

May 29, 1956

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2,747,877

CARD SHUFFLING MECHANISM

Filed Oct. 24, 1950

2 Sheets-Sheet 1

Fig. 1

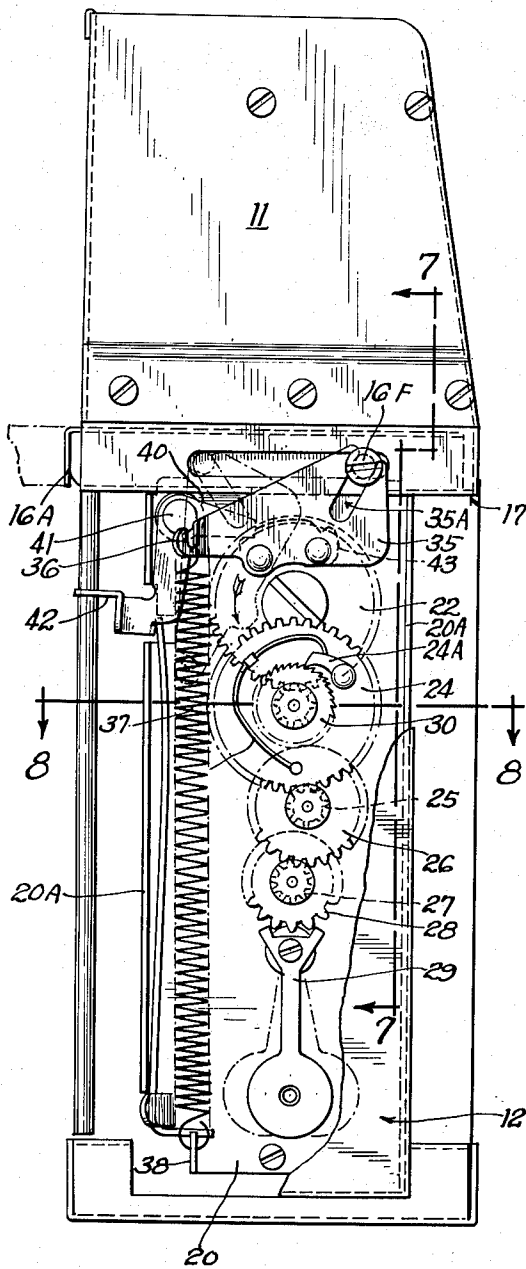
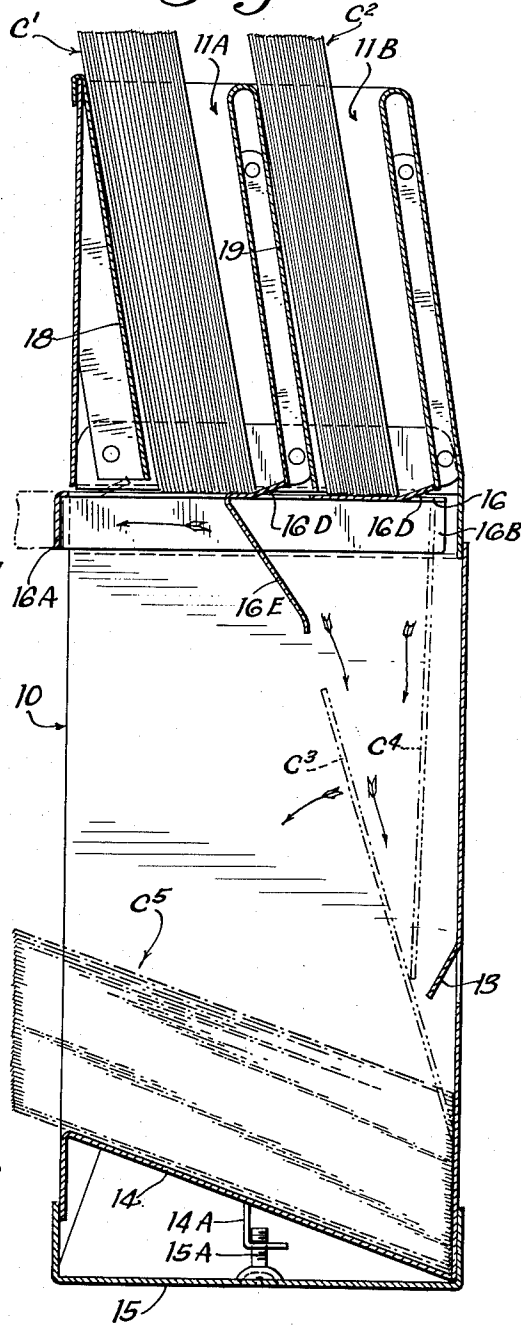


Fig. 2



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Fig. 3

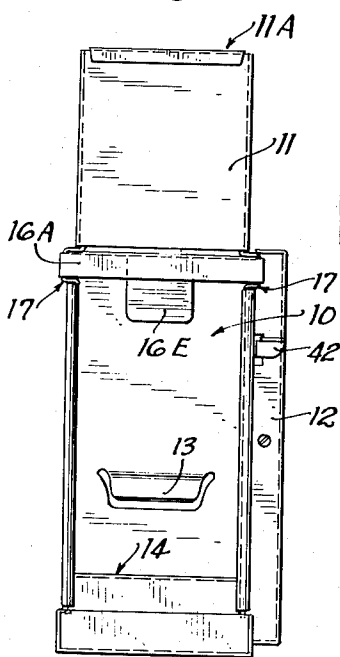


Fig. 4

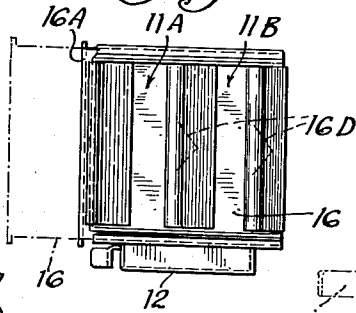


Fig. 5

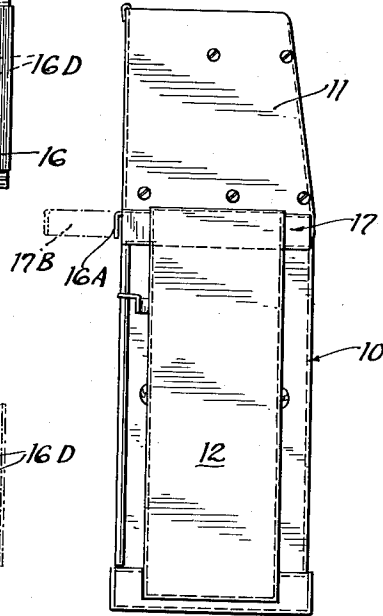


Fig. 6

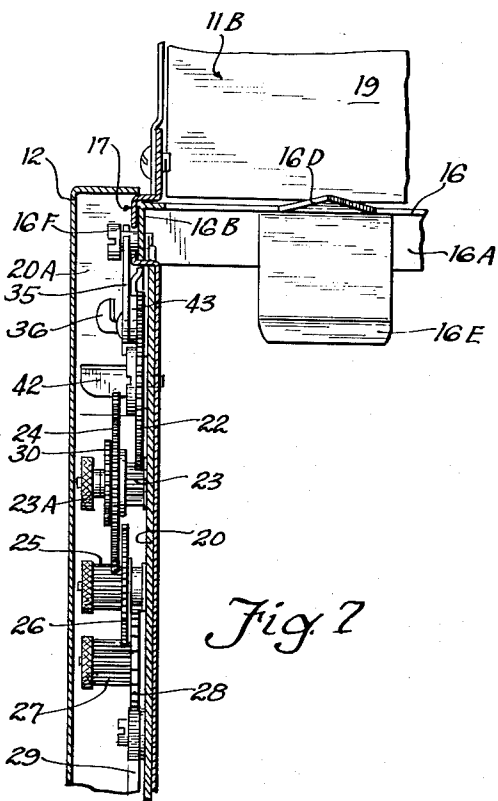
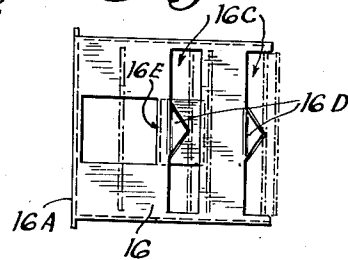
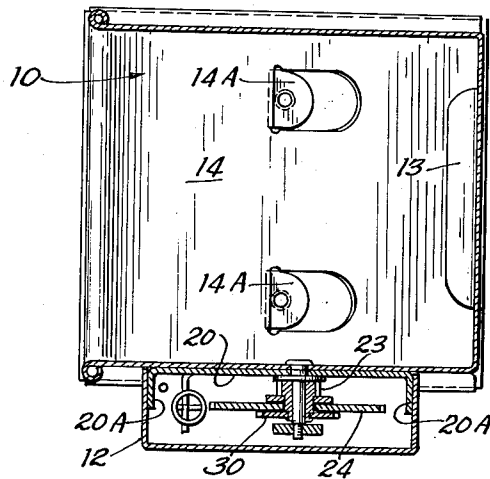


Fig. 7

Fig. 8



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CARD SHUFFLING MECHANISM

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2 Claims. (Cl. 273-149)

This invention has as its principal object the provision of an automatic shuffling mechanism for playing cards and the like.

Ancillary objects are: the provision of a compact, easily manufactured and operated shuffling unit driven by a spring motor of unique simplicity and which is itself a subassembly unit; the provision of a card-releasing trap which is also contrived to provide a cocking or setting means for the spring motor; the provision of a shuffling means in the form of a horizontally travelling trap which moves from beneath a plurality of stacks of cards and releases the same to intershuffle gravitatingly into a delivery chamber.

Additional objects and aspects of novelty and utility relate to details of the construction and operation of the embodiment described hereinafter in view of the annexed drawings, in which:

Fig. 1 is a side elevation of the shuffler with a major portion of the cover plate for the motor unit broken away;

Fig. 2 is a vertical section through the shuffler showing the shuffling chambers, particularly;

Fig. 3 is a rear elevation of the device, to reduced scale;

Fig. 4 is a top plan view to the scale of Fig. 3;

Fig. 5 is a side elevation similar to Fig. 1 but to reduced scale;

Fig. 6 is a top plan view of the shuffling trap, to reduced scale;

Fig. 7 is a fragmentary section looking in the direction of lines 7-7 of Fig. 1 at part of the motor unit;

Fig. 8 is a horizontal section looking in the direction of lines 8-8 of Fig. 1.

Referring to Figs. 3 and 5, the shuffler includes an upright housing having a lower or shuffling chamber 10 surmounted by an upper or stacking chamber 11 divided (as in Fig. 4) into two compartments 11A and 11B each receiving part of a split deck of cards, as in Fig. 2.

A motor unit 12 is mounted on a side wall of the housing.

An important feature of the shuffling means is the card-releasing trap 16 (Figs. 4 and 6) which is a plate slidable horizontally on opposite down-turned integral flanges 16B (Fig. 7) riding in offset track grooves 17 (Figs. 3 and 7) formed along the upper margins of the lower chamber.

The shuffling plate or trap 16 has another flange 16A which is exposed, as in Figs. 2 and 3, to serve as a handle element in moving the trap from the extended position, shown in dotted lines in Figs. 4 and 5, to the cocked, full-line position.

In the plan view of Fig. 6, it will be seen that the shuffle plate 16 has a pair of wide slots 16C extending thereacross laterally of the direction of reciprocable travel thereof; and at the rearmost or trailing edge of each slot is a card-releasing tongue 16D (see also Fig. 7) shaped to have a diminishing area and come to a marginal edge or point, for reasons to appear. In the present embodi-

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ment, the tongues 16D are triangular and terminate in an apex point, which is the last supporting means withdrawn from beneath a card in the shuffling operation. The tongues 16D may also be semi-circular, but in any event, the trailing edge of the tongue (i. e. the apex) is turned up to give the cards a slight agitating lift before release.

As viewed in Fig. 2, the upper or stacking chamber is provided with a pair of inclined aprons 18 and 19 against which the cards C¹, C² of a split pack lie in inclined position with their bottom edges supported on the shuffle plate 16 when the latter is fully pushed-in.

Struck down from the plate 16 (Figs. 2, 3, and 7) is a deflector tab 16E which directs the cards released from compartment 11A rearwardly, in the manner of the card indicated at C³, Fig. 2, so that they stack evenly, and freely intershuffle with other cards, C⁴, from the forward compartment 11B, to fall into the shuffled pack indicated at C⁵ (Fig. 2). Similarly, a tongue 13 (Figs. 2, 3, 5) is struck inwardly from the front wall of the lower or shuffling chamber to deflect the cards C⁴ released from the forward chamber 11B.

The shuffled pack indicated at C⁵ lies on an inclined bottom apron 14 (Fig. 2) having depending lugs 14A engaged by screws 15A from the bottom plate 15.

Motor means for moving the shuffling trap 16 slowly from beneath the split deck includes the unit 12 removably secured to a side of the housing, and consisting of a channel shaped base plate 20 (Figs. 1 and 8) having opposite side flanges 20A over which the side flanges of the cover 12 fit, as in Fig. 8.

Mounted on the base plate, as in Figs. 1 and 7, is a gear train consisting of a main driven gear 22, pinion 23 (Fig. 7), timing gears and pinions 24, 25, 26, and 27, escapement gear 28, and a weighted escapement lever 29.

A clutch ratchet gear 30 is fast with pinion 23 (see Fig. 8 also) while gear 24 floats on the stud which mounts these clutch and pinion gears on the base plate.

The gears of the timing train are removably held by screw nuts as indicated at 23A (Fig. 7), so that the assembly is easily taken apart for servicing or adjustment.

Gear 24 has a pawl 24A pressed by spring 24B to engage the teeth of ratchet 30, by means of which the timing gears and escapement are momentarily uncoupled when the driven gear rotates backwardly in setting or cocking the shuffle plate.

Attached by a pair of rivets to the main gear 22 (Fig. 1) is a driving yoke 35 having a tail lug 36 to which is attached one end of the main spring 37, the opposite end of which anchors on a lug 38 struck up from the base plate.

Spring 37 thus exerts an effort upon the yoke 35, and hence main gear 22, tending to produce counter-clockwise motion, and this motion is transmitted to the shuffle plate 16 by means of a stud screw 16F threaded into one of the flanges of the shuffle plate and working in a radial slot 35A in yoke 35.

It will now appear that by pressing the handle part 16A of the shuffle plate toward the right the yoke 35 will be turned clockwise, which will further tension the spring 37; and when the shuffle plate is pushed fully home to set or cocked condition, as in Fig. 1, it will be latched by a detent 40 in a notch in plate 43 behind the yoke 35 and riveted with the latter to gear 22.

The detent 40 is pivoted as at 41 on the base, and has a handle tab 42 projected through the cover plate.

In operating the device the shuffle plate is latched home and the pack of cards is split as desired, part of the pack being deposited in compartment 11A and part in compartment 11B, as depicted in Fig. 2.

When the shuffle plate is latched home, as aforesaid,

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stud screw 16F working in the slot of yoke 35 displaces the latter toward the right, tensioning spring 35 until detent 40 drops into the latching notch in plate 43. During the aforesaid cocking operation, the ratchet gear 30 idles past the pawl 24A, so that the timing gears are not driven.

With the cards to be shuffled disposed in the two upper compartments, the detent handle 42 is pressed, and spring 37 urges the main gear 22 counter-clockwise, so that the shuffle plate moves slowly outwardly, toward the left, the rate being governed by the timing gears and escapement means 28—29.

As the shuffle plate moves outwardly, the tongues 16D therein respectively pass from beneath the two stacks of cards and the latter (Fig. 2) drop to the lower chamber in the manner indicated for the cards at C³, C⁴, the cards being interspersed and shuffled as they descend toward the apron 14 to reform the shuffled pack C⁵.

The time required for a shuffle is preferably about 20 seconds.

By adjusting the tilt of the aprons 18 and 19 (Fig. 2) and hence the tilt of the cards in the upper compartments, and by properly shaping and tilting the dropping or feeding tongues 16D, the cards will drop into the lower chamber, one, two, three, and four at a time from each upper stack. This affords a desirable variable in the shuffle, and the fall of the cards from each stack can not be predicted in this respect, since skin friction, static charges, moisture conditions, flatness of the cards, and other conditions affect the cards in a variety of ways in a tendency for two or more cards to cling together as they are released by the shuffle panel.

In addition to being shuffled and intermixed, the order of the cards in the shuffled pack will always be reversed.

Changing the rate of movement of the shuffle member 16 will also affect the tendency of the released cards to drop into each of the drop-out openings 16C in groups of one or more cards per opening, a faster travel of the plate 16 generally causing an increase in the number of cards per group per drop-out opening. The 20-second rate at the feeding inclination of the edgewise disposition of the cards as shown in Fig. 2 is preferred for standard card purposes.

The device is simple and easy to operate, and yields a variable mix or shuffle which is wholly satisfactory for playing cards for which the disclosed embodiment was designed. However, the mechanism is adaptable

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to other card-mixing usages, for which it may be desirable to make various changes or adjustments, such as the tilt of the aprons, 18, 19; or the tilt or location of the deflecting means 13, or 16E; or the shape or tilt of the shuffling or dropping tongues 16D; all such changes and other modifications being contemplated within the scope of the invention as defined by the annexed claims.

I claim:

1. In a card-shuffling machine including a casing having upper and lower card chambers and a horizontal traveling card drop-out plate; improvements comprising, to wit: means mounting said plate to reciprocate between said chambers and to project to a normal starting position beyond said casing in one direction of its travel; for manual engagement; a stud on said plate; a driving gear in said casing closely adjoining said stud; means on said gear providing a radial slot drivingly coupling said gear to said stud; a long helical spring attached at one end to a radially extended part on said gear, and anchored at its opposite end within said casing; movement of the projecting part of the shuffle plate inwardly of the casing from said normal position turning said gear to tension said spring for returning said gear; and escapement means for regulating the spring-driven turning of said gear to produce a slow return of the drop-out plate to said normal position.

2. In a card-shuffling machine, a casing having an upper stacking chamber and a lower delivery chamber and a horizontally-movable card-releasing shuffle-trap between said chambers, said trap being movable to a normal position in which one end portion of the trap projects a substantial distance beyond said casing so as to be exposed for manual engagement to be pushed inwardly to a starting position; and gear and escapement means co-acting with said trap and having driving-spring means tensioned by movement of the trap to said starting position to return the trap slowly to said normal position.

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