United States Patent [19]

Greene

[11] **3,893,665**

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[54] **JOGGING AND ALIGNING APPARATUS FOR SORTING AND COLLATING DEVICE**

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[73] Assignee: **EMF Corporation**, Seattle, Wash.

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[52] **U.S. Cl.** **271/221**

[51] **Int. Cl.** **B65h 31/38**

[58] **Field of Search** 271/221–224, 271/64, 73

[56] **References Cited**

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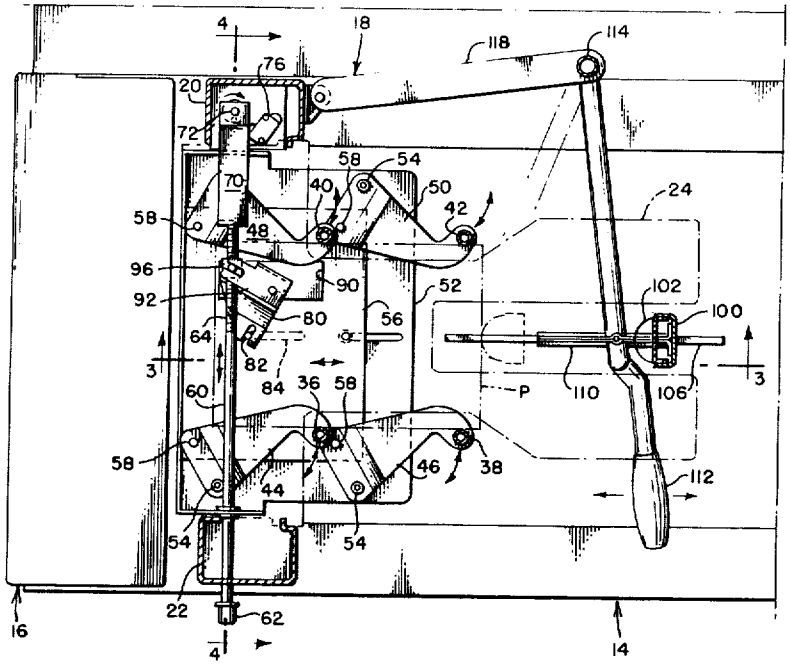
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Primary Examiner—Evon C. Blunk
Assistant Examiner—Robert Saifer

[57] **ABSTRACT**

Jogging and aligning apparatus for a sorting and collating device in which jogging bars extend generally vertically along the side of a vertical stack of horizontally disposed copy bins. The position of each jogger bar with respect to the bins is adjustable to accommodate the particular size paper being used. An automatic actuated mechanism moves the jogger bars inwardly after every sorting cycle to align the paper copies and to make the stacks in the bins as even as possible. A backstop mechanism is adjustable in and out for engaging the leading edge of the sheets as they enter each bin.

11 Claims, 4 Drawing Figures



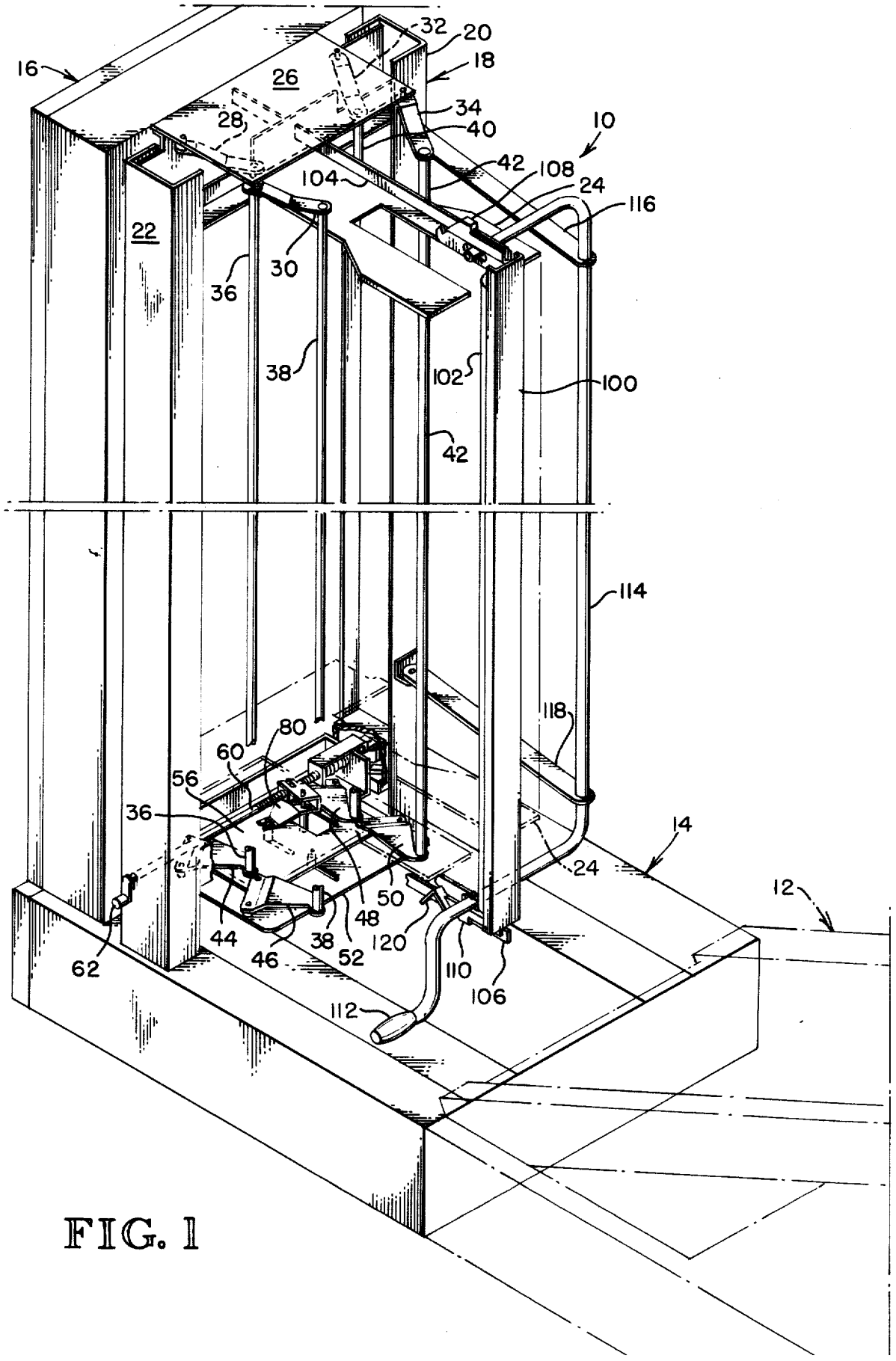

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FIG. 1

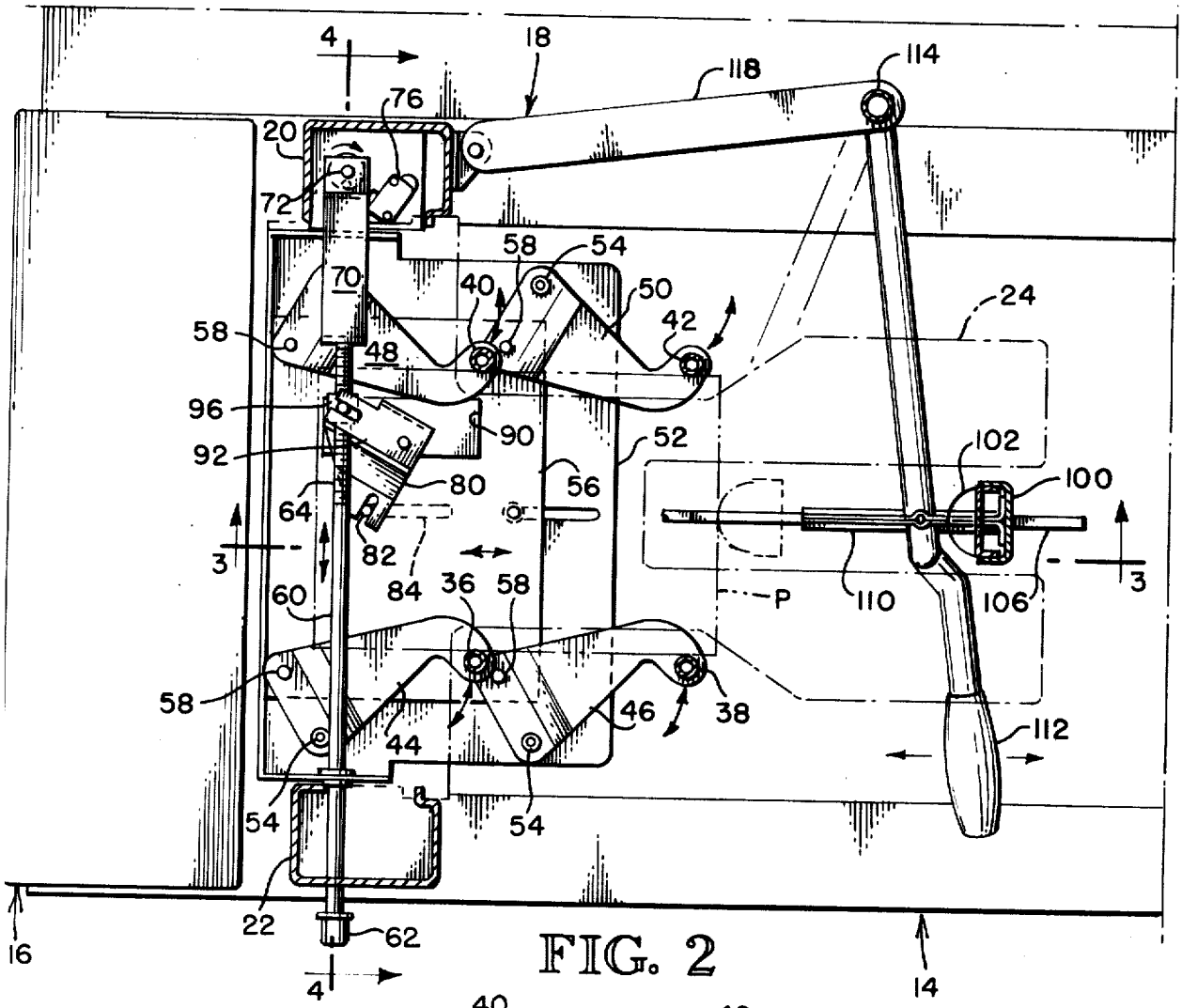


FIG. 2

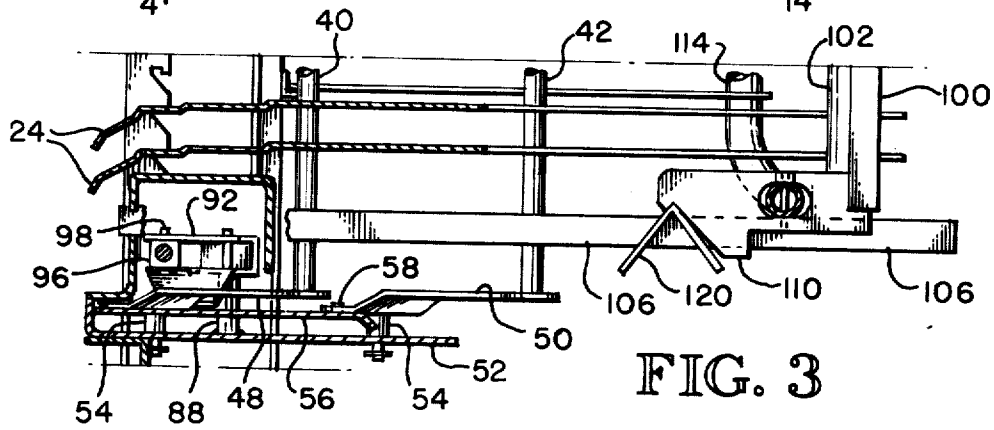
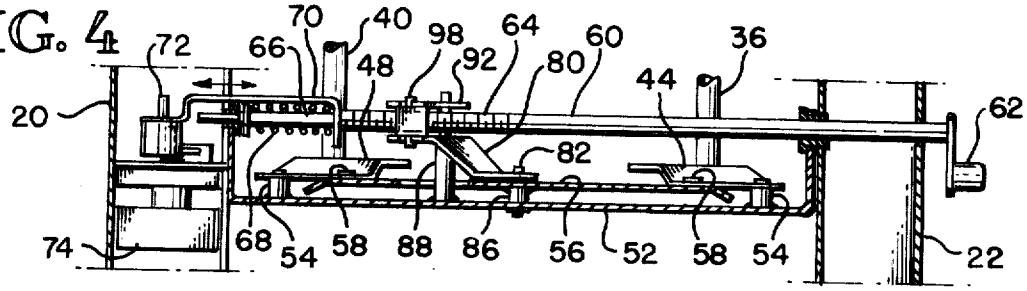


FIG. 3

FIG. 4



JOGGING AND ALIGNING APPARATUS FOR SORTING AND COLLATING DEVICE

BACKGROUND OF INVENTION

This invention relates to sheet sorting devices and in particular to sorting and collating devices having a generally vertically disposed array of bins for receiving paper copies in stacks and also having jogging and aligning bars for moving against the paper side edges to form even stacks within each bin.

Prior art sorters and/or collators have encountered many problems. One is that the rapid advances in copy producing machines have made increased demands on sorters and collators. For instance, the speed of copy producing machines to produce a number of like sets of copy materials requires that sorters have the capacity to accommodate changing work loads, that they be able to increase or decrease their capacity with modular slave units in tandem, and that they be equipped to keep the stacks in the individual bins as even and as neat as possible. Because of the speed at which copies are delivered to a sorter it is very easy for the individual sheets in a stack to become very disoriented with respect to each other. Accordingly, it may be necessary for the operator to straighten each stack as it is removed from the bin, thus consuming time and creating expense. Additionally, the types, weights and sizes of paper used in copy machines may differ. For instance, one sorting job may involve legal size paper, while the next job could be catalogue or brochure pages of a different size. The machine must be quickly adjustable both on the sides and on the leading edge of the paper so that the maximum amount of straightening and aligning is accomplished as the machine is doing its sorting job and further it must be able to tap and even up the stacks by periodic jogging.

Among the prior art references which may be considered with respect to the features of this invention are: U.S. Pat. Nos. 3,598,401; 3,388,907; and 3,658,324.

SUMMARY OF INVENTION

The jogging and aligning apparatus of this invention comprises a pair of vertically extending rods on each side of paper receiving bins. The jogger bars are supported top and bottom and are actuated to move against and away from the paper sheets by a combination of linkage elements. Stationary plates top and bottom pivotally support the jogger bar linkage arms. The lowere linkage arms are each fitted with an actuator pin which fits into a corresponding slot in a slide plate superimposed in spaced relation above the lower stationary plate. The slide plate is guided by pins and slots in the lower stationary plate to allow only longitudinal movement thereof so as to swing the linkage arms inwardly and outwardly during actuation. A bellcrank interconnects a trunnion on a threaded portion of the shaft with the slide plate. A hand crank at one end of the shaft on the outside of the collating device enables the operator to adjust the distance the jogger bars are apart in order to conform the jogger bars to the width of paper being sorted. At the other end of the shaft is a motor and eccentric mechanism which pulls the shaft a given distance against a spring loaded device. In this way, by manual depression of a button or during the sorting cycle the motor is actuated to move the shaft and the trunnion and thus the bellcrank for moving the slide plate so that the jogger bars are swung outwardly and then back against the edges of the paper. A backstop mechanism is also provided which is supported by bars at the top and bottom of the stack of bins. A handle device enables the operator to adjust the backstop to the length of paper which is being sorted.

Accordingly, it is among the many features, advantages and objects of this invention to provide a jogging and a paper aligning apparatus which aligns the side and end edges of sheets of paper within the bins of a collating apparatus to form neat stacks of papers within the bins. The mechanism may be jogged in order to tap the sheets into neat stacks as desired in the control cycle as for instance, at the completion of each sorting cycle and additionally by depression of a button on the control panel. The device is uniquely simple, dependable and inexpensive.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a view in perspective with some of the parts broken away to show the environment and general details of the jogging and aligning apparatus;

FIG. **2** is a plan view in section taken just above the shaft in FIG. **1** to show further details of the device;

FIG. **3** is a partial cross-section view in elevation taken along the line **3—3** of FIG. **2** showing further details of the invention; and

FIG. **4** is a partial cross-sectional view in elevation taken along the line **4—4** of FIG. **2** to show additional details of the mechanism.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings wherein like numbers refer to identical parts in the various views it will be seen that a tower type collator apparatus generally designated by the number **10** is comprised of several primary sections including an interface unit shown in dash-dot lines as number **12** which brings paper copies from a duplicating device to the base conveyor section generally designated by the number **14** of a tower type collator. Base **14** has a conveyor which in turn transfers copies on through the machine to the next collator apparatus or the copies are directed upwardly by a deflector mechanism (not shown) onto a vertical conveyor section generally designated by the number **16.** As the paper copies are directed upwardly on the conveyor section **16** they are stripped off the conveyor by deflector devices (not shown) which direct the paper copies into a bin sorting section generally designated by the number **18.** The bin section includes side support frame members **20** and **22** which form the basic support for a vertical stack of generally horizontally disposed trays or bins **24** which can be seen in FIGS. **1** through **3.** Intermediate bins have been broken out of the mechanism shown in FIG. **1** for the purposes of showing more clearly the details of the jogging and aligning mechanism. It will be seen by reference to FIG. **2** and the dash-dot outline of bin **24** that there is a paper copy P also shown in dash-dot lines to illustrate the relationship of the paper after it has entered a bin to the jogger bars and backstop mechanism.

At the top of the sorter tower is a support plate **26** on the underside of which are pivotally supported top jogger bar support arms **28, 30, 32** and **34.** At the outer end of each of the top support arms are secured vertical jogger bars **36, 38, 40** and **42** respectively. At the lower end the jogger bars are supported by pivot linkages **44,** 46, 48 and **50** respectively. Linkages **44, 46, 48** and **50**

are pivotally supported on a main stationary support plate **52** and are spaced slightly above said plate **52** by spacers **54.** Disposed above stationary plate **52** is a slide plate **56** which as can be seen is generally rectangular and smaller than plate **52.** The linkage arms, while being pivotally attached in spaced relationship to the stationary plate **52,** also pivot and slide slots in the slide plate **56** on detent pins **58.** The pins **58** are small detent pins extending into slots in slide plate **56** but are not in any way attached to slide plate **56** for reasons which will be explained hereinafter. The slide plate is supported to move longitudinally so that by its attachment at points **58** to the linkage arms that part of the linkage arm attached to the jogger bars will move inwardly as shown by the arrows in FIG. **2.**

The actuating mechanism for the slide plate **56** is best explained by reference to all views. A shaft **60** is supported by and extends between the main side frame members **20** and **22.** At one end is a hand crank **62** for turning shaft **60.** It will be noted that a portion **64** of the shaft is threaded which extends from an off-set surface to near the center of the shaft. It will be seen that near frame member **20** the off-set surface is defined by a reduced diameter portion **66** of the shaft around which is disposed a compression spring **68.** An eccentric link **70** is shaped to extend from the off-set surface of the shaft over the compression spring **68** to an eccentric connection **72.** A motor **74** having a switch **76** turns eccentric **72** as dictated by the control system of the sorter. The compression spring **68** forces shaft **60** to the right as viewed in FIG. **4** or towards the side of the machine on which the hand crank **62** is located. When motor **74** is actuated, eccentric **72** through link **70** pulls the shaft within the limit of the pre-load of compression spring **68** to the left as viewed in FIG. **4.**

A bellcrank **80** is connected by a pin **82** to slide plate **56,** which pin **82** extends through to a slot **84** in the stationary plate **52.** Note in FIG. **4** that a spacer **86** serves to separate slide plate **56** from stationary plate **52.** Pin **82** is free to slide in slot **84** in the stationary plate. Bellcrank **80** has its main support on column **88** which extends upwardly from the stationary plate through a rectangular opening **90** to connector **92** which is part of the bellcrank **80.** A threaded trunnion block **96** is received on the threaded portion **64** of shaft **60** and is engaged by the connector portion **92** of the actuator link. Open ended slots are provided in the connector **92** to engage pin **98** in the trunnion block which will be understood not to extend through shaft **60.** In like manner an open ended slot is provided in the actuator link **80** to engage pin **82** on slide plate **56.** In this way by turning hand crank **62** and rotating shaft **60** the trunnion block can be made to move in either direction depending upon which way the shaft is rotated. Rotating the shaft is one direction will bring the jogger bars through the various elements inwardly while he opposite rotation of shaft **60** will extend the jogger bars outwardly. In this way, the jogger bars can be adjusted in or out to the width of paper being sorted. As mentioned above upon actuation of motor **74** eccentric **72** will force the shaft away from the hand crank side to rotate actuator link **80** clockwise about its main pivot column which in turn forces slide plate **56** to the left as viewed again in FIG. **2.** Movement of slide plate **56** to the left rotates the linkage arms inwardly in the direction of the arrows to move the jogger bars inwardly. Also as mentioned above the pins detent **58** extend into slots in the slide plate. Construction of the link arms in such that when a sorting cycle is completed a jogger bar such as bar **38** may be lifted slightly to disengage pin **58** from its slot so that the bar may be swung away from the stack of bins to allow the operator access to the stack of paper. When removal of the stack is completed the jogger bar is pushed back into position and pin or pins **58** will ride up on the bevelled edges of the slide plate and back into the slot to be ready for the next sorting cycle.

The backstop mechanism is a channel member **100** having a flexible elastic material in the form of a semicircle extending from the top to the bottom of channel **100.** The backstop is supported at the top by rod **104** and at the bottom by rod **106.** The upper and lower ends of the backstop are supported by slide piece **108** on bar **104** and a slide piece **110** on bar **106.** An adjustment handle **112** is connected to a U-shaped slide actuator **114** which as can be seen interconnects top slide member **108** and the bottom slide member **106.** A pair of upper and lower pivotal support brackets **116** and **118** are provided to permit pivotal movement of the rod **114** so that the backstop can be moved inwardly and outwardly conveniently by the operator for easy setting of the backstop for paper length. A V-shaped stop spring member **120** is also mounted on lower bar **106** as best seen in FIG. **3** and presents its point at the top. The member **120** is light spring metal and may be slid by manually pressing the two ends towards each other to release the friction grip on bar **106.** A notch in slide member **110** engages the point of member **120.** The member **120** may be set according to paper length used when a cycle is complete the handle **112** is lifted disengaging slide **110** from member **120** to facilitate bin unloading. The handle **112** is then swung back to engage **110** with member **120** and the backstop is again in its proper position for another sorting cycle.

What is claimed is:

1. A sheet stack jogging and aligning mechanism for collator/sorter devices having a vertical stack of copy receiving bins, comprising:

a. at least one generally vertically extending jogger bar on each side of said stack of bins, said jogger bars being attached top and bottom to pivotal support arms attached to said collator/sorter device,

b. the bottom support arms comprising linkage arms for arcuately swinging said jogger bars inwardly and outwardly,

c. said linkage arms being pivotally secured to a stationary plate below said stack of bins and detachably secured to a slide means located above said stationary plate so that by movement of said slide means said linkage arms may be swung outwardly or inwardly according to the direction of movement of said slide means,

d. adjustable backstop means for engaging the leading edge of a sheet of paper when it enters a bin, and

e. actuator-adjustor means for moving said slide means.

2. The jogging and aligning mechanism of claim **1** and in which the initial positioning of said jogger bars with respect to the side edges of paper copies in said bins is adjustable with said actuator-adjustor means.

3. The jogging and aligning mechanism of claim **1** and in which there are a pair of jogger bars on each side of the stack of bins.

4. The jogging and aligning mechanism of claim 1 and wherein said slide means is a plate with slots into which are disengageably received detent shafts from each of said linkage arms.

5. The jogging and aligning mechanism of claim 4 and in which said actuator-adjustor means is a shaft means provided above said slide plate and to which is attached actuator means for moving said slide plate when said shaft is moved longitudinally.

6. The jogging and aligning mechanism of claim 5 and wherein one end of said shaft is attached to an eccentric mechanism for moving said shaft in either direction longitudinally.

7. The jogging and aligning mechanism of claim 6 and wherein said actuator is a bellcrank connected to a threaded trunnion block on said shaft.

8. The jogging and aligning mechanism of claim 7 and wherein a hand crank is provided at the other end of said shaft for rotating said shaft to relocate said trunnion and to thereby adjust the jogger bars to the width of paper to be received in said bins.

9. The jogging and aligning mechanism according to claim 1 and wherein said backstop is supporting by support bars above and beneath said stack of bins, said backstop being secured to slide members on each of said support bars.

10. The jogging and aligning mechanism of claim 9 and wherein said lower support bar has an adjustable stop means which can be removably engaged with the lower slide member for quickly sliding said backstop away from the paper copies to facilitate unloading.

11. The jogging and aligning mechanism of claim 10 and in which a handle means interconnects to said upper and lower slide members for conveniently moving said backstop.

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