ABSTRACT: A mechanism for feeding cards singly from a stack of cards where the feeding is initiated by intermittent forces applied to the stack, each force operating to press the stack against a driven feed roller and to push a foremost card of the stack into a dispensing slot, the application of each force rendering the feed roller effective to eject the foremost card.
3,618,933 1. CARD FEED DEVICE

SUMMARY OF THE INVENTION

The invention is related to a class of mechanisms generally termed document or card feeders. A common function of the class is the sequential removal of single cards from a stack of cards. In order to perform this function, the invention utilizes a combination of a reciprocating arm or hammer, a driven roller, and stack-supporting means in which a reciprocating force upon the stack by the hammer causes cards to be singly fed at the reciprocating rate of the hammer. A single force against the stack by the hammer presses the stack against the roller and toward a slot formed by an edge of a stack-retaining plate and the roller. Pressed against the roller by the applied force, the card of the stack abutting the roller, or foremost card, bends to the contour of the roller, thereby sliding over the edge of the stack retainer plate and into the slot to be carried away by the roller. The invention also provides a displaceable roller which is displaced by the force of the hammer to effectively widen the slot and facilitate the passage of a card.

IN THE DRAWINGS

FIG. 1 is a perspective view of a device for feeding cards singly from a stack of cards;
FIG. 2 is a fragmentary plan view of the device of FIG. 1;
FIG. 3 is an enlarged sectional view, taken along the line 3-3 of FIG. 2;
FIG. 4 is a sectional view similar to FIG. 3 illustrating the feeding of a card;
FIG. 5 is a sectional view similar to FIG. 3 of a modification;
FIG. 6 is a view similar to FIG. 5 illustrating the feeding of a card;
FIG. 7 is a sectional view similar to FIG. 3 showing another modification; and
FIG. 8 is a view similar to FIG. 7 illustrating the feeding of a card.

Referring to the drawings and first to FIGS. 1 to 4, the device includes a card stack holder which, as viewed in FIG. 1, comprises a horizontal retainer plate 10, a vertical card stack backing plate 12 and a pressure plate 14. A stack of cards 16 are formed on the plate 10 and are urged toward the backing plate 12 by a biasing element, such as a weight 17 connected by a cord 18 over a pulley 19 to the pressure plate 14. The plate 14 is positioned above the plate 10 to bear against an upper portion of the stack 16 so as to hold the stack in the position shown.

A driven card feed roller 20 is mounted on the other side of the backing plate 12 from the retainer plate 10, the roller extending horizontally across the width of the card stack. The roller 20 is affixed onto a drive shaft 22 which may be coupled to a suitable drive means (not shown) for rotating the roller at a uniform angular velocity in a clockwise direction, as seen in FIGS. 3 and 4. In the backing plate 12 there is a clearance opening 24 through which the periphery of the roller 20 projects to engage the foremost card, as at 26, of the stack. Disposed toward the periphery of the roller 20 is an edge 28 of the plate 10 to define a card-feeding passage or slot 30 with the roller periphery. Preferably, the upper surface of the plate 10 is offset from the roller axis anteriorly thereof with respect to the direction of card feed, or is below the axis of the roller 20, as viewed in FIGS. 3 and 4.

In accordance with the invention, a force-transmitting member or hammer 32 is provided to strike the card stack to render the roller 20 effective to feed the foremost card from the stack. To this end, the roller 20 is preferably made of a durable resilient material (low durometer), such as rubber, so as to yield under the impact force of the reciprocating member or hammer 32. The width of the slot 30 is normally slightly less than and/or equal to the thickness of a card and the yieldings of the roller 20 under the hammer impact force results in the widening of the slot. At the same time, the impact force moves the leading edge of the foremost card into the slot whereupon the roller is effective to eject the card through the slot.

As shown, the hammer 32 is disposed on the other side of the stack from the roller and is slidally mounted for reciprocation on the upper surface of the retainer plate 10. The hammer 32 is intermitently actuated by a power element, preferably a pneumatic power element. Such devices are well known and in general comprise, a cylinder 34 to contain a piston for connection by a rod 38 to the hammer 32. The use of a pneumatic power element is desirable for delivering a predetermined force to a diminishing stack of cards.

The end or stack-striking face 40 of the hammer 32 is sloped from the upper surface of the plate 10 upwardly away from the roller 20. Such a sloped face 40 has the effect of bending lower margins of the stacked cards such that the foremost card is pressed against the roller 20 with its lower edge free of the plate 10 whereby to enable the roller to feed the card.

Below the slot 30 a pair of driven feed rollers 42 may be provided to receive and transport cards away from the card stack feeders.

Referring now to the modification of FIGS. 5 and 6, the card-feeding device is similar to the above described preferred device and therefore like parts have been designated by like reference characters to avoid unnecessary repetitious description. The modification differs from the preferred form in the provision of a nonyieldable roller 44 and in the provision of a card-feeding slot of a width greater than the thickness of a card and less than the sum of the thicknesses of two cards. The roller 40 may be made of any suitable nonyieldable material, such as hard rubber, metal or a plastic material. In operation, the pressure applied to the stack by the hammer presses the foremost card against the roller 44 and deflects the foremost card into the slot 30 whereby the roller is effective to eject the card.

The modification of FIGS. 7 and 8 differs from the preferred card-feeding device solely in the location of the retainer plate 46. As shown in FIGS. 7 and 8, the upper surface of the retainer plate is in a horizontal plane posterior to the axis of the roller with respect to the direction of card feed. In this case, the width of the slot is normally less than and/or equal to the thickness of a card. The roller yields to increase the width of the slot by and upon the application of pressure against the stack by the hammer which also bends the foremost card clear of the edge of the retainer plate.

What is claimed is:

1. A device for feeding cards singly and edgewise from a stack of cards comprising a card stack backing member adapted to engage the broadside of a foremost card of a stack, a card stack retainer plate transversely and laterally disposed to said backing member and anteriorly disposed from said backing member with respect to the direction of card feed, said card stack retainer plate having a broadside thereof adapted to abut the leading edges of the cards with respect to said direction of card feed and having an edge disposed toward and in spaced apart relationship to said backing member, a card feed roller having its periphery extending along said edge in spaced apart relationship therewith to define a card ejection slot with said edge, the periphery of said roller being continuously effective to frictionally impel the foremost card from the stack upon the application of a predetermined amount of pressure against said roller by the stack and the displacement of the leading edge of the foremost card clear of said retainer plate, a force-transmitting member adaptable to apply pressure to the rear of the stack toward said card feed roller, and means to reciprocate said force-transmitting member cyclically against the rear of the stack to apply the predetermined amount of pressure thereto, and to displace the leading edge of the foremost card into the card ejection slot, whereby the cyclic rate of said force-transmitting member establishes a corresponding rate of card feed.

2. A device as defined by claim 1 wherein the width of said slot is less than the thickness of a card and said roller is displaceable by said force-transmitting member to widen said slot to receive a card.
3. A device as defined by claim 2 wherein said roller is composed of a resilient material that elastically deforms upon the application of pressure thereto by the foremost card to effectively widen said card ejection slot.

4. A device as defined by claim 1 wherein said means to reciprocate the force-transmitting member is characterized by a pneumatically operated piston coupled by a connecting member to said force transmitting member.

5. A device as defined by claim 1 wherein the broadside of said retainer plate is in a plane intersecting said roller and offset from the axis of rotation of said roller anteriorly thereof with respect to the direction of card feed, said plane being closer to said axis than to a plane tangent to the periphery of said roller and parallel with said axis so that the foremost card normally abuts said backing member, the leading edge of the foremost card being retained on said card stack retainer in close proximity to the card ejection slot so that pressure applied to the rear of the stack by said force-transmitting member is effective to bend the foremost card toward the contour of the periphery of the roller and thus displacing the leading edge into the slot there to be frictionally impelled free of the stack by said card feed roller.

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