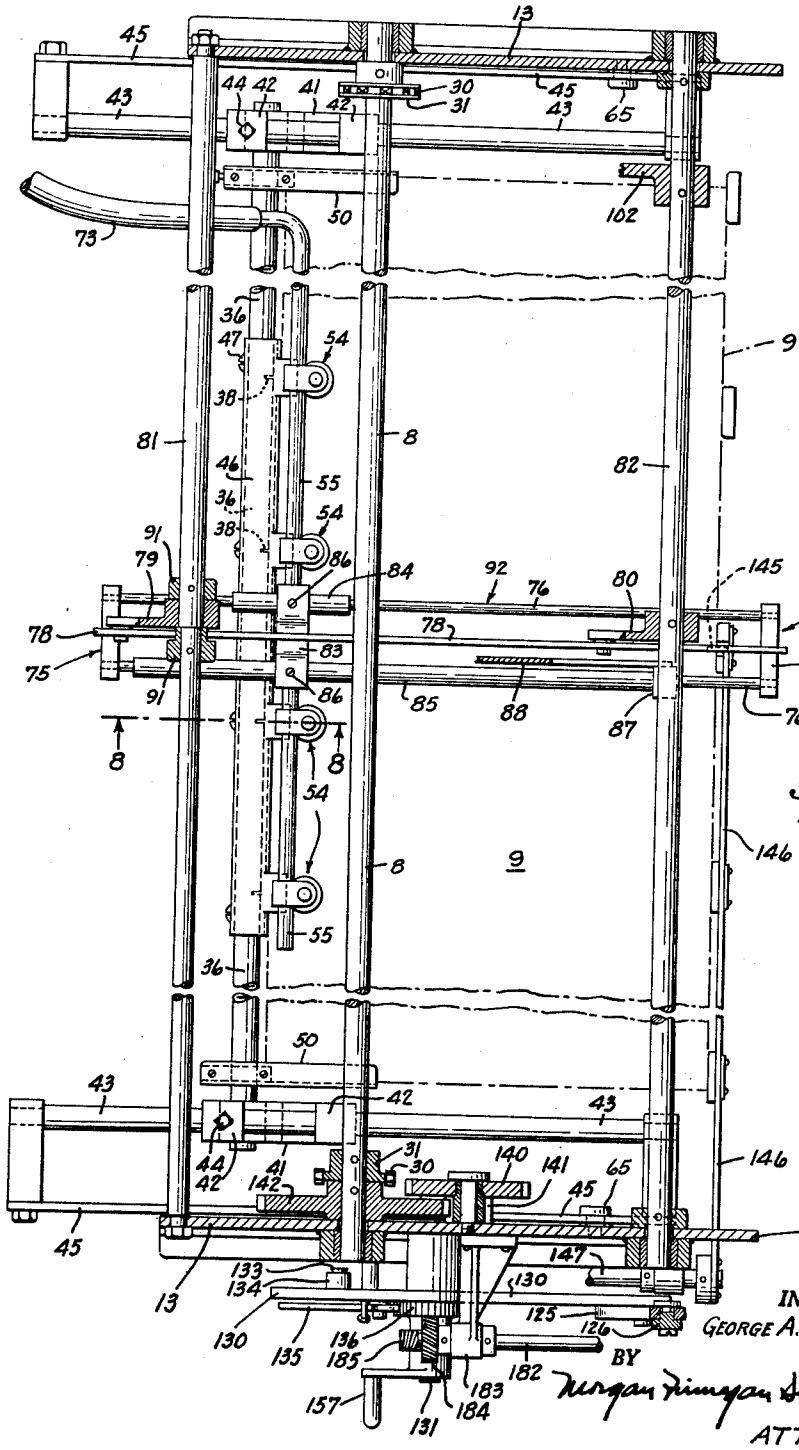


Fig. 5

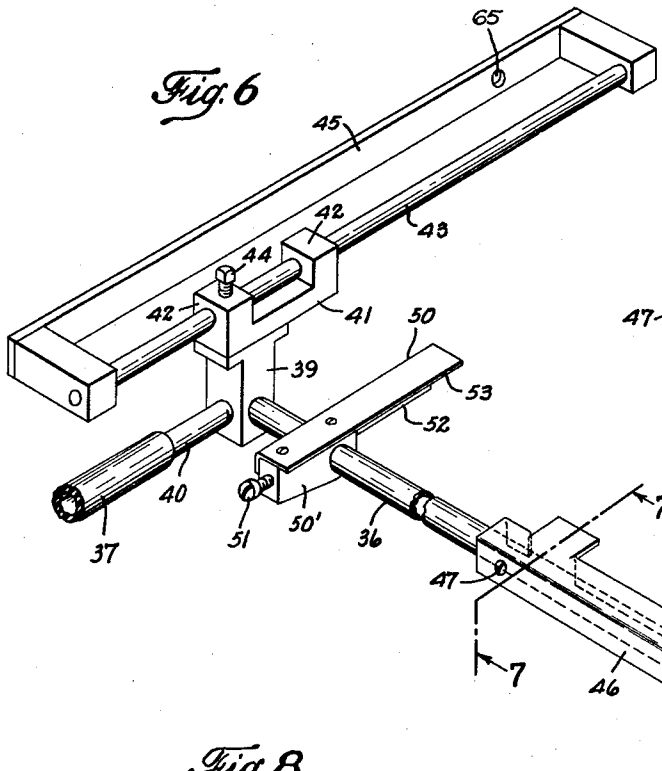
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APPARATUS FOR FEEDING FLAT STOCK

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Fig. 6



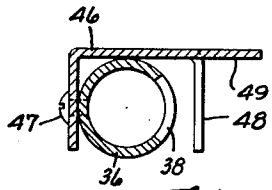
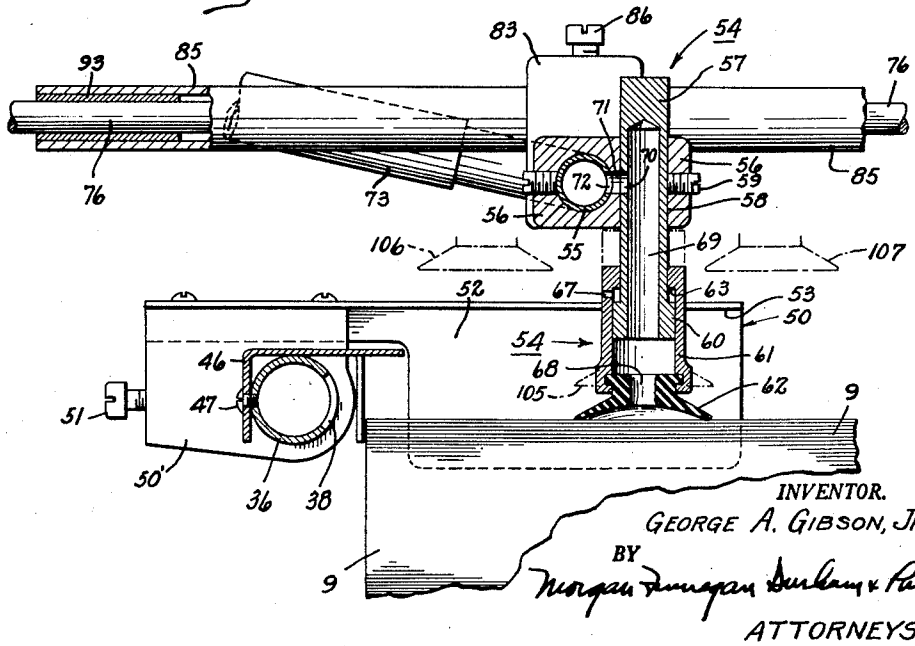


Fig. 7

Fig. 8



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Fig. 10

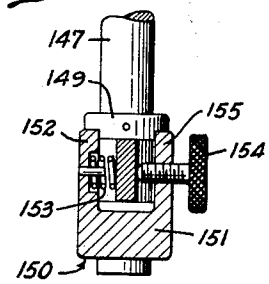


Fig. 9

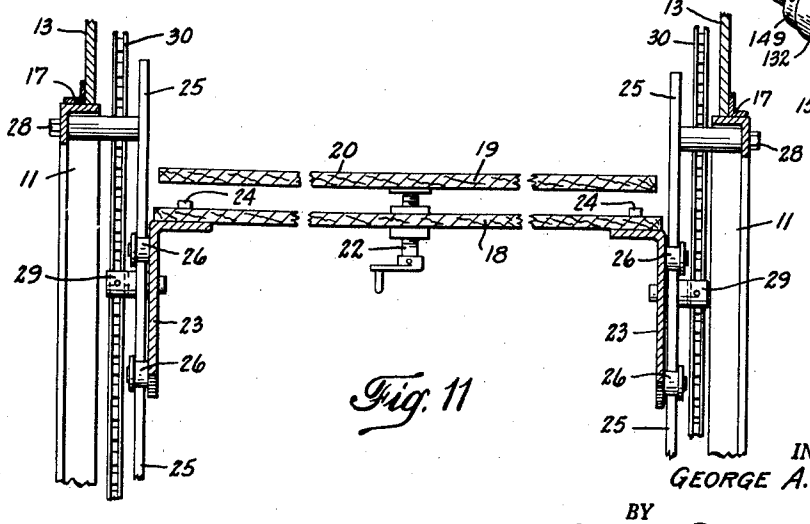


Fig. 11

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2,915,310

APPARATUS FOR FEEDING FLAT STOCK

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Original application July 7, 1954, Serial No. 441,820. Divided and this application August 21, 1957, Serial No. 680,032

1 Claim. (Cl. 271—62)

The present invention relates to apparatus for feeding, cutting and stacking articles of a flat nature such as paper, cards, or the like.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

This application is a division of my copending application Serial No. 441,820, filed July 7, 1954.

The invention comprises apparatus for feeding and forwarding flat articles such as paper, cards, or the like, which may be either ornamented or unornamented at the time of forwarding, in a predetermined position to cutting or slitting means whereby the flat articles are cut into segments. The device herein shown and described for purposes of illustration may, for example, be adapted to receive printed or embossed card stock through a supply means, said stock being in the form of flat rectangular sheets, and to forward said sheets to a cutting mechanism which will cut each sheet into a plurality of relatively long and narrow rectangular units which are suitable to be further processed into finished cards by spaced cuts lengthwise of each unit. The preferred embodiment of the apparatus illustrated in the accompanying drawings and described in the specification is adapted for fully automatic operation, in which each of the individual operations is performed by the apparatus automatically and in rapid sequence, but manually operable controls are provided by which certain operations may be carried out by the operator.

The illustrative form of the invention shown and described preferably comprises supporting means for holding a supply of flat articles, such as sheets of flat paper stock, said means being movable so as to bring successive sheets of flat articles to a position from which they may be inserted into the conveying mechanism. The feeding mechanism is also provided with transfer means for lifting the sheets off the top of the pile and inserting them into the conveying mechanism.

As embodied in the illustrative form of the invention shown in the drawings, the supporting means for the feeding mechanism, upon which the flat sheets are piled, comprises a tiltable platform movably mounted on vertical rails or tracks disposed at each side of the apparatus and secured to a pair of endless chains whereby said platform may be moved toward or away from the transfer mechanism. Suitable adjusting means are provided for selectively varying the tilt of the platform to change the pitch of the flat sheets. The separating means for

the sheets adjacent the top comprises means for directing a series of vertical columns of air against the outermost top edge of the pile of flat sheets, the air raising several of the sheets adjacent the top so as to allow the air to pass between the sheets and to separate them. A catch, or some other suitable form of restraining device, is positioned at the back edge of the pile to insure that only one sheet at a time is removed from the top of the pile.

The gripping means of the transfer mechanism comprises longitudinally adjustable suction apparatus which fastens to the top sheet upon contact therewith, said gripping means being constructed to compensate for irregularities in contour in the sheets. The carrying means for the suction apparatus is operable both vertically and longitudinally and operates first to raise the suction apparatus, then to move it frontally away from the restraining device, and then rearwardly toward the conveying mechanism. The control mechanism comprises the restraining catch, mounted so as to move downwardly as the height of the pile decreases, and a stop mechanism inter-connected with the catch which isolates the endless chains from a source of power until the catch has moved a predetermined distance whereupon the chain is actuated to move the supporting platform upwardly a compensating distance. Suitable adjustment is also provided whereby the predetermined movement of the catch may be selectively varied.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not intended to be restrictive thereof.

Of the drawings:

Fig. 1 is a longitudinal section taken near the center line of the apparatus showing a preferred form of the invention,

Fig. 2 is a side elevation of the upper right hand forward portion of the frame of the apparatus showing the means for raising and lowering the supporting platform for the feeding mechanism and the means by which the travel of the platform toward the transfer mechanism is regulated.

Fig. 3 is a side elevation of the upper left hand forward portion of the frame of the apparatus, partly broken away, showing the actuating and control mechanisms for the sheet gripping means.

Fig. 4 is a sectional view of a detail of Fig. 3 taken along the line 4—4 in Fig. 3 looking in the direction of the arrows, and showing the control valve for the sheet gripping apparatus.

Fig. 5 is a plan view, partly in section, taken along the line 5—5 in Fig. 1 looking in the direction of the arrows, showing the separating, gripping and carrying means of the sheet transfer apparatus,

Fig. 6 is a perspective view of the sheet separating means,

Fig. 7 is a transverse sectional view taken along the line 7—7 in Fig. 6 looking in the direction of the arrows,

Fig. 8 is an enlarged sectional view of a portion of the transfer means, showing details of the separating and gripping means with successive positions of the gripping means indicated by dot and dash lines,

Fig. 9 is a perspective view, with all interfering frame and supporting portions of the apparatus eliminated, of the control apparatus which regulates the travel of the sheet elevating means toward the transfer means,

Fig. 10 is a sectional view of a detail of Fig. 9 taken along the line 10—10 looking in the direction of the arrows, and

Fig. 11 is a transverse sectional view taken along the line 11—11 in Fig. 1 looking in the direction of the arrows, showing details of the sheet supporting means.

Referring now to the drawings and at first to Fig. 1

there is shown an illustrative embodiment of the invention. The numeral 10 denominates the frame of the apparatus which is generally formed of two main sections, 11, 12 and front and rear side members 13 and 14, respectively, bolted together as at 15, 16 and 17 (Fig. 2). The left hand portion of Fig. 1 generally constitutes the front section of the apparatus and comprises the feeding mechanism of the apparatus which inserts the flat sheets of the pile 9 into the conveying mechanism, generally situated in the central portion of the figure and indicated by the numeral 34. Supporting means for the sheets of flat articles are provided and preferably comprise a pair of platforms 18 and 19 mounted one above the other, in a substantially parallel relation, the upper platform 19 being provided with a surface 20 upon which the flat sheets 9 are piled. The platform 19 is joined to the platform 18 at its rearward edge by means of hinges 21 which permit the platform 19 to be tiltable with respect to the platform 18, such tiltable movement being effected by means of a manually adjustable screw jack 22 mounted on the front end of the platform 18 and abutting the underside of the platform 19. The purpose of tilting the platform 19 is to compensate for different heights between the front and rear edges of the pile 9 resulting from embossments or other raised sections on the flat articles.

The platform 18 is secured by bolts 24, to a pair of brackets 23 which are movably mounted by means of rollers 26 on vertical tracks or rails 25 secured to the frame 11 by machine screws as at 27 and 28. Vertical movement of the brackets 23 and the platforms 18 and 19 is effected by means of studs 29 provided on the brackets and fixedly secured to links in the endless chains 30 mounted for rotation on the sprockets 31 and 32. Sprockets 31 are secured on a transverse shaft 8 which is journaled in the side frames 13, and sprockets 32 are rotatably mounted on stub shafts carried by frame 11. Upward travel of the platforms 18 and 19 serves to carry the flat sheets piled on the platform 19 to the transfer mechanism generally designated by the numeral 33 which inserts them, one by one, into the conveying mechanism 34.

The transfer mechanism 33 comprises means for separating, gripping and carrying each sheet to the roller elements 35. To this end, the machine is preferably provided with a transverse tube 36 to which a supply of compressed air is delivered from a suitable source (not shown) by a flexible tube 37. Tube 36 is positioned adjacent the outermost top edge of pile 9 and is provided with spaced vertical slots 38 (Figs. 7 and 8) through which vertical columns of air are directed against the edge of the pile. The air so directed against the pile of flat sheets 9 raises several of the sheets adjacent the top of the pile and separates them whereby the compressed air is permitted to enter between the sheets and to maintain them in a separated condition. In order to accommodate various sized sheets the tube 36 is mounted so as to be longitudinally adjustable with respect to the side frames 13.

Referring now to Figure 6 wherein the adjusting structure is shown, the left hand end of rod 36, as featured in the drawing, is secured in block 39, as is the end of the flexible tube 37 by means of pipe 40. The block 39 is provided with an inner passage (not shown) by which the tube 36 communicates with the inner portion of the tube 37. A bracket 41, to which the block 39 is secured, is provided with lugs 42, having bores to receive the rod 43 upon which the bracket 41 may slide. A set screw 44 is provided to fixedly position the bracket on the rod 43 wherever desired and rod 43 is secured to the side frame 13 by means of the supporting member 45 which is pivotally secured to the frame at 65. Pivotal mounting of the member 45 on the frame 13 avoids damage to the separating or gripping means by the upward travel of the platform 19 as the pile 9 becomes exhausted. A pin 64 holds the member 45 against downward movement. Similar adjusting means are provided at the opposite, or right hand end, of tube 36 with the exception that no other flexible tube is provided. A front guide plate 46 is secured to rod 36 by screws 47 and is provided with surfaces 48 and 49 adapted to guide the front and top edges of the pile 9 respectively. A pair of similar side guide plates 50, provided with surfaces 52 and 53, are also secured to tube 36 by means of blocks 50' and set screws 51.

The gripping means for picking up the top sheet preferably comprises suction apparatus and in the preferred form of the invention shown in the drawings, a series of adjustably positionable suction devices 54 are transversely spaced across the top sheet of the pile 9 (Fig. 5). The suction devices 54 are mounted on a tube 55 by means of brackets 56 and are formed by a hollow cylindrical pin 57 (see Fig. 8) secured in a bore 58 in the bracket 56 by a set screw 59 and having its lowermost end formed with an enlarged head 60. Barrel 61, carrying rubber suction cup 62, is slidably mounted on the exterior of pin 57 and is prevented from dropping off the pin 57 by a shoulder 63 which would strike the enlarged head 60 on the pin. A passage 67 in barrel 61 exhausts air trapped between the head 60 and the shoulder 63 whenever relative movement occurs between the barrel 61 and the pin 57. By providing for relative movement between the pin 57 and the barrel 61 good suction is assured regardless of any irregularities or deformities occurring in the sheets between different suction cups.

Suction pressure is applied to the tube 55 through flexible tube 73 connecting the tube with control valve 74 and a source of suction pressure (not shown). Suction pressure is applied to the uppermost sheet of the pile 9 from an opening 68 in rubber suction cup 62, passageway 69 and orifice 70 in the pin 57, passageway 71 in bracket 56 and the orifice 72 in the tube 55.

The tube 55 is mounted on a carrying mechanism generally designated by the numeral 75 and preferably comprising a pair of parallel rod members 76 joined at their ends by brackets 77 to form a frame 92 (see Fig. 5). The frame 92 is mounted for arcuate parallel movement toward and away from the flat sheets 9 by means of a longitudinal bar 78 secured to the brackets 77 and also, at each end, pivoted to crank levers 79 and 80 mounted on the transverse shafts 81 and 82. Crank 79 is freely rotatable on the stationary shaft 81 and is positioned thereon by the collars 91, and crank 80 is fixedly secured to oscillatory shaft 82. Oscillation of shaft 82 (to be described hereinafter) effects the raising and lowering of the frame 92 toward and away from the pile 9 of flat sheets through the cranks 79 and 80. Tube 55 is carried by a block 83 fixedly secured to sleeve members 84 and 85 by the set screws 86. The sleeves 84 and 85 are slidably mounted on the rod members 76 by means of buslings 93 (Fig. 8) so that tube 55, block 83 and sleeves 84 and 85 form a sliding assembly on the frame 92. Secured to one end of the sleeve 85 is a lug 87 (Fig. 5) to which a link 88 is pivotally secured, said link also being pivoted, at its opposite end, to a crank lever 89, (Fig. 1) fixedly mounted on shaft 90 so that oscillation of the shaft 90 (to be described hereinafter) rocks the lever 89 and link 88 so as to cause the sleeves 84, 85 and hence the suction devices 54, to slide along the rods 76 of frame 92.

Oscillation of the shafts 82 and 90 is effected through the rotation of the cams 100 and 103. The cam 100 acts through the cam follower 101 carried on the end of lever 102 which is fixedly secured to the shaft 82 adjacent the inside face of the left hand frame member 13. Cam 103 acts through the cam follower 104 carried on the end of lever 105 which is fixedly secured to shaft 90 adjacent the outside face of the left hand frame member 13. Tension springs 122, 123 associated with cam levers 102,

105 serve to maintain the cam followers 101, 104 in operative contact with their respective cams.

The cams 100, 103 are mounted for rotation on a common drive shaft 99 journaled in each of the side frames 13 said shaft being rotated through the gear 98, fixed on the shaft 90 adjacent the inside face of the right hand frame 13, and gear 97 fixed on a stub shaft 96 journaled in the frame and having pulley 95 secured on the outer end thereof. Pulley 95 is driven in a clockwise direction through the belt 94 by a suitable source of power (not shown) which may preferably be an electric motor secured to the frame of the apparatus.

Cams 100 and 103 are shaped and mounted on shaft 99 so as to provide the proper sequence of operation of frame 92 and the sliding assembly for the suction devices and serve to impart combined vertical and longitudinal motion to the suction devices 54 to cause them to move successively to and through the positions indicated by the dot-dash lines 105, 106 and 107 in Fig. 8.

Control means are provided whereby the suction on the sheet is released when the suction devices 54 are in their rearward position as shown by the dot-dash lines 107. As embodied, the control means comprises a valve 74 (Figs. 4 and 5) which communicates the flexible tube 73 with the atmosphere at the proper time thereby destroying the suction in the cups 62 and releasing the sheet. The body 108 of the valve is mounted on the outer face of the left hand side frame 13 and has a chamber 109 connected by a conduit 110 to a source of suction pressure (not shown), and communicating with flexible tube 73 through the orifice 111. The chamber 109 has apertures 112 formed in the outer wall 114, said apertures being normally closed by a slidable plate 113 provided with similarly spaced apertures 115 so positioned as to be out of register with the apertures 112 during the greater portion of the stroke of the carrying mechanism. The plate 113 slides in groove 116 in the valve body 108 and is connected by a link 117, to a cam lever 118 pivotally mounted on the frame 13 adjacent the shaft 90. Cam lever 118 and its follower 120 are actuated by a cam 119 provided on the shaft 99. A spring 121 constantly urges the follower 120 against the cam 119. Upon rotation of the shaft 99 the proper cam surfaces on the cam 119 causes the lever 118 to raise slidable plate 113 to bring the apertures 112 and 115 into register whereby the suction line is exhausted to the atmosphere.

Control of the upward travel of the platforms 18 and 19 toward the transfer mechanism 33 is achieved in a unique and novel manner (see Figs. 2 and 9). Shaft 99 carries a crank arm 124 on the outer face of the right hand side frame 13. Pivotally joined to the end of arm 124 is a slotted link 125 having a block 126 adjustably secured in the slot 127 by the screw 128. A pin 129 is provided on a lever 130 and resides within slot 127 in slidable relation thereto. As the shaft 99 and arm 124 rotate, the slotted link 125 rides up and down, sliding and pivoting about the pin 129 on lever 130. The lever 130 is pivoted on a shaft 131 (Fig. 9) and is maintained in substantially horizontal position by a stop lever 132, abutting the underside of a peg 133 on spacer 134 secured to the heavier end 143 of lever 130. A pawl 135 (Fig. 2) is pivoted on the heavy end of lever 130 and engages ratchet 136 fixed on shaft 131 under the constant urging of a spring 137. On the inner face of right hand side frame 13 shaft 131 is provided with gear 138 which drives the endless chains 30 through a train of gears 139, 140, 141, 142 and sprockets 31 secured on the transverse shaft 8. While the lever 130 is in the horizontal position no motion of the slotted link 125 is transmitted to the chain through the pawl 135 and ratchet 136, but when the stop lever 132 is withdrawn from underneath the peg 133 on the lever 130 the heavy end 143 thereof pivots downwardly on shaft 131 thereby moving the pawl to the next ratchet tooth. When the upraised end 144

of the lever 130 is engaged by the descending block 126 and pushed downwardly the pawl 135 turns the ratchet wheel 136 on the shaft 131 and advances the chains 30 through the gears 138, 139, 140, 141, 142, and sprockets 31 on shaft 8.

Suitable control means are provided whereby the stop lever 132 is periodically removed from underneath the peg 133 in accordance with the rate at which the height of the pile 9 decreases. To this end the catch 145 at the back of the pile 9 is provided with an arm 146 mounted on shaft 147. The shaft 147 is mounted upon bearings 148 secured to the outer face of right hand side frame 13 and at the front end thereof carries stop lever 132. The lever 132 is positioned on the shaft 147 by means of the collar 149 and the clamp 150. As shown in Figs. 9 and 10 clamp 150 is shaped at its upper end in the form of a yoke 151 through which the stop lever 132 projects. One arm 152 of the yoke carries spring 153 which urges lever 132 against the adjusting screw 154 carried by the opposite side 155 of the yoke by which the relative position of the lever 132 with respect to the yoke 151 may be selectively varied. Due to the strength of the spring 153 once this adjustment has been made the positions of the lever and the yoke are fixed and the rotation of the shaft and yoke 151 results in a like rotation of the stop lever 132.

With the removal of each sheet of the pile 9 the catch 145 is lowered a distance equal to the thickness of the sheet and arm 146 tends to rotate a slight amount. The rotation of the arm 146 is restrained by the weight of the lever 130 resting on the stop lever 132 fixedly positioned in the yoke of clamp 150. However, the block 126 on the slotted link 125 is so positioned in the slot 127 so that it will slightly contact and move the lever 130 at the extreme downward position of the crank arm 124. Each revolution of the crank arm thereafter causes the block 126 to strike the lever 130 and momentarily release the stop lever 132. Each time the lever 130 releases the stop lever 132, clamp 150 and shaft 147 rotate very slightly so that the top of lever 132 moves axially along peg 133 and away from lever 130. After a certain number of sheets have been removed the stop lever 132 is entirely withdrawn from underneath peg 133 and the lever 130 will pivot counterclockwise about the shaft 131. Upon the pivoting of lever 130 the pawl 135 engages the next ratchet tooth on the wheel 136 and when the next revolution of crank arm 124 brings block 126 into contact with the pin 129 on the lever 130 and the lever 130 is rotated in a clockwise direction, as shown in the drawing, thereby advancing the chains 30 and raising the platform 19 a sufficient amount to compensate for the number of sheets which have been withdrawn since the last advancement of the chains. As the platform is raised the catch 145, arm 146, shaft 147 and stop lever 132 are rotated in the opposite direction and the stop lever 132 is restored to its position underneath peg 133 thereby halting the endless chains 30. A second pawl 156 holds the ratchet 136 against counter-rotation of the shaft 131 when the lever 130 is being pivoted counterclockwise. A handle 157 is also provided on the shaft 131 for manually operating the chains 30 and platform 19 whenever it is desired to do so.

The feeding mechanism feeds the flat sheets into a conveying mechanism 34 mounted on the frame 12 said mechanism comprising a series of transverse roller elements 35 which receive the sheets from the transfer mechanism. The rollers 35 are driven from a source of power (not shown) which may or may not be the same source of power for actuating cams 100, 103 and 119 and the platforms 18 and 19. Suitable guides 161 are provided adjacent the rollers 35 to insure that the sheets find their way into the roller elements.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the

accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

I claim:

Control means for feeding apparatus for flat stock such as paper or the like, comprising support means for a pile of flat articles, means for effecting movement of the support means having an oscillatable lever member, a stop for holding the lever against oscillation whereby the moving means are held in a normally inoperative position, a catch at the top of the pile adapted to move downwardly as the articles are withdrawn from the pile, means for intermittently reducing the pressure of the lever on the stop, and a shaft connected between the catch and the stop by which the downward travel of the catch is transformed into rotation of the stop whereby the stop is moved out from under the lever during the periods of reduced pressure until the lever is free to oscillate and the moving means may advance the support means.

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