Dec. 4, 1962 M. FIEHL 3,066,933

DEVICE FOR STACKING FORMS

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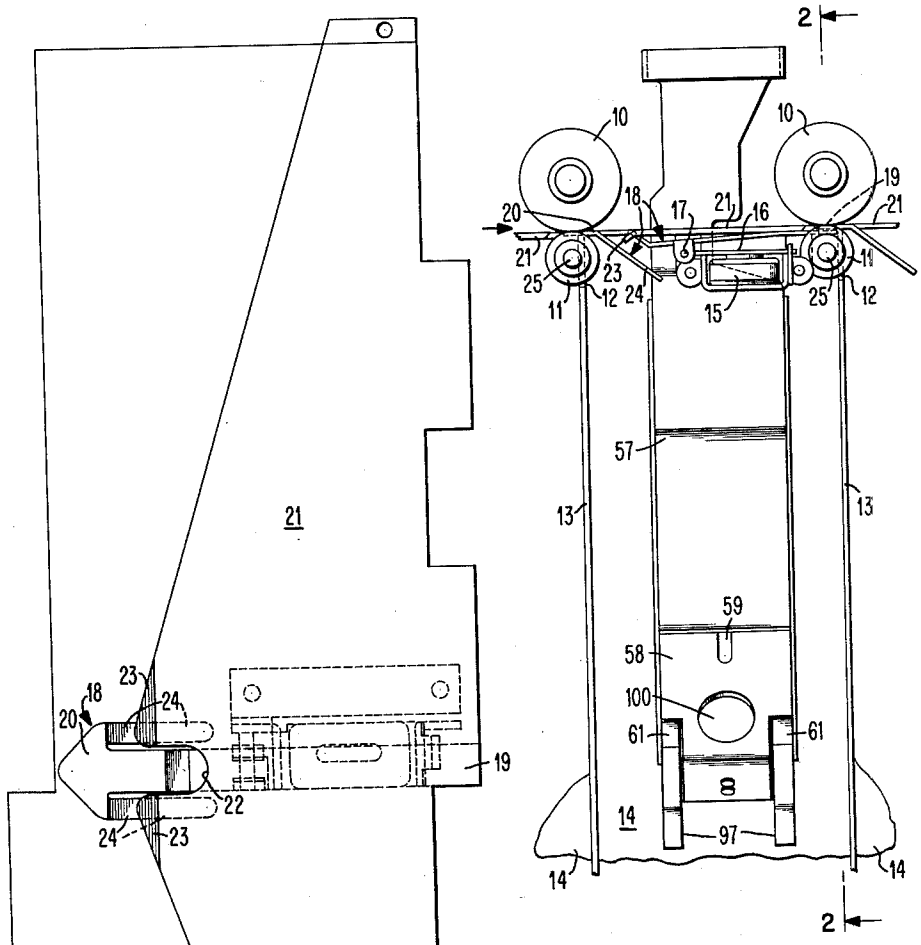


FIG. 1

FIG. 3

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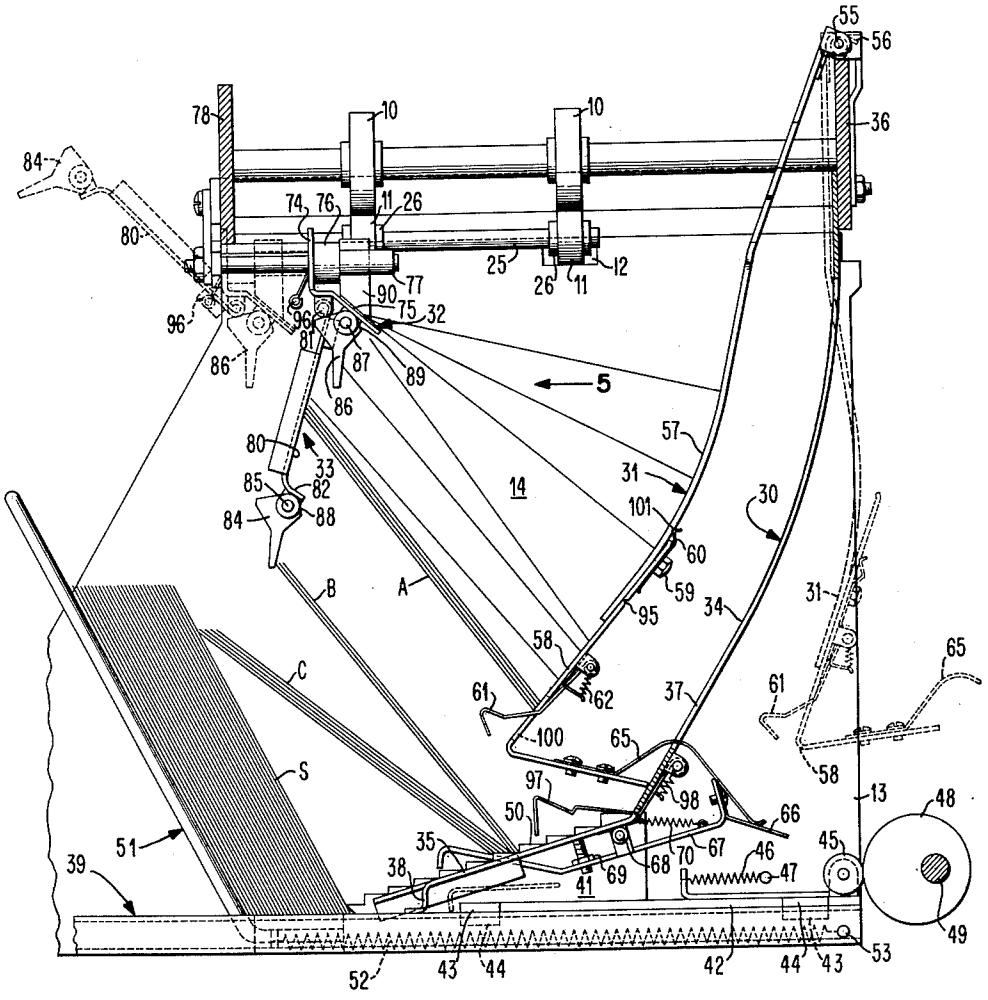


FIG. 2

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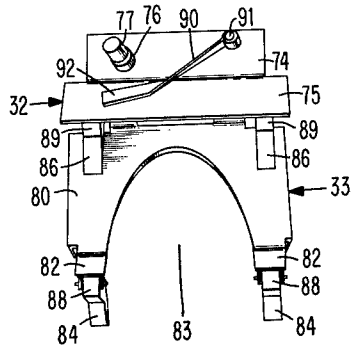


FIG. 5

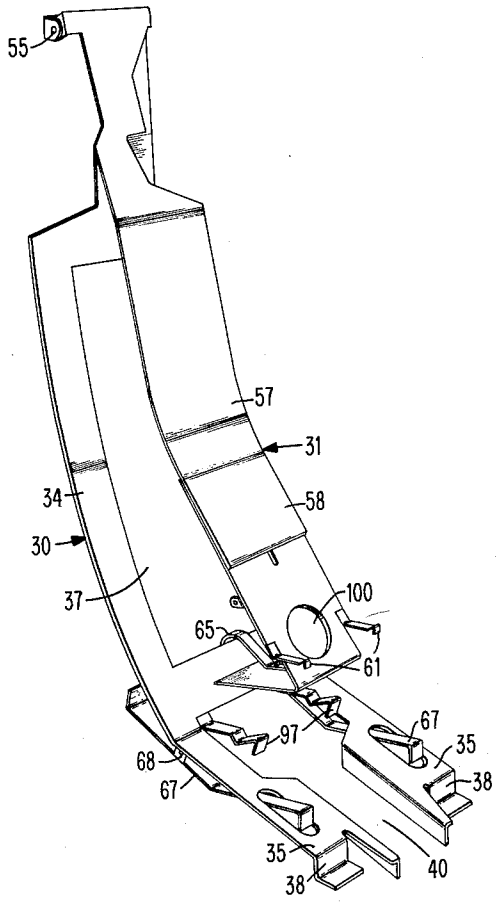


FIG. 4

United States Patent Office 3,066,933 Patented Dec. 4, 1962

3,066,933

DEVICE FOR STACKING FORMS

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Filed Mar. 28, 1961, Ser. No. 98,884
6 Claims. (Cl. 271—87)

This invention relates to stacking devices for stacking forms, such as record cards, and relates more particularly to a stacking device of the so-called radial type embodying uniquely adjustable means for enabling stacking on edge of forms of different sizes.

In FIG. 2 of my U.S. Patent 2,964,314, granted on December 13, 1960 and assigned to the assignee of the present invention, there is disclosed a radial stacker comprising means for diverting a selected record card downwardly into a selected pocket as it is being advanced in a defined path over spaced sidewalls of a plurality of adjacent pockets. The forward motion of the diverted card is arrested by the downpath side wall of the selected pocket; and as the card drops, one edge that is parallel to the feed path is held up by a ledge in the pocket to cause the card to pivot on the ledge such that its opposite edge will swing generally in an arc relative to the ledge and in a curved path as prescribed by an arcuate surface of a guide member. Below this arcuate surface is a spring finger-type arrester or gate which temporarily supports the lower edges of the cards. When enough cards accumulate to depress the gate, the cards drop onto an inclined lower portion of the guide member. A reciprocating pusher vibrates this lower portion to jiggle the cards down onto a bed plate and cause them to pile up in side-by-side relation on an inclined card support.

The stacking device just described operates very satisfactorily to stack cards of a predetermined length. However, it embodies no means whereby it can be adjusted to stack cards or other forms of different lengths. The radius of curvature of the arcuate surface of the guide member is prescribed by the distance from the card ledge to the arcuate surface and corresponds substantially to the length of the card. Hence, the position of the guide member cannot be altered appreciably in an attempt to suit cards of different lengths because the radius of curvature of the guide surface cannot change automatically to correspond to variations in the length of the card.

It is therefore the principal object of this invention to provide an improved stacking device of the above general type which is especially suitable for use in sorting machines, collators and the like and which embodies uniquely adjustable means per permitting the stacking device reliably and selectively to stack on edge forms of different selected lengths.

According to the invention, the improved stacking device comprises a fixed guide member for guiding long forms and adjustable guide means for guiding shorter forms. The fixed guide member has its inclined lower portion secured to the bed plate and has a slot through its arcuate surface. The adjustable guide means comprises an upper part providing an arcuate surface suitable for guiding the shorter forms. This part at its upper end is carried on a fixed pivot so as to be swingable generally toward and away from the card pivot ledge. The adjustable guide means also comprises a lower part in the form of a nose piece which is adjustably positionable relative to the upper part in directions toward and away from the pivot so that the guide means may be contracted and elongated. The support means, when contracted, is preferably spring-biased away from the ledge and rearward through the slot in the fixed guide member to an ineffective position to permit the long forms to contact and

be guided by the fixed guide member. To stack the shorter forms, the adjustable guide means, while contracted, is pulled toward the ledge means and through the slot; it is then elongated to cause the nose piece to be spring-biased into contact with the fixed guide member at a point below the slot. Thus, the guide means is maintained in proper position to provide the correct radius of curvature for stacking the shorter forms.

The improved stacking device also preferably comprises a ledge which is carried on a slidable bracket so as to be adjustable transversely of the card feed path. A deflector assemblage depends from, and is hingedly connected to, a pin carried by the ledge. When in its depending position, this assemblage controls the descent of the shorter cards after their edges drop below the ledge. When stacking long cards, the deflector assemblage is swung upward relative to the pin and latched out of the way in a retracted position.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings, wherein:

FIG. 1 is a front view of a stacking device embodying the invention disposed in one pocket of a collator or the like;

FIG. 2 is an end or side view taken along the line 2—2 of FIG. 1;

FIG. 3 is a top view of a deflector and shear plate shown in FIGS. 1 and 2;

FIG. 4 is a perspective view of a fixed guide member and adjustable guide member shown in FIGS. 1 and 2; and

FIG. 5 is a view looking in the direction of arrow 5 in FIG. 2 showing a side view of a deflector assemblage forming part of the stacking device.

Referring to the drawings, after forms, such as conventional record cards, have been fed from a hopper (not shown) and sensed by a suitable sensing means (not shown), they are advanced rightward, as viewed in FIG. 1, into the bites of successive sets of suitably driven feed rolls 10 and cooperating idler rolls 11. The rolls 11 extend into cut-outs 12 formed in the upper edges of spaced partitions constituting the side walls 13 of adjacent card-receiving pockets 14, only one of which pockets is fully shown.

If a magnet 15 associated with a particular pocket 14 is energized, as shown in FIG. 1, its armature 16 will be attracted and through a pivot connection at 17 pull a deflector 18 downward relative to its cantilevered fixed support at 19. In such case, the card will be driven by the rolls 10, 11 over the leading portion or nose 20 of the deflector and above and along a shear plate 21 associated with that particular pocket 14 and thence into the bite of the rolls 10, 11 associated with the next succeeding pocket. The shear plate 21 has a recess 22 (FIG. 3) in its leading or lefthand edge and has downwardly bent lips 23 to either side of said recess. These lips guide the leading edge of the card up onto the flat upper surface of the shear plate 21. If, however, the magnet 15 associated with a particular pocket is de-energized, the nose 20 of the corresponding deflector 18 will be rocked above the card feed path and cause the rolls 10, 11 to drive the card against, and along the under side of, two transversely spaced downwardly inclined fingers 24 (see FIG. 3) to divert the card into said particular pocket.

It may here be noted that each idler roll 11 is carried on a shaft 25 and resiliently biased by suitable means (not shown) toward its corresponding driven roll 10 to assure that the cards will be positively and accurately driven despite minor variations in their thickness.

According to the invention, and as best shown in FIG. 2, there is provided a fixed guide member 30, an adjustable guide means 31, a card pivot ledge 32 adjustable transversely of the card feed path, and a hinged deflector assemblage 33, each of which will now be described in detail.

The fixed guide member 30 comprises an upper portion having an arcuate, generally radial surface 34 which joins a downwardly inclined straight surface 35 of a bifurcated lower portion. The upper portion is suitably secured to a back plate 36 at the rear of the pocket 14. A relatively wide generally rectangular slot 37 (see FIG. 4) extends substantially the full length of and through the arcuate surface 34 of member 30. However, enough of the slot-surrounding arcuate surface 34 remains to provide a surface of proper configuration for guiding long cards, such as conventional 80-column record cards. The bifurcated lower portion comprises two integrally connected projections 38 having their lower ends suitably secured to a bed member 39. These projections 38 are separated by a U-shaped slot 40 which accommodates a reciprocable card pusher 41.

The pusher 41 is mounted on a plate 42. As more fully shown in my aforementioned patent, plate 42 has transversely extending arms 43 which overlie the side channels of the bed member 39; and plate 42 also has depending guides 44 that ride in a guide slot defined between said side channels. A roller follower 45 is carried on a pin supported by a lug secured to plate 42. A spring 46 is anchored to a fixed pin 47 and connected to a lug secured to plate 42. This spring biases plate 42 and hence pusher 41 rightward, as viewed in FIG. 2, to maintain the follower 45 in contact with a cam 48 eccentrically mounted on a suitably driven shaft 49. Thus, as cam 48 rotates, it will act through follower 45 to reciprocate the pusher 41 so that a stepped inclined surface 50 of the pusher will be alternately projected through the slot in surface 35 and then withdrawn behind said surface to impart a leftward pushing action on the lower edges of the cards.

An inclined card support 51 extends down into the slot between the side channels of the bed member 39. A helical spring 52 anchored at 53 to the bed member 39 is connected to the lower end of the card support 51 to resiliently bias the latter toward the pusher 41. As the cards accumulate on the stack at S, the support 51 will yield leftward as necessary to maintain a substantially constant distance between the righthand side of the stack and the fixed guide member 30.

As illustrated, the adjustable guide means 31 comprises an upper piece or portion having its upper end hingedly supported on a fixed pivot pin 55 carried by the back plate 36. A suitable spring, such as a mousestrap type spring 56 wrapped around pin 55, biases the guide means 31 counterclockwise, as viewed in FIG. 2, relative to said pin. The upper piece has an arcuate guide surface 57 with a radius of curvature (different from that of surface 34) suitable for guiding cards of a shorter length, such as 51-column record cards. The upper piece overlies the upper side of a nose piece 58 that has a pin or rivet-in-slot type adjustable connection with the upper piece at 59. This connection permits elongation and contraction of the guide means 31 according to whether the nose piece 58 is moved away from or towards the pivot pin 55. A spring detent 60 is preferably clamped by the rivet at 59 to cooperate with detent notches in the upper piece and nose piece accurately to define the elongated and contracted conditions or positions of the guide means 31. A pair of card-supporting arresting fingers or gates 61 are biased outwardly beyond the upper surface of the nose piece 58 by a suitable spring 62.

To the base of nose piece 58 is secured a curved spring 65 that is adapted to pass through slot 37 and at its free end bear on an arm 66. Arm 66 is secured to or formed integrally with one end of a gate element 67 that is rockably supported on a pin 68 carried by a lug depending from the fixed guide member 30. When spring 65 bears down on arm 66 and rocks gate element 67 clockwise about pin 68, it biases the gating end of element 67 above the inclined surface 35 of fixed guide member 30 to a limit position as determined by adjustment of an adjusting nut 69 on a stud interposed between and engaging the fixed guide member and element. When the relatively strong spring 65 does not act on arm 66, a weaker helical spring 70 biases element 67 counterclockwise to a withdrawn position as partially shown by dotted lines.

The card pivot ledge 32 comprises an angle plate portion 74 providing a card-supporting surface 75 inclined downwardly at about a 45-degree angle toward the guide means 31. Portion 74 is laterally connected to a hub or sleeve portion 76, both of which are slidably mounted on a stud 77. This stud extends transversely of the card feed path and is suitably supported in a vertical support plate 78 so as to permit the ledge 32 to be moved therealong toward and away from the back plate 36 to prescribed, preferably detent-defined positions.

The deflector assemblage 33 comprises a generally inverted U-shaped deflector plate 80 having its upper end pivotally connected to a pin 81 that is carried by a downturned ear or lug formed on the ledge 32. At its lower end, plate 80 has two fingers 82 defining the sides of the U and separated by an access recess 83. These fingers are bent generally toward the guide means 31 to provide surfaces inclined downwardly at an angle of about 45 degrees and generally parallel to the ledge surface 75 when the assemblage 33 is in its lowered or short-card-stacking position, in which it is shown by full lines in FIG. 2.

The assemblage 33 also comprises lower support members 84 which are rockably supported on respective pins 85 each carried by a downturned ear formed integrally with the under side of a corresponding one of the fingers 82 of the deflector plate 80. Two transversely spaced upper support members 86 are rockably supported on respective pins 87 each carried by a downturned ear formed integrally with the under side of the card-supporting portion 74 of the card pivot ledge 32 below the inclined surface 75. As viewed in FIG. 2, each of these support members 84, 86 is rockable clockwise a substantial degree relative to their respective pins, 85, 87 to permit the upper edges of any cards temporarily supported thereon to move leftward therepast; however, these support members are rockable only a limited degree in a counterclockwise direction to positions in which their respective edges 88, 89 contact the under side of the fingers 82 or the under side of the card-supporting portion 74. The extent of counterclockwise rocking of these support members 84, 86 is so limited in order to assure that if the operator should inadvertently push all or some of the stacked cards S rightward as viewed in FIG. 2, when attempting to remove cards from the pocket, the upper edges of such cards can rock these support members only as far as their counterclockwise limit positions. This prevents card jams or misstacking which could otherwise occur if the upper edges of such stacked cards S were permitted to hit and disturb the cards which are in the process of being stacked and are then temporarily supported on the ledge 32 or deflector plate 80.

As best shown in FIG. 5, a card aligning element 90 is pivotally connected to and depends from a stud 91 connected to the ledge portion 74 in spaced relation to the stud 77. The element 90 extends angularly downward from stud 91 and near its lower end is bent to provide a flat portion 92 that is adapted to make planar contact with the inclined surface 75 of ledge 32. This aligning element 90 is gravity-biased downward about stud 91 so that portion 92 will tend to lightly bear down on a diverted card and urge it into aligning contact with surface 75.

Operation

Assume initially that the feed rolls **10** are rotating; that cards are being fed rightward as viewed in FIG. 1; that the guide means **31**, pivot ledge **32** and deflector assemblage **33** are positioned as shown by full lines in FIG. 2 to condition the stacking device to stack short, such as 51-column, cards; and that in response to information sensed by the aforementioned sensing means, the normally energized magnet **15** associated with a particular pocket **14** has been de-energized to operatively swing the deflector **18** upward to divert a particular card from the card feed path and down along the under side of fingers **24** into said pocket, in the manner already explained.

As viewed in FIG. 2, the cards are being fed toward the reader by the rolls **10**, **11**. As the selected card is diverted by the deflector **18** and guided by the fingers **24** down into the pocket, aligning element **90** will lightly urge the left edge of the card downward toward ledge surface **75**. Forward motion of the diverted card will cease when its leading edge hits and is stopped by the upper part of the side wall **13** that defines the downpath side (see FIG. 1) of the selected pocket **14**. Then, while the left-hand edge (as viewed in FIG. 2) of the diverted card is temporarily supported on ledge surface **75**, its right-hand edge will start to swing downward in an arc prescribed by the arcuate surface **57** of the adjustable guide means **31**. As the lower edge of the card starts to fall onto the bridge of nose piece **58**, its upper edge will drop off ledge **32** and temporarily be supported by contact with upper support member **86**. Member **86** will thereafter swing clockwise and guide the upper edge of the card down onto the deflector plate **80**.

A plurality of cards will tend to accumulate side-by-side at A. When the weight of these cards is sufficient to lower the gate **61** against resistance of bias spring **62**, they will drop off the end of the nose piece **58** to the position shown at B. During this movement to position B, the fingers **82** will prevent the upper edges of the cards from snagging between the deflector plate **80** and lower support members **84**; and the upper edges of the cards will come to rest temporarily on the members **84** and then swing the latter clockwise out of the way so that the cards will swing generally to the position shown at C. In this position, the lower edges of the cards will alternately rest on the stepped surface **50** of the reciprocable card pusher **41** or on the inclined surface **35** of the fixed guide member **30**, according to the position of the pusher relative to said guide member.

Gating element **67** is preferably provided to assure that the lower edges of the cards will be temporarily held rightward far enough to insure that the cards will drop from position A through position B in a counterclockwise direction to position C. If gating element **67** is not provided, there is a possibility that the cards may fall away from stack S rather than toward it. For example, if the pusher **41** happened to be retracted at the time the lower edges of the cards dropped from position A toward position B, their lower edges might move leftward and down far enough along flat surface **35** to cause the cards to rock clockwise such that their upper edges would undesirably project into the space between support members **84** and gate **61**. If this should happen, it would prevent proper stacking of the cards. On the other hand, without gating element **67**, the pusher **41** might push the lower edges of the cards rightward too soon (i.e., before their upper edges have moved leftward past members **84**); and this, too, could cause the cards undesirably to rock clockwise. When a sufficient number of cards rest on gating element **67**, their weight will depress said element. This will permit the lower edges of the cards nearest stack S to move leftward off the end of gating element **67** and onto the portion of surface **35** below said element.

As the pusher **41** is operatively reciprocated by the rotating cam **48** acting through the follower **45**, the cards will be progressively pushed leftward by the steps on surface **50** until the cards are finally pushed onto the upper surface of the bed member **39** and become compacted against and form part of stack S.

To condition the stacking device to stack longer cards, such as conventional 80-column cards, the adjustable guide means **31** is first contracted and then retracted behind the fixed guide member **30**. The guide means **31** is contracted by pulling the nose piece **58** slightly leftward, as viewed in FIG. 2, away from member **30** and then pushing it upward toward the pivot pin **55** until the detent **60** pops into detent notch **95**. Spring **56** will then bias the contracted guide means **31** rightward through slot **37** to the position shown by broken lines. With the pressure of spring **65** removed from arm **66**, the gating end of element **67** will be biased by spring **70** to the retracted position denoted by dotted lines.

Also, the portions **74** and **76** of card pivot ledge **32**, and hence the card aligning element **90** supported from portion **74**, are manually moved leftward, as viewed in FIG. 2, in unison along stud **77** to the position denoted by broken lines. The deflector plate **80** is then rocked clockwise about pin **81** to the retracted position denoted by broken lines, and is resiliently latched in said position by a spring detent **96** carried by the ledge portion **74**.

With the device thus conditioned, cards diverted into the particular pocket will be biased downward toward surface **75** by the aligning element **90**, as before. Their left-hand edges will be temporarily supported on the ledge **32**, while their right-hand edges will free fall arcuately downward in a path prescribed by the arcuate surface **34** of guide member **30**. As the lower edges of the cards drop from surface **34** toward inclined surface **35**, they will tend to accumulate on a resilient gate **97** that is biased above surface **35** by a helical spring **98** anchored to the fixed guide member **30**. When a sufficient number of cards thus accumulates, their weight will depress the gate **97** and permit the cards to advance onto surface **35**. By this time, the upper edges of the cards will have dropped below the upper card support member **86** and will be in a position somewhat comparable to that shown at C in FIG. 2. As the pusher **41** is reciprocated by the action of cam **48**, the cards will be pushed down off the inclined surface **35** and onto the bed member **39** and stacked in compacted relation against the inclined card support **51**, in generally the same manner as heretofore described.

To recondition the device to stack the shorter cards, the operator reaches through slot **37** and hooks his finger in a finger hole **100** in the nose piece **58** to pull the contracted guide means **31** forward through the slot **37**. The guide means **31** is then elongated by pulling down the nose piece **48** until detent **60** pops into the positioning notch **101**, as shown in FIG. 2. The operator then releases his hold on guide means **31** and permits spring **56** to bias said guide means into firm contact with surface **34** below the slot **37**. The operator also shifts card pivot ledge **32** toward the guide means **31** and effects restoration of deflector assemblage **33** to its lower position, denoted by solid lines in FIG. 2.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. In a device adjustable to stack forms of different sizes, the combination of means for diverting successive forms downwardly from a defined feed path, ledge means for temporarily supporting each diverted form on one edge while its opposite edge free falls in an arc for edgewise stacking on said opposite edge, a member having a guide portion contactable by the said opposite edges of forms of one size and having a slot through said portion,

bias means, and guide means comprising another guide portion normally biased by said bias means to an ineffective position in which it is retracted fully through and behind said slot, said other guide portion being movable forward through said slot toward said ledge means to an effective position in which it is contactable by said opposite edges of forms of smaller size and maintained by said bias means in a predetermined spaced relation away from the slot, whereby forms are selectively guided and supported by said member or guide means according as said other guide portion is in ineffective position or effective position.

2. In a device adjustable to stack forms of different sizes, the combination of means for diverting successive forms downwardly from a defined feed path as they move longitudinally along said path, ledge means for temporarily supporting each diverted form on one longitudinal edge while its opposite edge free falls in an arc for edgewise stacking on said opposite edge, a member having a guide portion contactable by the said opposite edges of forms of one size and having a slot through said portion, and guide means comprising a curved element carried on a pivot and a nose piece adjustably connected to said element, said guide means normally being retracted to an ineffective position behind said member, said guide means while contracted by positioning the nose piece toward the pivot being movable through the slot toward the ledge means to an effective position in which it is contactable by said opposite edges of forms of smaller size, said nose piece being positionable away from the pivot to cause its end to bear against said member at a point adjacent the slot to support said guide means in effective position.

3. The combination according to claim 2, including means biasing the guide means away from the ledge means thereby to cause the guide means when in effective position to be biased toward said member and also cause the guide means when contracted to be biased to ineffective position.

4. The combination according to claim 2, wherein the ledge means is adjustable transversely of said path in directions toward and away from said support member, thereby to provide a secondary means for adjusting the device to stack documents of different sizes.

5. The combination according to claim 2, wherein said member adjacent its lower end has a downwardly inclined surface with an opening therethrough, and including pusher means for pushing the forms in a direction away from said inclined surface for stacking on their said opposite edges, and means for moving the pusher means back and forth such that in moving to one position said pusher means projects through the last-mentioned opening to contact and push forms in said direction and in moving to another position is retracted through said last-mentioned opening to permit said opposite edges of said forms to move downward along said inclined surface under the influence of gravity.

6. The combination according to claim 2, wherein said member has a substantially flat inclined surface adjacent its lower end, and including support means pivotally connected to and depending from said ledge means to support and guide the descent of the said one longitudinal edges of said forms, a gating element which is resiliently biased to a position in which it projects upwardly through an opening in said inclined surface, said gating element cooperating with said support means to assure that the forms will rock in a prescribed way toward preceding forms on a stack and be prevented from rocking toward and causing misstacking of succeeding cards, said gating element being depressible by the weight of a sufficient number of forms to permit their said opposite edges to move downward along said inclined surface and toward the stack.

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