Nov. 20, 1945. R. CONNOR 2,389,343

CARD SORTING MACHINE

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Fig. 1.

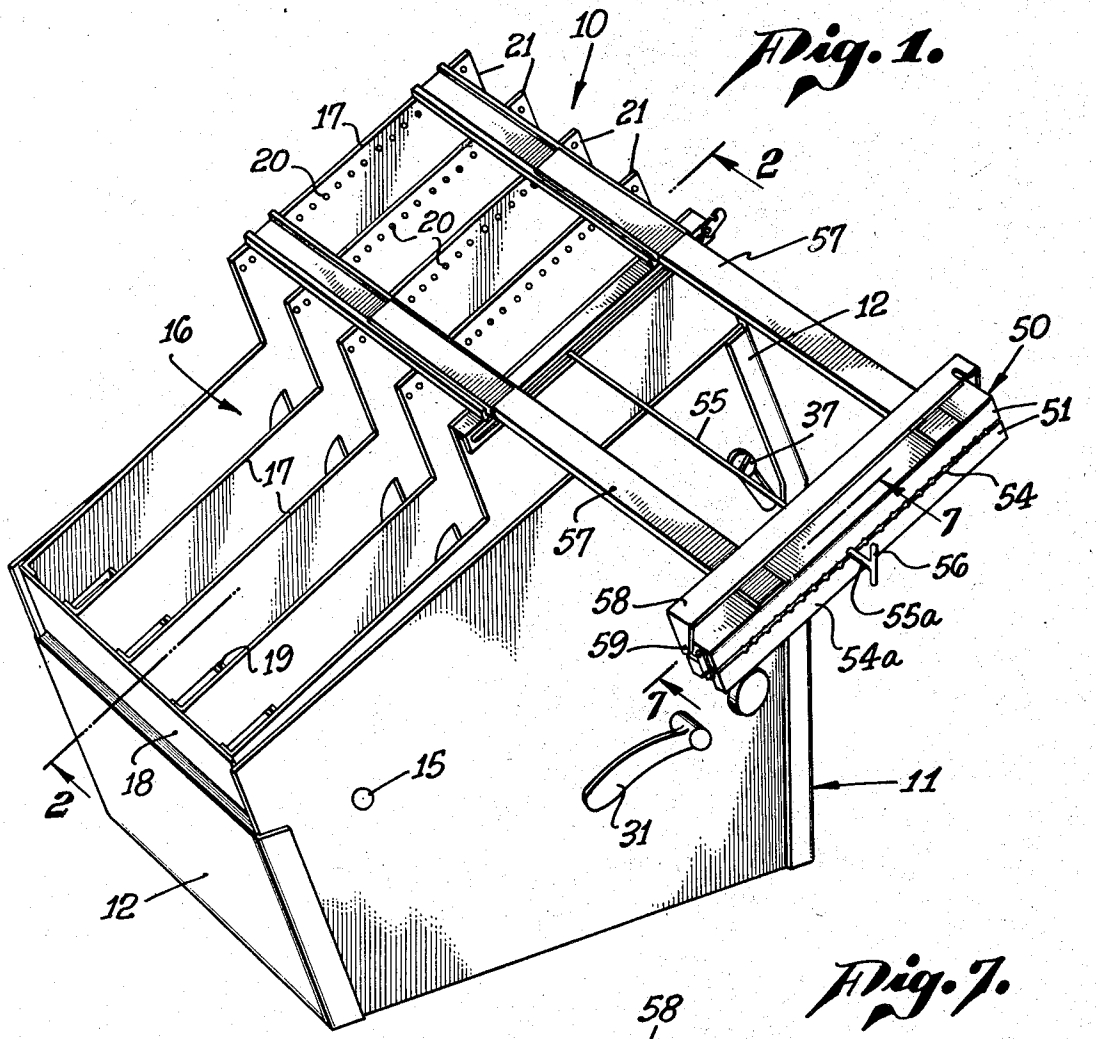
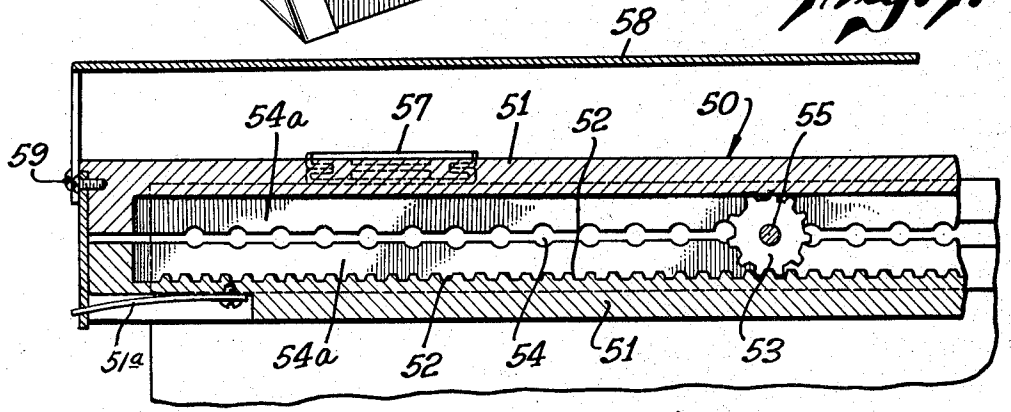


Fig. 7.



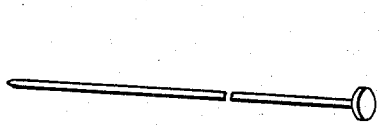


Fig. 8.

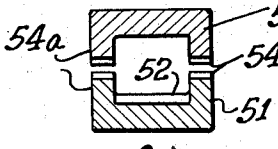


Fig. 9.

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Fig. 2.

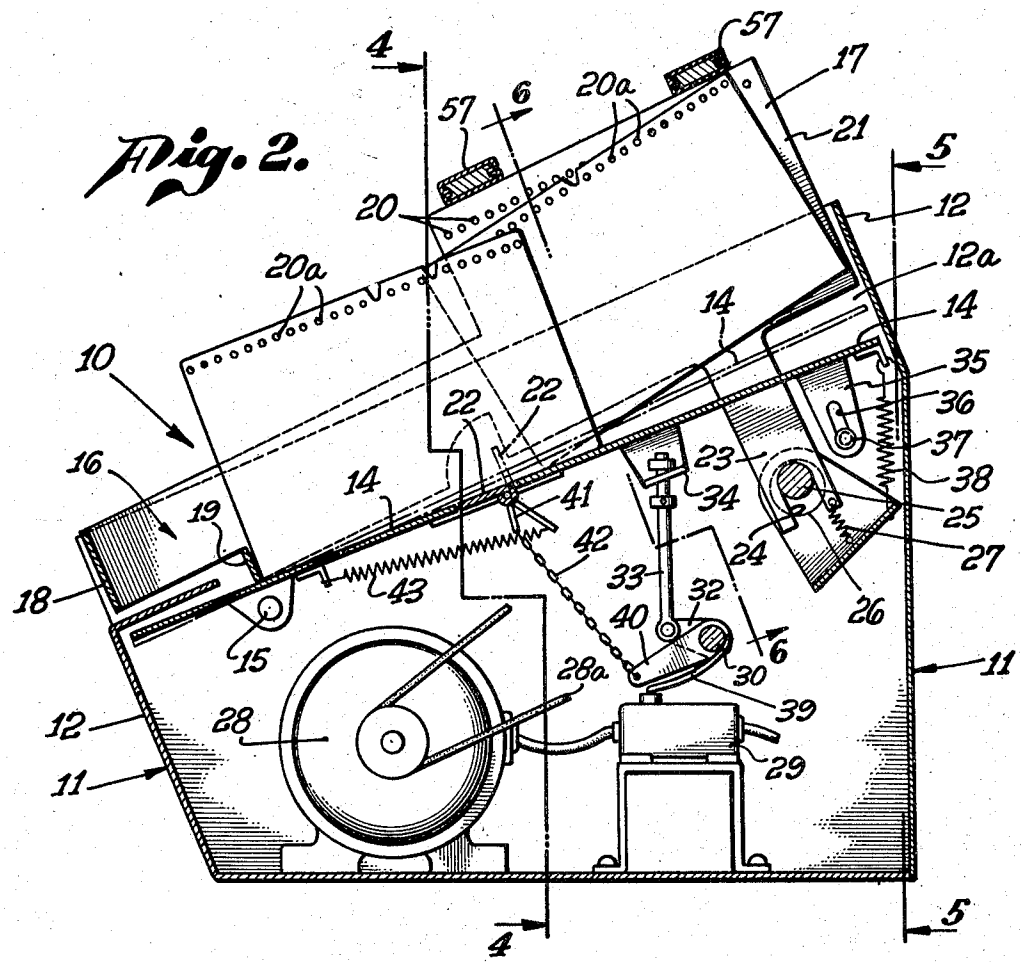
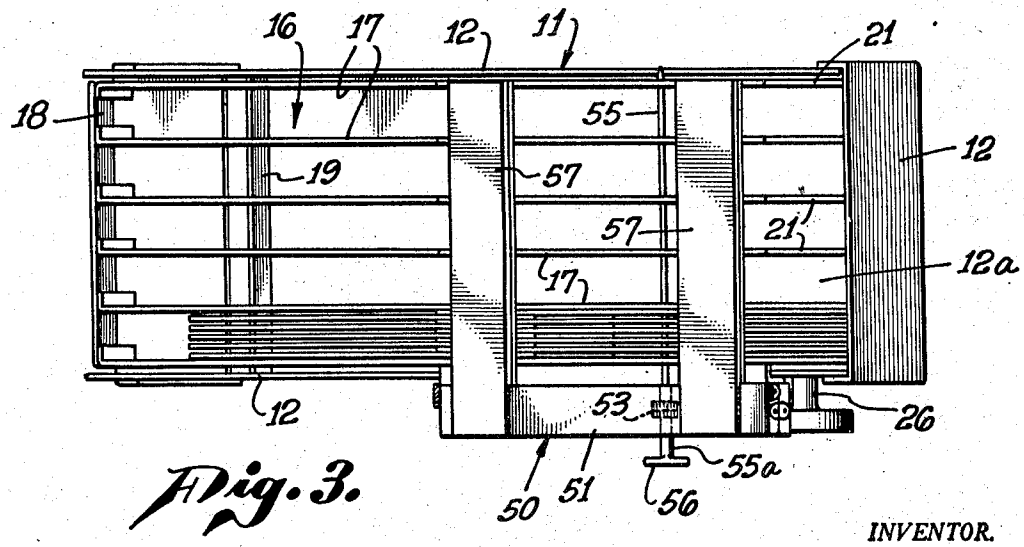


Fig. 3.



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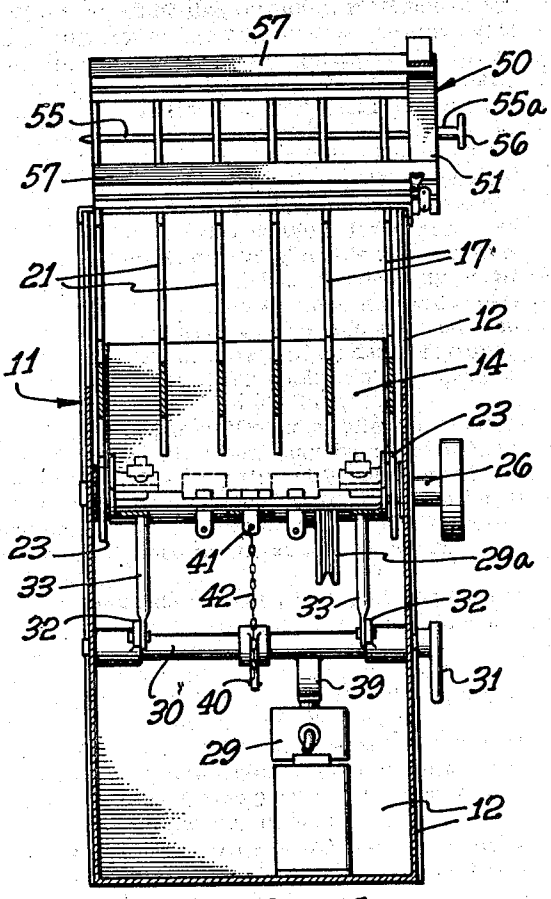


Fig. 4.

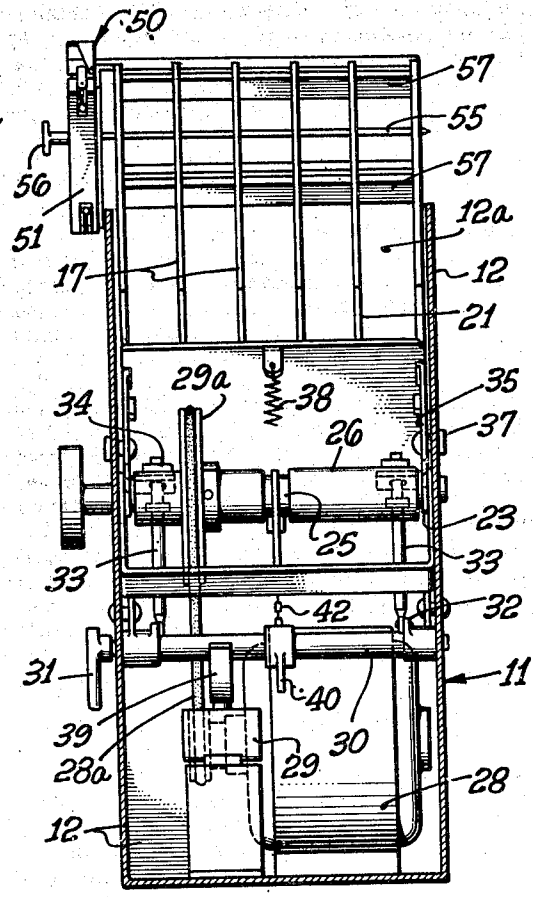


Fig. 5.

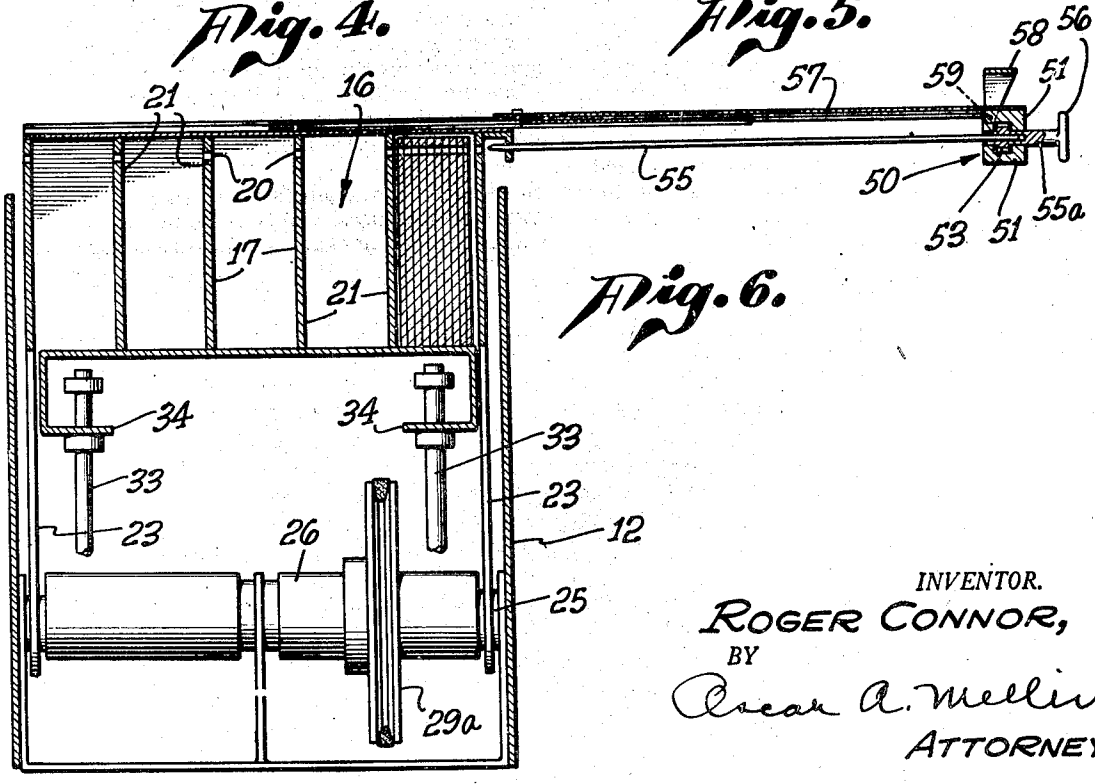


Fig. 6.

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UNITED STATES PATENT OFFICE

2,389,343

CARD SORTING MACHINE

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Application October 30, 1943, Serial No. 508,385

6 Claims. (Cl. 129—16.1)

This invention relates to card sorting and selecting machines for use in direct and sequence sorting of cards of the character widely known as "Keysort" cards and which are illustrated and described in Letters Patent of the United States #1,544,172.

It is the principal object of my present invention to provide a generally improved apparatus capable of receiving cards of the character referred to and of operation to expeditiously sequence sort or direct sort the cards disposed therein with greater facility and accuracy than prior devices for similar purposes.

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 an apparatus embodying the preferred form of my invention.

Fig. 2 is a central longitudinal section therethrough taken on line 2—2 of Fig. 1.

Fig. 3 is a plan view of the machine showing the sorting rod in sorting position.

Fig. 4 is a vertical sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is a vertical sectional view taken on line 5—5 of Fig. 2.

Fig. 6 is a vertical sectional view taken on line 6—6 of Fig. 2.

Fig. 7 is a fragmentary view in section taken on line 7—7 of Fig. 1.

Fig. 8 is a perspective view of the form of selector rod employed when a plurality of the same are used simultaneously.

Fig. 9 is a transverse sectional view through the selector rod holder.

Referring more particularly to the accompanying drawings, 10 indicates an apparatus constructed in accordance with my present invention. This apparatus is a portable one and may be disposed on a table, desk or other convenient support for use. The apparatus 10 is capable of use in sequence sorting of edge punched cards as well as the direct sorting thereof.

The cards to be sorted in the present machine are those of the character set forth in the before mentioned Letters Patent of the United States #1,544,172 and in general consist of a sheet or a card having a plurality of perforations adjacent the edge of the card which may be separately slotted out to the edge of the card. The slotting of the card indicates or represents a particular classification. In direct sorting, as pointed out in said patent, those cards relating to a particular classification are separated from the remainder of a stack by means of a sorting rod or rods passed through the perforations of a particular classification. The rod or rods retains those cards unslotted for this classification while the cards slotted to represent the selected classification separate from the stack.

In sequence sorting as set forth in said patent, any number of cards in a stack may be placed in numerical order or other sequence by passing the selector rod successively through the perforations in a particular sequence as set forth in the patent. Both direct and sequence sorting is well known and therefore will not be described herein with particularity.

The present machine 10 is capable of receiving a stack of cards and direct sorting or sequence sorting the same. The machine comprises a frame or base 11 which in this instance is illustrated as a hollow base preferably formed of sheet metal although other construction may be employed. At the top of this frame there is a circumscribing wall 12 defining a rectangular card receiving chamber 12a. This chamber 12a is disposed on an angle to the horizontal. At the bottom of the chamber 12a is a flat platform 14 also disposed at an acute angle to the horizontal. This platform 14 is pivoted adjacent its lower end to the sides of the frame 11 as at 15 so that it may be raised and lowered vertically a limited amount as will be described.

Disposed within the chamber 12a is a card receiving rack 16 formed of a plurality of equally spaced separator plates 17. This rack is normally disposed at the same angle as the platform 14 and bears thereon. It will be noticed that each side of the rack is formed by a separator plate 17 and that all of the separator plates are rigidly joined together adjacent the lower end by transverse members 18 and 19. The upper ends of the separator plates 17 constitute templates and are substantially the same in contour and dimension as the cards to be sorted.

I prefer to call the upper portion of the separating plates templates inasmuch as they match the cards to be sorted and are formed with selector rod receiving holes or perforations 20 which are identically the same in spacing as the punched holes along the edge of the cards to be sorted. In the present instance, I have illustrated the templates 21 as formed with a row of holes along their upper marginal edges. However, it is obvious that the end edges of the templates may be likewise formed with selector rod receiving holes.

When the platform 14 is in normal position as shown in dotted line in Fig. 2 and the card receiv-

ing rack is in its normal position with its lower edge bearing on its platform, cards stacked between the templates will register with the templates and the punched holes 20a in the cards will register with the selector rod receiving holes 20 in the templates. This enables a selector rod to be projected through the templates and through the cards for sorting purposes as will be described.

In order to hold the cards in aligned position with the templates 21 while the selector rod or rods are projected through the cards and templates, the platform 14 is formed with an aligning gate 22 which extends transversely thereof and may be positioned so that the lower ends of the cards will engage the same and be maintained in register with the templates 21. This gate 22 may be, as shown in the drawings, swung to a position flush with the top of the platform 14 so that the cards released from the templates 21 may slide downwardly of the platform to a position as shown in Fig. 2 that they may be removed from the rack.

It should be pointed out that in causing removal of selected cards from a stack thereof after the selector rod or rods are projected therethrough, it is necessary to produce a jarring action on the cards so that those cards having notches registering with the selector rod or rods will drop completely from the stack. This jarring action is necessary to overcome the tendency of the cards to stick together or cards being held from dropping by adjacent cards. In the present instance I have provided means for imparting a vibrating or gyratory movement to the templates 21 to effect such separation of the cards during sorting. I accomplish this by providing the receiving rack 16 with two downwardly projecting arms 23. One arm 23 projects downwardly from one side of the rack 16 and the other from the opposite side of the rack 16. The lower ends of these arms 23 are bifurcated as indicated by 24 and each engages a crank 25 on a transverse shaft 26 carried by the frame 11. A spring 27 maintains the bifurcated ends 24 of the arms 23 in engagement with the cranks 25. Obviously when the shaft 26 is revolved, the templates 21 of the card receiving rack 16 will be rapidly gyrated or vibrated to effect complete separation of the cards. The shaft 26 is preferably driven by an electric motor 28 mounted within the base 11 through a belt 28a and a pulley 29a on the shaft 26. The motor 28 is controlled by a conventional type of switch 29 also mounted within the base.

As before stated, the platform 14 is pivoted to the base 11 as at 15 for the purpose of enabling it to be lowered with relation to the bottom of the templates 21 of the card receiving rack 16. The templates 21, of course, form a rigid part of the rack. For this purpose a transverse shaft 30 is mounted in base 11. At one end the shaft 30 is provided with an operating handle 31 positioned exteriorally of the base that it may be grasped and manipulated by the operator of the machine. Secured on this shaft 30 are crank arms 32 connected by connecting rods 33 to lugs 34 secured to the underside of the platform 14. When the operating handle 31 is in one position, the platform is positioned at its normal or upper position or that shown in dotted lines in Fig. 2. in which position the bottom of the templates 17 are closely contiguous to the upper surface of the platform. When the parts are in this position, the punched holes in cards stacked between the templates will register with the holes 20 of the templates and will rest on the platform 14 so that the selector rods may be projected through the holes in the cards and selector rod holes as previously described. When the operating handle is turned to its other position, the platform 14 will be lowered to the full line position shown in Fig. 2 so that the cards will be suspended in the rack 16 from the selector rods projecting through the openings. The lowering of the platform 14 permits the cards having notches registering with the selector rod or rods to disengage therefrom and drop downwardly to the platform and slide downwardly along the same a distance slightly less than the length of the cards or until their lower ends abut against the transverse member 19 adjacent the lower end of the rack. It is important that the cards be not permitted to slide their full length downwardly of the platform as it prevents the removed cards from falling sidewise and blocking the exit of other cards from the stack. In other words, it maintains the selected cards in a vertical position in their respective places. To guide the platform 14 in its vertical movement, ears 35 are formed thereon at the sides thereof. These ears have slots 36 of a length agreeing with the amount of movement it is desired to permit the platform 14, which slots engage fixed pins 37 at the sides of the frame 11. When the pins 37 engage the lower ends of the slots 36, the platform will be in normal or upper position and when the pins 37 engage the upper ends of the slots 36, the platform will be in its lower or selecting position. A spring 38 normally tends to move the platform to its lower position.

When the platform 14 is moved to its lower position, the switch 29 is automatically closed to start the motor 28 and the aligning gate 22 is automatically lowered to unobstruct the exit of the cards from between the templates 21. These two functions are accomplished by the provision of a switch arm 39 and a gate arm 40 both fixed to the shaft 30. When the operating handle 31 of the shaft 30 is moved to lower the platform 14, it causes the switch arm 39 to close the switch 29 and to cause the arm 40 to lower the gate 22. The arm 40 is connected to a crank arm 41 on the gate by a connection 42. A spring 43 is provided which constantly tends to move the gate 22 to its upper or aligning position.

When the operating handle 31 is swung in the opposite direction to move the platform 14 to its upper or normal position, the arm 40 swings upwardly allowing the spring 43 to swing the gate 22 to its uppermost or aligning position. At the same time the arm 39 disengages from the switch 29 and permits the same to open, cutting off the operation of the motor. Thus, it will be seen that after the selector rod or rods are projected through the cards and templates, the operating handle 31 may be operated to lower the platform 14 and simultaneously operate the gate 22 and the switch 29.

Immediately that the motor commences operation, it will impart a drive to the shaft 26 to revolve the crank 25 and through the cranks and the arms 23 rapidly gyrate or vibrate the card receiving rack 16 and templates 21 thereof, causing the selected cards to drop from the stack to the surface of the platform 14. Due to the inclination of the latter the cards will slide downwardly thereover until they engage the transverse member 19. The remaining cards or the unselected ones will be held suspended in the card receiving rack by the selector rod or rods.

When the operator determines that all of the selected cards have been discharged from the stack, the operating handle 31 is manipulated to turn the shaft 30 to raise the platform 14 and simultaneously shut off the operation of the motor and raise the gate 22. Of course, prior to the operation of the handle 31, the operator removes from the rack the selected cards that have been discharged from the stack of cards.

For the purpose of operating the selector rod or rods, I have provided a selector rod holder 50 which is disposed at one side of the frame. This selector rod holder comprises a pair of complementary members 51 which are channel shaped in cross section. One of the inner opposed faces of the members 51 (which is at the base of the channel in each instance) is formed with rack teeth 52 engaged by a pinion 53 fixed on the selector rod 55. The side legs 54a of the members 51 are spaced slightly apart and formed with equally spaced sockets 54. The spacing between the sockets is precisely that of the template holes 20 and the sockets are in register with such holes 20. These sockets 54 are adapted to receive the hub 55a of a selector rod 55. The hub 55a is formed with a knob 56 so that the selector rod 55 may be revolved by revolving the knob 56 and when so rotated, the engagement of the pinion 53 with the teeth of the rack 52 will force the members 51 further apart so that the selector rod may be moved successively from one socket 54 to the succeeding one. Obviously, when the knob 56 is turned, the engagement of the teeth of the pinion 53 with the teeth of the rack 52 will require that the pinion 53 and its hub will be forced to move longitudinally of the members 51. It is enabled to do this by the hub creating a camming action on the adjacent faces of the members 51 between the sockets 54. Thus, the hub will enter the spaces between the adjacent faces of the members 51 between the sockets and wedge them apart so that the hub of the pinion 53 will move to the next socket, and when aligned with this socket, the members 51 will move toward each other. This is possible because of the yielding of the spring means 51a which holds the two members 51 together which spring means 51a permits sufficient separation of the members 51 to enable the hub 54 of the selector rod 55 to pass from one socket to the succeeding one. The spring means which holds the two members 51 together are located at opposite ends of the members 51, as illustrated in Fig. 7, and consist of flat springs as shown.

The selector rod holder 50 is connected by two telescoping slides 57 to the templates 21 of the rack 17. These guiding slides extend horizontally at right angles to the faces of the templates as illustrated so that the selector rod holder 50 may be moved laterally relatively to the templates 21 as illustrated. The amount of movement permitted the selector rod holder 50 is slightly greater in dimension than the spacing between the outermost templates 21. Therefore, when the selector rod holder 50 is in its outermost position it will be completely withdrawn from the adjacent template and permit the insertion of cards between the templates. When the selector rod holder 50 is in its innermost position the selector rod will be projected through the furtherest template 21 so as to engage all of the cards disposed in the rack and be supported by each template.

The selector rod holder and selector rod construction just described is provided for the purpose of sequence or other sorting where but one selector rod is employed in that by merely turning the selector rod it will be moved to the next position and be in alignment with the next selector rod hole 20 of the templates. The selector rod may be moved, however, to any position in alignment with any selector hole of the templates by merely continuing to revolve the same as described. However, if it is desired to direct sort and use more than one selector rod, the selector rod 55 is rotated until it engages the last opening in the selector rod holder 50 which opening is beyond the upper end of the templates 21 in which position the selector rod may pass in back of the templates without engaging either the templates or the cards therein.

For use in direct sorting with multiple rods, selector rods such as shown in Fig. 8, are provided, which are straight rods with flat heads. One or more of these may be projected endwise through the sockets 54 of the selector rod holder 50 and after they have been positioned in the selector rod holder, the selector rod holder is moved toward the card receiving rack to project those selector rods through the cards and templates. In connection with such use the selector rod holder 50 is formed with a retainer member 58 pivoted thereto as at 59 and capable of overlying the outermost face of the selector rod holder 50 and the heads of the rods and maintain the selector rods in position in the holder 50.

In operation of the device, the operating handle 31 is disposed in a position maintaining the platform 14 in its uppermost normal position at approximately the lower edges of the templates 21. The selector rod holder 50 is withdrawn to its outermost position. The operator then places the cards in between the templates with their lower ends engaging the gate 22 and resting, of course, on the inclined platform 14. In this position, the holes therein will register with the holes 20 of the templates. If but one operating rod 55 is employed, the operator positions it in the operating rod holder 50 in alignment with the selected hole 20 of the templates and cards. The operating rod holder is then moved laterally toward the card receiving rack so as to project the selector rod 55 through the cards and templates. If, however, more than one selector rod is to be employed such as in a direct sort, the selector rod 55 is moved to an inoperative position as previously described and the selector rods are projected through the proper sockets 54 in the rod holder 50. The retainer member 58 is then positioned to maintain these rods in position with respect to the holder 50.

Thereafter the selector rod holder 50 is moved laterally in a direction toward the templates to its innermost position at which the selector rods will project through the templates 21 and the cards therebetween. Regardless of the type of sort, the operator then operates the handle 31 as previously described to lower the platform 14 so that the cards will be suspended in the rack 16 from the operating rod or rods. Simultaneously with the lowering of the platform 14, the switch 29 will be closed by the switch arm 39 and the gate 22 will be lowered through the medium of the arm 40, the connection 42 and the crank arm 41. Immediately upon closing of the switch 29, the motor will commence and will drive the shaft 26 to vibrate or gyrate the card receiving rack causing the cards having notches registering with the selector rods to fall from the stack to the face of the platform 14 and slide downwardly along

the same until they engage the transverse member 19. The amount of endwise movement permitted the selected cards will cause their upper end to overlap with the unselected ones so that they will not fall sidewise and block the exit of other cards. When the operator has determined that all of the selected cards have been removed from the stack, the selected cards will be removed from the rack. Thereafter, the operator will operate the handle 31 to discontinue the motor, raise the platform 14 and also reposition the gate 22 as previously described. When this has been done, the operator withdraws the selector rod 55 by withdrawing the selector rod holder 50 to its outermost position. At this time the gate 22 will be upraised maintaining the selected cards in position between the templates. The operator may then withdraw the cards from the apparatus so that the same will be in condition for a subsequent operation.

To those familiar with the various sorting operations utilized in conjunction with cards of this character, it will be obvious that various types of sorts may be effected including direct sorting and sequence sorting.

From the foregoing it is obvious that I have provided a very simple and efficient apparatus for expeditiously sorting edge punched cards and while I have shown the preferred form of my invention, it is to be understood that various changes may be made therein 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. In an apparatus of the character described, a frame, a longitudinally inclined platform on the frame, a plurality of vertically disposed laterally spaced templates superposed over the upper end of the platform and arranged longitudinally thereof, said templates each having a row of holes arranged longitudinally thereof complementary to and aligning with holes in cards to be disposed therebetween for sorting, a selector rod holder at one side of the templates and arranged in parallelism therewith, a telescopic connection connecting the top of the templates with said holder enabling lateral movement of the holder toward and away from the templates a distance equivalent to the lateral dimension occupied by the templates, said selector rod holder including a pair of complementary members yieldingly urged together and formed with complementary parts of selector rod receiving sockets in alignment with the holes of the templates, a selector rod yieldingly retained in said sockets and projecting in a direction whereby it will be projected through and withdrawn from the holes of the templates upon movement of the holder, and complementary means on said rod and holder whereby turning movement of the rod will urge said members away from each other and move said rod from socket to socket along said holder.

2. In an apparatus of the character described, a frame, a longitudinally inclined platform on the frame, a plurality of vertically disposed laterally spaced templates superposed over the upper end of the platform and arranged longitudinally thereof, said templates each having a row of holes arranged longitudinally thereof complementary to and aligning with holes in cards to be disposed therebetween for sorting, a selector rod holder at one side of the templates and arranged in parallelism therewith, a telescopic connection connecting the top of the templates with said holder enabling lateral movement of the holder toward and away from the templates a distance equivalent to the lateral dimension occupied by the templates, said selector rod holder including a pair of complementary members yieldingly urged together and formed with complementary parts of selector rod receiving sockets in alignment with the holes of the templates, a selector rod yieldingly retained in said sockets and projecting in a direction whereby it will be projected through and withdrawn from the holes of the templates upon movement of the holder, complementary toothed engagement means on said rod and said holder whereby turning movement of the rod will urge said members away from each other and move said rod from socket to socket along said holder.

3. In an apparatus of the character described, a frame, a longitudinally inclined platform on the frame, a plurality of vertically disposed laterally spaced templates superposed over the upper end of the platform and arranged longitudinally thereof, said templates each having a row of holes arranged longitudinally thereof complementary to and aligning with holes in cards to be disposed therebetween for sorting, a selector rod holder at one side of the templates and arranged in parallelism therewith, a telescopic connection connecting the top of the templates with said holder enabling lateral movement of the holder toward and away from the templates a distance equivalent to the lateral dimension occupied by the templates, said selector rod holder including a pair of complementary members yieldingly urged together and formed with complementary parts of selector rod receiving sockets in alignment with the holes of the templates, a selector rod yieldingly retained in said sockets and projecting in a direction whereby it will be projected through and withdrawn from the holes of the templates upon movement of the holder, a rack formed on one of said members, a pinion secured on said selector rod in engagement therewith whereby turning movement of the rod will force said members away from each other and move said rod from socket to socket along said holder.

4. An apparatus of the character described comprising a frame, an inclined platform on the frame, laterally spaced templates superposed on the platform, said templates being complementary to cards to be received between the templates and having holes formed therethrough to register with holes in cards to be interposed therebetween, means for independently raising and lowering the platform with respect to the bottom of the templates, vibrating means connected with the templates for vibrating the same, and means for automatically placing the vibrating means in operation upon the lowering of the platform and ceasing operation of the vibrating means automatically upon raising of the platform from its lowered position.

5. An apparatus of the character described comprising a frame, an inclined platform on the frame, laterally spaced templates superposed on the platform, said templates being complementary to cards to be received between the templates and having holes formed therethrough to register with holes in cards to be interposed therebetween, means for independently raising and lowering the platform with respect to the bottom of the templates, motor driven vibrating means operatively connected with the templates for vibrating the same, switch means for the circuit of said motor driven vibrating means, an operative connection

between the platform and said switch whereby lowering of the platform will close the circuit of said motor driven means and raising of the platform from its lowered position will open the circuit of said motor driven means.

6. An apparatus of the character described comprising a frame, a longitudinally inclined platform on the frame, laterally spaced templates relatively fixed together and superposed on the platform and arranged longitudinally thereon in a vertical position, said templates being complementary to cards to be received therebetween and having holes arranged in a row therealong to be in register with holes in cards to be interposed therebetween, means for raising and lowering the platform with respect to the bottom of the templates, motor driven vibrating means for vibrating the templates, means for automatically closing the motor circuit upon lowering of the platform and opening said circuit upon raising said platform from its lowered position, means on the platform capable of engaging the lower ends of the cards disposed between the templates to maintain them in alignment therewith, and a connection between the platform and said aligning means for rendering the aligning means ineffective upon the lowering of the platform.

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