

Feb. 6, 1962

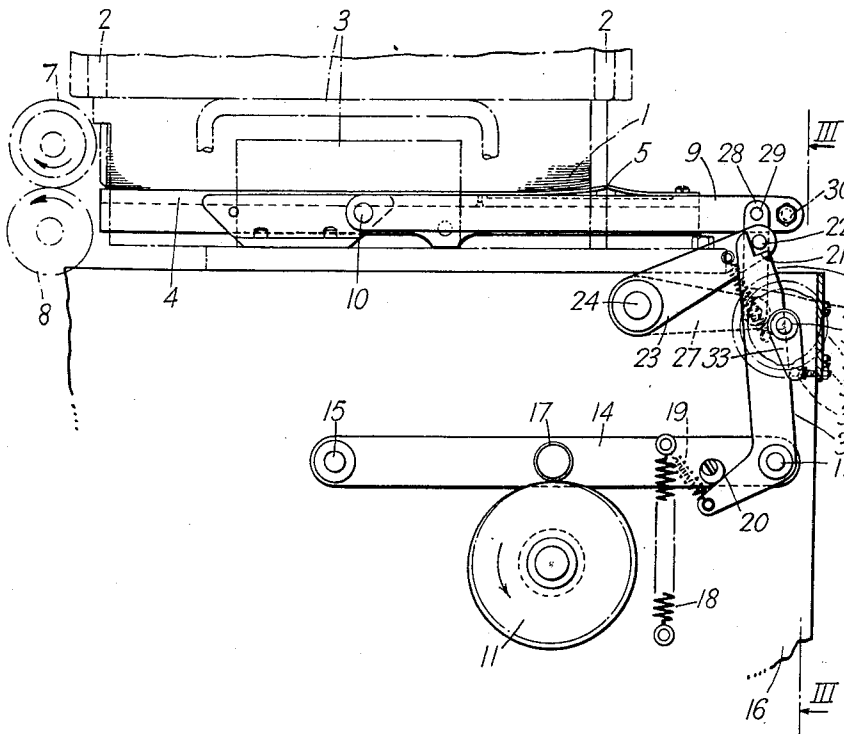
H. J. HILLEN ET AL
CARD FEEDING APPARATUS

3,020,044

Filed June 20, 1958

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Fig. 1.



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Fig. 2.

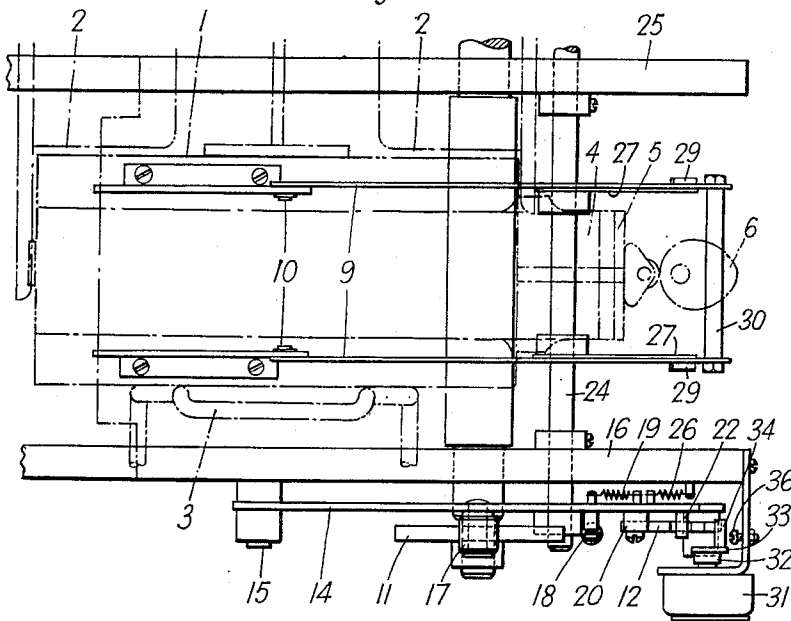
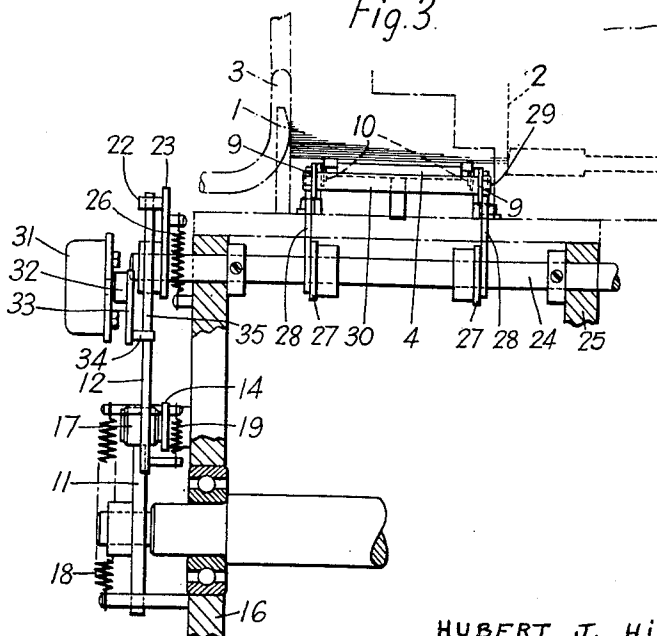


Fig. 3.



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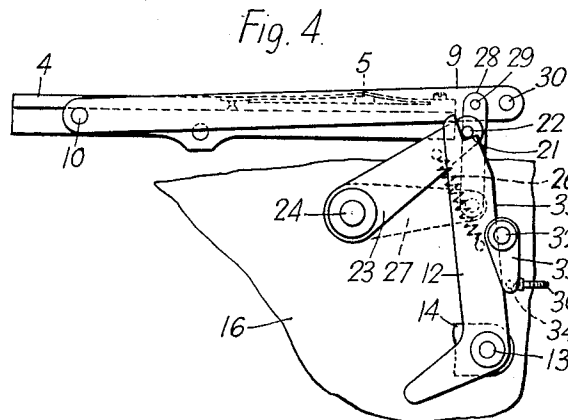
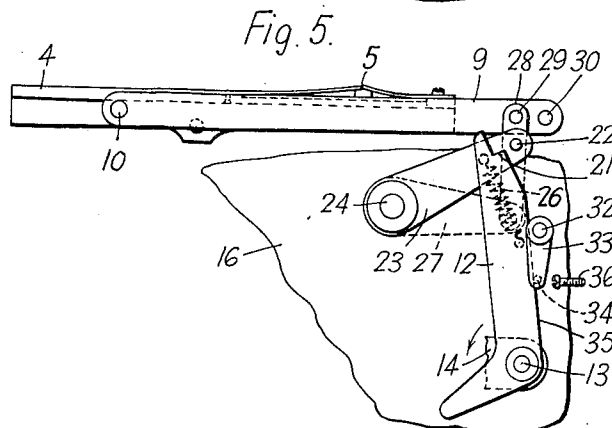
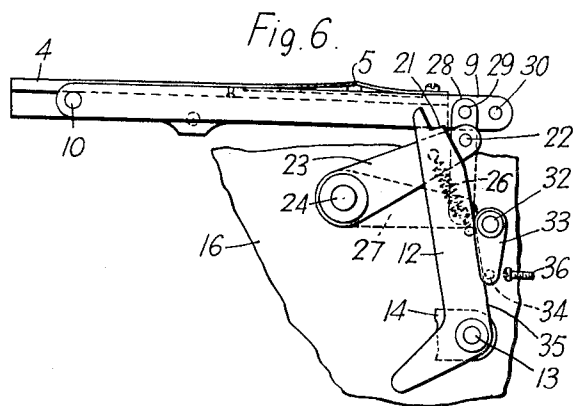
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3,020,044

CARD FEEDING APPARATUS

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Filed June 20, 1958, Ser. No. 743,240

Claims priority, application Great Britain Aug. 7, 1957
6 Claims. (Cl. 271-44)

This invention relates to card feeding apparatus and in particular to apparatus for feeding record cards to record controlled statistical machines such, for example, as computing machines.

It is customary when feeding record cards to record controlled statistical machines to feed the cards one at a time from the bottom of a pile contained in a magazine by a reciprocable picker device which engages an edge of the bottom card and moves the card out of the magazine to be engaged by rollers which feed the card into the machine. As is well understood, a record controlled computing machine operates on data fed thereto as the result of one or more sensing operations performed on a record card and the intervals between the feeding of successive cards from the magazine depend on the length of the computations to be effected by the machine. Thus it often happens that, although the picker device is a cyclically operable device, card feeding must be interrupted for one or more cycles and this is effected by signals emitted from the computer. The development of electronic computing machines has resulted in the need for a high potential rate of card feeding, for example a potential rate of card feeding of 600 or more cards per minute, and at the increased rate of card feeding it has been found difficult to stop and restart card feeding in the very brief intervals of time available and which may be of the order of from 8 to 10 milliseconds.

It is a main object of the present invention to provide for the selective interruption of card feeding at the above-mentioned high potential rates of card feeding and this is done by providing card-feeding apparatus in which a picker device is cyclically reciprocated relative to a magazine and is arranged to engage an edge of the bottom card of a pile contained in the magazine and to effect feeding of the card from the magazine, and wherein a card elevator connected through a trip device with a cyclically operable cam is arranged to elevate out of the path of the picker device that edge of the bottom card which is to be engaged by the picker device when the card is fed thereby, and operation of an automatically operable actuator is arranged to render the trip device inactive thereby to disconnect the elevator from said cam and permit feeding of the bottom card by the picker device.

One embodiment of the invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

FIG. 1 is a side elevation of apparatus according to the invention,

FIG. 2 is a top plan of FIG. 1,

FIG. 3 is a broken section on line IIII-III, FIG. 1, and

FIGS. 4 to 6 illustrate the positions of some of the parts illustrated in FIG. 1 during different stages of operation of the apparatus.

Referring to the drawings, a stack of cards 1, FIGS. 1 and 3, is contained in a magazine composed of guides 2, 3, and the bottom card of the pile rests on a carriage 4 which supports a picker device 5 and which is reciprocable by a cyclically operable cam 6, FIG. 2, so that the picker 5 will engage an edge of the lowermost card of the pile to effect feeding thereof from the magazine to feed rollers 7, 8, FIG. 1, which feed the card into the machine. In

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accordance with the present invention there is provided a card elevator which consists of a pair of bars 9 which, as can be seen from FIG. 2, are disposed one alongside each of two opposite sides of the picker device 5. Each of the bars 9, at one end thereof, is arranged to rock about a pivot 10 for movement towards and away from the bottom card of a pile in the magazine under control of a cyclically operable cam 11, FIGS. 1 to 3.

The elevator is connected with the cyclically operable cam 11 through a trip device which comprises a latch 12 pivoted at 13 to a cam lever 14 which, in turn, is pivoted at 15 to a side frame 16 of the machine. The cam lever 14 supports a follower roller 17 which is urged into engagement with cam 11 by a spring 18. The latch 12 is urged by a spring 19 to the active position thereof and in this position the latch is engaged with a stop 20 carried by the cam lever 14. The upper end of the latch 12 is formed with a notch 21 arranged, when the latch is in the active position thereof, as illustrated in FIGS. 1 and 4, to co-operate with a pin or other suitable abutment 22 extending laterally from an arm 23 which is secured to a rocking shaft 24 supported for rocking movement in the frame 16 and in a further frame 25, FIGS. 2 and 3. A spring 26 urges the arm 23, clockwise as viewed in FIG. 1, towards the latch 12.

Also secured to the rocking shaft 24 for rocking movement therewith are two levers 27 to the free end of each of which is pivoted a link 28, each link 28 being pivoted at 29 to one of the bars 9. A spacer element 30 connects those ends of the bars 9 which are remote from the pivots 10 therefor. Rocking of the latch 12 about its pivot 13 is controlled by a selectively operable actuator which, in the embodiment of the invention illustrated in the drawings, consists of a solenoid 31 having a rocking armature 32 to which is secured a latch actuating arm 33, a pin or abutment 34 extending laterally therefrom for co-operation with the edge 35, FIGS. 1 and 4 to 6, of latch 12. An adjustable stop 36 controls the extent of movement of latch-actuating arm 33 and co-operates with the latch-actuating arm in a manner such as to permit movement thereof only when the torque applied to the armature 32 approaches its maximum.

The solenoid 31 is included in an electrical circuit, not shown, which is arranged to effect energisation of the solenoid on initial starting of the machine, and automatic de-energization of the solenoid as the result of signals transmitted thereto from a computing machine indicating that interruption of card-feeding is required. Thus, with this arrangement when the machine is started up solenoid 41 is energised and the latch-actuating arm 33 is rocked, clockwise as viewed in FIG. 1, thereby rocking latch 12 counter-clockwise, about its pivot 13 to the position thereof illustrated in FIG. 5. Thus, when the cam 11 operates to rock cam lever 14, counter-clockwise as viewed in FIG. 1, about its pivot 15, the latch 12 is raised to the position illustrated in FIG. 6 but, as the notch 21 has been moved out of alignment with the pin or abutment 22, the arm 23 does not rock shaft 24 so that the bars 9 remain in the down position thereof, as illustrated in FIGS. 1 and 5, and the picker device 5 effects feeding of the lowermost card from the stack of cards. The cam 11 is timed to effect lifting of latch 12 just prior to the picker device 5 being moved to a position at which it can engage the rear edge, that is the right-most edge as viewed in FIG. 1, of the bottom card to effect feeding of the card.

On receipt of a signal from the computing machine indicating that card-feeding is to be interrupted the solenoid 31 is de-energised and the latch-actuating arm 33 is rocked counter-clockwise so that its pin 34 abuts the stop 36, as illustrated in FIG. 4, thus permitting the latch to assume the position thereof shown in FIG. 1 so that, on

raising of the latch by cam 11, the notch 21 is engaged with the pin or abutment 22, as illustrated in FIG. 4, and the upward movement of the latch 12 effects rocking of arm 23, counter-clockwise as viewed in FIG. 1, to the position thereof illustrated in FIG. 4 in which the rocking of arm 23 has, through levers 27 and links 28, effected rocking of the bars 9, counter-clockwise as viewed in FIG. 1, to the position thereof shown in FIG. 4. When bars 9 are in this position the lowermost card is engaged by the upper edges of the bars 9 and the card has that edge thereof which, at the appropriate time, is to be engaged by the picker device 5 raised by the bars 9 out of the path of the picker so that on forward movement of the picker, that is to the left as viewed in FIG. 4, the picker 5 passes beneath the bottom card and does not effect feeding thereof. It is found that rocking of the latch 12 by the arrangement of a spring 19 and solenoid as herein described can be effected in an interval of from 8 to 10 milliseconds and this is found to give ample time for operation of the apparatus in the manner described when card feeding is effected at 600 cards per minute and it also leaves sufficient time for this potential rate of feeding to be increased should it be so desired.

In the foregoing description the solenoid has been described as operating normally to effect tripping of latch 12 so that interruption of card feeding is effected when the solenoid is de-energised. It will be understood, however, that if desired the arrangement may be such that the latch 12 is normally active and the solenoid 31 is energised when interruption of card feeding is required.

It will also be understood that the card elevator may be of a form other than two bars as herein described, particularly should the cards be fed from the magazine in a direction transverse to the length thereof instead of lengthwise as illustrated in the drawings.

We claim:

1. Card feeding apparatus comprising a magazine, a picker device reciprocable cyclically relative to the bottom of the magazine to engage an edge of the bottom card of a pile contained in the magazine and to effect feeding of the card from the magazine, a card elevator and a cyclically operable cam co-operating therewith to effect movement thereof from a position below the magazine to a position at which the bottom card is elevated by the card elevator out of the path of the picker device, a trip device operable to connect the card elevator with the cam and to effect disconnection therebetween, and an automatically operable actuator co-operable with the trip device to control said connection and disconnection between the card elevator and cam thereby to prevent or permit feeding of the bottom card by the picker device without interruption of the operation of the picker device.

2. Card feeding apparatus comprising a magazine, a picker device reciprocable cyclically relative to the bottom of the magazine to engage an edge of the bottom card of a pile contained in the magazine and to effect feeding of the card from the magazine, a pair of bars extending one along each of two opposite sides of the picker device and pivoted at one end thereof for rocking movement from below the magazine to a position at which the bottom card is elevated thereby out of the path of the picker device, a cyclically operable cam to effect said movement of the said bars, a trip device operable to connect the bars with the cam and to effect disconnection therebetween, and an automatically operable actuator co-operable with the trip device to control said connection and disconnection between the bars and cam thereby to prevent or permit feeding of the bottom card by the picker device without interruption of the picker device.

3. Card feeding apparatus comprising a magazine, a picker device reciprocable cyclically relative to the bot-

tom of the magazine to engage an edge of the bottom card of a pile contained in the magazine and to effect feeding of the card from the magazine, a pair of bars extending one along each of two opposite sides of the picker device, a rocking shaft to which one end of each bar is secured to permit rocking of the bars from below the magazine to a position at which the bottom card is elevated thereby out of the path of the picker device, an arm connected to said shaft to effect rocking thereof, a cyclically operable cam to effect rocking of said arm, a trip device operable to connect the arm with the cam and to effect disconnection therebetween, and an automatically operable actuator co-operable with the trip device to control said connection and disconnection between the arm and cam thereby to prevent or permit feeding of the bottom card by the picker device without interruption of the picker device.

4. Card feeding apparatus comprising a magazine, a picker device reciprocable cyclically relative to the bottom of the magazine to engage an edge of the bottom card of a pile contained in the magazine and to effect feeding of the card from the magazine, a pair of bars extending one along each of two opposite sides of the picker device, a rocking shaft to which one end of each bar is secured to permit rocking of the bars from below the magazine to a position at which the bottom card is elevated thereby out of the path of the picker device, an arm connected to said shaft to effect rocking thereof, a cyclically operable cam to effect rocking of said arm, a rocking lever operable by said cam, a latch pivotally mounted on the rocking lever for co-operation with an abutment carried by said arm, a spring urging the latch towards said abutment, and an automatically operable actuator co-operating with the latch to control engagement thereof with said abutment and disengagement between the latch and abutment thereby to prevent or permit feeding of the bottom card by the picker device without interruption of the picker device.

5. Card feeding apparatus comprising a magazine, a picker device reciprocable cyclically relative to the bottom of the magazine to engage an edge of the bottom card of a pile contained in the magazine and to effect feeding of the card from the magazine, a pair of bars extending one along each of two opposite sides of the picker device, a rocking shaft to which one end of each bar is secured to permit rocking of the bars from below the magazine to a position at which the bottom card is elevated thereby out of the path of the picker device, an arm connected to said shaft to effect rocking thereof, a cyclically operable cam to effect rocking of said arm, a rocking lever operable by said cam, a latch pivotally mounted on the rocking lever for co-operation with an abutment carried by said arm, a spring urging the latch towards said abutment, and an automatically operable solenoid having an armature co-operating with said latch and adapted on energisation of the solenoid to disconnect the latch from said abutment thereby to permit feeding of the bottom card by the picker device.

6. Card feeding apparatus comprising a magazine, a picker device reciprocable cyclically relative to the bottom of the magazine to engage an edge of the bottom card of a pile contained in the magazine and to effect feeding of the card from the magazine, a pair of bars extending one along each of two opposite sides of the picker device, a rocking shaft to which one end of each bar is secured to permit rocking of the bars from below the magazine to a position at which the bottom card is elevated thereby out of the path of the picker device, an arm connected to said shaft to effect rocking thereof, a cyclically operable cam to effect rocking of said arm, a rocking lever operable by said cam, a latch pivotally mounted on the rocking lever for co-operation with an abutment carried by said arm, a spring urging the latch towards said abutment, an automatically operable solenoid having an oscil-

latable armature, a latch-actuating arm movable with said armature and adapted on energisation of the solenoid to rock said latch and disconnect it from said abutment to permit feeding of the bottom card by the picker device, and a fixed stop located in the path of said latch-actuating arm to permit movement thereof only when the torque applied to the armature approaches its maximum.

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