May 30, 1950 N. S. WELK ET AL 2,509,546

COLLAPSIBLE CARD SORTING DEVICE

Filed Aug. 8, 1945 3 Sheets-Sheet 1.

Fig. 1.

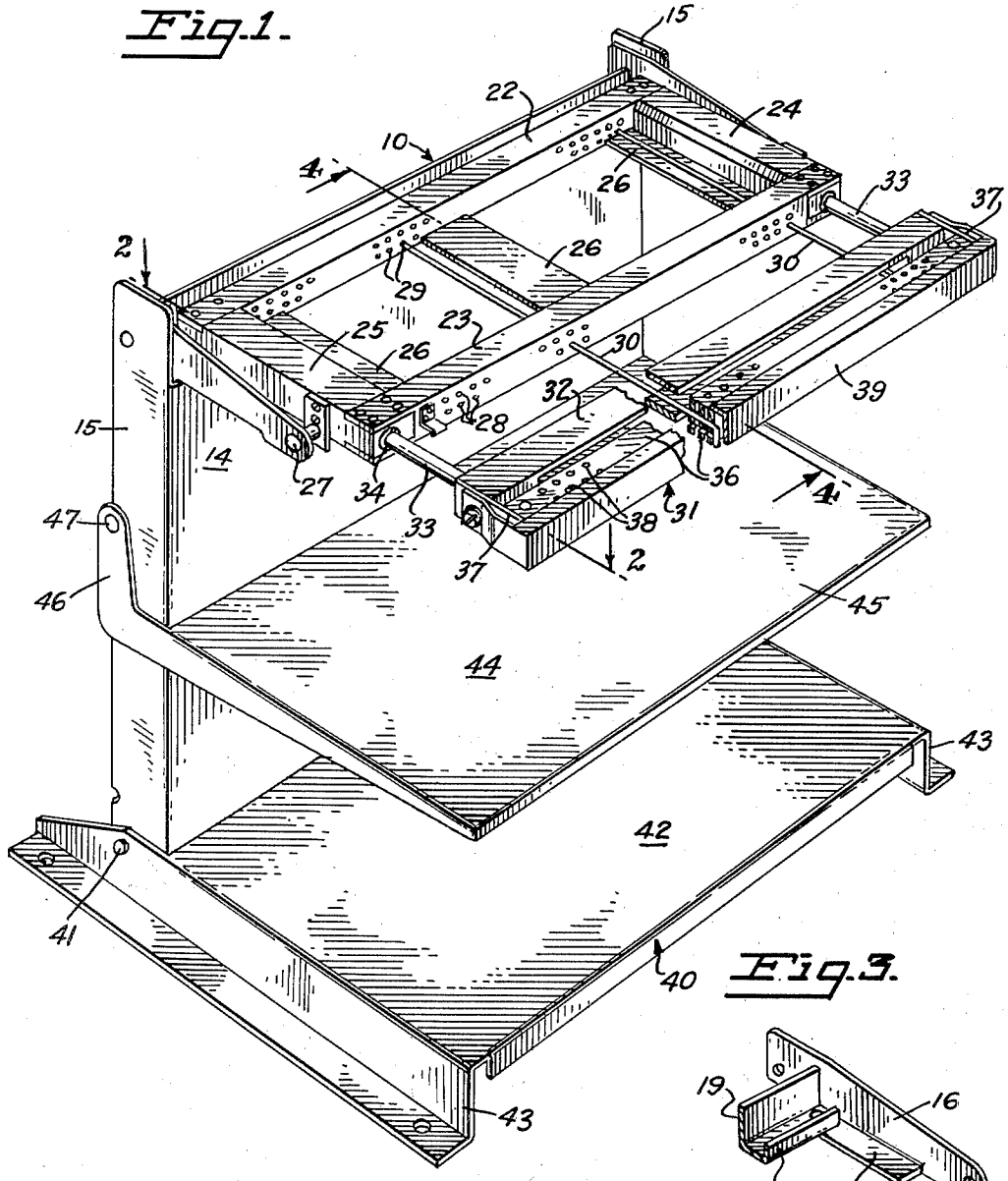
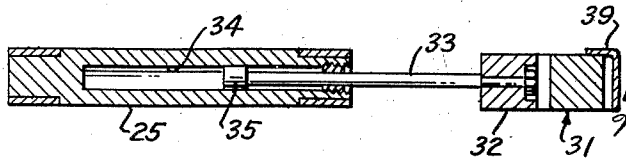


Fig. 3.

Fig. 2.



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Fig. 4a

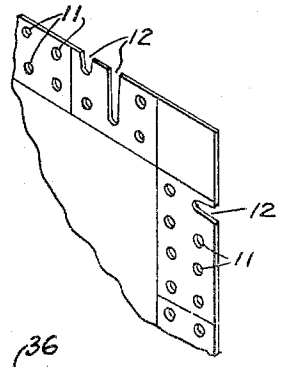


Fig. 4.

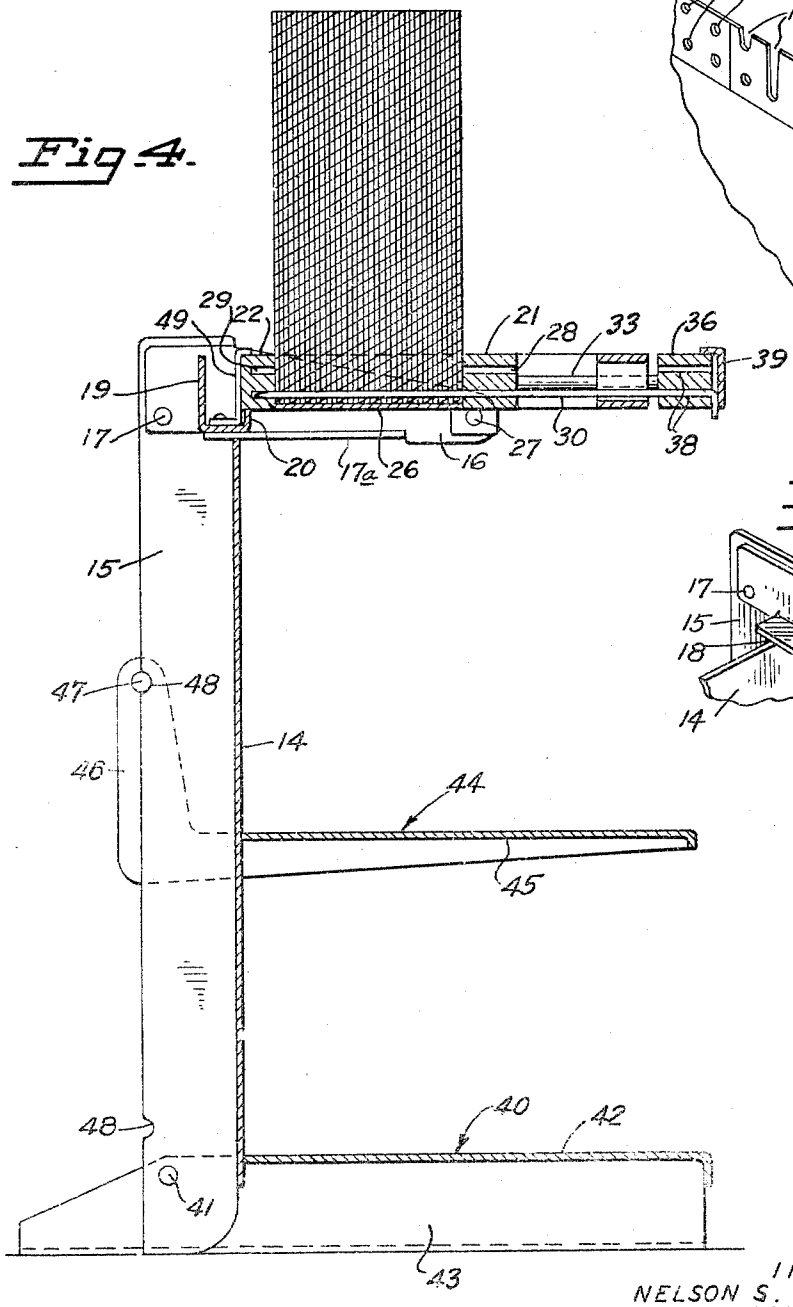
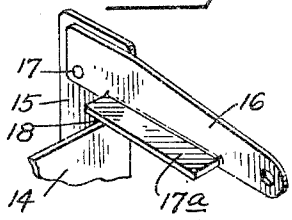


Fig. 5.



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Fig. 6.

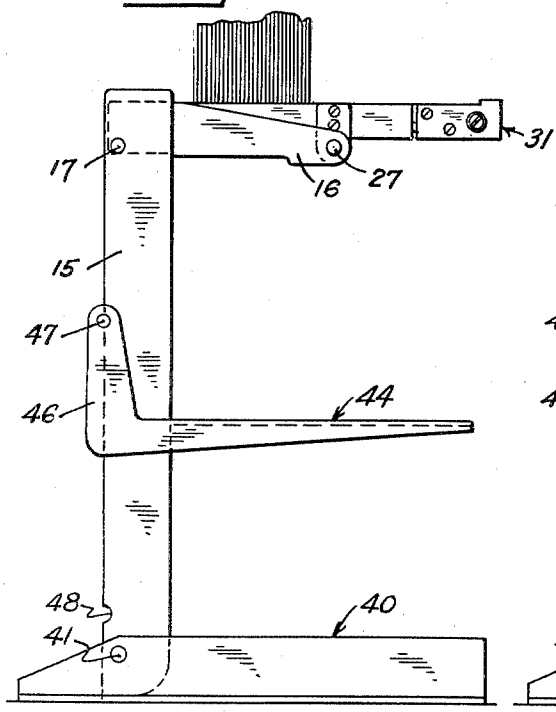


Fig. 7.

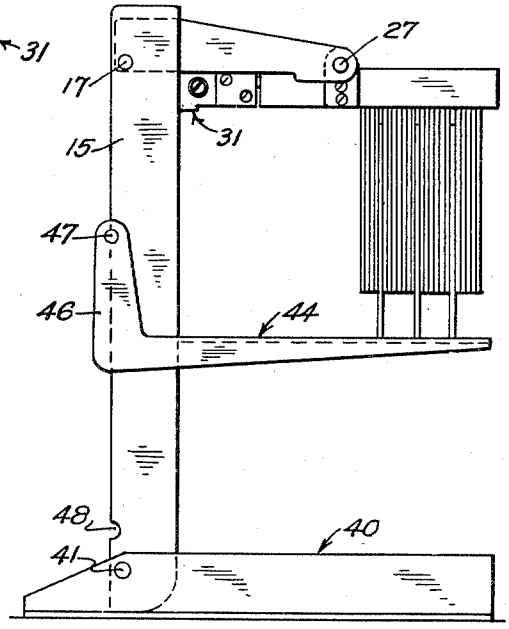


Fig. 8.

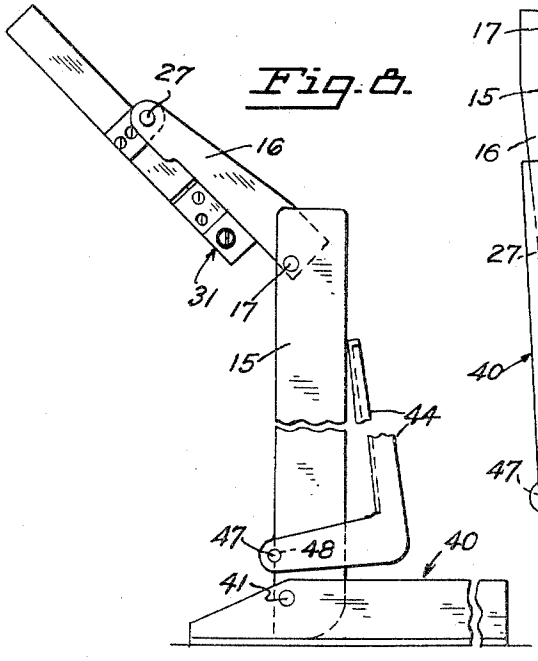
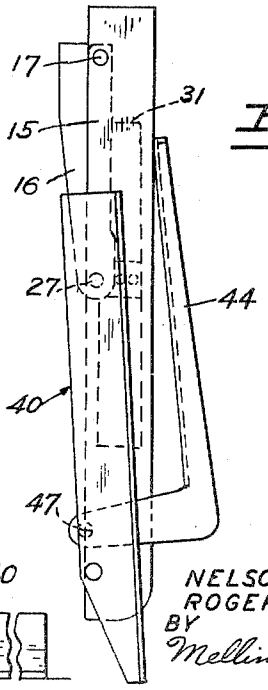


Fig. 9.



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UNITED STATES PATENT OFFICE

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COLLAPSIBLE CARD SORTING DEVICE

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Application August 8, 1945, Serial No. 609,568

8 Claims. (Cl. 129—16.1)

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This invention relates to devices for selectively sorting cards of the type known commercially as "Keysort" cards.

Cards of the type referred to are provided along one or more edges with one or more rows of perforations which are grouped and identified by suitable indicia to represent desired classifications. In practice, a plurality of these perforations are notched or slotted out to the edge of the card, forming a pattern of notches or slots pertaining to a single classification. The cards when thus notched or slotted may be selectively sorted by passing one or more sorting rods through the selected perforations of a group of cards, which perforations representing the desired classification. By then permitting the cards having notches or slots coinciding with the perforations penetrated by the rod or rods to disengage from the rods, while the remainder of the cards remain suspended from the rod or rods, the cards of one or more selected classifications are sorted from a stack of cards.

It is the principal object of our present invention to provide an improved and simplified sorting device for cards of the type referred to, which sorting device will enable the sorting to be effected accurately and expeditiously and may be collapsed so as to occupy a comparatively small space.

One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a perspective view of a collapsible card sorting device embodying the preferred form of my invention.

Fig. 2 is a fragmentary view in section taken on line 2—2 of Fig. 1, showing certain details of construction.

Fig. 3 is a fragmentary view in perspective, showing one of the tray carrier arms and the manner in which it is constructed.

Fig. 4 is a view in section through the device taken on line 4—4 of Fig. 1.

Fig. 4a is a fragmentary view in perspective, illustrating a type of card which may be sorted by the present device.

Fig. 5 is a fragmentary view in perspective, showing the manner of attachment of the carrier arms to the frame plate.

Fig. 6 is an end elevation of the machine, showing the tray in position for insertion of the sorting needles.

Fig. 7 is a similar view, showing the tray inverted to effect sorting.

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Fig. 8 is an end view, showing the device partly collapsed.

Fig. 9 is a similar view, showing the device completely collapsed.

Referring more particularly to the accompanying drawings, 10 indicates a selective sorting apparatus for cards of the character commercially known as "Keysort" cards. These cards are what are commonly known as edge punched cards. The particular type of "Keysort" card with which the present apparatus is concerned is diagrammatically illustrated in Fig. 4a. This card has two rows of perforations 11 adjacent and parallel to one or more edges of the card. The perforations of each row are in alignment perpendicularly with respect to the adjacent edge of the card.

In practice, certain of the perforations or punchings 11 are notched out to the end of the card, as indicated in Fig. 4a by the numeral 12, in patterns to represent a desired classification or classifications. To effect this result, certain of the punchings extend only to the outermost perforations, while others extend to the innermost perforations so that notches or slots of two depths are provided. Obviously, it is necessary, therefore, when sorting these cards, that needles or sorting rods be run through certain of the perforations of the outer row and through certain perforations of the inner row.

The card sorting device here disclosed is what is known as a selective sorting apparatus by means of which punched and notched cards of one or more classifications of the type shown in Fig. 4a may be separated or sorted from a stack of cards. Although in the present instance we have shown our apparatus as applied to a particular type of punched card and a particular arrangement of the perforations therein, it will be obvious to those skilled in the art that the apparatus is applicable for use to various other types of edge punched cards in which the perforations may be differently arranged to designate a desired classification or classifications.

The device here disclosed comprises a flat rigid frame plate 14 having its ends bent in the same direction at right angles thereto to form two aligned and parallel frame bars 15 at opposite ends thereof. The upper ends of these frame bars 15 project above the upper end of the frame plate 14, as illustrated, for the purpose of providing a connection between the frame bars 15 and tray carrier arms 16. There is a tray carrier arm 16 positioned adjacent each frame bar 15, which arms 16 are mounted in juxtaposition to the inner surfaces of the frame bars 15. The carrier

arms 16 are pivotally connected as at 17 to the frame bars to enable them to be moved about the pivot 17 in a plane parallel to the plane of the inner surfaces of the frame bars 15.

Each arm 16 has an inturned flange 17a at one edge thereof adapted to bear, as at 18, on the upper edge of the frame plate 14 when the device is in uncollapsed condition for operation. It will be noticed that the point of engagement between the flange 17a and the upper edge of the frame plate 14 is eccentric with respect to the pivotal connection 17 so that the carrier arms 16 will be firmly supported in a more or less horizontal position, as illustrated in Fig. 4. From this position, however, the tray carrier arms 16 may be swung approximately 270° so as to lie between the frame bars 15 at the rear side of the frame plate 14, as illustrated in Figs. 8 and 9.

The tray carrier arms 16 are rigidly connected together by a channel member 19 which extends longitudinally between said arms and is fastened thereto at its ends through the medium of the flange 17a. One of the legs of this channel member 19, or that indicated by the numeral 20, is of a height that it may be engaged by a card receiving tray 21 to support the latter, as will be described.

The card receiving tray 21 is a rigid open rectangular frame composed of longitudinal bars 22 and 23 and transverse bars 24 and 25. At one side of the frame at a distance below one face thereof are transverse members 26 so that the inner periphery of the frame and the transverse members 26 define a shallow card receiving recess. The card receiving tray 21 is of a length that it fits longitudinally between the tray carrier arms 16 and is pivoted to the outer ends of these arms as at 27 so that the frame may be rotated approximately 180° about a horizontal axis, or an axis which is parallel to the axis on which the arms 16 pivot.

One longitudinal bar 23 of the tray 21 is perforated, as at 28, complementary to the cards to be sorted. The other longitudinal frame bar 22 is likewise perforated. The perforations are so arranged that when the cards are stacked in the recess in the tray and rest on the transverse members 26, the perforations in the edge thereof will register with the perforations 28 in the bar 23 and the perforations or sockets 29 in the bar 22 of the tray. This is so that sorting needles or rods 30 may be projected through the perforations in the bar 23, thence through the perforations in the cards stacked in the tray 21, and thence into the perforations or sockets 29 in the bar 22.

The cards are stacked in the tray, as illustrated in Fig. 4, and the sorting rods or needles are projected through the selected perforations indicating the desired classification, and the tray 21 is then inverted by swinging it about its pivots 27 so that the cards which are unnotched in alignment with the needles or rods 30 will remain suspended on the rods or needles, while those notched in alignment with the needles or rods will descend from the stack, so that they may be removed therefrom.

To enable the selector rods or needles to be arranged and held in accordance with a selected pattern or patterns so that a complete selective sort may be made through the classifications along one edge of the cards with a single setting of the needles or rods and in a single sorting operation, we provide a sorting rod holder 31 which is telescopically connected to the tray 21. The sorting rod holder 31 comprises a rigid head

member 32 which is arranged in alignment with and in parallelism to the adjacent side of the tray 21. Projecting at right angles from this rigid head member 32 are two plunger rods 33 which project into plunger bores 34 formed in the transverse bars 24 and 25 of the tray 21. Within the bore each plunger rod 33 is formed with an enlarged plunger head 35 reciprocably engaging the bores 34. When the sorting rod holder is in sorting position, the inner ends of the plunger heads 35 engage the inner ends of the plunger bores 34, and when the sorting rod holder 31 is in its extended or non-sorting position, the opposite ends of the plunger heads 35 engage annular shoulders adjacent the outer ends of the plunger bores 34 to limit the outward movement of the sorting rod holder.

In this latter position, the needles will be withdrawn to a point where their ends will not project into the sorting tray. When the sorting rod holder 31 is in its sorting position, the sorting needles or rods will be projected completely transversely through the tray with their ends projected into the sockets 29 in the longitudinal bar 22 of the tray.

Cooperating with the fixed head member 32 is a rotatable indexing member 36 which is arranged in parallelism and in juxtaposition to the rigid head member 32 at the outer side thereof. This member 36 is rotatably connected to the member 32 by rigid brackets 37 or by other suitable means so that the rotatable member 36 may rotate about its longitudinal axis. The rotatable indexing member 36 is formed with a plurality of sets of holes 38 which are complemental to and in alignment with the holes 28 and 29 in the opposite sides of the tray 21.

From the drawings it will be seen that the sets of holes 38 in the member 36 extend transversely therethrough so that by rotation of the member 36 about its axis, either set of holes 38 therein may be registered and longitudinally aligned with the holes 28 and 29 in the tray. Thus, by rotational adjustment of the member 36, either set of holes 38 therein may be registered and aligned with the holes 28 and 29 in the tray.

The advantages of providing such a rotatable indexing member 36 in a card sorting device is set forth in a copending application of Roger Connor entitled "Selector rod holder," filed June 18, 1945, and bearing Serial No. 600,121, Patent No. 2,427,046 dated September 9, 1947, in which application such device is fully described and claimed.

It will suffice here to state that in practice the sorting rods or needles are projected through the rotatable member 36 and are held thereby in cooperation with the member 32 in a selected pattern for sorting. The sorting rods may be held from endwise movement in the member 36 by a hinged cover or latch member 39, pivotally connected with the member 32, as illustrated.

To support the sorting device in position for operation, we provide a base plate 40 pivotally connected at opposite ends to the frame bar members 15 as at 41. This base plate 40 comprises a flat plate 42 having its ends bent at right angles to form supporting legs 43. These legs extend beyond one edge of the plate 42 in contact with the exterior sides of the frame bars 15, as illustrated, to enable the base to be pivotally connected as at 41 to the frame bars 15.

It is seen that when in extended position, as shown in Fig. 4, one edge of the plate 42 will engage the frame plate 14, which engagement will

prevent pivotal movement between the base member 40 and the frame plate 14 in one direction and hold them disposed at right angles to each other. However, it is seen that the base plate 40 may be pivoted in the opposite direction approximately 270° so as to nest over the frame plate 14 and the frame bars 15, as illustrated in Figs. 8 and 9.

Suspended on the frame is a card receiving platform 44 disposed substantially parallel to the base plate 40 and the tray 21, when the latter is in normal card receiving position. This platform 44 is composed of a flat plate 45 having right-angularly turned arms 46 at its opposite ends. These arms each have an inwardly projecting stud 47 adapted to engage notches 48 in the rear edges of the frame bars 15. Inasmuch as the inner edge of the plate 45 engages the surface of the frame plate 14, a lever action is created which latches the platform 44 in position. To release it from this position, it is only necessary to upraise the outer end of the platform opposite the arms 46, detaching the studs 47 from the notches 48.

When the entire device is collapsed, the studs 47 are engaged with the lower notch 48 and the platform folded against the face of the frame plate 14, as illustrated in Figs. 8 and 9.

It is seen that when the device is in uncollapsed and operating condition, the tray 21, the platform 44 and the base plate 40 are normally disposed in parallelism and in a horizontal position extending perpendicularly to the frame plate 14. In normal position the tray 21 may be latched in card receiving condition, shown in Fig. 4, by a spring latch 49 fixed to the channel member 19. This rigidly connects the tray to the carrier arms 16.

In operation of the device, assuming that it is in uncollapsed condition, as shown in Figs. 1 and 4, and it is desired to selectively sort a stack of cards, the cards are stacked edgewise in the tray resting on the members 26. In this condition, the perforations in the edge of the card will be aligned and registered with the holes 28 and 29 in the longitudinal members 22 and 23 of the tray. The needles or sorting rods are then arranged in the sorting head 31 in the pattern of the desired sort. At this time, of course, the sorting head 31 is in extended position. Thereafter, the sorting head 31 is moved toward the tray 21 so as to project the needles or sorting rods 30 through the perforations in the cards and into the perforations or sockets 29. The latch 49 is then released and the tray is inverted to the position shown in Fig. 9. In this position the cards which are notched in conformity with the pattern of the needles will drop by gravity from the stack and rest on the platform 44, at which time they may be removed endwise from the stack. After the removal of the selected cards, the tray 21 is returned to normal position and latched in such position by the latch 49. The selector rod head 31 is then withdrawn so as to disengage the rods or sorting needles 30 from the cards remaining in the tray. These cards may then be removed from the tray and a second stack of cards placed in the tray for sorting.

It is desired to point out that if the cards are extremely long, the platform 44 may be disengaged from its upper notch 48 and lowered to a position on top of the base 40.

When the card sorting device is not in use, the selector rod head 31 may be placed in juxtaposition to the adjacent edge of the tray 21 and

this tray, together with the tray carrier arms 16, may be pivoted around the pivot points 17 of the arms 16 and be suspended in parallelism with the frame plate 14 closely adjacent thereto between the end frame members 15, all as shown in Figs. 8 and 9. The platform 44 is then detached from the upper notches 48 and placed in the position shown in Fig. 9 with its plate 45 parallel to and closely adjacent to the frame plate 14 at the side thereof opposite the side at which the tray 21 is disposed. Thereafter the base member 40 may be swung about its pivots 41 approximately 270° so as to nest over the frame bars 15, and with its plate 42 exteriorly of the tray 21 and the arms 16 so that the latter two elements are confined between the base plate 42 and the frame plate 14. In this position the plate 42 will be positioned approximately at the extended edges of the member 15. The ends 43 of the base 40 will lie at the exterior side of the frame bar members 15, while the tray carrier arms 16 will lie at the inner sides thereof.

Thus, it is seen that when collapsed, the entire device is folded into a space not much greater than that outlined by the frame plate 14 and its frame bars 15, all as illustrated in Fig. 9. Obviously in this condition, the device needs but little storage space.

From the foregoing it is obvious that we have provided a very simple but very efficient card sorting device which will be inexpensive to manufacture and which may be used with great facility for sorting edge punched cards, and which when not in use may be collapsed or folded into a condition requiring little space for storage.

While we have shown the preferred form of our invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. A sorting device comprising a flat rigid frame, a pair of complementary and aligned arms pivoted at the upper end and at the opposite sides of the frame, engaging means on the arms and frame whereby the former may be supported in a position extending perpendicularly to one side of the frame or positioned to lie flatwise against the opposite side of the frame, a card receiving tray disposed between the arms and pivotally connected to the other ends thereof on an axis parallel to the axes about which said arms pivot, said tray having sorting rod receiving openings complemental to the edge punching of cards to be sorted.

2. A sorting device comprising a flat rigid frame, a pair of complementary and aligned arms pivotally connected at the upper end and at opposite sides of the frame, engaging means on said arms and frame whereby the former may be supported in a position extending perpendicularly to one side of the frame or positioned to lie closely adjacent to the opposite side of the frame in substantial parallelism with the side thereof, a rectangular card receiving tray disposed between said arms and pivotally connected with the other ends thereof on an axis parallel to the axes about which the arms pivot, said tray being formed with a shallow recess in one face whereby a stack of cards may be disposed in edgewise condition in the tray, the sides of said tray on opposite sides of said recess being provided with perforations

complemental to the edge punchings of cards to be sorted.

3. A sorting device comprising a flat rigid frame, a pair of complementary and aligned arms pivotally connected at the upper end and at opposite sides of the frame, engaging means on said arms and frame whereby the former may be supported in a position extending perpendicularly to one side of the frame or positioned to lie closely adjacent to the opposite side of the frame in substantial parallelism with the side thereof, a rectangular card receiving tray disposed between said arms and pivotally connected with the other ends thereof on an axis parallel to the axes about which the arms pivot, said tray being formed with a shallow recess in one face whereby a stack of cards may be disposed in edgewise condition in the tray, the sides of said tray on opposite sides of said recess being provided with perforations complemental to the edge punchings of cards to be sorted, a sorting rod holder reciprocably connected to the tray and lying in alignment with the perforated side thereof in parallelism therewith for movement laterally of the tray toward and away from the same, and sorting rods carried by said holder to be projected and withdrawn laterally of the tray by reciprocation of the holder.

4. A sorting device comprising a flat rigid upright frame, a pair of carrier arms projecting horizontally from the upper end and at opposite sides of the frame, a card receiving tray disposed horizontally between said arms and pivotally connected to the outer ends thereof for pivotal movement about a horizontal axis, the point of pivotal connection between the tray and the arms being disposed intermediate the side edges of the tray whereby the tray may be maintained in a horizontal position to receive cards to be sorted or to be inverted by pivotal movement to discharge selected cards, said tray comprising an open rectangular rigid frame, members extending transversely of the frame across one face thereof to form a shallow recess within the frame for the reception of cards to be sorted, opposite side members of the frame being perforated complementary to the perforations in cards to be stacked in the tray and sorted.

5. A sorting device comprising a flat rigid upright frame, a pair of carrier arms projecting horizontally from the upper end and at opposite sides of the frame, a card receiving tray disposed horizontally between said arms and pivotally connected to the outer ends thereof for pivotal movement about a horizontal axis, the point of pivotal connection between the tray and the arms being disposed intermediate the side edges of the tray whereby the tray may be maintained in a horizontal position to receive cards to be sorted or to be inverted by pivotal movement to discharge selected cards, said tray comprising an open rectangular rigid frame, members extending transversely of the frame across one face thereof to form a shallow recess within the frame for the reception of cards to be sorted, opposite side members of the frame being perforated complementary to the perforations in cards to be stacked in the tray and sorted, a selector rod holder arranged in alignment and in parallelism with one side of the tray, means reciprocably connecting said holder to the tray whereby it may be reciprocated toward and away from the tray, and selector rods carried by said holder to be projected thereby laterally through the tray or withdrawn from the recess in the tray by reciprocation of said holder relative to the tray.

6. A sorting device comprising a flat rigid upright frame, a pair of carrier arms projecting horizontally from the upper end and at opposite sides of the frame, a card receiving tray disposed horizontally between said arms and pivotally connected to the outer ends thereof for pivotal movement about a horizontal axis, the point of pivotal connection between the tray and the arms being disposed intermediate the side edges of the tray whereby the tray may be maintained in a horizontal position to receive cards to be sorted or to be inverted by pivotal movement to discharge selected cards, said tray comprising an open rectangular rigid frame, members extending transversely of the frame across one face thereof to form a shallow recess within the frame for the reception of cards to be sorted, opposite side members of the frame being perforated complementary to the perforations in cards to be stacked in the tray and sorted, a selector rod holder arranged in alignment and in parallelism with one side of the tray, sockets formed in opposite ends of said tray frame and extending transversely of the tray frame, a plunger mounted in each socket and reciprocable therein, a plunger rod extending in each socket and connected with the plunger at one end and connected at its other end to the selected rod holder whereby the selector rod holder may be reciprocated toward and away from the tray.

7. A sorting device comprising a flat rigid frame, a pair of complementary and aligned carrier arms pivotally connected at the upper end and at opposite sides of the frame, engaging means on said arms and frame whereby the former may be supported in a position extending perpendicularly to one side of the frame or positioned at the opposite side of the frame in substantial parallelism to the side of the frame in close proximity thereto, a shallow card receiving tray extending between the arms and pivotally connected to the other ends of the arms on an axis parallel to the axes about which the arms pivot, means for latching said tray relative to the frame so that it will extend perpendicularly thereto for receiving cards, a base plate pivotally connected to the frame at a spaced distance from the arms, engaging means on said base plate and frame whereby the frame may be held in a position perpendicularly to the base plate when the latter is extended in the same direction and in parallelism to the arms when the latter are extended perpendicularly to the frame, said pivotal connection enabling the base plate to be swung about its pivot points to lie in parallelism with the frame overlying the arms and tray when the latter are positioned in parallelism with the frame.

8. A sorting device comprising a flat rigid frame, a pair of complementary and aligned carrier arms pivotally connected at the upper end and at opposite sides of the frame, engaging means on said arms and frame whereby the former may be supported in a position extending perpendicularly to one side of the frame or positioned at the opposite side of the frame in substantial parallelism to the side of the frame in close proximity thereto, a shallow card receiving tray extending between the arms and pivotally connected to the other ends of the arms on an axis parallel to the axes about which the arms pivot, means for latching said tray rela-

tive to the frame so that it will extend perpendicularly thereto for receiving cards, a base plate pivotally connected to the frame at a spaced distance from the arms, engaging means on said base plate and frame whereby the frame may be held in a position perpendicularly to the base plate when the latter is extended in the same direction and in parallelism to the arms when the latter are extended perpendicularly to the frame, said pivotal connection enabling the base plate to be swung about its pivot points to lie in parallelism with the frame overlying the arms and tray when the latter are positioned in parallelism with the frame, and a platform member adapted to be detachably supported by the frame in a position in substantial parallelism with the

arms when they are extended perpendicularly to the frame at a point intermediate the frame and the base plate.

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