United States Patent [19]

Ervin

[11] **3,907,279**

[45] **Sept. 23, 1975**

[54] **COLLATING DEVICE**

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[73] Assignee: **Addressograph Multigraph Corporation,** Cleveland, Ohio

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[52] **U.S. Cl.** **271/173;** 270/58

[51] **Int. Cl.²** **B65H 39/10**

[58] **Field of Search** 270/58; 271/64; 220/22

[56] **References Cited**

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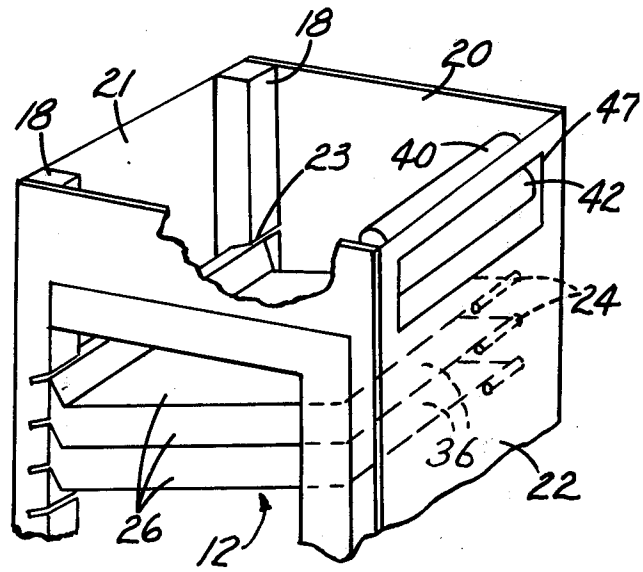
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Primary Examiner—Robert W. Michell
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Attorney, Agent, or Firm—Russell L. Root; Ray S. Pyle

[57] **ABSTRACT**

A collating device having movable partitions whereby different numbers of copies can be delivered to different bins utilizing a standard uniform sequence of movement of the sheet distributor with respect to the bins.

3 Claims, 7 Drawing Figures



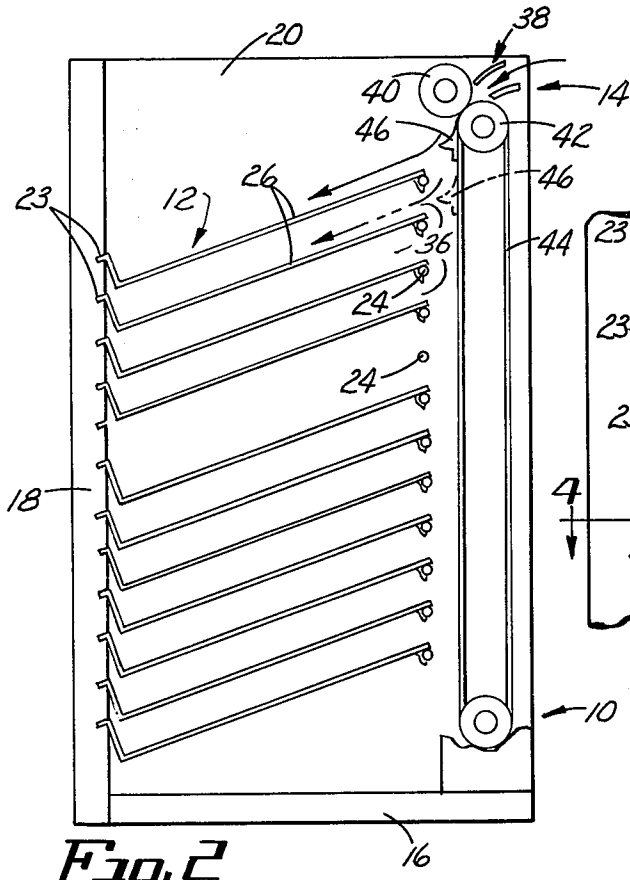


Fig. 2

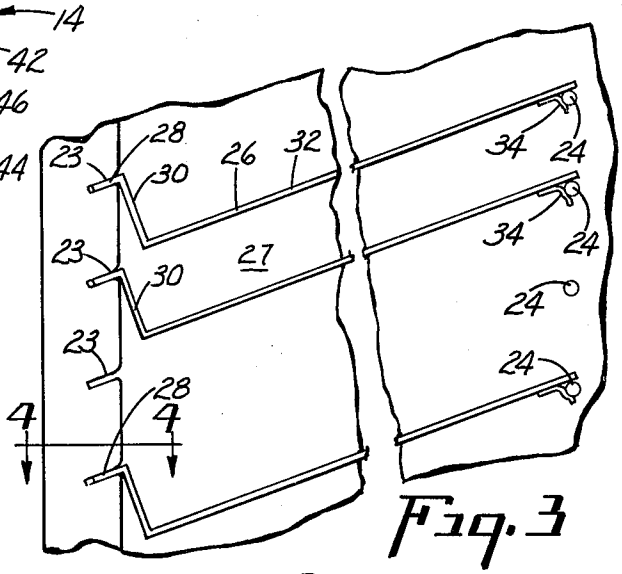


Fig. 3

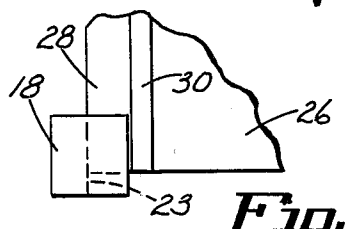


Fig. 4

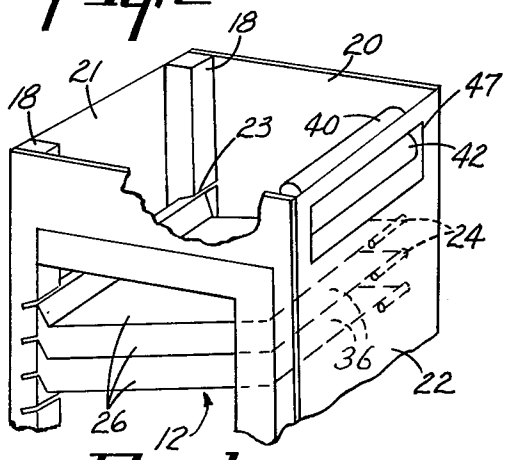


Fig. 1

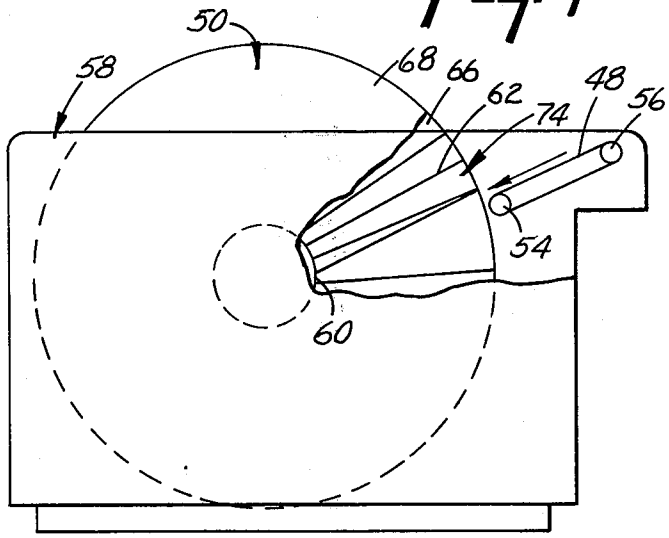


Fig. 5

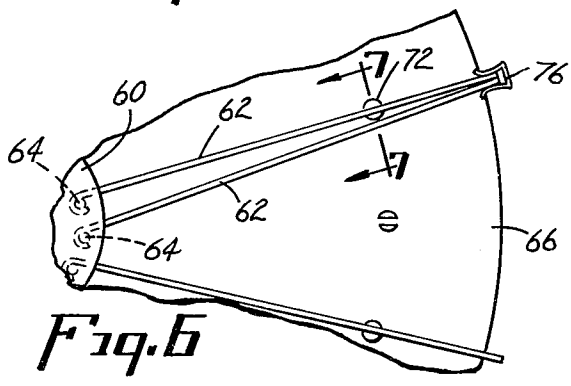


Fig. 6

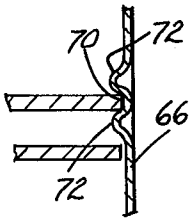


Fig. 7

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COLLATING DEVICE

BACKGROUND OF THE INVENTION

In many business offices, it is often necessary to provide copies of printed or duplicated documents to several different people, and it has become conventional practice to employ collating machines in conjunction with the printing or duplicating machines to separate the copies into separate bins as they are produced. In some cases, equal numbers of documents are delivered to each person and for such purpose conventional collating equipment is adequate. Such collating equipment takes many different forms. However, this equipment generally includes some type of structure having a plurality of bins with equally spaced openings and some means to sequentially deliver copies to two or more of these bins in some type of preprogrammed sequence. This may take the form of a movable sheet feeding mechanism and stationary bins or stationary sheet feeding mechanism and movable bins. In either case, the sheet feeding mechanism will become aligned with a bin opening to deliver a predetermined number of sheets and then will become aligned with an adjacent bin and deliver the same preprogrammed number of sheets. This will continue until the preprogrammed number of sheets have been delivered to all of the bins programmed. It is a relatively simple matter to provide a structure wherein the number of sheets delivered to each bin can be varied, provided that this same number is delivered to each bin programmed. However it requires much additional and often complex equipment to provide a collating device wherein different numbers of sheets are delivered to different bins. Nevertheless, office requirements may be such that different persons or different departments must receive different numbers of any given document. Extra hand collating is the usual solution whenever the expense of a variable program collator is not justified.

SUMMARY OF THE INVENTION

The object of this invention is to provide collating programming to a limited extent, by using a fixed delivery sequence and altering the receptical members by enlarging the receptical to embrace two or more imput stations.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, somewhat schematic of a collating device according to this invention;

FIG. 2 is a side elevational view, of the device of FIG. 1;

FIG. 3 is an enlarged detailed view of several of the shelves and the supporting structure of the device of FIG. 1;

FIG. 4 is a fragmentary sectional view taken substantially along the plane designated by the line 4—4 of FIG. 3;

FIG. 5 is an elevational view partly in section and somewhat schematic of another embodiment of a collating device according to this invention;

FIG. 6 is an enlarged detailed view of several of the partitions of the device of FIG. 5; and

FIG. 7 is a fragmentary sectional view taken substantially along the plane designated by the line 7—7 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, and for the present to FIGS. 1 through 4, one embodiment of a sheet collating device according to this invention is shown. The device includes a main frame, designated generally as **10**, a partitioning structure designated generally as **12**, and a sheet conveyor mechanism, designated generally by reference **14**. The main frame **10** includes a base **16**, a pair of vertical support members **18** extending upwardly from the base, a side plate **20** secured to one of the support members **18** and to the base **16**, a rear plate **21**, and a front plate **22**. One side is left open to provide access to the bins; however a door or movable plate could be employed to cover the side.

Each of the support members **18** has a plurality of equally spaced vertically aligned grooves **23**; and extending from the side plate **20** are a plurality of vertically aligned equally spaced support pins **24**. The support pins **24**, together with the grooves **23**, are disposed to support partitions in the form of shelves **26** in generally an angularly upwardly extending position as shown in FIGS. **2** and **3** to form a plurality of sheet receiving bins **27**. The shelves **26** are generally an exaggerated "z" shape with an end tab **28** disposed to be slidably received in the grooves **23**, an end wall **30** to define the end of the bin and a bottom wall **32** to define the bottom of the bin. A spring clip **34** is secured to the bottom wall **32** and is adapted to press against its respective support pin **24** when the shelves are in position. Thus, each of the shelves **26** can be slidably inserted or removed from a groove and pin pair. In FIGS. **2** and **3** the collator is shown with one shelf removed. The openings to the bins **27** are defined between the front edges of the shelves **26** and are designated by reference number **36**. Openings **36** are equally spaced by virtue of the fact that the pins **24** are equally spaced.

The manner of sheet delivery to a bin is not germane to this invention. There are a number of sheet conveyor mechanisms commercially available which will deliver one sheet to one bin, and then step to the next bin and deliver one sheet to that bin until all of a series of bins have been delivered one sheet. Such devices could readily be altered to deliver more than one sheet per bin, but always a uniform number to each bin.

An example of such sheet conveyor mechanism is U.S. Pat. No. **3,372,922**. This mechanism is described as a collator distributor having a set of conveyor belts disposed vertically in front of a plurality of shelves. Non-moving, retractable, metallic tapes are disposed contiguous to each of the conveyor belts to hold sheets against the belt as the sheets are fed downwardly. Moving vacuum tape means are mounted between the conveyor belts to hold the sheets flat as they are conveyed. Although that structure is not exactly illustrated in the drawings of this invention, nevertheless the endless belt and vertically moving deflector will be recognized as producing the conveying and deflecting function of the referenced United States patent.

The sheet conveyor mechanism **14** as shown schematically, includes a sheet entry guide **38** disposed to direct sheets to a pair of rolls **40** and **42**. An endless vacuum belt **44** carries each sheet along until diverted from the belt into a bin by a sheet diverting flange **46**. Flanges **46** are carried along by a pair of flexible straps,

which do not appear in the drawings, but may be studied in U.S. Pat. No. **3,372,922.**

The sheets are received from a duplicator or printer (not shown) and pass through opening **47** into the entry guide **38** and are fed by rolls **40** and **42** to the endless belt **44.** The sheet will continue along the belt **44** until it comes to the diverting flange **46** where it will be diverted to the left as shown in FIG. **2.** Shown in solid outline in FIG. **2** is a sheet being diverted into the top bin and in phantom outline a sheet being diverted into the second bin down from the top.

The collator is programmed to sequentially move the diverting flange **46** successively to the openings **36** for a given period of time to deliver a predetermined number of copies and then move to the next opening for same time to deliver the same number of copies, etc.

If all of the shelves **26** are in place, this sequence will deliver an equal number of copies to each of the bins. However, if one shelf is removed, the shelf immediately below the location of the removed shelf will receive twice as many copies as the other bins during a collating sequence by virtue of the fact that it will receive copies both from its own entrance and from the entrance immediately thereabove.

If it is desired that one bin receive three times as many copies, an additional shelf can be removed, and so on, so that different bins can receive different multiples of copies from a preprogrammed uniform distributing sequence. Thus by providing removable shelves, the same program can deliver multiples of the programmed number of copies to different bins.

Referring now to FIGS. **5** through **7** another embodiment of the present invention is shown. In this embodiment, a stationary sheet feeding device, designated generally as **48,** is provided which feeds the sheets to a movable bin structure designated generally as **50.** The sheet feeding device **48** includes an endless belt reeved around a pair of rolls **54** and **56** and is disposed to receive sheets from a duplicator or printer not shown.

The bin structure includes a main frame designated generally as **58** on which a hub **60** is rotatably mounted. The hub **60** has extending radially thereform a plurality of partitions **62** each of which are pivotally mounted to the hub **60** by a rod **64.** A pair of circular side plates **66** and **68** are secured to the hub **60** at opposite ends thereof. Spaced around each of the side plates **66** and **68** are circumferentially spaced detent grooves **70** formed from raised buttons **72.** The detent grooves **70** secure the opposite edges of the partitions **62** to thereby form a plurality of circumferentially spaced bins **74.**

In order to perform the collating operation, the hub **60** is rotated to sequentially bring the entrances of each of the bins **74** into register with the sheet feeding device **48.** In a normal position, each bin will receive an equal number of sheets if the hub **60** is rotated at a given rate. The number of sheets fed to every bin will depend upon the rate of feed and the rate of rotation. In order to double the number of sheets fed to a given bin, one partition **62** is pivoted from its normally detented position to the position shown in FIGS. **5** and **6,** and the end is secured to the next adjacent partition by means of a spring clip **76.** Thus, during sequential rotation at a given rate, the bin immediately adjacent the pivoted partition will receive twice the number of sheets as the other bins since it will receive the sheets from its own entrance and also from what would have been the entrance of the adjacent bin. Thus by providing pivoted partitions, a standard uniform rotation can provide multiples of documents to different bins.

In the above embodiments, removable shelves are shown with a stationary bin embodiment and pivotal partitions with the movable bin embodiment. It is to be understood however that removable bins or pivoted partitions or other types of removable shelves or partitions could be used in either type device.

I claim:

1. A method of delivering sheets to a plurality of adjacent bins each of which as a support panel and an entrance area through which a sheet may pass into the bin, said method comprising the steps of sequentially delivering sheets to each of the bins by directing a sheet through the entrance area for each of the bins in turn, connecting the entrance area for one of the bins in communication with an adjacent bin by changing the position of a support panel for the one bin relative to the adjacent bin, delivering first and second sheets to the adjacent bin after changing the position of the support panel for the one bin by directing the first sheet through the entrance area for the one bin and directing the second sheet through the entrance area for the adjacent bin to accumulate the first and second sheets in the adjacent bin.

2. A method as set forth in claim **1** wherein said step of changing the position of a support panel includes the step of removing the support panel for the bin from a framework holding the support panels for the plurality of bins.

3. A method as set forth in claim **1** wherein said step of changing the position of a support panel includes the step of pivoting the support panel in a direction away from the support panel for the adjacent bin.

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