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MEANS FOR SHUFFLING CARDS

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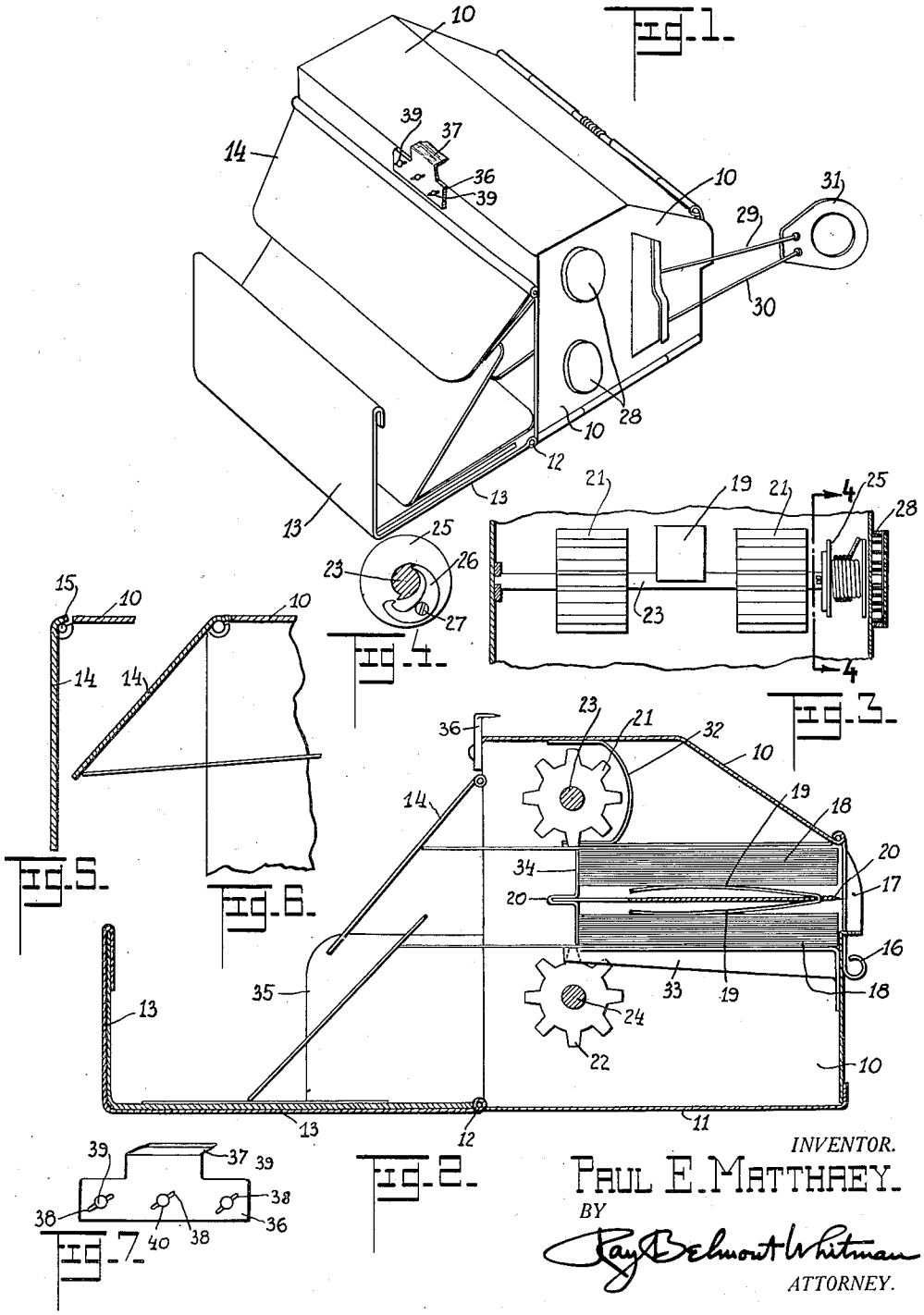


FIG. 1.

FIG. 4.

FIG. 3.

FIG. 5.

FIG. 6.

FIG. 2.

FIG. 7.

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MEANS FOR SHUFFLING CARDS

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8 Claims. (Cl. 273—149)

This invention relates to methods and means for sorting articles and more especially to a device and method for shuffling and dealing playing cards.

An object of the invention is to provide a simple and efficient device in which a pack of playing cards may be inserted and which will operate to eject such cards quickly in shuffled arrangement.

Another object is provide a means for dealing the cards after being shuffled into four separate packs or "hands".

A further object is to provide a method of shuffling cards automatically which includes the step of dividing the cards into two unequal packs by their mere insertion into a card container, and the irregular ejection of each pack intermingling with cards from the companion pack and at a rapid rate of speed.

All these and other objects as suggested here below are attained by the method and means now to be described and illustrated in the accompanying drawing, in which—

Figure 1 is a perspective view of the card shuffling device comprising this invention and showing the device in shuffling operation.

Figure 2 is a side sectional view of Fig. 1 through a central plane, showing the operating details of the device.

Figure 3 is a fragmentary top plan view of the roller shaft showing the two rollers which feed out the upper portion of the card pack.

Figure 4 is a detail view showing the dog and ratchet arrangement by which the two roller shafts are keyed to the rollers when rotated in one direction and are permitted to revolve to original position without movement of the rollers in the opposite direction.

Figure 5 is a cross sectional view of the detail of the card flap, which directs some of the cards downwardly as they emerge from the device, said view showing the shoulder portion which limits the movement of said flap to a predetermined position.

Fig. 6 is a further detail of Fig. 5, but showing the flap in extended position with a card being ejected and moving the said flap to such extended position.

And Fig. 7 is a detail view of the device for dividing the pack of cards into quarters for the purpose of dealing.

Like numerals refer to like parts throughout the several views.

The invention consists essentially of a container 10 made preferably of sheet metal, and having a bottom member 11, Fig. 2, hinged at 12, in order to get at the operating parts within the container.

A hinged member 13 also hinged at 12 is adapted to be let down from its position covering the front side and a portion of the top of container 10 to a substantially horizontal position, as shown in Figs. 1 and 2, for the purpose of retaining the cards as they are ejected in shuffled relation from the container 10, in manner as hereinafter described. A loosely hanging flap or projecting plate 14 is positioned as shown in Figs. 1 and 2, for the purpose primarily of deflecting the uppermost cards downwardly as they are ejected. This flap normally hangs vertically by gravity, but is moved outwardly by the ejecting cards to a limiting position as shown, this being determined by a projecting shoulder 15, Fig. 5, formed in the partially bead-shaped edge of member 14 at that point and adapted when in fully extended position to bear against the edge of a slot formed in the container wall 10, as clearly shown in Fig. 6. This shoulder need extend only a short distance across the width of the device since the pressure of the cards which extend the flap to the full engaging position of said shoulder with the slot is slight.

To the rear vertical side of the device, a projecting spring-closed gate 16 is hingedly attached which is always held downwardly to close the opening through which the cards are inserted into container 10. Side members 17 project outwardly from each end of member 16 and above a horizontal shelf-like projection extending across the base thereof, and serve to limit the endwise position of the cards 18. The pack of cards 18 is inserted by first resting it on the shelf between members 17 and the pack is then pushed into container 10 to rest in the position shown in Fig. 2.

The pack as it is pushed into position is deflected into two portions, an upper one and a lower one, by a pair of flexible oppositely-disposed springs 19—19 terminating in a sharp dividing edge member 20, as shown, and the two springs 19—19 are bowed or flexed outwardly against the adjacent surfaces of the two pack portions, forcing them against their respective ejecting rollers 21—22. The two pack portions are preferably of somewhat unequal size, this being determined by the position of dividing member 20 in relation to the opening above the outwardly-projecting shelf of container 10 on which the cards rest when inserted into the device. Such position is determined by experiment and depends largely upon the variation in the

difference of drop for the cards from the upper roller 21 and from the lower roller 22. Rollers 21 and 22 have a serrated surface, being in fact almost gear-shaped in cross section, and their extreme outer surfaces are made somewhat irregular in contour, or flattened in spots away from their circumscribing cylinder surfaces, to accomplish an erratic action in feeding out the cards, by sometimes engaging them and sometimes not. Rollers 21 and 22 are formed of soft rubber and mounted upon suitable shafts 23 and 24, and these shafts revolve freely in bearings on each side of container 10. Two adjacent ends of the shafts each have a winding drum 25 attached thereto when moved in one direction, but rotating freely therefrom when moved in the other. This is effected by means of dogs 26, Fig. 4, pivoted at 27 on one of the sides of each drum 25 and engaging with diametrically-opposed projecting teeth formed on the shafts 23 and 24 at those points. Thus the rotation of drum 25 in one direction will either immediately, or within about a half a revolution thereafter, also rotate its roller shaft, whereas the motion of the drum 25 in the opposite direction will permit its movement without a corresponding movement of said shaft. Because of the positioning of the two rollers, requiring one to turn clockwise and the other counter-clockwise when feeding out the cards, the ratchet arrangement above described is placed in reversed position on one shaft to that of the other. Drum 25 has an outer shaft-like end keyed to a spiral spring 28, Fig. 3, held in a suitable casing on the container 10, and so arranged that a movement of the drum in one direction will wind the spring and a release of such moving force will let the spring unwind to return the drum to its original position. Flexible cords or strings 29—30, Fig. 1, are wound around the two drums 25—one to a drum—and terminate in a suitable grip or handle 31, which when pulled outwardly away from the device will rotate the two drums 25 in proper direction to permit the ratchet connection, shown in Fig. 4, to also rotate the two shafts 23 and 24 and with them, the two pairs of feeding rollers, one pair on each shaft. There is about two inches of slack in the lower cord which rotates the lower drum 25, and which permits the upper drum to rotate its rollers first, and in such manner that the lowermost card in the shuffled pack—that is, the card first to be ejected—is equally apt to come from the lower portion as from the upper portion of the cards. Now since cards from the upper pack portion have farther to fall than do those from the lower pack portion, there is an equal chance of the first card in the finally-shuffled pack having come from either portion. The lower surface of roller 21 engages the front of the uppermost card of the upper pack portion, and the upper surface of roller 22 engages the front portion of the lowermost card of the lower pack portion. And their movement by means of pulling on the handle 31 feeds such cards from their pack portions and continues to engage and feed successively the upper and lower engaging cards. An arched guide member 32, Fig. 2, positioned centrally across the container 10, engages the uppermost card of the upper pack portion and limits its movement to such a position that roller 21 when turned, may continue to feed it outwardly. And a second projecting member or shelf 33 is centrally positioned across the bottom of the lower pack portion as shown in Fig. 2 and limits the downward movement of said portion in the same manner. A restraining gate 34 suspended, for instance, on the adjacent end of member 20, restrains all the cards except the upper card or cards of the upper pack portion and the lower card or cards of the lower pack portion from being fed out as the rollers are turned.

Member 13, Fig. 2, has an upwardly-extending stop member 35 positioned as shown from one of its edges, and adapted to limit the movement of the cards sideways in that direction when being fed out in shuffled relation, and to permit the operator to press the cards against such stop member 35 after the cards have all been fed in order to get the pack together. This member extends slightly beyond the adjacent side plate of container 10 so that it will not interfere therewith when member 13 is moved to closed position when the device is not in use. It will be noted that the directing flap 14 extends somewhat below the upper flanged end of member 13 so that all cards will be properly deflected within such flanged portion and not permitted to escape over the top thereof; and also that stop member 35 is somewhat higher than the position of the lowermost card of the lower pack portion. It will also be seen that member 13 is wide enough, with some space to spare, to take the width of the cards as ejected. The bottom portion of member 13 is made somewhat shorter laterally than the length of the cards which will rest on them, so that when the user takes up the cards, it can be easily done by first pressing them against stop 35 and then getting the fingers beneath the opposite end of member 13 to lift them.

The above describes the construction and operation of the card shuffler, and it is now only necessary to provide a means for dividing the pack of cards as it is shuffled into exact fourth portions, one for each of the four hands to be dealt in the average card game, such as bridge. This is accomplished by the simple device shown in Figs. 1, 2, and 7, and which consists essentially of a plate portion 36, Fig. 7, terminating in a flanged and sharpened edge 37 formed at right angles to portion 36. A plurality of slanted slots 38—38—38 is formed in plate 36 is shown, and the two outer slots engaged by rivets 39—39 secured to container 10, as shown in Fig. 1, and the central slot 38 is engaged by a knurled-headed screw 40 adapted to be loosened to permit vertical movement (and at the same time lateral movement) of the knife edge 37, and the height of edge 37 from the surface of container 10 is made substantially equal to one-fourth the thickness of a standard pack of cards, and the vertical movement is necessary to adapt this distance to card packs of different thicknesses, and also because of the variation in thickness between new and used packs.

In operation, knurled screw 40 is loosened and knife edge 37, attached to plate 36, is pushed downwardly on 13 cards, which are counted from the pack to be used. Screw 40 is then tightened to hold the knife edge in this position, and the pack then shuffled as needed, and then dealt by inserting the lowermost portion of the pack across the plate portion of container 10 and beneath the knife edge which automatically divides 13 cards from the pack, the remainder of which are then removed and the 13 cards dealt to one of the players, and the operation repeated until the pack has been exactly divided into cards or hands of 13 cards each.

It will be noted in the arrangement of the various essential parts of this device that the for-

ward edges of the cards extend out to about the center of the two pairs of feeding rollers; also, that the gate 34 attached in front of the cards is so designed as to permit usually one card but sometimes two, or possibly three to be fed out above or beneath its edges at a time. The object of the spring door 16 at the back is to keep the cards forward and in proper position in container 10 and to be sure that they have all been so inserted in the beginning. The tray member 13 hinged at 12 is adapted to permit the easy removal of the cards therefrom after being shuffled, as by merely tilting container 10 upwardly to slant the bottom of said tray member, for instance.

It will be noted that the cards when being ejected in shuffled relation alternate from top to bottom, occasionally feeding two or even more at a time, also intermixing with those that have had more time to settle in the pile. It will also be noticed that the cards from the upper portion reverse their position since the uppermost falls first and remains at the bottom; whereas, the cards in the lower portion remain much in their original rotation except for their intermixing with the upper cards. This shuffling operation is highly erratic and confusing and impossible of preadjustment or predetermination, and is, therefore, highly efficient. It will also be noticed that the speed of rotation of the upper rollers compared to that of the lower rollers is highly erratic and varying and thus the relation of feeding the cards from their respective pack portions is likewise erratic, and so highly efficient from a shuffling standpoint. This is due to the cords 29 and 30 winding around drum 25 and then on top of each other in the manner as shown in Fig. 3, such that at certain times one cord is being unwound from a pile-up of other cord windings and at other times is coming off the bare shaft which is of lesser diameter and, therefore, of higher gear ratio, in a sense. This, of course, varies between the two drums constantly.

The length of cord 25 may be conveniently from one to two feet, and such that but two or three pulls on handle 31 are necessary to completely shuffle and eject a full pack of 52 cards. The lowermost card portion contains about two-fifths of the total number of cards, and the uppermost portion contains the remaining three-fifths. This has been found desirable or even necessary, since the lower cards when falling have an occasional retarding effect on those falling from the uppermost portion. Of course, a crank, a motor or any other means of rotating the feeding rollers may be employed besides the one disclosed. Thus, an endless string could be used, and always pulled in one direction.

It is to be understood that the present disclosure is for the purpose of illustration only, and that the invention is not limited thereto. To those skilled in the art, many modifications of the invention will be readily apparent, and will also be obvious to such skilled persons that part of the device may be used without other parts thereof, and steps in the method without other steps thereof, many such combinations of the parts readily suggesting themselves. Therefore, it should be, and is to be distinctly understood that for a definition of the limitations of the invention, reference must be had to the appended claims.

Having now described the invention, what is claimed as new and for which Letters Patent of the United States is desired, is:

1. A card shuffler, including a rotary frictional means for horizontally feeding out a card from the top of the pack, and other means for feeding out the lowermost card from the pack and means for deflecting the uppermost cards into the lowermost cards, as fed, to shuffle them, said deflecting means being positioned so as to deflect the cards before they have been fully fed from the shuffler.

2. The invention as in claim 1, there being flexible means positioned intermediate of the pack to press the uppermost card, and also the lowermost card, against its respective feeding means.

3. A card shuffler comprising a container, an opening therein, a dividing member within said opening and adapted to divide a pack of cards into two portions when inserted through the opening into the container, and means surrounding said dividing member and adapted to press the two portions away from said dividing member.

4. The invention as in claim 3, including stop members positioned within the container and adapted to limit the upward and downward movement of the upper and lower pack portions respectively, through said pressing action.

5. The invention as in claim 4, including frictional rollers adapted to engage the forward edges of the uppermost and lowermost cards, and to be rotated to feed them from the container.

6. In combination, a container, a card-feeding means within the container adapted to feed cards horizontally from the upper and lower sides of the card pack and deflecting means in the path of the ejected cards from the upper portion of the pack and adapted to deflect such cards downwardly into the path of the cards being ejected from the lower portion of the pack for the purpose of shuffling them together, said deflecting means being positioned so as to deflect the cards before they have been fully fed from the shuffler.

7. The combination in a card shuffling device of a shaft, card-feeding rollers keyed to the shaft, a winding drum, ratchet means connecting the drum and shaft and permitting them to rotate together in one direction only, and resilient means attached to the drum and adapted to be wound up when the drum is moved in one direction, and to unwind to return the drum to original position when the moving force is released.

8. In a card shuffler, means for rotating an upper card ejector, and other means operated with said first-named means for rotating a lower card ejector, including means for delaying the operation of the last-named means with respect to that of the first-named means.

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