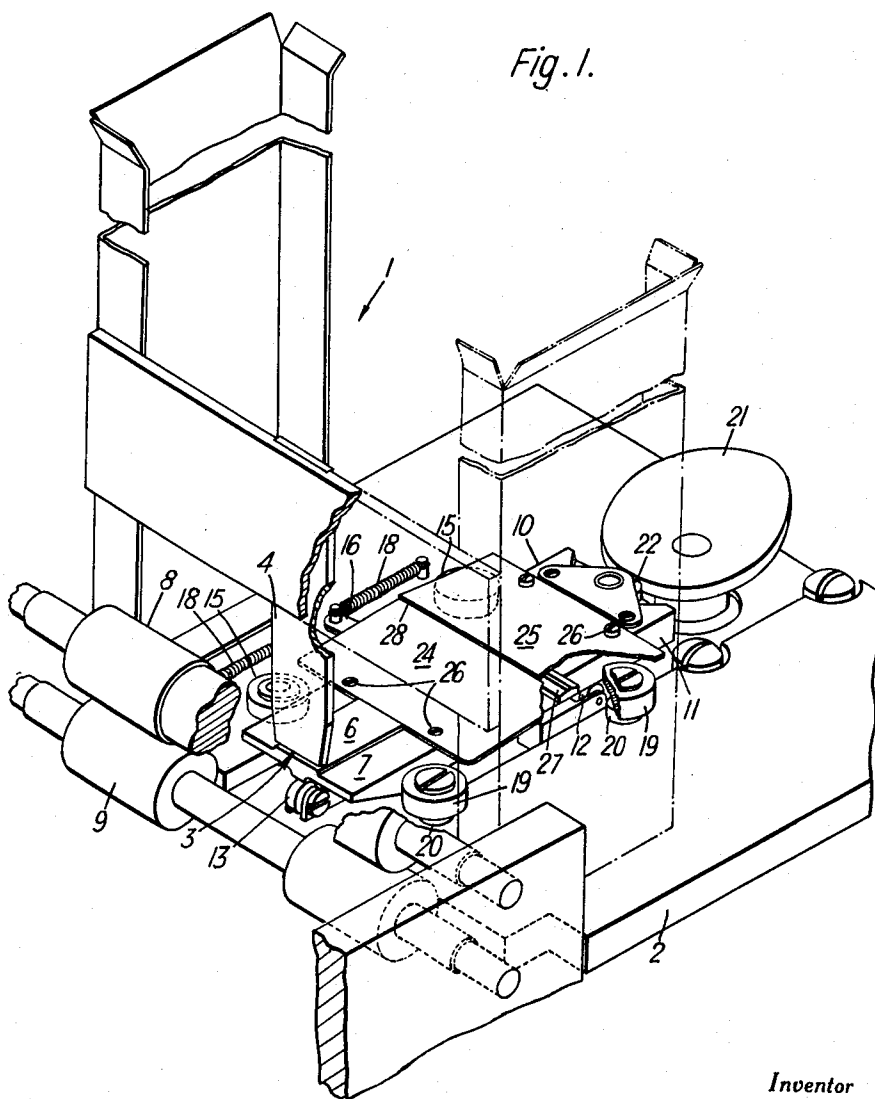


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CARD FEEDING APPARATUS

2 Sheets-Sheet 1



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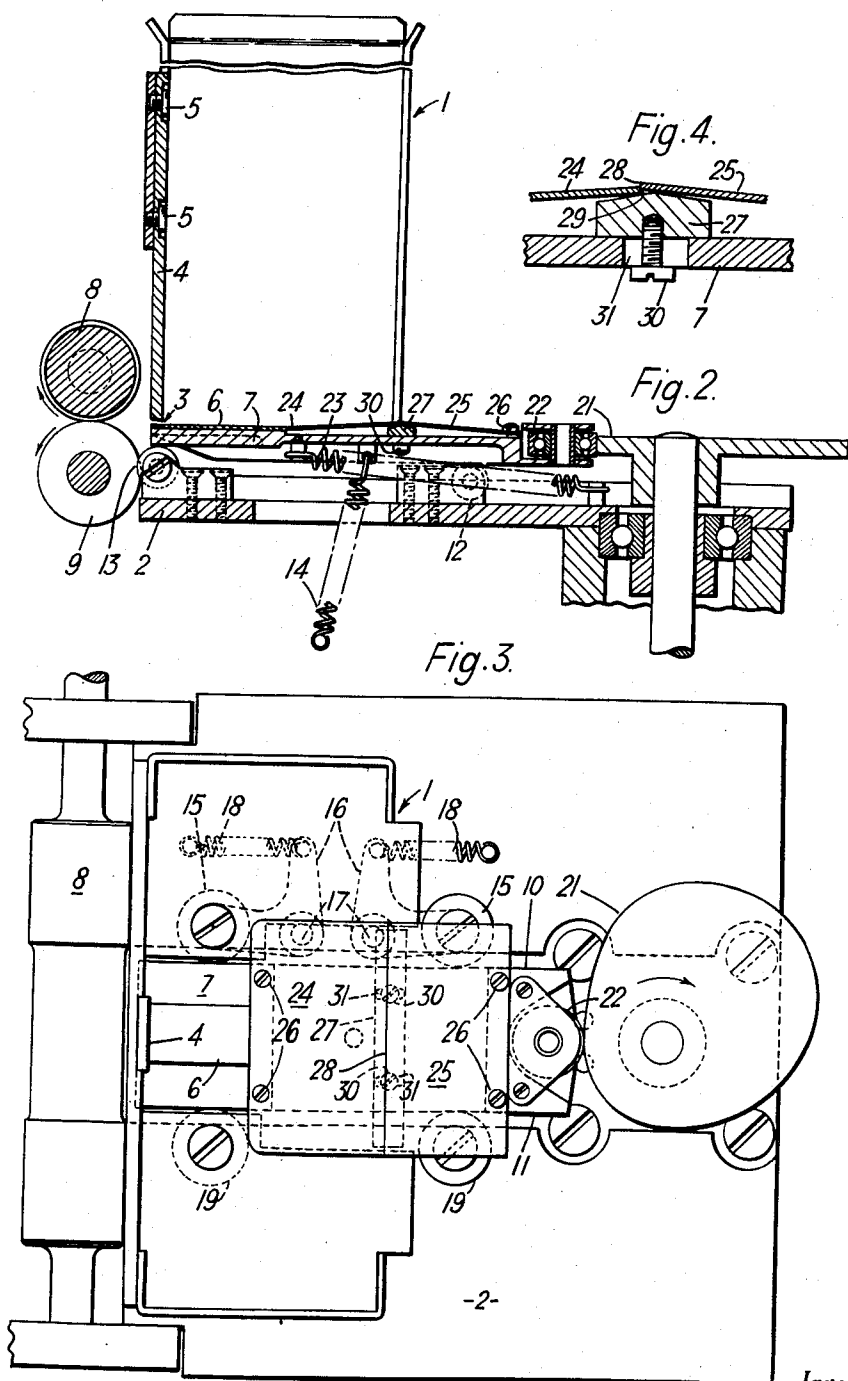
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CARD FEEDING APPARATUS

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2 Sheets-Sheet 2



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1

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CARD FEEDING APPARATUS

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7 Claims. (Cl. 271-44)

This invention relates to card feeding apparatus and in particular to apparatus for feeding cards to record card controlled statistical machines.

It is customary when feeding cards to record card controlled statistical machines to feed the cards one at a time from the bottom of a pile contained in a magazine, by a picker element which engages an edge of the bottom card and moves the card out of the magazine through a throat adjusted to permit the passage of only one card at a time, the card as it issues from the throat being engaged by feed rollers which co-operate with each other to complete withdrawal of the card from the magazine and to feed it into the machine. It is found that when operating at very high speeds, for example speeds of one thousand or more cards per minute, the cards may be damaged by the impact of the picker device against the cards, or by the impact of the cards against the throat, and it is an object of the invention to provide a card feeding apparatus which is not only capable of feeding cards at a rate in excess of one thousand per minute but which will minimise or eliminate such potential causes of card damage.

In order that the invention may be clearly understood one embodiment thereof will now be described, by way of example, with reference to the accompanying drawings in which:

Fig. 1 is a diagrammatic pictorial representation of apparatus constructed in accordance with the invention, Fig. 2 is a longitudinal section through the apparatus shown in Fig. 1,

Fig. 3 is a top plan of Fig. 2, and

Fig. 4 shows, to an enlarged scale, a detail of the apparatus illustrated in Fig. 2.

Referring to the drawings, a pile of cards to be fed to a machine is placed in a magazine 1 supported by a frame plate 2. At the forward end of the magazine 1 there is provided a throat 3 which is formed by a throat knife 4 secured to the front of the magazine by screws 5, Fig. 2, in a manner such as to permit the throat knife to be adjusted in a vertical direction, as viewed in Fig. 2, so as to permit adjustment of the knife relative to a throat pad 6 thereby to define a throat 3 which will permit the passage of one card only at a time.

The throat pad 6 comprises a flat plate secured in any suitable manner, as for example by screws, to a carriage 7 which is disposed beneath the magazine to be reciprocable relative thereto towards, away from, and between, see Figs. 2 and 3, feed rollers 8, 9 which are rotated from the main shaft, not shown, of the machine and which receive those leading end portions of cards fed from the magazine 1, and which extend beyond the sides of the carriage 7, and feed the cards into the machine at a very high linear speed.

The carriage 7 is guided by freely rotatable rollers engaging opposite edges 10 and 11 of the carriage and also the under side of the carriage. The rollers engaging the under side of the carriage comprise a pair of ball races 12, one of which is shown in Fig. 2, and a third

2

ball race 13, the axis of rotation of which is disposed to be immediately below the throat 3. The carriage is maintained in engagement with rollers 12, 13 by a spring 14, Fig. 2.

The side 10 of the carriage is engaged by a pair of ball races 15 spaced apart along the path of the carriage, each roller 15 being supported by a bellcrank 16, Fig. 3, pivoted at 17 to the plate 2. Springs 18 urge the rollers 15 about the pivots 17 into engagement with the side 10 of the carriage. The side 11 of the carriage is engaged by ball races 19 also spaced apart along the path of the carriage and mounted on angularly adjustable eccentrically mounted pillars 20, Fig. 1, supported by the plate 2. The purpose of the eccentric mounting for the rollers 19 will be described below.

Reciprocation of the carriage 7 is effected by a cam 21 rotatable from the main drive, not shown, of the machine. The cam 21, as shown in Fig. 2, is rotatable in a horizontal plane and co-operates with a follower roller 22 mounted on the carriage 7 thus imparting movement directly to the carriage. The roller 22 is maintained in engagement with cam 21 by two springs 23, one of which is shown in Fig. 2.

The cards are fed from the bottom of the magazine by a picker device which is arranged during movement of the carriage in one direction under control of cam 21, that is towards the feed rollers 8, 9, to engage the rear edge of the bottom card of a pile contained in the magazine and to effect delivery of the card through the throat 3 to the feed rollers 8, 9. The profile of the cam 21 and the timing thereof is such that the picker device has a relatively low velocity on first engaging the rear edge of a card but is accelerated after engagement with a card so that at the instant of engagement of the front edge of the card with the feed rollers 8, 9 the card has a linear speed substantially equal to that of the feed rollers. The picker device comprises a pair of thin resilient plates 24, 25 each having one end anchored to the carriage 7, as for example by screws 26. The opposite ends of the plates 24, 25 are supported in substantially abutting relation by a ramp 27 mounted on the carriage 7 for movement relative thereto, thereby to determine the distance by which an edge 28 of the plate 25 projects above the edge 29, Fig. 4, of the plate 24. The edge portion 28 which projects above the edge 29 constitutes a picker knife which engages the rear edge of the bottom card of a pile contained in the magazine so as to effect the delivery of the card through the throat 3 to the feed rollers 8, 9. The distance by which the edge 28 projects above the edge 29 is of the order of .005 inch. The extent of projection of the edge 28 above the edge 29 can be adjusted by the ramp 27 since, as can be seen clearly from Fig. 4 the ramp is secured relative to the carriage 7 by screws 30 movable in slots 31 formed in the carriage 7, the slots extending lengthwise of the carriage. As can be seen from Fig. 4, the ramp has two sloping faces, one of which is engaged by the resilient plate 24 and the other by the resilient plate 25. Accordingly, by movement of the ramp 27, to the right or to the left as viewed in Fig. 4, the edges 28, 29 can be adjusted relative one to the other thereby readily to effect adjustment of the edge portion of plate 25 to be engaged with the rear edge of a card. The plate 24 also acts as a support for the rear end portion of a card being fed from the bottom of a pile in the magazine 1.

It will be understood that the edge portion 28 should be arranged so as squarely to engage the rear edge of a card in the magazine and by effecting angular movement of the eccentric pillars 20 supporting the rollers 19, it is possible to effect the desired alignment of the picker device to position the edge 28 so as to ensure that the edge

28 squarely engages the rear edge of a card in the magazine.

From the foregoing description it will be understood that by reason of the provision of the throat pad 6 on the carriage 7 wear of the throat pad is reduced because as the throat pad moves with the carriage and a card being fed through the throat there is no tendency for the leading edge of the card to impact against the throat pad. Further, by reason of the arrangement of cam 21, the picker device is moved at a low velocity into engagement with a card so that, although the apparatus feeds cards at a very high speed, the possibility of damage to the rear edges of cards is minimized or eliminated. By the acceleration of the rate of feeding of a card after engagement thereof by the picker device the card is delivered to the feed rollers at a higher velocity, viz. at a linear speed substantially equal to that of the feed rollers 8, 9 thereby eliminating the possibility of damage to the cards due to "snatching" by the feed rollers; and by elimination of the "snatching" noise which normally occurs during card feeding, and which is increased when cards are "snatched," is substantially reduced.

The facility for adjustment of the picker device is also an improvement over the kinds of picker device usually employed in card-feeding apparatus as in the usually employed forms of card feeding apparatus, the knife is wholly fixed relative to the carriage therefor and no adjustment thereof to determine the height of the card-engaging face thereof is possible.

I claim:

1. Card feeding apparatus comprising in combination, a magazine including a throat through which cards can be fed one at a time, feed rollers co-operating to effect withdrawal of a card through the throat at a high linear speed, a rotatable cam, a picker device movable beneath the magazine to effect removal of cards one at a time from the magazine, and a carriage for the picker device, said carriage being supported for reciprocation, and means spring-urging the carriage into engagement with said cam, the contour of said cam being such as to impart movement to the carriage in a manner such that initial engagement of the picker device with a card is effected at a low velocity and movement of the picker device is thereafter accelerated to deliver the card to the feed rollers at a linear speed substantially equal to that of the feed rollers.

2. Card feeding apparatus according to claim 1, wherein the throat is formed by a throat knife carried by the

front wall of the magazine, and a throat pad spaced from the knife and carried by the end of the carriage remote from the end thereof which is engaged by said cam.

3. Card feeding apparatus according to claim 1, wherein the picker device includes a pair of thin resilient plates each having one end anchored to the carriage and their opposite ends in substantially abutting relation, and a ramp having inclined surfaces mounted on the carriage for movement therewith, means adjustably mounting the ramp on the carriage for movement relative thereto, said ramp supporting said opposite ends of the plates on the inclined surfaces thereof and determining by movement thereof the distance by which the edge of one of said opposite ends projects above the other to effect engagement with a card for movement thereby through said throat.

4. Card feeding apparatus according to claim 1, including rollers supported to be freely rotatable in a horizontal plane and to engage the opposite sides of the carriage during reciprocation thereof by the cam.

5. Card feeding apparatus according to claim 4, including rollers supported to be freely rotatable in a vertical plane and to engage the underside of the carriage.

6. Card feeding apparatus according to claim 1, including a first pair of rollers supported to be freely rotatable in a horizontal plane and spaced apart alongside the path of the carriage, a pivot arm supporting each roller of the pair, a spring acting on each pivot arm to maintain the roller supported thereby in engagement with one side of the carriage, and a second pair of rollers engaging the opposite side of the carriage and supported to be freely rotatable in a horizontal plane about fixed axes spaced apart alongside the path of the carriage.

7. Card feeding apparatus according to claim 6, including rollers supported to be freely rotatable in a vertical plane and to engage the underside of the carriage.

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