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Mahler et al.

[11] **3,767,187**

[45] **Oct. 23, 1973**

[54] **ADJUSTABLE PAPER CASSETTE**

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[52] **U.S. Cl.** **271/169,** 271/19

[51] **Int. Cl.** **B65h 1/04**

[58] **Field of Search** 271/61, 24, 25, 22, 271/21, 39, 36, 62

[56] **References Cited**

UNITED STATES PATENTS

3,583,697	6/1971	Tippy	271/21 X
3,672,665	6/1972	Schnall et al.	271/39
3,651,933	3/1972	Bell	271/61 X
1,094,713	4/1914	Gibbs	271/24
815,905	3/1906	Cox	271/22
3,153,534	10/1964	Eichler et al.	271/61

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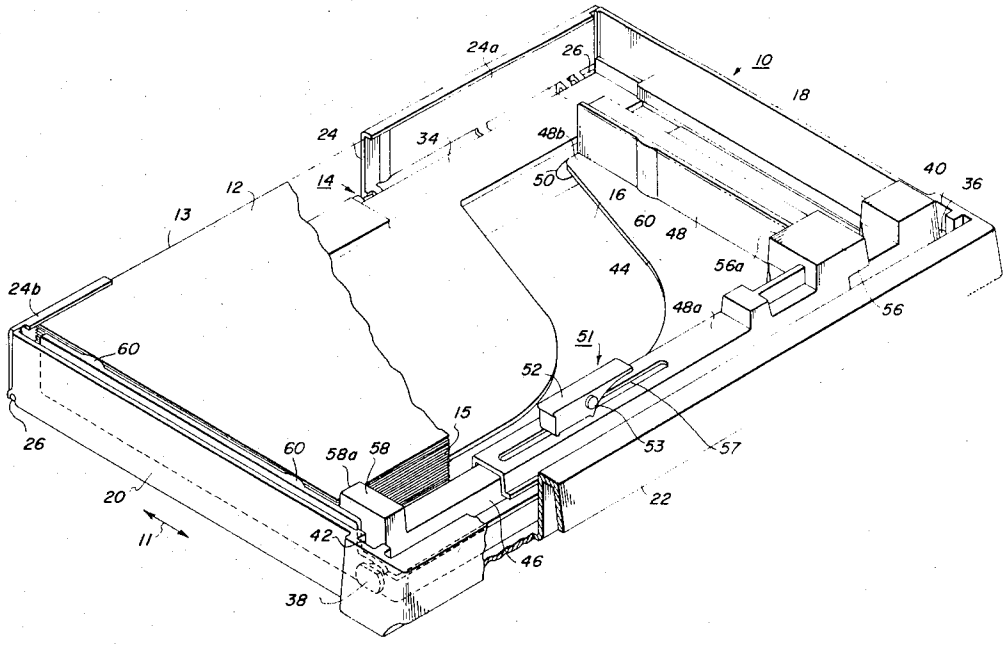
[57] **ABSTRACT**

A container in which an adjustable guide member cooperates with a registration member to align the edge portions of a stack of sheet material supported therein.

4 Claims, 4 Drawing Figures



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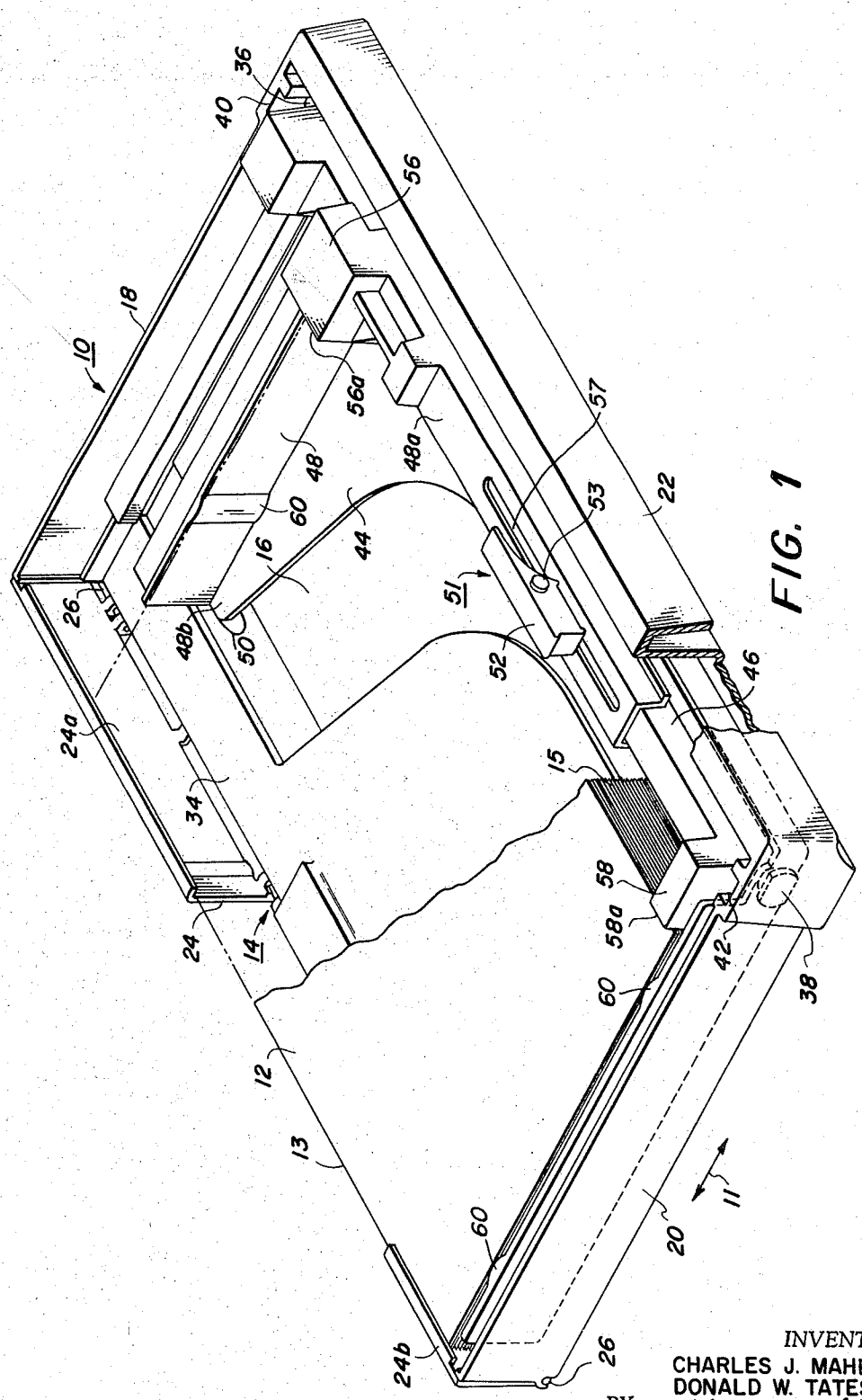

FIG. 1

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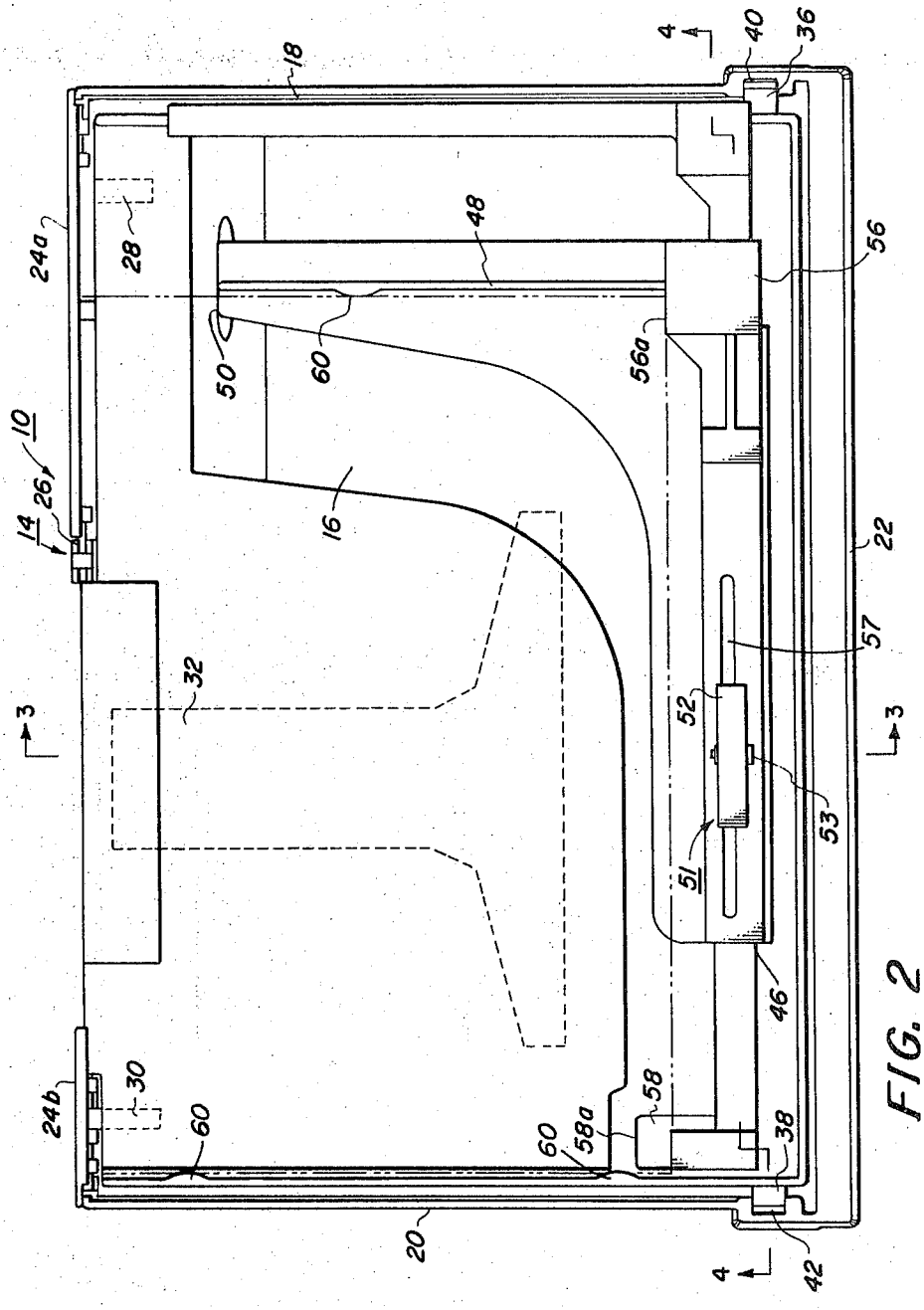
18
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56a
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FIG. 2

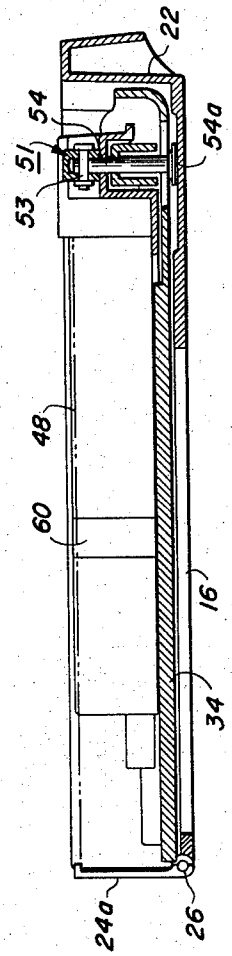

FIG. 3

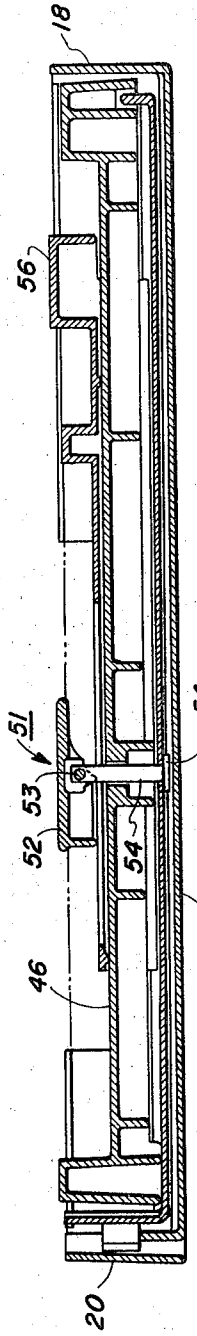

FIG. 4

ADJUSTABLE PAPER CASSETTE

The foregoing abstract is neither intended to define the invention disclosed in the specification, nor is it intended to be limiting as to the scope in any way.

BACKGROUND OF THE INVENTION

This invention relates generally to a container for supporting sheet material which is to be dispensed therefrom, and more particularly, to a container which is adjustable to align the edge portions of a stack of sheet material disposed therein.

It is customary to provide cut sheet material, such as paper, for typical copiers used in business offices. Generally, the paper is of a preselected size which advances through the copier, one sheet at a time, for suitable processing therein. Inasmuch as copies may be made at high speeds, it is advantageous to stack a pile of paper in the feeding mechanism of the copier and to automatically advance one sheet of paper at a time therefrom. The paper is advanced until the stack is depleted, whereupon the operator refills the copier with a new stack of paper. Therefore, the operator need only supply more paper to the copier when the stack of paper is depleted or the size of the paper has to be changed.

A problem often encountered in loading a stack of paper directly into the copier is that the size of paper frequently has to be changed. This necessitates the removal of the entire stack of paper from the copier and the replacement thereof with another stack of different size paper. If the supply of paper is maintained in a loose pile which is merely placed in a tray or other container within the copier, the changing of the paper can be a difficult and unmanageable task since the stack of paper may be readily disarranged and the edges thereof bent or torn as the stack is loaded into and unloaded from the copier.

One approach to this problem has been to utilize rolls of paper. The paper is advanced from the roll into the copier and, thereafter, cut to a suitable length. Alternately, the paper may be cut to a suitable length prior to being advanced into the copier. However, in either case the unrolled sheet of paper is of a constant width. Thus, in this solution to the problem only the length of the sheet of paper may be varied, the width thereof remains constant.

Another solution to this problem is to place the selected size stack of paper into a cassette, which is removable from the copier. The conventional cassette, as disclosed in U. S. Pat. No. 3,360,258 issued to Nix, has the interior periphery thereof fixed so as to substantially conform to the exterior periphery of the paper and maintains the stack in alignment during the loading and unloading thereof from the copier.

In operation, a cassette of the appropriate size is selected by the operator and filled with a stack of the corresponding size paper. Thereafter, the operator need only load the cassette into the copier, the cassette being adapted to prevent the paper from becoming disarranged, or bent and torn. However, when a fixed size cassette is used, a plurality of such cassettes must be provided for each size of paper processed in the copier. Moreover, a conventional cassette does not cooperate with the feeding mechanism of the copier so as to insure that only one sheet of paper at a time is advanced therefrom. This will occasionally result in sheet misfeed or in two or more sheets of paper being advanced simultaneously from the cassette to the copier. In either

case the normal operation of the machine is effected resulting in a machine shut down and ensuing loss of machine and labor time.

In a feeding mechanism having one or a plurality of feed rollers for advancing the paper from the cassette to the copier, the relationship of the feed rolls with respect to the paper is extremely critical. Each sheet of paper should preferably engage the feed rolls at the same point on the circumference thereof. All the sheets of paper are, thereby, advanced from the cassette to the copier along the same path, i.e., tangentially from the feed rolls at the point of contact therewith. it has been found that in order to achieve the aforementioned commonality of paths for each sheet of paper being advanced from the cassette, it is preferable for the feed rolls to remain stationary, i.e., not to move into engagement and out of engagement with the paper, but rather to have the cassette move into and out of engagement with the feed rolls. Conventionally, the entire cassette may be moved so that each sheet of paper successively engages the feed rolls of the copier for advancement thereto. However, when the entire cassette is moved, it is difficult to insure that each sheet of paper contacts the same point on the circumference of the feed rolls so as to follow a common path tangential thereto.

In order to overcome many of the disadvantages associated with the hereinbefore utilized cassette, there is, in accordance with the present invention, provided a cassette which can support one of a plurality of different size stacks of paper therein, and which moves each sheet of paper successively into engagement with a feeding mechanism insuring that each sheet transverses a substantially common path of travel as it is being advanced therefrom.

Accordingly, a primary object of the present invention is to improve the adjustable cassette supporting a stack of sheet material to move the stack into engagement with a feeding mechanism for advancing successive single sheets therefrom along a substantially common path.

SUMMARY OF THE INVENTION

Briefly stated and in accordance with the present invention, there is provided an adjustable container, such as a cassette, supporting a stack of sheet material, such as paper, which is to be dispensed therefrom. This is accomplished in the present instance by placing the stack of paper within the cassette and suitably adjusting the cassette to correspond to the exterior periphery thereof. In accordance with the preferred embodiment of the present invention, the cassette includes a registration member a movable guide member and a base plate supporting the paper. The guide member is moved across the base plate engaging the edge portions of the stack of paper to align the paper with the registration member. Hence, the cassette may be adjusted so as to hold any one of a plurality of different size stacks of paper merely by properly positioning the guide member relative to the registration member.

Pursuant to one aspect of the present invention, a tray member is mounted pivotably on the base plate for supporting the stack of paper. Moreover, the registration member includes a gate member pivotable relative to the base plate. In this way, the gate member pivots away from the leading edge of the stack to free the leading edge of at least the uppermost sheet when the tray member pivots the stack of paper in an upwardly

direction engaging the uppermost sheet of paper with an external feeding mechanism to allow the uppermost sheet to be advanced therefrom.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the present invention will become apparent upon reading the following detailed description and upon reference to the drawings, in which;

FIG. 1 is a perspective view of a cassette constructed in accordance with the present invention;

FIG. 2 is a plan view of the cassette depicted in FIG. 1;

FIG. 3 is a sectional elevational view taken along the line 3—3 of FIG. 2; and

FIG. 4 is a sectional elevational view taken along the line 4—4 of FIG. 2.

While the present invention will be described in connection with a preferred embodiment, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

With continued reference to the drawings, wherein like reference numerals have been used throughout to designate like elements, FIG. 1 illustrates a cassette, designated generally at **10**, constructed in accordance with the present invention. Cassette **10** is well adapted to contain therein a stack of sheet material **12**, such as paper amongst others, which is to be dispensed therefrom to a work station. The illustrated embodiment is described herein as being operatively associated with a xerographic copier of the type disclosed in U. S. Pat. No. 3,062,109 issued to Mayo. The copier (not shown) has a feeding mechanism for advancing successive sheets of paper from cassette **10** thereto for suitable processing therein.

In the preferred construction cassette **10** includes a registration member, generally indicated by the reference numeral **14**, a base plate **16**, and a guide member indicated generally at **44**. Preferably, registration member **14** includes a pair of opposed distally spaced substantially parallel side members **18** and **20**. Side members **18** and **20** extend in substantially a direction perpendicular to base plate **16** and are suitably affixed thereto such as being integral therewith in the region of the corresponding side marginal edges thereof. Registration member **14** also includes rear member **22** and gate member **24**. Rear member **22** extends in substantially a perpendicular direction relative to base plate **16** in the region of the trailing marginal edge thereof. Rear member **22** is also suitably affixed to base plate **16** and side member **18** and **20**, such as by being integral therewith. In the preferred embodiment, rear member **22** in conjunction with side members **18** and **20** is adapted to form a substantially U-shaped frame affixed to base plate **16**. One of the features of the present invention is that gate member **24** pivots about hinge pin **26** attached to the leading marginal edge of base plate **16**. gate member **24** is formed from a pair of gate portions **24***a* and **24***b* spaced from one another so as to permit a portion of leading edge **13** of stack **12** to be exposed, i.e., leading edge **13** of stack **12** does not abutt gate member **24** over the region between gate portions **24***a* and **24***b*. The copier feeding mechanism is suitably adapted to pivot gate member **24** from a closed to an open position to pivot gate member **24** from a closed to an open position in response to cassette **10** being loaded therein. In the closed position, as shown in FIG. **1**, gate portion **24***a* engages the opposed edge of the side member **18** and gate portion **24**b engages the opposed edge of side member **20**. Both gate portions **24***a* and **24***b* are also in engagement with leading edge **13** of stack **12** when in their closed position. Gate portions **24***a* and **24***b* are adapted to pivot in the range of from about 3° to about 4° in pivoting from their closed position to their open position.

Turning now to FIG. **2**, a pair of leaf springs **28** and **30** attached to base plate **16** engage their respective gate portions **24***a* and **24***b* to maintain them in their closed position. Moreover, base plate **16** includes a T-shaped opening **32** therein so as to permit access to the interior of registration member **14**.

Referring once again to FIG. **1**, tray member **34** is mounted on base plate **16** so as to normally be supported thereby. Stack **12** is placed in cassette **10** with the bottommost sheet thereof resting on tray member **34**. Tray member **34** includes a pair of pivot shafts **36** and **38** extending from opposed sides in the region of the trailing edge portion thereof. Side member **18** has a corresponding groove **40** adapted to receive shaft **36**. Similarly side member **20** includes a corresponding groove **42** adapted to received shaft **38**. The shafts **36** and **38** are designed to be slidably mounted in their respective grooves **40** and **42** to pivotably attach tray member **34** to side members **18** and **20**. It is contemplated that the feeding mechanism of the copier will include suitable apparatus for engaging the bottom portion of tray member **34** through opening **32** in base plate **16**. Tray member **34** may therefore, be pivoted in substantially an upwardly direction relative to base plate **16** to enable the uppermost sheet of stack **12** to engage the feed rollers of the feeding mechanism. Prior thereto, gate member **24** pivots to an open position permitting the sheet to be advanced from cassette **10** to the copier. After the upppermost sheet has been advanced to the copier, tray member **34** is pivoted in substantially a downwardly direction to disengage the next successive uppermost sheet of stack **12** from the feed rolls. Tray member **34** is, therefore, adapted to oscillate so as to move successive sheets of stack **12** into engagement with the feeding mechanism. Accordingly, each sheet of stack **12** is brought into contact with the feed rolls of the feeding mechanism at about the same point thereon to be advanced tangentially therefrom along approximately the same path.

Pursuant to the present invention, guide member **44** is mounted movably in tray member **34** and cooperates with side member **20** and gate member **24** to align the stack **12** of paper disposed on tray member **34** (FIG. **1**). Tray member **34** supports guide member **44** slidable in aperture **50** of tray member **34**. Aperture **50** is of a size sufficient to permit guide member **44** to be moved relative to tray member **34** and base plate **16**, in the direction of arrow **11**, as well as normal thereto. Guide member **44** includes a rear guide **46** slidably mounted on tray member **34**. Rear guide **46** extends in substantially a direction parallel to gate member **24** and is positioned between gate member **24** and rear wall **22**. Rear guide **46** moves in substantially a direction perpendicular to gate member **24**, as indicated by arrow **11** in FIG.

1, so as to engage the trailing edge 15 of stack 12, thereby abutting the leading edge 13 of stack 12 against gate member 24. In this way rear guide 46 cooperates with gate member 24 to form a substantially rectangular frame adjusted to align the leading and trailing edges of stack 12. Also in accordance with the present invention, guide member 44 includes a side guide 48 having the rear portion 48*a* thereof mounted slidably on rear guide 46. The front portion 48*b* of side guide 48 passes through a suitable aperture 50 in tray member 34 so as to permit rear guide 46 to be readily advanced into engagement with trailing edge 15 of stack 12. Moreover, aperture 50 is of sufficient size so as to enable side guide 48 to be moved in substantially a direction parallel to gate member 24. Side guide 48 may, thereby, be moved into engagement with the side edge of stack 12 opposed therefrom. Thus, side guide 48 moves stack 12 to align the side edges thereof with registration member 14. It is, therefore, apparent that by providing an aperture 50 of suitable size and by suitably adjusting side guide 48 and rear guide 46 any size stack of paper may be placed in the cassette. In recapitulation, any size stack of paper is aligned by having the operator adjust side guide 48 to engage one side edge of stack 12 against side member 20, and rear guide 46 is adjusted to engage the leading edge 13 of stack 12 against gate member 24.

While the invention has been described in connection with a pair of mutually orthogonal guide members adjustable with respect to one another, one skilled in the art will appreciate that the invention is not necessarily so limited and that many other structures may be utilized for providing an adjustable guide member which cooperates with the registration member to align the edges of any size stack of paper disposed on the tray member. For example, the guide member may be a one piece assembly movable diagonally across the base to align the paper with the registration member, i.e., the rear guide and side guide do not move independently.

Having observed the details of the manner in which guide member 44 may be adjusted, attention may now be given to the manner of locking guide member 44 in position to maintain the respective edges of stack in engagement with registration member 14. Guide member 44 includes locking means, indicated generally by the reference numeral 51, illustrated in FIGS. 3 and 4. Locking means 51 includes a latch 52 pivotably mounted on a hinge pin 53 attached to the upper portion of pintle 54. Pintle 54 passes through slot 57 (FIG. 1) of rear guide 46 and a corresponding slot (not shown) perpendicular thereto in tray member 34. The aforementioned mutually orthogonal slots are required in order to permit the adjustment of side guide 48 and rear guide 46 relative to one another and base plate 16. When latch 52 is in its closed position pintle 54 is moved, preferably in an upwardly direction, to press rear guide 46 and side guide 48 together between bottom flange 54a and latch 52 preventing any sliding motion therebetween. Contrawise, when latch 52 is pivoted clockwise to its open position, as shown in FIGS. 1 through 4, inclusive pintle 54 moves, preferably in a downwardly direction, to permit side guide 48 and rear guide 46 to move relative to one another to their selected positions. It is, therefore, seen that locking means 51 is readily engageable to secure side guide 48 and rear guide 46 in their respective appropriate positions. Incidentally, latch 52 is adapted to be pivoted manually so that an operator is required to engage and disengage locking means 51.

The cassette of the present invention cooperates with the feeding mechanism to separate the uppermost sheet of stack 12 therefrom. The feeding mechanism separates the uppermost sheet from stack 12 by initially moving the sheet in the direction of rear panel 46 to buckle the sheet. This buckling action initiates the separation of the uppermost sheet from the remaining sheets of stack 12. In order to insure that normal loads and other forces applied to the uppermost sheet do not disengage the trailing edge of the sheet from rear guide 46 and rear portion 48*a* to prevent buckling thereof, a pair of kick blocks 56 and 58 are affixed thereto. As depicted more clearly in FIG. 1, kick blocks 56 and 58 are adapted to have one surface thereof in engagement with portions of the trailing edge 15 of stack 12. Only kick blocks 56 and 58 engage trailing edge 15, the remainder of rear guide 46 and rear portion 48*a* is spaced therefrom. Surface portion 56a of kick block 56 and surface portion 58*a* of kick block 58 contacts the trailing edge 15 of stack 12. Kick blocks 56 and 58 are spaced from one another and located at opposed ends of rear guide 46 and rear portion 48*a*. In the preferred construction surface, portions 56*a* and 58*a* have a textured sandpaper finish molded therein or secured thereto, i.e., about an 80 grit finish. The textured finish increases the frictional forces of surface portions 56*a* and 58*a* to retain the trailing edge of the uppermost sheet in engagement therewith when the feeding mechanism moves the uppermost sheet in the direction of rear guide 46 and side portion 48*a*. Texturing of surfaces 56*a* and 58*a* is but one means for insuring that the trailing edge of the uppermost sheet of stack 12 remains in contact therewith when the sheet is being moved toward rear guide 46 and rear portion 48*a*. One skilled in the art will readily appreciate that the invention is not necessarily so limited. For example, each surface portion 56*a* and 58*a* may have a lip, extending therefrom over the uppermost sheet to insure that it does not slide thereover when being moved in the direction of rear guide 46 and rear portion 48*a*. Hence, kick blocks 56 and 58 remain in contact with the uppermost sheet of stack 12 as the feeding mechanism moves the sheet in a rearwardly direction. This rearward movement buckles the uppermost sheet to facilitate separation thereof from the remaining sheets of stack 12.

Referring once again to FIG. 1, guide member 44 of the present invention includes at least one protuberance 60 for engaging a side edge of stack 12. Protuberance 60 is attached to side guide 48, preferably by being integral therewith and extends inwardly therefrom to form a channel between side guide 48 and the opposed side edge of stack 12. Air passes downwardly between side guide 48 and the opposed side edge of stack 12 into the channel defined therebetween preventing the formation of a partial vacuum. The flow of air between side guide 48 and the side edge of stack 12 facilitates the separation of the uppermost sheets therefrom. Similarly, side member 20 includes a pair of spaced protuberances 60 extending inwardly therefrom. In this way, the hereinbefore described kick blocks 56 and 58 in conjunction with protuberances 60 cooperate with the feeding mechanism to further insure the separating of one sheet at a time from stack 12.

By way of illustration the cassette of the present invention is adapted to support about 250 sheets of 20 pound weight paper, or a stack of paper about one inch thick. It is contemplated that the cassette may be adjusted to accommodate a stack having a periphery ranging from about 8 inches by 10 inches to about 8 ½ inches by 14 inches. However, one skilled in the art will readily appreciate that the invention is not necessarily so limited and the cassette may be easily adapted to accommodate any desired range of stacks of paper. A suitable cassette is preferably made from Lexan 500, however, it may be made from any of a plurality of inexpensive materials, e.g. heavy paper, plastic, cardboard, or metal.

it is therefore evident that the present invention achieves the various objectives hereinbefore set forth. Namely, the guide member and the registration member of the container cooperate with one another to align any size stack of sheet material disposed on the tray member. Furthermore, the tray member is pivotable to move the uppermost sheet of the stack of sheet material into and out of engagement with the feeding mechanism to successively advance one sheet at a time therefrom along substantially a common path. Moreover, the container is provided with kick blocks and a plurality of protuberances assisting in the separation of one sheet at a time from the stack. In this way the cassette supports the sheet in engagement with the feeding mechanism to advance successive single sheets therefrom. Furthermore, the container of the present invention is reusable for a multiplicity of different size stacks of paper.

Thus it is apparent that there has been provided, in accordance with the present invention, a container that fully satisfies the objects, aims and advantages set forth hereinbefore. While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications, and variations as fall within the spirit and broad scope of the appended claims.

What is claimed is:

1. An adjustable container housing a stack of sheet material to be dispensed therefrom, including;

a base plate;

a tray member arranged to support the stack of sheet material, said tray member being mounted pivotably on said base plate;

a side member affixed substantially stationarily to said base plate in the region of one side marginal edge portion thereof, said side member defining a generally planar surface adapted to engage one side edge portion of the stack of sheet material;

a gate member attached movably to said base plate in the region of the leading marginal edge portion thereof, said gate member defining a generally planar surface adapted to engage the leading edge portion of the stack of sheet material;

a rear guide defining a generally planar surface having means for maintaining the trailing edge of the uppermost sheet of the stack of sheet material in engagement therewith as the uppermost sheet moves rearwardly during the separation thereof from the remainder of the stack of sheet material, said rear guide being mounted movably on said tray member to engage the trailing edge of the stack of sheet material substantially aligning the leading and trailing edges thereof; and

a side guide mounted movably on said tray member, said side guide having at least one protuberance extending inwardly therefrom adapted to engage the other side edge of the stack of sheet material to define a channel therebetween enabling air to pass downwardly between the other side edge of the stack of sheet material and said side guide substantially preventing the formation of a partial vacuum therebetween and facilitating the separation of the uppermost sheet from the remainder of the stack of sheet material

2. A container as recited in claim **1**, wherein the maintaining means of said rear guide includes a pair of kick blocks, each of said kick blocks being secured to said rear guide at opposed end regions thereof and having frictional means integral with the surface portions thereof in engagement with the trailing edge portion of the stack of sheet material.

3. A container as recited in claim **2**, further including locking means for securing releasably said rear guide and said side guide in a preselected position.

4. A container as recited in claim **3**, wherein said gate member is attached pivotably to said base plate, said gate member pivoting in substantially a direction spacing said gate member from the leading edge portion of the stack of sheet material as said tray member pivots in substantially an upwardly direction, said gate member pivoting in substantially a direction engaging said gate member with the leading edge portion of the stack of sheet material as said tray member pivots in substantially a downwardly direction.

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