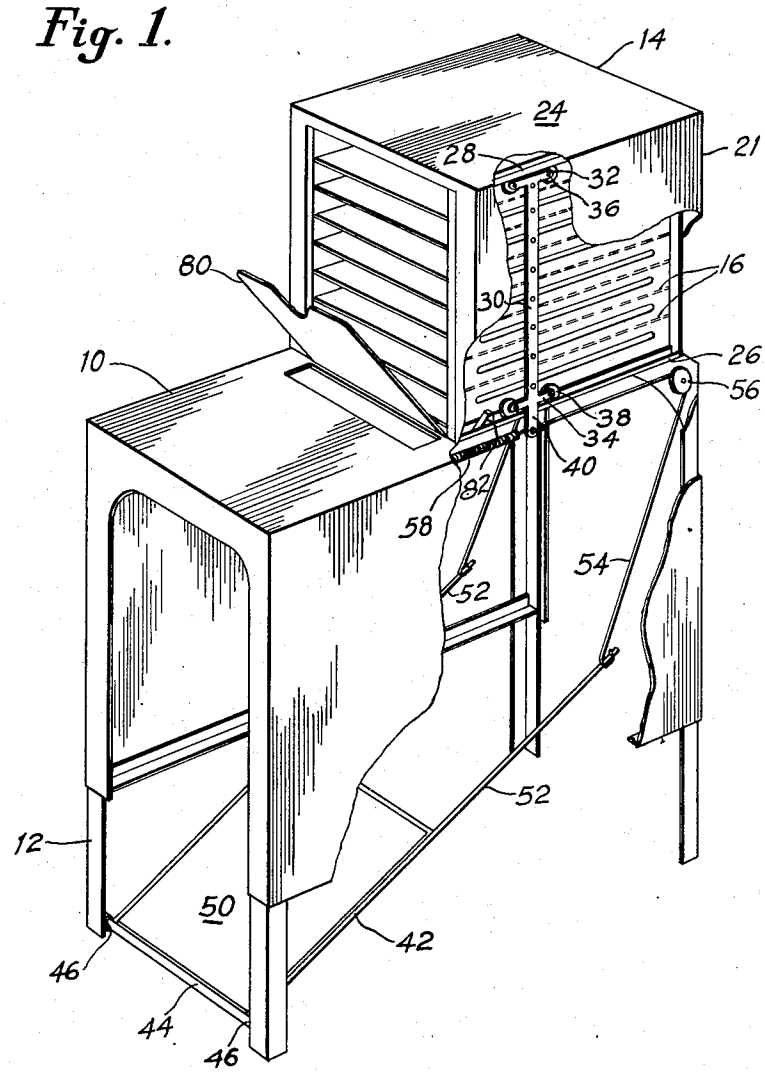
July 21, 1953 W. E. THOMAS 2,646,279

MECHANICAL COLLATOR

Filed Sept. 17, 1947 2 Sheets-Sheet 1

Fig. 1.



INVENTOR.

Walker & Thomas.

July 21, 1953 W. E. THOMAS 2,646,279

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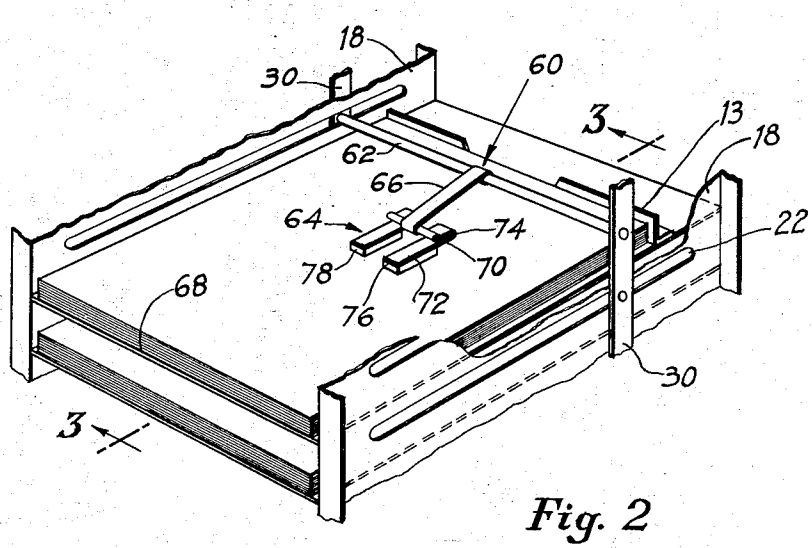


Fig. 2

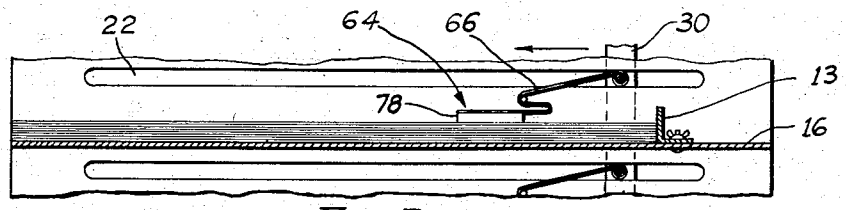


Fig. 3

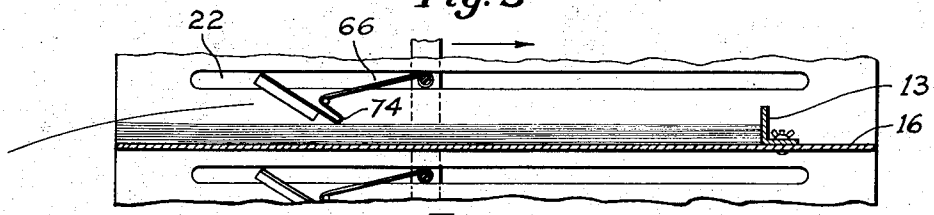


Fig. 4

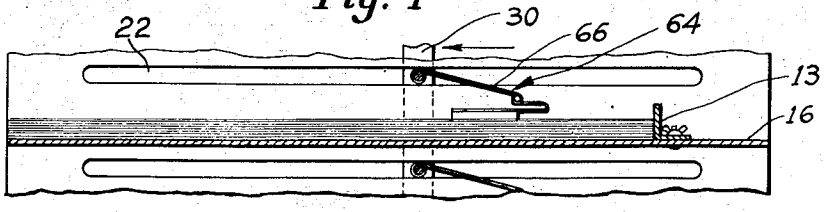


Fig. 5

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Patented July 21, 1953

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UNITED STATES PATENT OFFICE

2,646,279

MECHANICAL COLLATOR

Wilbur E. Thomas, Cranford, N. J.

Application September 17, 1947, Serial No. 774,584

1 Claim. (Cl. 271—42)

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The instant invention relates to apparatus for collating sheet material, i. e., pamphlet pages and the like, and is particularly concerned with improvements in the machine disclosed in my prior patent, #2,399,584, issued April 30, 1946.

The principal object of the invention is the provision of a collator which insures the delivery of single sheets from each stack without either "skips" or "double sheetings." The machine of my prior patent consists essentially of a series of superposed shelves or trays, each of which is adapted to support a stack of the sheets to be collated. An ejector device is mounted in each tray, the several ejector devices being connected to slides which are driven in a forward or sheet-ejecting direction by manual operation of a foot treadle. The ejector devices include fingers carrying traction pads which rest on the uppermost sheets of the stack and urge the sheets forwardly when pressure is applied to the treadle. Upon return movement of the treadle the traction surfaces of the fingers are dragged along the next exposed sheets of the stacks to their initial position. The machine is relatively inexpensive and of a character which adapts it for use in the ordinary office in contrast to previously known machines of this type, which are uneconomical for such uses from the standpoint of initial cost, upkeep and the space required. The collator of the instant invention retains the advantages of my prior machine but includes an improved construction and operation of the sheet-ejector means.

The most difficult problem encountered in the design of the apparatus is the arrangement of the ejector devices whereby they will each eject a single sheet upon each operation with very few "skips" or "double sheetings." Applicant determined that major causes of such defects in operation were lack of smoothness in the travel of the ejector devices during ejecting movement and the tendency of the traction pads upon return movement to provide polished lanes on the surfaces of the sheets to be ejected with resultant slippage on forward movement. If the fingers are weighted sufficiently to insure gripping contact more than one sheet may be ejected, i. e., "double sheeting" may occur.

A specific object of the invention is the provision of improved operating means which permit the desired smoother operation of the ejector devices during ejecting movement. In addition the ejector fingers are constructed and arranged to have full frictional contact with the sheets during ejecting movement and only partial contact during return movement to avoid the occurrence of polished lanes in the sheets.

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A further object of the invention is the provision of spring operated means for causing delivery movement of the ejector devices.

A still further object of the invention is the provision of ejector devices and mountings therefor which have flat traction faces in contact with the sheets during delivery movement and relatively line contact with the sheets during rearward movement.

My invention will be more fully understood and further objects and advantages thereof will become apparent when reference is made to the more detailed description of a preferred embodiment of the invention which is to follow and to the accompanying drawings in which:

Fig. 1 is a perspective view of a collator in accordance with the invention;

Fig. 2 is a perspective view on an enlarged scale of a portion of the apparatus;

Fig. 3 is a sectional view, taken on the line 3—3 of Fig. 2, illustrating the position of the ejector devices in one position of their operation;

Fig. 4 is a view similar to Fig. 3 illustrating the ejector devices in another position of their operation, and;

Fig. 5 is a view similar to Fig. 4 illustrating a modified construction of the ejector device.

Referring now to the drawings and more particularly to Fig. 1, there is shown a collator comprising a suitable base 10 which, as illustrated, may comprise a table supported from the floor or other foundation on legs 12. Mounted on the table is the collator proper, indicated at 14 and comprising a plurality of shelves 16. The shelves, as best illustrated in Fig. 2, are supported from side plates 18 secured to frame members, all enclosed by a housing 21. The shelves 16 and side plates 18 define a plurality of superposed trays. Adjacent the rear end of each shelf is a stop 13 which suitably may be adjustably secured to the shelf to permit the shelf to accommodate sheets of different lengths with their forward ends adjacent the delivery ends of the shelves. Side plates 18 are provided with elongated slots 22 extending for substantially the length of and preferably parallel to the shelves and spaced a substantial distance therefrom to permit a stack of sheets to be supported on each tray beneath the ejector device which includes elements extending through the slots at each side of the tray, as will be later more fully described.

Supported adjacent base 10 and beneath the top of housing 21 are vertically spaced tracks 26 and 28, respectively. A set of the tracks is posi-

tioned on each side of the superposed shelves between the housing and side plates 18. Mounted for reciprocation in tracks 26 and 28 are slides 30, preferably constituting metal bars provided with cross flanges 32 and 34, respectively, on which rollers 36 and 38 are rotatably supported to ride in the tracks. The lower end of each slide 30 projects below the lower track 26 to provide an extension 40.

A treadle 42 is hingedly mounted adjacent the front of the base member in position for easy foot operation. Suitably the hinge connection is provided by shaft 44 mounted in bearings 46 adjacent the lower ends of the front legs of the base. Treadle 44 includes a pressure plate 50 and rearwardly and upwardly extending arms 52.

Flexible cables or cords 54 connect the extending arms with the lower projecting ends 40 of slides 30, the cords passing around pulleys 56 rotatably mounted at the rear of the machine, preferably in such position that the direction of pull on the slides is substantially parallel to slots 22. Coil springs 58 are connected to the projecting ends 40 of slides 30, the springs extending forwardly therefrom. The forward ends of the springs are secured to the frame or base at a convenient location, the spring preferably extending parallel to the slots to exert a straight pull on the slides directly opposed to the pull exerted by cables 54.

Springs 58 are selected to have sufficient tension to relatively rapidly move slide 30 and the several ejector elements, later to be described, forwardly upon release of pressure on treadle 50, shown in Fig. 1. It will be understood that other power exerting means may be employed in lieu of the spring.

Referring now particularly to Figs. 2, 3 and 4, the ejector devices, indicated generally at 60, each include a rod or shaft 62 overlying the tray and with its ends extending through slots 22 and secured to slides 30. An ejector element 64 is rockably mounted on each of the shafts substantially centrally of the tray, the ejector element consisting of an arm 66 extending forwardly from the shaft toward the delivery end 68 of the tray. The forward end of arm 66 carries a short shaft 70 which preferably projects on both sides of the arm. Rockably mounted on the projecting ends of shaft 70 are fingers 72 including, in the preferred embodiment, rearwardly extending sections 74 connected by an 180° bend with lower, forwardly extending sections 76, the latter projecting a substantial distance ahead of shaft 70. The fingers carry traction members 78, the latter being formed of sponge rubber, felt, or other material which, when in flat contact with the stack of sheets, will frictionally engage the uppermost sheet to exert a tractive force thereon.

A deflector plate 80 may be mounted on the base adjacent the end of the lowermost shelf and inclined outwardly and forwardly therefrom to extend, say, at least half the height of the superposed shelves, similarly as in my prior construction.

The several parts of the apparatus, including the shelves, side plates, housing and base, are preferably of metal construction, although as will be appreciated, other materials may be employed if desired.

In the operation of the device as described above, as many of the shelves are used as is necessary to accommodate the number of pages or sheets to be collated, stacks of the sheets being placed on the shelves in the selected order. The stacks are suitably inserted by lifting the fingers and shoving the stacks beneath the traction pads until they contact stops 11 which have previously been positioned a distance from the delivery end substantially equal to the length of the sheets. The fingers are lowered to place the traction pads on the stacks and the machine is then ready for operation. When pressure is applied to treadle 42 slides 30 are drawn rearwardly by cables 54. This rearward movement of the slides causes each of the ejector members to similarly move rearwardly to place the ejector elements adjacent the rear ends of the sheets. During the rearward movement of the ejector elements, illustrated particularly in Fig. 4, the fingers rotate on shaft 70 to assume the inclined position shown in Fig. 4 whereby substantially only line contact is obtained between the traction pads and the sheets.

When the ejector devices have moved to their rearmost position and the pressure on the treadle is released, the action of the spring causes forward movement of slides 30 and, hence of the ejector devices. During the initial interval of this forward motion, fingers 72 rock on the shaft 70 to bring the traction pads into full contact with the upper sheets of the stacks (see Figs. 2 and 3) and the pads force the sheets from the delivery end of the trays. As the sheets issue from the several trays, the ends of the uppermost sheets sag downwardly and the lowermost sheets are raised upwardly by the action of the deflector plate 80, with the result that the outer ends of all the sheets are bunched whereby they may be readily grasped as a unit by the operator. The assembled sheets may then be stapled together to form the finished article.

Referring now to Fig. 5 a modified position of the ejector element is illustrated. The several parts of the element are preferably the same as before and therefore are referred to by the same reference characters. However, the arm 66 is directed rearwardly rather than forwardly whereby the element exerts a pulling rather than pushing action. The cables 54 and springs 58 are adjusted to permit the change of position of the fingers 72. It will be appreciated that in both arrangements suitable stops may be used, for example as indicated at 82 in Fig. 1, to limit the travel of the ejector devices in the forward direction to the extent desired.

The construction of the ejector element in the manner shown and described above in Figs. 3–5 to have full contact with the sheets during their forward delivery movement and line contact during rearward movement has been found to be highly effective to secure delivery of but a single sheet from each shelf on each forward movement of the ejector elements. The efficiency of the operation is also due to the smooth forward movement of the ejectors under spring control, as distinguished from the inherent uneveness of manual operation. The construction of Fig. 5 with the ejector element pulling rather than pushing on the sheets provides further insurance against "double sheeting" as there is less tendency for the traction pad to dig into the sheet during the forward movement.

Having thus described my invention in rather full detail, it will be understood that these details need not be strictly adhered to but that

various changes and modifications may suggest themselves to one skilled in the art, all falling within the scope of the invention as defined by the subjoined claim.

What I claim is:

In a collator or the like, a sheet-ejector device comprising a reciprocating element, an arm pivotally mounted thereon for rocking movement, a finger pivotally mounted on said arm, said finger including a section extending rearwardly of said pivot, a return bend and a section extending forwardly therefrom, said forwardly extending section carrying a flat traction element.

WILBUR E. THOMAS.

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