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CARD WEIGHT

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FIG. 1

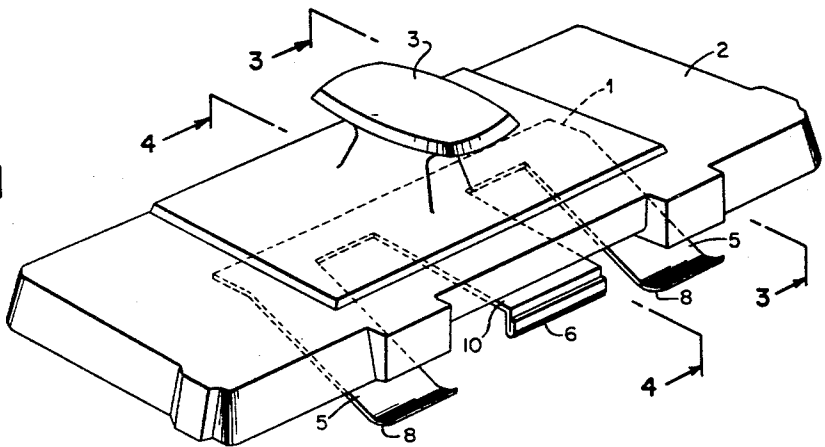


FIG. 2

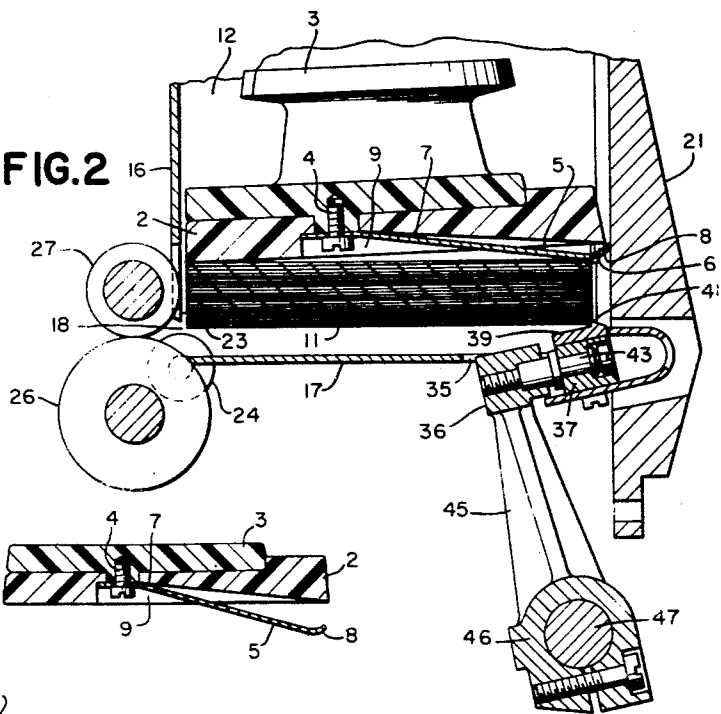


FIG. 3

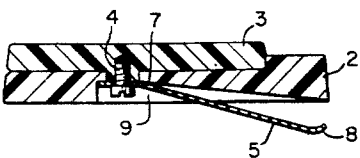
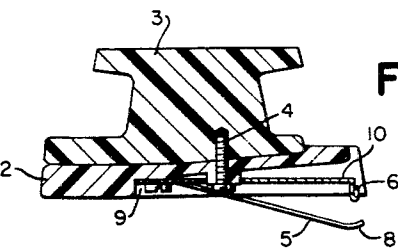


FIG. 4



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2,938,722

CARD WEIGHT

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4 Claims. (Cl. 271—44)

This invention relates to improvements in feeding mechanisms such as may be employed in record card controlled machines and more particularly to a device for controlling the feeding of cards from the magazines of machines of this general character.

In such machines, it is customary to place a stack of cards in a magazine or hopper and successively feed the cards at the bottom of the stack through a throat to an analyzing means. During the feeding operation there is imparted to the stack of cards a jogging or bouncing motion, the rapidity of which increases with the speed at which the cards are fed, and the amplitude of which becomes greater as the height of the stack, and therefore its weight, decreases. The rapid jogging motion of the stack may result in improper feeding and jamming of the bottom card. With a large stack of cards, the problem of card picker misses is very small because the weight of the stack absorbs the major portion of the stack bounce. However, as the number of cards in the stack is reduced to approximately 100 cards or less, a card bounce may be imparted to the card stack by the picker knives. This bounce is generated by the rapid forward and slightly upward movement of the picker knives. Also, under some conditions this bounce may be severe enough to pivot the deck about the leading edge and thus permit the trailing edge of the bottom card to leave the picker knives entirely. If the bottom card has not returned to position at the next forward stroke of the feed knives, a card miss occurs, thus causing the machine to stop before the normal end of the operation. These card picking failures are time consuming because the operator must then personally investigate the cause of the trouble and restart the machine. To overcome this difficulty, a common practice has been to place a single weighted member on top of the stack to exert pressure on the stack to reduce its jogging motion. Another practice has been to employ a pressure device having a weight and a base plate with some relative movement between them. None of these practices have entirely eliminated the jamming of cards in the magazine.

It is, therefore, the principal object of this invention to provide a card weight which will further reduce the possibility of improper feeding of cards through a hopper of a record card controlled machine.

It is another object of this invention to provide a deck bounce dampener for use on a card deck in a business machine which includes a weight member for engaging the card deck at its leading edge about which the weight is pivotable or tiltable, and, has a trailing edge suspended or biased from the card stack by a spring interposed between the card weight and stack, so that when the deck begins to exhibit unacceptable card bounce, the leading edge of the card weight being in engagement with the card stack at all times will exert constant pressure at this point and will tend to maintain the leading edge of the cards in alignment with the throat passageway to prevent card jams, the trailing edge of the card weight being normally spaced from the card stack will be oscil-

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lated by the spring to exhibit a hammerlike motion in opposition to the upward amplitude of the card deck so that the inertia due to the mass of the weight will dampen the bounce to maintain the cards being fed on the picker knives, the dampener thereby simultaneously exerting pressure at both the leading and trailing edges during bouncing of the deck.

In this invention a card weight having a spring suitably attached to its base rests on the stack of cards in order to absorb or suppress the jogging motion of the cards at and adjacent the bottom of the stack. The weight member is grooved in a manner to permit one end of the spring to be attached free from contact with a card upon which the card weight rests and the other end of the spring to be in contact with the card. In a preferred embodiment, the spring comprises two outer blades and a central card aligning blade. The free ends of the outer blades are bent under the pressure of the card weight, and oscillate in response to the jogging motion of the stack of cards in order to absorb this jogging motion and permit uninterrupted feeding.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings which disclose, by way of example, the principle of the invention and the best mode which has been contemplated of applying that principle.

In the drawings:

Fig. 1 is a perspective view of the card weight.

Fig. 2 shows the card weight on a stack of cards in a hopper normally spaced from the spring at its trailing edge.

Fig. 3 is a side view taken on lines 3—3 of Fig. 1.

Fig. 4 is another side view taken on lines 4—4 of Fig. 1.

Fig. 1 broadly illustrates the structure of a deck bounce dampener according to the invention, including spring 1, a substantially rectangular weight portion 2, and handle 3. The weight portion 2 and handle 3, both of which may be composed of plastic material, may be a single piece or two elements attached together in any suitable manner such as by screws 4 (Figs. 3 and 4). In the same way one end of spring 1 may be attached to the base of the weight portion 2. Suitable grooves 9 are provided at the base of the weight portion 2 to permit the spring 1 to be attached without allowing the ends of the screws 4 to contact the top card in a stack of cards.

As illustrated in Fig. 1, a preferred spring arrangement comprises three blades, two outer blades 5 and a center blade 10. The outer blades 5 have their inner portions 7 in a recessed area 9 of the weight portion 2, at which location the spring is attached by screws 4 to the card weight. A larger portion of the blades 5 is unsupported, and therefore free to ride on a stack of cards. The free ends of the outer blades have a slight curvature to prevent engagement with a feeding knife when the stack of cards is reduced to a low level. Each of the outer blades 5 normally will be aligned with each of a pair of picker knives to exert pressure on the card at each picking knife area to keep the trailing edge of the card in engagement with the picker knives during card feeding.

The entire length of the center blade 10 of spring 1 rests in a recessed portion of weight member 2. As seen in Figs. 2 and 4, the free end of blade 10 has a hook member 6 which fits over the back edge of some of the cards at the top of the stack, and serves as a guide during operation. A steel spring having a .006 gage was found to give optimum performance, although other gages were also found to be satisfactory.

The invention is applicable to any card feeding mech-

anism of the general type illustrated in Fig. 2 and described in greater detail in a patent application of George A. Luning et al., Ser. No. 431,316, dated May 21, 1954, now U.S. Patent No. 2,877,017.

Such a mechanism comprises a feed hopper 12 having a forward or front wall 16 spaced from a bottom member 17 to define a throat passage 18, end walls (which are not shown), and a rear wall defined by a pair of upwardly extending guide posts 21. The walls of the hopper cooperate to receive and hold the stack of cards 11 in position. At the lower central portion of the front wall is a throat knife 23, against which the cards above the bottom card are urged to prevent the passage of more than one card at a time through the throat passage 18. Disposed slightly more than a card thickness directly below the throat knife 23 is a throat roller or supporting means 24 to support the central forward edge of the cards in spaced relation to the bottom member 17. Thus as the bottom card is advanced it passes over the roller 24 through the throat passage 18 to a pair of feed rolls 26 and 27.

At the rear portion of the bottom surface 17 of the hopper are a pair of parallel spaced forwardly directed slots 35, in each of which is closely mounted a card feed unit 36. Each card feed unit includes a picker knife swivel block 37 having forward and rear ends and an upwardly tapering top surface 39 terminating in a feed knife edge 41 which extends parallel to the rear edge of the cards and is adapted to engage the bottom card to transport the same forwardly to the first pair of feed rolls. The head 37 is mounted to swivel about the axis of an adjustable stud member 43 which is secured to the upper head end of a rocker arm 45 whose lower end 46 is securely clamped to rocker shaft 47. During a typical card feeding operation the rotation of rocker shaft 47 oscillates the rocker arms 45 and the picker heads 37 in an arc, thereby permitting the feed knife edge 41 to engage the rear edge of the picked card and move it forward through the throat 18 to engage the first pair of feed rolls 26 and 27.

In Fig. 2 the card weight of this invention is shown resting on a stack of cards 11 in hopper 12. The card weight is placed on the stack by the handle 3 in such a manner that the outer blades 5 are bowed with respect to the bottom of the card weight. The front part of weight member 2 rests directly on the top card, whereas the rear part of the weight member rests on the spring 1 so as to be suspended from the cards. This weight causes the outer blades 5 to bow. The outer blades 5 engage the trailing portion of the cards at all times during picking operation so as to exert constant pressure on the picker knives.

In operation, as the last portion of the stack of cards (for example 15 cards) approaches the feed knives and a larger bounce is imparted to the stack, the amplitude of the bounce of the stack urges the spring upwardly which reacts to pivot the card weight about its leading edge. The leading edge of the card weight will be maintained in engagement with the stack at all times and exerts a constant pressure so as to align the leading edge of the cards with the throat passage-way to prevent card jams. Since the bouncing takes place at or near the trailing edge of the card stack so as to pivot the cards, the trailing edge of the card weight will raise. The trailing edge of the card weight remains normally spaced from the card stack so as to provide an opportunity to utilize the mass or inertia of the card weight as a result of its oscillatory arcuate motion. By selecting the appropriate size spring, a frequency of operation of the inertia member or card weight can be obtained such that the weight develops a frequency of movement substantially out of phase with the card bounce. The inertia member will transmit a striking force through the springs upon which it is suspended from the cards so as to transmit a hammerlike force to

the stack at the instant of the next card bounce. The energy of the hammerlike action takes place at the right frequency in opposition to the energy of the card bounce to dampen the bounce. The tendency for the cards to bounce will be reduced to such an extent that the cards will be forced to remain on the picker knives or at least always be returned before the beginning of the next feed stroke. The mass of the weight provides a deadbeat action to dampen the deck bounce. Also, the spring exerts a constant force on the cards regardless of the oscillation of the card weight. Therefore, since the leading edge of the card weight acts on the leading edge of the cards, and, since the spring engages the trailing portion of the cards, pressure is simultaneously exerted at the throat and picker knife so as to align the leading edge of the card to the throat and maintain the trailing edge of the last few cards on the picker knives. The curvature of the outer edges 8 of the two outer blades 5 prevents the spring from engaging feeding knife edge 41. Such a card weight employed in the record card control mechanism, illustrated in Fig. 2, is capable of feeding more than one thousand cards per minute without card picking failures due to the cards bouncing above the path of motion of the picker knife.

While there have been shown and described and pointed out the fundamental features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A deck bounce dampener for use on a stack of cards in a magazine of a business machine having picker knives therein, comprising a pivotable card weight with a leading and trailing edge, and spring means secured to the weight and extending outwardly from the card weight, the spring means engaging the card stack adjacent the trailing edge only of the top card at all times so as to bias the trailing edge of the card weight away from the stack, the card weight being pivotable about the leading edge of the card weight with the leading edge being in engagement with the stack at all times, the spring means and pivot point of the card weight simultaneously exerting pressure on the card stack during card feeding the card weight acting as an inertia member pivotable about its leading edge so as to act in opposition to the upward amplitude of the card bounce so as to dissipate the energy of the bounce tending to raise the card stack off the picker knives, and to exert substantially constant pressure at the leading edge of the card stack.

2. A deck bounce dampener for use on a stack of cards in the magazine of a business machine having picker knives therein comprising a pivotable card weight with leading and trailing edges, spring means secured to the weight adjacent the trailing edge only of the top card to bias the trailing edge of the card weight away from the card stack, the leading edge of the card weight being in engagement with the card stack at all times, the spring means and pivot point of the card weight simultaneously exerting pressure on the card stack during card feeding the trailing edge of the card weight acting as an inertia member to exert a dynamic force in opposition to the upward amplitude of the bounce caused by the picker knives, the leading edge exerting a constant static force on the leading edge of the cards.

3. A deck bounce dampener for use on a stack of cards in the magazine of a business machine having picker knives therein comprising a pivotable card weight, spring means secured to the weight adjacent the trailing edge only of the top card to bias the trailing edge of the card weight away from the card stack, the spring means containing an aligning member for aligning the

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card stack, the card weight being pivotable about its leading edge so as to exert a static force on the leading edge of the cards, the spring means and the leading edge of the card weight simultaneously exerting pressure at the leading and trailing edges of the cards, the card weight also exerting a dynamic force at its trailing edge in opposition to the upward bounce of the card stack caused by the picker knives and thereby maintain the card being picked on the picker knives.

4. In combination, a card feed mechanism and deck bounce dampener, the card feed mechanism including a picker knife, a magazine containing cards to be fed from the magazine by the picker knife, and a throat passage through which the cards are fed from the magazine, the deck bounce dampener including a pivotable card weight with its leading edge as its pivot point which is in engagement with the cards so as to exert constant pressure on the cards at the throat passage to keep the cards from bouncing at the throat area, and spring means

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on the card weight adjacent the trailing edge only of the top card to bias the trailing edge of the card weight from the cards, the spring means and the leading edge of the card weight simultaneously exerting pressure at the leading and trailing edges of the cards, the mass of the card weight being pivotable about the pivot point of the card weight and oscillated out of phase with the bounce to dampen the energy in the upward bounce of the cards.

References Cited in the file of this patent

UNITED STATES PATENTS

236,427	Griffith et al. -----	Jan. 11, 1881
472,492	Begg -----	Apr. 5, 1892
1,420,834	Giles -----	June 27, 1922
1,686,949	Brandt -----	Oct. 9, 1928
1,882,261	Schofield -----	Oct. 11, 1932
1,995,229	Schulte -----	Mar. 19, 1935
2,401,719	Braun -----	June 11, 1946