

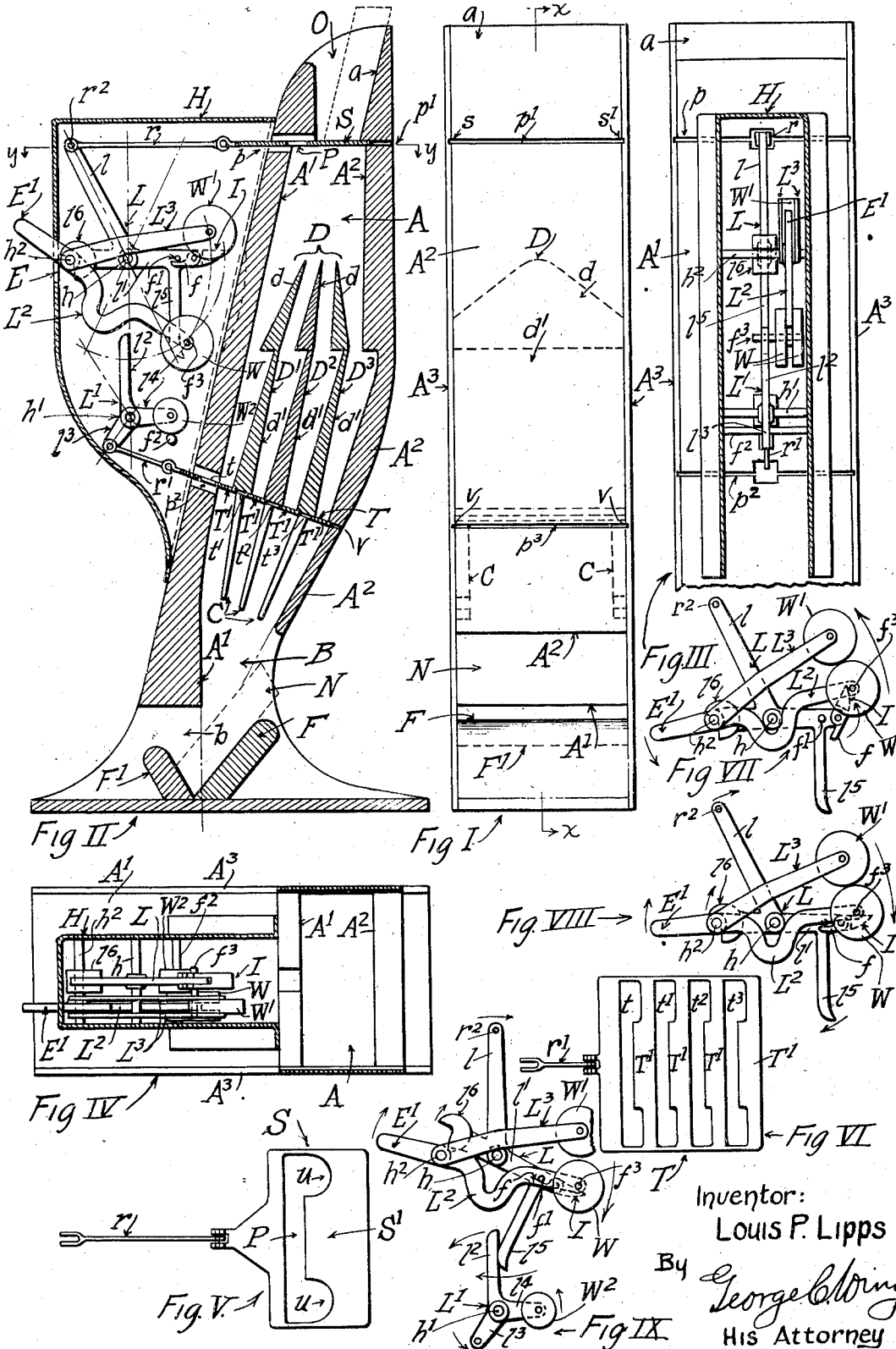
Oct. 13, 1925.

1,556,856

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DEVICE FOR SHUFFLING CARDS

Filed Feb. 28, 1924



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DEVICE FOR SHUFFLING CARDS.

Application filed February 28, 1924. Serial No. 695,683.

To all whom it may concern:

Be it known that I, LOUIS P. LIPPS, a citizen of the United States, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Devices for Shuffling Cards, as to which the following is a sufficiently full, clear, and exact description to enable one skilled in the art to which it relates to make and use the same without other or more particular explanation.

The invention belongs more especially to the type of shufflers wherein the means and mechanisms involved are for the most part, not for the purpose of directly moving the cards themselves, but to free and clear the way for them, under the influence of gravity alone, to fall in such position, succession and direction that their relative order will be changed in the process, and, at the close, the cards be brought together in a freshly shuffled and ready-for-use pack.

As compared with devices that rely upon special mechanisms to directly handle the cards and force their movements in spite of friction or other obstructions, the gravity type of shuffler, such as is herein set forth, so organizes the elements and conditions of the problem as to overcome these difficulties and do away with the need of special mechanisms to such end.

This distinction, as will be later observed, is manifested and provided for in the invention under examination, among other features, by firm, unitary means, based on physical rather than mechanical considerations, for compelling the cards to successively and evenly "take off" from their initial station for the shuffling process, by so posturing the pack at such station, that not only the friction of the cards between themselves, and their supports, is materially minimized, but the cards, at the same time, are thereby best disposed toward their predetermined course downward, by guiding them in such course by parts that function for the most part, not by any prolonged frictional bearings and restraints, but through tangential or other instantaneous contacts along the path of descent, and, by appropriate provisions whereby fallen cards instantly clear themselves from following cards in the various stages of the shuffling process.

Generally summarized, the purpose and object of said invention, may be said to be to provide an always reliably working machine for shuffling playing cards and like articles, that is free from frail, complicated and expensive parts and mechanisms, and, by which a scientific and wholly incalculable shuffle of the pack is automatically and rapidly effected without other handling or personal participation in the process, than is required to simply place the pack upon an open receiving table or ledge-like support at the top and slightly move a starting member for the purpose.

In the drawings, Figure I is a front elevation of the shuffler; Figure II a view on the line $x-x$ of Figure I; Figure III a fragmentary view of a rear elevation of the device with certain parts omitted; Figure IV, a sectional view on the line $y-y$ of Figure II; Figure V, a plan view of the slidable support for the pack; Figure VI a plan view of a series of gates for closing the compartments into which the pack is distributed during the shuffling process, and, Figures VII, VIII and IX are side views of mechanisms for actuating the support and gates, respectively, shown in Figures V and VI.

The device comprises a hollow frame or housing A, which may be of any suitable material or design. For convenience of explanation the front and rear walls of the housing are designated on the drawing by, respectively, A^1 and A^2 and the sides by A^3 .

The shuffler has a receptacle O, at the top for the placement of the pack, which, as shown in the figures, may be made up of the enclosing walls of the frame at that point.

In this form the receptacle extends down a suitable distance to accommodate the pack to a generally upright position and is normally closed at the bottom by a plate-like platform S. The interior faces of the walls of the receptacle O, are vertical except the face of the fourth or rear wall a , which is inclined outwardly to an angle which should not be less than the natural slope of the cards.

The platform S is rectangular and is slidably seated crosswise of the frame or box A, beneath the receptacle O, within opposite coincidental slots s and s^1 in the sides

of the frame for the purpose. Openings p and p^1 in the front and rear walls of the frame are provided to accommodate the horizontal movements of the plate there-through.

For constructive purposes a portion S^1 along the rear of the platform, substantially with the same superficial dimensions as the aperture at the lower end of the receptacle it is to close, is separated from the front portion, by a slotted passageway P , lengthwise of the same, through which the cards are to fall during the shuffling process.

In order to reduce the frictional area between the cards and the plate at the point where they are thus to take-off or fall, incurves u, u from the direct line of said passageway are introduced as shown in the drawing.

A rod, or prolong r , to connect with plate actuating mechanism hereinafter pointed out, is attached to the forward end of said plate S .

At a predetermined point below the platform support S , at a distance approximately equal to the vertical dimensions of the cards when falling therefrom, a series D of divisional members D^1, D^2, D^3 is arranged transversely of the shuffler to receive the cards within the interspaces or compartments between said members.

Besides composing a series of compartments for this purpose, the members thereof are adapted by the shape and location of their upper portions d , to serve as guides for the cards between the members along the natural line of their descent, when free to fall by gravity to points below.

To this end, the members are arched or rounded along their upper edges (Figure I), as well as somewhat sharpened, and rigidly fastened to the sides of the shuffler in the planes of said lines, and have their guiding surfaces at a pitch to correct any tendency of the cards to deviate from such lines.

On the other hand, in order to afford a shelter for the cards as soon as they arrive at the foot of said compartments, from the cards that follow, the lower portions d^1 of said members are retracted from a point behind the front or guiding faces of the upper portions d of the same to form a recess or undercut across said members, and downwardly from said upper portions towards the base. The upper portions d , will thus project from and overhang the lower portion d^1 like the horizontal eaves of a roof.

It will be plain that the heights or upright lengths of the divisional members must be not less than the combined length of the vertical dimensions of the pack when placed for shuffling, and the determined length for said upper or guide portions of said members.

It will also be evident, that it will be advisable, as supplementary to the set of compartments in question, to similarly undercut the corresponding guiding face of the rear wall A^2 of the frame where it adjoins the rearmost divisional member of the series, and, together therewith, makes up the last compartment of the set in use.

In a device wherein the working parts and mechanisms are relatively located as in the figures, the series of divisional members just described, will be arranged at an upward slant from the rear wall A^2 toward the front wall A^1 .

The set of hopper-like compartments just described necessarily have apertures at the bottom of the same, and means must be provided for opening and closing these apertures as the operation of shuffling requires.

The means shown consists of a unitary series T , of transverse grid-valve plates or gates T^1 , of similar dimensions as the apertures they serve, alternating with a series of oblong slots t, t^1, t^2, t^3 . The series T is rectangular and movably seated, beneath the compartment series, crosswise of and within the frame A , in grooves v, v , in the sides thereof for the purpose. A rod r^1 is conveniently attached to the end of the part T for connecting the same to mechanism for oscillating the part in the manner to be more particularly referred to. Openings p^2 and p^3 , in the front and rear walls of the frame are provided to accommodate the oscillation of the part T upon its groove seats v, v .

The bases of the divisional members D^1, D^2, D^3 , must be sufficiently, thick, or otherwise extended, to shield the slots t, t^1, t^2, t^3 , when the plates are beneath said apertures.

The interior faces of the front and rear walls A^1 and A^2 of the frame, below the series of divisional members D , converge downwardly towards the bottom of the shuffler to guide and deflect the cards in that direction, and, between the walls along the sides of the frame A for a like purpose, cheeklike guides C , are arranged in opposite, coincidental pairs that severally point downwardly through the chamber below. The guides C will best answer their purpose if given a length approximately the same as the height or downward dimension of the cards as they fall.

The front wall, however, is prolonged and continued in its downward course to a distance above the base of the shuffler somewhat less than the height of the cards, at which point the front wall ends across its entire breadth.

The remaining or lower interior space in the frame A , below the series of guides C , serves as a chamber B , within which the cards are to re-assemble themselves into the shuffled pack. As contributing to this purpose, a fixed floor-like sup-

port F for the cards as they escape from the compartments in the series D extends upwardly from the base from behind the projected plane of the inner face of the front wall A¹, towards the rear of the shuffler. At no part of its upward inclination is the floor F nearer to the front wall A¹ than the thickness of the pack, and the angle of its inclination with the base, should always be greater than the natural slope of the cards in order to insure that the force of gravity will overcome the friction of the cards against the support and between themselves, when they are on said support, and cause them to slide down the support and arrange themselves into pack form at its lower end.

Although the better to screen the faces of the cards as they fall upon the floor-section F, the latter is shown as a single piece extending across the chamber B, it will be manifest, that, for all other purposes, skid-like pieces, on parts, for instance, or shorter transverse pieces, may be used instead.

Between the upper end of the floor F and the lower end of the rear wall A² an open space N, is left across the frame A, through which the shuffled pack may be grasped and removed.

As a stop and resistance to the cards as they slide down the floor F, a part or piece, F¹ extends obliquely outward from and along the lower edge of said floor to a distance above the floor that somewhat exceeds the thickness of the pack. The angle of its inclination with the floor is preferably, a little less than a right angle.

It remains to explain the particular means illustrated in the figures for automatically operating the movable parts involved in the device and bringing about the gravity shuffle designed.

In Figure II all parts are represented as in their normal positions and set for being started for the shuffling process.

H is a housing or supporting frame for said mechanism. It is fastened to the front of the shuffler body, or box A.

In the upper part of the housing, a four-arm lever L is centrally mounted upon a shaft h which passes crosswise of the housing and is supported at its ends in the sides thereof.

As positioned in the drawings, an arm l, of the lever L, projects above the shaft to meet the rod r when the latter is extended horizontally from the front wall of the box A, and the plate S is in closing place below the receptacle O. It is pivotally connected to the rod, in such relation, by a pin r². A second arm l¹ of the lever L, extends inwardly from the shaft towards the shuffler box A. It carries an upwardly moving tripper I, fulcrumed to the forward end which is provided with an inwardly projecting

finger f, to engage with a stop f¹, on the arm, and thereby limit any downward movement of the forward end of the tripper around its fulcrum point. Below the shaft h, a corresponding shaft h¹, extends crosswise of the housing H and, on the shaft, a three-arm lever L¹ is centrally mounted. One of its arms l² is upright, another l³, projects outwardly from the shaft to connect pivotally with the outer end of the rod r¹ and the third arm, l⁴ inwardly towards the box A. The latter arm is specially weighted to return the arm to its normal place upon a stop-rod f² located between the sides of the box A for that purpose.

From a given point on the arm l¹, of the lever L, a rigid arm l⁵, extends downwardly a suitable distance to engage the arm l² when the lever L is rotated on its shaft for the purpose. The fourth arm l⁶, is on the opposite side of the shaft h, and radiates outwardly therefrom, above and in position to meet the shaft h² hereinafter specified and stop further revolution of the lever L around the shaft h when the arm L is in normal upright position.

At or below the outer end of the arm l⁵, is a third shaft h² extending crosswise of the housing H, upon which is fulcrumed a lever L², by which the mechanism is set in motion for the shuffle. The lever L² passes downwardly from its fulcrum h² along the side of the lever L, to a point below the inner arm l¹, and, upwardly on the other side of the fulcrum, through a hole E in the front of the housing H, to a sufficient distance to present its outer end as an operating handle, or thumbpiece, E¹. An auxiliary lever L³, that turns on the same shaft as the lever L², and straddles the same, projects inwardly of the housing above the shaft h, in the plane of the starting lever, L².

A pin f³ extends in a horizontal direction from the inner side of the lever L² across the curvilinear path of the outer end of the tripper I, to engage and lift the tripper when the lever is revolved upwardly around its shaft h² from below said end, and to engage and rest upon the top of said end, when the lever is revolved downwardly by gravity from a point above. (See Figures II, IV, VII, VIII and IX.)

Provision to stop the upward movement of the outer, or handle, end of the lever L², is insured by suitably locating the upper end of the hole E, for the purpose.

The moment of the several lever arms and parts shown in the drawings, must be such as under the conditions appearing, will suffice to produce the corresponding movements designed, that is to say, the moment of the arm l¹ for instance around the fulcrum of the compound lever L, while said arm is carrying the weighted arms L² and

L³, and distributing the pack from its position on the platform S into the series of compartments D, must be so calculated as not only to overcome the friction of the platform, and the superimposed pack, against the slotted seats *s* and *s*¹, but, also, after said arm *l*¹ is freed of the weight W¹, to correspond with the moment required to actuate the lever L¹, around its fulcrum and overcome the friction or inertia of the movable series of valves T, in the grooves *v*, *v*, and the weight of the superimposed cards in the compartments; in both cases, the moments around the fulcrum of the levers L and L¹, of the arms *l*⁰ and *l*¹, for returning severally, the platform S and the series T, to their normal closing positions, must be adequately calculated in each case.

In the drawings, the particular arms of the levers involved that are specially weighted for the purpose of obtaining the moments referred to, are severally indicated by disklike outlines W, W¹, W², on said arms. Throughout the figures, arrows denote the direction of revolutions of parts, and broken lines the angular positions to be assumed, or orbits followed by the same.

The operation of the machine is brought about by resting the pack on one of its four edges upon the platform S, in an inclined position against the rear wall *a*, and pressing the protruding handle E¹ of the lever L² downwardly around its shaft until the opposite arm is raised upwardly into supporting engagement with the auxiliary lever L³, and the latter carried above its normal place (Fig. VII). The handle E¹ is then released of pressure and left free in the hole E, whereupon the lever L² and the superimposed lever L³, will descend together in a common orbit, until further downward movement by the lever L³ is arrested by contact with the shaft *b*. The lever L³ is so shaped that such contact will occur simultaneously with the completion of the inward movement of the upright arm *l* whereby the plate S is propelled across the bottom of the chamber O. During this movement the cards under the force of gravity will of course, slide off from each other in rapid succession through the passageway P, in the support S, into the several compartments between the divisional members composing the series D, and, as such travel is finished, the parts are so spaced that the pin *f*³ will come into engagement with the top of the rigid tripper I, and, thereupon lever L² in such relation, will carry the lever L downward in its path, with a calculated remaining moment sufficient to actuate the lower lever L² and overcome the inertia of the movable series of valves T, beneath the compartments in the series D.

This latter movement is effected by the engagement of the downwardly extending arm *l*⁰ on the lever L, with the upwardly extending arm *l*¹ on the lever L¹, as shown in Figure IX, and the consequent rotation of that lever around the shaft to a calculated extent to propel the movable series T, through the openings *p*² and *p*³, until the valves T¹ have gradually passed beneath the compartments in the series D, and the cards successively escaped thereupon, by the force of gravity, into the chamber B, below.

At this stage of the shuffling operation, the calculated duration of the engagement between the pin *f*³ and the top of the tripper I, will automatically terminate by reason of the pin passing off the end of the tripper, whereupon, the moments of the weighted arms *l*¹ and *l*⁰ will carry back their respective compound levers, and all parts involved, to their original or starting positions.

But slight practice will disclose the essential value in the shuffling operation contributed by the features respectively of the obliquely disposed series T, in connection with the undercut spaces described, in the one case, and the inclined floor F, in connection with the upright cavity or space *b*, in the chamber B into which the floor leads, in the other.

Without such features, in any rapid flow of the cards downward upon T or F, a card that arrives will often hesitate to tip out of the path in time to clear the way for following cards, with the result that the cards become stacked up or wedged in the compartments or chamber before reaching their designed places therein.

By the arrangement shown the incline or slope, in each case, is generally sufficient to instantly carry the card onward towards its destined place, and beyond the lines of any disturbing impact of the oncoming cards.

Having thus explained my invention as embodied in a concrete form, what I claim and wish to protect by Letters Patent, is:—

1. In a shuffler for cards and similar articles, the combination of a casing, a series of transverse compartments for the reception of the cards during the process of shuffling rigidly affixed thereto, a supporting platform for the pack above said series in and movably related to the casing, and means for gradually moving said support backwardly beneath the pack in order to allow the cards to fall into the compartments below, substantially as shown and described.

2. In a shuffler for cards having a series of fixed transverse compartments for the reception of the cards during the process of shuffling, a plate-like support for the pack movably seated in the frame-work of the shuffler above, and means for gradually withdrawing said support from beneath the

pack in order to thereby allow the cards to fall into the compartments below, substantially as shown and described.

3. In a card shuffler having a slidable support for the pack at the top, movably related to the frame-work of the shuffler and a series of fixed upright compartment members beneath said support, which members have openings at their lower ends and normally closed gates for said openings, the combination of means for gradually withdrawing said support from beneath the pack in order to permit the cards to fall into said members below, and means for gradually opening said gates in order to permit cards within said compartment members to fall therefrom, substantially as shown and described.

4. In a card shuffler having a slidable support for the pack at the top, and a series of fixed upright compartment members, beneath said support, with apertures at the lower ends thereof and normally closed gates beneath said apertures, the combination of means for gradually withdrawing said support from beneath the pack in order to permit the cards to fall into said members below and, thereafter, gradually opening said gates in order to permit the cards within said members to fall through said apertures, and thereupon returning said support and said gates to their positions first hereinbefore specified, substantially as shown and described.

5. In a card shuffler, the combination of a slidable support for the pack at the top, a series of upright compartment members provided with apertures for the escape of the cards at their lower ends, normally closed gates for said apertures, a chamber below said series for the reception of the cards as they fall through said apertures, and means for gradually withdrawing said support from beneath the pack to be shuffled, in order to permit the cards to fall therefrom into the compartment members, and means for, thereafter, gradually opening said gates simultaneously in order to permit the cards to fall through said apertures, substantially as shown and described.

6. In a card shuffler the combination of a slidable support for the pack at the top and crosswise of the same, a series of fixed upright compartment members provided with apertures for the escape of cards at their lower ends, normally closed gates for said apertures, a chamber below said series for the reception of the cards as they fall through said apertures, and means for gradually withdrawing said support from beneath the pack to be shuffled in order to permit the cards to fall therefrom into said compartment members, and means for thereafter, gradually opening said gates simultaneously in order to permit the cards to fall

through said apertures, together with means for, thereupon, closing said gates and drawing back said support to the position first above specified therefor, substantially as shown and described.

7. In a shuffler for cards and similar articles, having a fixed series of divisional sections for the reception of the cards between the same during the process of shuffling, the combination of a plate-like slidable support for the pack above said series, means for holding said pack obliquely on and with respect to said support, and means, while in such position, for gradually withdrawing said support from beneath the pack in order to permit the cards to fall by the force of gravity downwardly between said sections, substantially as shown and described.

8. In a card shuffler having a slidable support for the pack at the top and a series of fixed upright compartment members provided with passages at their lower ends and normally closed gates therefor, beneath said series, guides within and on the sides of the shuffler, extending downwardly between said support and said series with their respective guiding faces in substantial alignment with and overhanging the passages in the compartment member to which such face in each case pertains, a chamber below said series for the reception of the cards as they fall from said series, and means, severally, for gradually withdrawing said support from beneath the pack in order to allow the cards to fall into said members, thereafter simultaneously, opening said gates in order to allow said cards to fall from said members into the chamber below, and thereupon, returning said support and gates to the positions first hereinbefore specified therefor, substantially as shown and described.

9. In a shuffler for cards, the combination of a series of upwardly extending divisional sections, within and crosswise of the shuffler and fixedly attached to the sides thereof at predetermined intervals, the upper portion of said sections having guiding faces for the cards in alignment with and overhanging the intervals, a slidable support for the pack to be shuffled, above said series, an obliquely disposed movable series of alternately arranged closure-pieces and open spaces, for said intervals beneath and in normally closed relation with respect to said intervals, a receiving chamber below said movable series for the cards that fall therefrom, having an obliquely disposed floor extending downwardly in a direction opposite to the direction of the designed movement of said last named series, together with suitable means for withdrawing said support from beneath the pack in order to permit the cards to fall by gravity into said intervals, thereafter, to gradually

- move said closure-pieces from their closed relation with respect to said intervals and bring the open spaces beneath the same, and upon the completion of such movements, to reverse such movements, until said support, and said closure-pieces and open spaces, are brought back to their normal or starting positions, substantially as shown and described.
10. In a shuffler for cards, the combination of a series of upwardly extending divisional sections, at predetermined intervals within and crosswise of the shuffler, the upper portion of said sections having guiding faces for the cards in alignment with and over-hanging said intervals, a slidable support for the pack to be shuffled above said series, an obliquely disposed movable series of alternately arranged closure-pieces and open spaces for said intervals beneath and in normally closed relation with respect to said intervals, a receiving chamber below said movable series for the cards that fall therefrom, provided with an upwardly extending recess or cavity in the lower portion of the wall of the same and a floor extending obliquely downwardly into said recess or cavity in a direction opposite to the direction of the designed movement of said last named series, together with suitable means for withdrawing said support from beneath the pack in order to permit the cards to fall by gravity into said intervals upon said closure-pieces, thereafter to gradually move said closure-pieces from their closed relation with respect to said intervals and bring the open spaces beneath the same in order to thereby permit the cards to fall by gravity into said chamber, and upon the completion of said movements, to reverse the same until said support, and said closure-pieces and open spaces, are brought back to their normal or starting positions, substantially as shown and described.
11. As a unitary device of the class described, the combination, with a casing for the same, of a slidable plate-like support for the pack at the top, a series of compartment-members, for the reception of the cards in the intervals between the same, below said support, and rigidly affixed to and crosswise of the casing at a slant from the rear to the front wall thereof, the said members having their upper portions at a predetermined pitch with respect to the natural line of the descent of the cards when free to fall by gravity from the support above, and having their lower portions undercut with respect to said upper portions, and being widened at their bases, a unitary series of grid-valve gates for closing the intervals between said members movably seated beneath said compartment series, the intervening slot-like spaces corresponding in dimensions to said intervals; the front wall of the casing being prolonged below said members and being cut away or recessed along its inner face from a point nearer the base of said device than the height of the cards, an inclined floor beneath said members, extending obliquely downwards to within said recessed portion, together with means for slidably actuating said support, and for moving said series of gates, substantially as shown and described.
12. In a card-shuffler, the combination of an obliquely disposed series of fixed divisional members located at predetermined intervals, one with respect to the others, a correspondingly disposed unitary series of closure-pieces for such intervals movably mounted beneath the same, and suitable means for moving said last named series for its designed operation, substantially as shown and described.
13. In a card-shuffler, the combination of a slidable receiving-platform for the pack, a fixed series of divisional sections at predetermined intervals beneath the same, a unitary series of alternately arranged closure-pieces and slot-like apertures movably mounted below, the two said series being obliquely disposed with relation to said shuffler, said intervals and the base-width of said divisional sections corresponding respectively in dimensions with said closure-pieces and said apertures, substantially as shown and described.
14. In a shuffler for playing-cards, the combination with a casing for the same, of a series of normally closed compartments for the reception of the cards during the process of shuffling, a chamber below said series for the assemblage of the cards as they fall from their several compartments, the front wall of the casing being suitably conformed to guide the cards toward a predetermined part of the floor of the chamber, and having its lower interior face cut away, or recessed, at a predetermined distance above the base of the shuffler, an inclined floor beneath said series extending obliquely downwards to within said recessed portion of said wall, and means for opening said compartments for the successive escape of the cards therein by gravity to the chamber below, and, means for normally closing the same, substantially as shown and described.
15. In a shuffler for cards having a series of compartments from which, in the process of shuffling, the cards fall into an assemblage chamber below provided with an open space, or cavity, in the lower part thereof an inclined floor in said chamber that extends downwardly, in the direction of said series, to and within said cavity, substantially as shown and described.