March 18, 1947. N. S. WELK 2,417,531

CARD SORTING MACHINE

Filed July 7, 1944 2 Sheets-Sheet 1

Fig. 1.

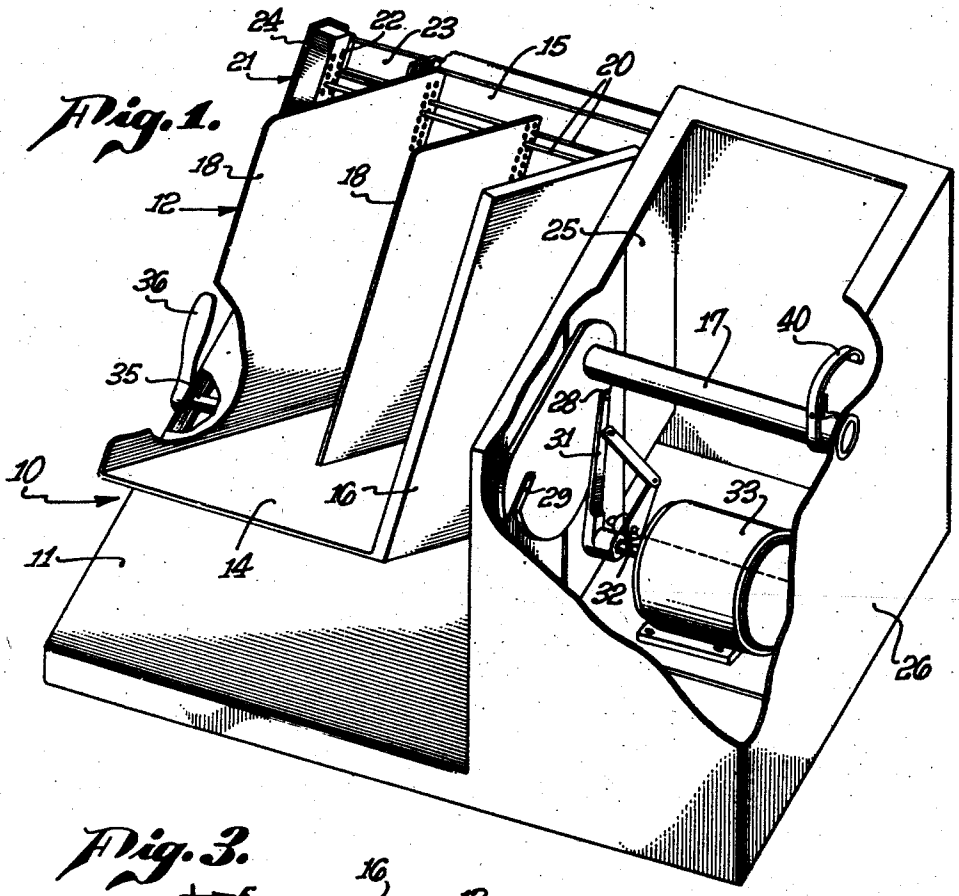


Fig. 3.

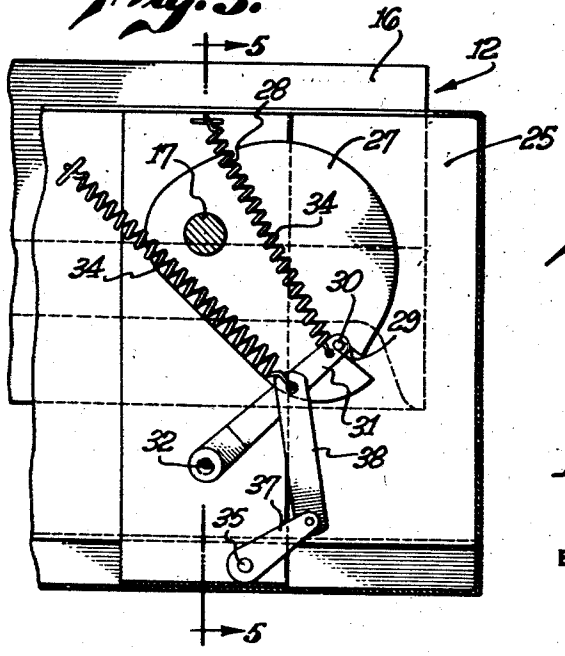
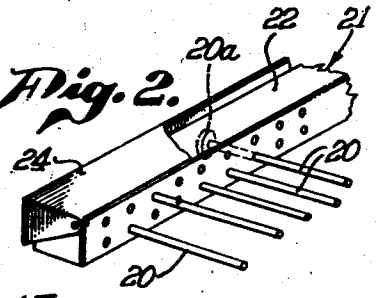


Fig. 2.



NELSON S. WELK,
INVENTOR.

BY Oscar A. Mellin
ATTORNEY.

March 18, 1947. N. S. WELK 2,417,531

CARD SORTING MACHINE

Filed July 7, 1944 2 Sheets-Sheet 2

Fig. 4.

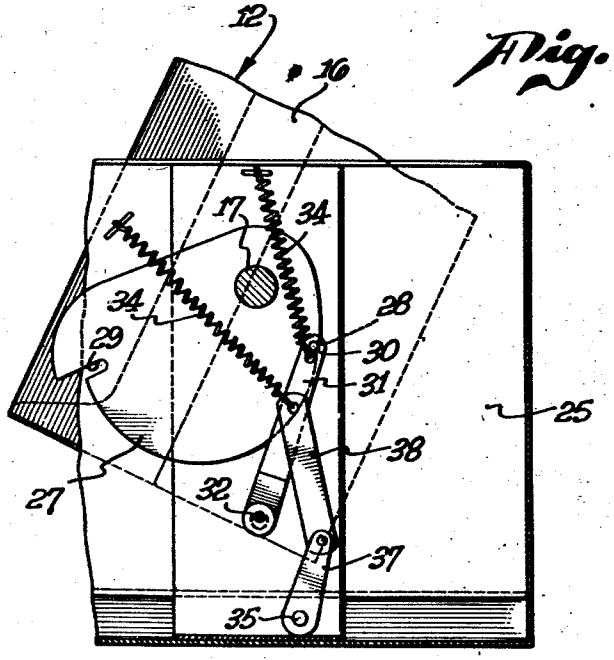


Fig. 5.

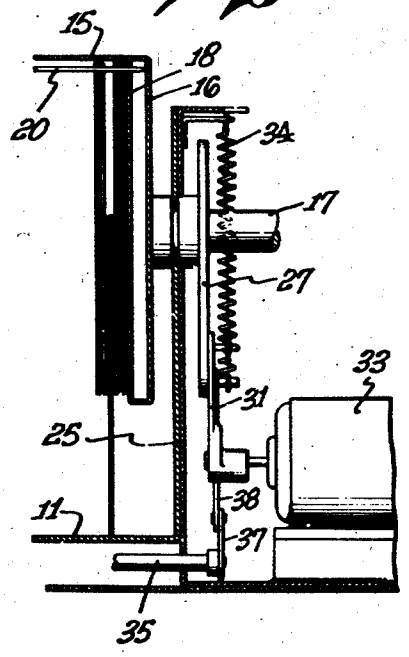
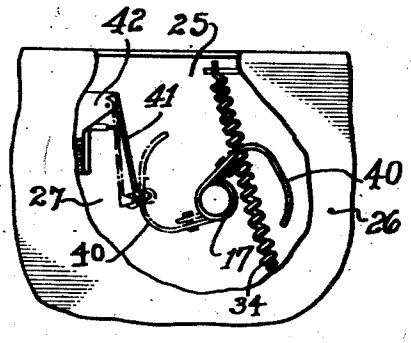


Fig. 6.



NELSON S. WELK,
INVENTOR.

BY Oscar A. Mellin
ATTORNEY.

Patented Mar. 18, 1947

2,417,531

UNITED STATES PATENT OFFICE

2,417,531

CARD SORTING MACHINE

Nelson S. Welk, Athens, Ohio, assignor to The McBee Company, Athens, Ohio, a corporation

Application July 7, 1944, Serial No. 543,813

8 Claims. (Cl. 129—16.1)

1

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 represent 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 my present invention to provide an improved sorting device for such cards to enable the slotted cards to be more expeditiously separated from the unslotted cards after the insertion of the rods for selection.

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 card sorting device embodying the preferred form of my invention shown in the position to receive stacks of cards for sorting and with parts thereof broken away to more clearly disclose certain features of construction.

Fig. 2 is a fragmentary view in perspective showing the construction of the selector rod holder.

Fig. 3 is a fragmentary view in transverse section through the apparatus showing the mechanism for indexing the tray and for vibrating the same and disclosing the tray in card separating position.

Fig. 4 is a similar view except that it discloses the tray in card receiving position.

Fig. 5 is a fragmentary view in vertical section showing the connection taken on line 5—5 of Fig. 3.

Fig. 6 is a detail view showing the switch operating mechanism.

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 as previously set forth, are edge punched cards. Certain of the punchings are notched out to the edge of the card in patterns to represent a desired classification or classifications. The card sorting device 10 is what is known as a selective sorting apparatus by means of which punched and notched cards of one or more classifications may be separated from a stack of cards. The sorting device or apparatus 10 is of a construction, size and weight that it is portable.

2

The sorting apparatus 10 comprises a rigid sheet-metal frame 11 which has suspended thereon a rotatable card receiving tray 12. This card receiving tray 12 comprises a flat bottom plate 14, a flat back plate 15 arranged at 90 degrees thereto and extending perpendicularly therefrom. At the rear end thereof a rigid end plate 16 is secured to the edges of the bottom plate 14 and the back plate 15 thereof, as illustrated.

Substantially at center, the end plate 16 of the tray 12 is rigidly secured to the end of a horizontal tray shaft 17 which is rotatably mounted in the frame. This enables the frame to rotate about a horizontal axis, as will be further herein described.

Arranged in parallelism with the end plate 16 are three templates 18 which are fastened at one edge to the back plate 15 and at the other edge to the bottom plate 14. One of these templates is arranged vertically from the edge of the bottom plate 14 opposite the end plate 16. The second template is arranged substantially centrally of the bottom plate 14, and the third which is arranged closely adjacent the end plate 16, as illustrated in Fig. 5.

Parallel to the edge of each template which joins the back plate 15, the templates are formed with a series of perforations or punched holes corresponding in size and relative position, both with respect to each other and with respect to the punched holes or perforations in the cards to be sorted. This is so that when a stack of cards is positioned between the templates in parallelism therewith with their punched edge and one end abutted against the back and bottom plates 15 and 14, the perforations or punched holes will align with the punched holes or perforations in the templates. This is so that sorting rods 20 may be inserted through the perforations in the templates and through the perforations in the cards disposed therebetween for the purpose of sorting.

To properly manipulate the selector rods 20 and

maintain them in a selected pattern for sorting, I provide a selector rod holder 21 which comprises an elongated member 22 which is perforated complementary to the templates and consequently to the cards to be sorted. Further, the elongated member 22 is at all times maintained in alignment with the templates with its perforations in longitudinal alignment with the perforations in the templates.

The selector rod holder 21 is connected by two telescoping slides 23 to the back wall 15 of the card receiving tray 12. These telescoping and guide slides 23 extend longitudinally of the card receiving tray 12 and enable the selector rod holder 21 to be moved or reciprocated longitudinally relative to the tray 12. The amount of movement permitted the selector rod holder 21 is sufficient to enable the selector rods 20 to project entirely through a stack of cards disposed in the tray 12 and into the template which is positioned adjacent the end plate 16 and to be completely disengaged from such cards at the end of its opposite movement.

The construction of the telescoping slides 23 is conventional and for this reason their construction is not further illustrated or described. Similar slide constructions are disclosed in the patent to Connor, No. 2,389,343, dated November 20, 1945.

To maintain the selector rods 20 from endwise movement in the selector rod holder 21, the selector rods 20 are provided with enlarged heads 20*a* which will not pass through the perforations in the member 22. Therefore, the selector rods 20 may be projected endwise through the member 22 and into the corresponding perforations in the templates. The spacing and positioning of the selector rods 20 is, of course, determined by the selected classification.

A hinged cover 24 is fitted to the selector rod holder 21 so that after the rods have been positioned this cover plate 24 may be disposed as illustrated to prevent endwise movement of the selector rods 20 by clamping the heads 20*a* thereof to the member 22.

To rotatably support the tray shaft 17 it will be seen that the frame 11 is formed with two vertical walls 25 and 26 which are in parallelism and which extend transversely of the frame. The wall 25 is positioned in parallelism and closely adjacent to the end wall 16 of the tray. The tray shaft 17 extends between these two walls 25 and 26 and is suitably journaled therein to rotatably support the tray 12.

Fixed on this shaft 17 at the side of the wall 25 opposite the end wall 16 of the card receiving tray 12 is a latching cam 27. This cam is of the eccentric type and is formed with two latching sockets 28 and 29 in its periphery. These sockets cooperate with a roller 30 carried on the end of an oscillatory vibrating arm 31, the opposite end of which is rotatably mounted on the motor shaft 32 of the motor 33. Springs 34 tend to constantly maintain the roller 30 in contact with the cam surface of the latching cam 27 and in engagement with the sockets 28 and 29. To effect disengagement of the roller 30 from the sockets 28 and 29, I provide an operating mechanism which includes an operating shaft 35 which is journaled longitudinally of the frame as illustrated. Exteriorly of the end of the frame opposite the wall 26, this shaft is fitted with an operating lever 36 for the purpose of operating the shaft 35. At the same side of the wall 25 at which the cam 27 is positioned, the operating

shaft 35 is fitted with a crank arm 37 which is connected by a link 38 with the vibrating lever 31 at a point intermediate the roller 30 and the motor shaft. Obviously, the springs 34 tend to constantly cause the roller 30 to seek engagement with the cam sockets 28 or 29. To effect disengagement of the roller 30 with the latching socket 28 or 29, the lever 36 is depressed to rotate the operating shaft 35 which in turn through the crank arm 37 and the link 38 will swing the vibrating lever 31 radially outward with respect to the center of the latching cam 27 and effect disengagement of the roller 30 from the socket 28 or 29. When such disengagement is effected, the tray 12 may be rotated together with the shaft 17 and, of course, the cam 27.

When the cam 27 is in the position where the roller 30 of the vibrating arm 31 is in engagement with the latching socket 28, the tray is latched in the position shown in Fig. 1, with the bottom plate 14 tilted at an angle horizontally and the back plate 15 of the tray tilted at an angle to the vertical so that cards may be nested into the tray. In this position the card edges will abut against the back wall 15 and the bottom wall of the tray. This effects alignment of the perforations of the cards with the perforations of the tray. However, when the tray is rotated until the roller 30 engages the latching socket 29, as seen in Fig. 3, the back plate 15 of the tray will be uppermost and will be disposed substantially horizontally, as illustrated in Fig. 3, so that the cards will be suspended in the tray from the selector rods 20. That is to say, those cards whose slotted perforations are not in register with all the rods 20 will be suspended while those cards which are slotted in register with all the selector rods 20 will be free to drop downwardly onto the frame and be removed.

It has been found, however, that when a considerable number of cards are disposed in a tray of this character, surface friction and other effects will tend to prevent the cards slotted in alignment with the rods from readily disengaging and dropping from the stack. To overcome this, I have provided a medium for oscillating the tray at high frequency when it is so positioned to separate the cards. I accomplish this by making the pin on the motor shaft which rotates in the end of the vibrating arm 31 slightly eccentric to the center of revolution of the motor. This eccentricity, while very small, reciprocates the vibrating arm 31 a small amount at high frequency. This reciprocation is translated into oscillation of the cam at high frequency which in turn is imparted through the shaft 17 to the end wall 16 of the tray 12 and consequently to the entire tray.

I have found that this oscillation of the tray at high frequency very effectively and expeditiously causes the cards having notches registering with the sorting rods to separate from the remainder of the cards and drop downwardly so that they may be removed from the tray.

In operation of the apparatus, it is constructed and assembled substantially as illustrated and described, and the selector rods are fitted to the selector rod holder to correspond with the desired classification. The selector rod holder is then withdrawn from the tray so as to withdraw the selector rods from between the templates. The cards to be sorted are then stacked in the tray between the templates so that their notched edges will abut against the back wall of the tray and their lower edges rest on the bottom of the tray.

In this position, the punchings in the cards will be in register with the perforations in the templates. The selector rod holder is then operated to insert the selector rods through the templates and through the cards as previously described. The operating lever **36** is then depressed to disengage the roller **30** from the latching socket **28** and the tray is then rotated until the roller **30** registers with the latching socket **29** which will again latch the tray in card separating position.

It will be noticed that at one side of the latching notch **29** the latching cam **27** is formed with a radial face which extends radially outward so as to prevent passing of the point of registration between the roller **30** and the latching socket **29**. At this point of operation the circuit of the motor **33** is automatically closed so as to place the motor in operation. This is effected by providing a spring arm **40** on the shaft **17** which cooperates with a switch arm **41** of a microswitch **42**. The latter is, of course, fixed on the wall **26** of the frame. The formation of the spring arm is such and its relationship with the switch arm **41** is such that as the tray reaches its card separating position of Fig. 3 the microswitch is closed to close the motor circuit. Upon closing of the motor circuit the tray will be oscillated at high frequency and the cards having notches registering with the sorting rods will separate from the stack and descend so that they may be removed. After removal of the cards so selected, the handle **36** is again depressed to disengage the roller **30** from the indexing notch **29** and the tray is rotated to its original card receiving position or until roller **30** reengages with the indexing notch **28**. Immediately that the tray commences to rotate back to a card receiving position, the spring arm **40** disengages from switch arm **41**, which opens the motor circuit and discontinues the vibratory or oscillatory effect on the card receiving tray. The operation just described is then repeated on succeeding stacks of cards until all have been sorted. Obviously, any desired classification or classifications may be selected by merely changing the positions of the selector rods **20** to correspond with the desired classification or classifications.

From the foregoing it is obvious that I have provided a comparatively simple device for selectively sorting cards known commercially as "keysort" cards. It will be apparent from the foregoing and from the drawings that by means of my improved apparatus, selective sorting of a relatively few or a large stack of cards may be expeditiously accomplished.

While I have shown the preferred form of my 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 my invention, what I claim and desire to secure by Letters Patent is:

1. A card sorting device comprising a frame, a card receiving tray rotatably mounted on the frame for rotation about a horizontal axis, and latching means for releasably latching said tray in card receiving and card separating positions and means associated with the latching means for oscillating the tray at high frequency through the latching means when the latter has latched the tray in card separating position.

2. A card sorting device comprising a frame, a card receiving tray rotatably mounted on the frame for rotation about a horizontal axis, templates on said tray having perforations formed therethrough complementary to perforations in cards to be disposed in the tray, selector rods to penetrate through the perforations in the templates and cards in the tray, and latching means for releasably latching said tray in card receiving and card separating positions and means associated with the latching means for oscillating the tray at high frequency through the latching means when the latter has latched the tray in sorting position.

3. A card sorting device comprising a frame, a card receiving tray, a horizontal shaft fixed to the tray and journaled in the frame, a latching member fixed on the shaft, said member having two circumferentially spaced latching sockets formed in its periphery, a latch member constantly urged to engage a latching socket registering therewith, said sockets being positioned so that said tray may be latched in a card receiving position and in a card separating position, and operative means for disengaging said latch from a socket.

4. A card sorting device comprising a frame, a card receiving tray, templates on said tray having perforations formed therethrough complementary to perforations in cards to be disposed in the tray, selector rods to penetrate through the perforations in the templates and cards in the tray, a horizontal shaft fixed to the tray and journaled in the frame, a latching member fixed on the shaft, said member having two circumferentially spaced latching sockets formed in its periphery, a latch member constantly urged to engage a latching socket registering therewith, said sockets being positioned so that said tray may be latched in a card receiving position and in a card separating position, operative means for disengaging said latch from a socket.

5. A card sorting device comprising a frame, a card receiving tray, a horizontal shaft fixed to the tray and journaled in the frame, a latching member fixed on the shaft, said member having two circumferentially spaced latching sockets formed in its periphery, a latch member constantly urged to engage a latching socket registering therewith, said sockets being positioned so that said tray may be latched in a card receiving position and in a card separating position, operative means for disengaging said latch from a socket, and means for oscillating said latching member at high frequency when said tray is latched in card separating position.

6. A card sorting device comprising a frame, a card receiving tray, a horizontal shaft fixed to the tray and journaled in the frame, a latching cam fixed on the shaft, said cam having two circumferentially spaced latching sockets formed in its periphery, a latch member constantly urged to engage a latching socket registering therewith, said sockets being positioned so that said tray may be latched in a card receiving position and in a card separating position, operative means for disengaging said latch from a socket, and means connected with said latch member for actuating the same to rapidly oscillate the cam when said tray is latched in separating position.

7. A card sorting device comprising a frame, a card receiving tray, a horizontal shaft fixed to the tray and journaled in the frame, a latching cam fixed on the shaft, said cam having two circumferentially spaced latching sockets formed in its periphery, a latch member constantly urged to engage a latching socket registering therewith,

said sockets being positioned so that said tray may be latched in a card receiving position and in a card separating position, operative means for disengaging said latch from a socket, motor driven means connected with said latch member for actuating the same to rapidly oscillate the cam when said tray is latched in separating position, and switch means controlling said motor driven means to automatically place the same in operation when the tray is moved to card separating position.

8. A card sorting device comprising a frame, a card receiving tray, templates on said tray having perforations formed therethrough complementary to perforations in cards to be disposed in the tray, selector rods to penetrate through the perforations in the templates and cards in the tray, a horizontal shaft fixed to the tray and journaled in the frame, a latching cam fixed on the shaft, said cam having two circumferentially spaced latching sockets formed in its periphery, a latch member constantly urged to engage a latching socket registering therewith, said sockets being positioned so that said tray may be latched in a card receiving position and in a card

separating position, operative means for disengaging said latch from a socket, and means connected with said latch member for actuating the same to rapidly oscillate the cam when said tray is latched in separating position.

NELSON S. WELK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,358,389	O'Neil	Nov. 9, 1920
1,704,259	Rainey	Mar. 5, 1929
2,259,463	Griffin	Oct. 21, 1941
1,702,994	Buckeridge	Feb. 19, 1929
1,748,692	Adams	Feb. 25, 1930
2,261,719	Connor	Nov. 4, 1941
2,284,808	Duane	June 2, 1942
2,315,860	Jones	Apr. 6, 1943
2,338,133	Sandell	Jan. 4, 1944
2,389,343	Connor	Nov. 20, 1945