Oct. 10, 1950 J. L. McKEOWN 2,524,918

DEVICE FOR SEPARATING SHEETS, CARDS, OR THE LIKE

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FIG. 1.

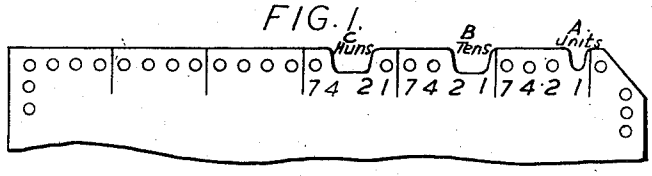


FIG. 2.

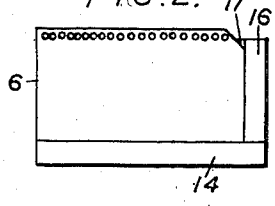


FIG. 3.

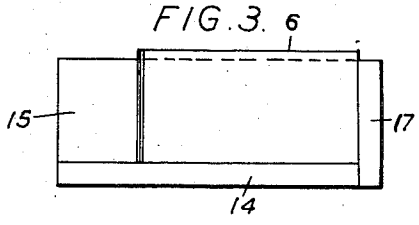


FIG. 4.

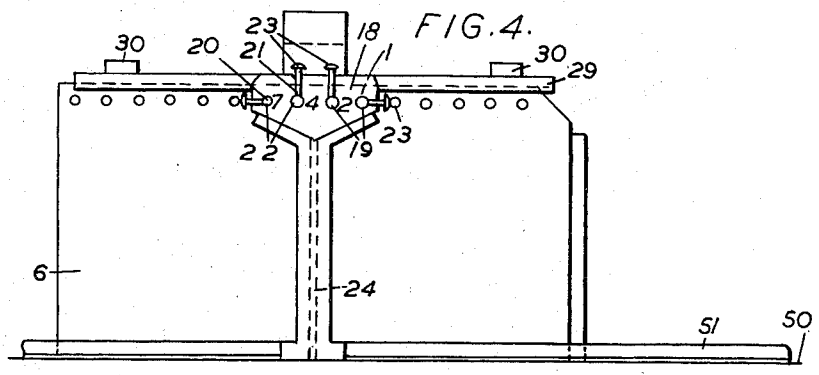
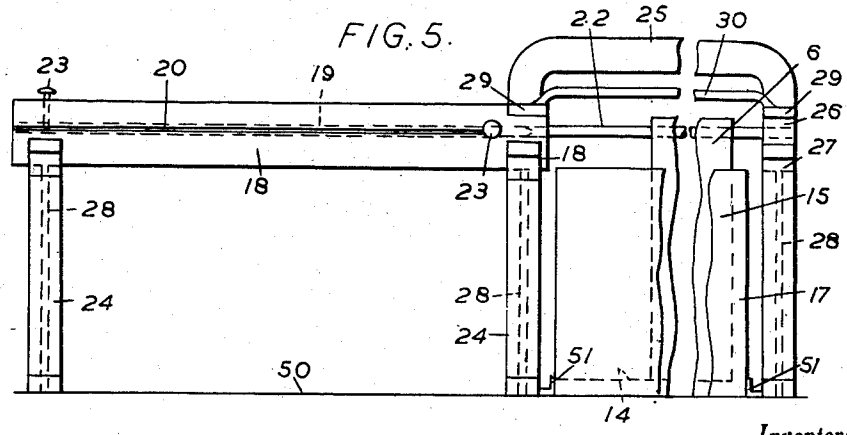


FIG. 5.



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FIG. 6.

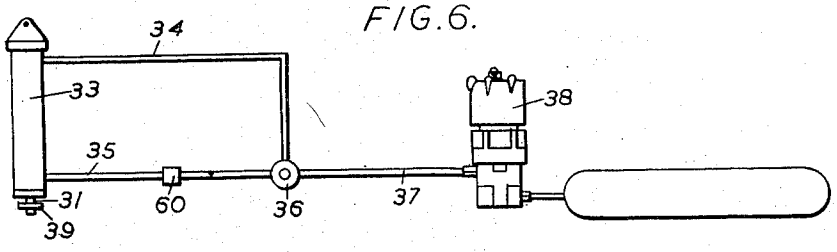
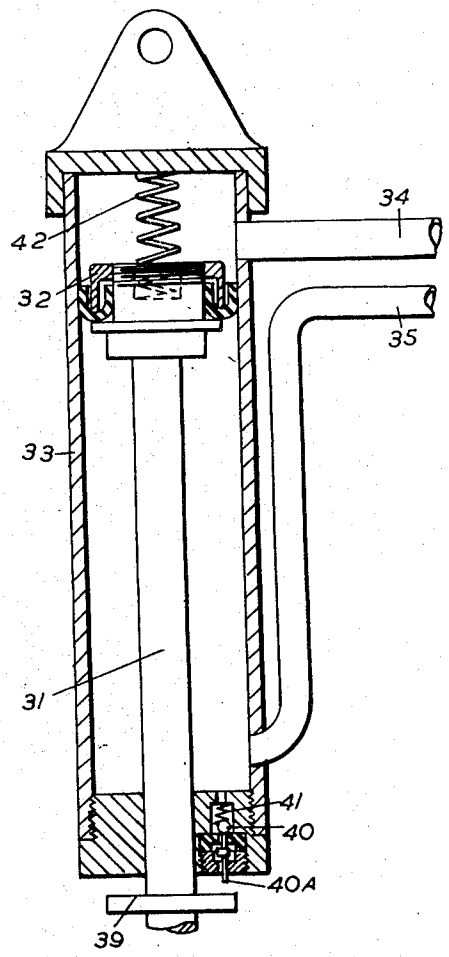


FIG. 7.



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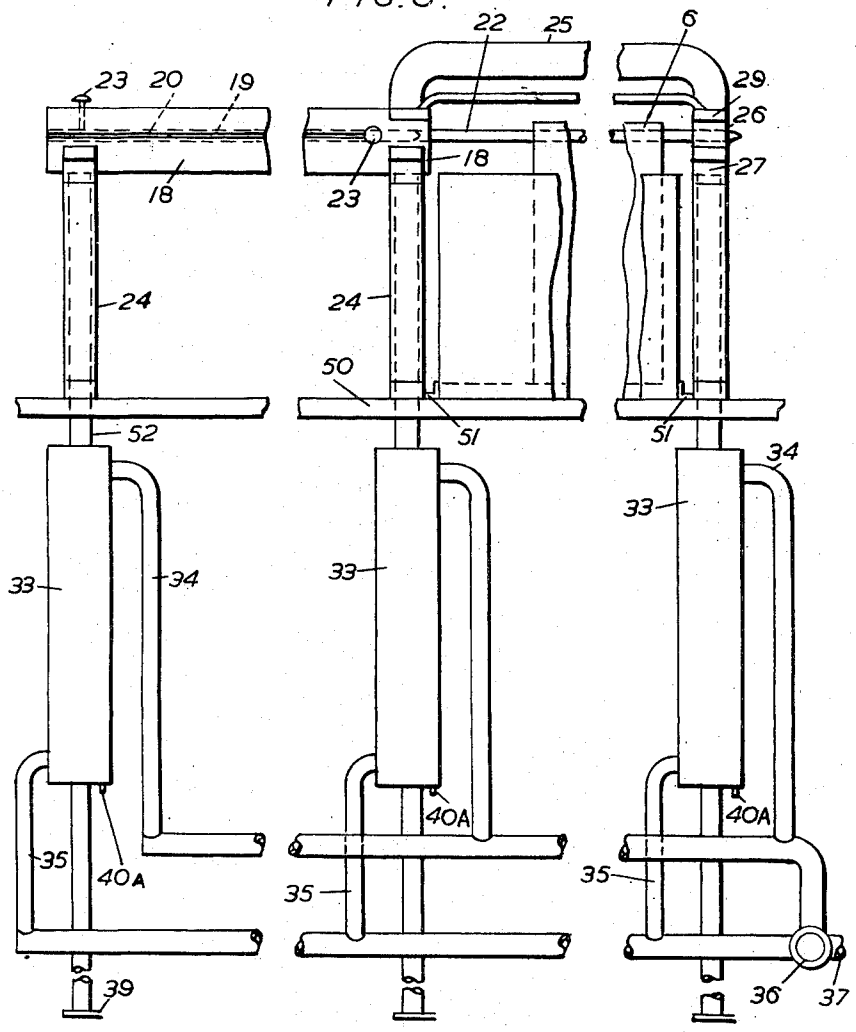
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DEVICE FOR SEPARATING SHEETS, CARDS, OR THE LIKE

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FIG. 8.



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DEVICE FOR SEPARATING SHEETS, CARDS, OR THE LIKE

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14 Claims. (Cl. 129—16.1)

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This invention relates to means for use in separating flat sheets, cards, tallies, checks, orders, documents or the like (hereinafter for the sake of brevity referred to as cards), of known kind in which each card is provided adjacent to one or more of its edges with perforations so placed that they may be opened out to the edge of the card, the several perforations on all the cards being so placed as to coincide with one another when the cards are stacked together, so that by stacking the said cards and working a rod, wire or other separating implement through any coinciding set of perforations, the cards in which these perforations have in every case been opened out may be separated from the remainder of the cards, the perforations of which remainder have not been so opened out; and in which, by the appropriate grouping, numbering and combination of these perforations in fields, a smaller number of perforations is necessary than the number of digits, numbers of classifications (hereinafter for the sake of brevity referred to as digits) that may be distinguished or represented in each field, the coding in such cases being known as "condensed coding." Any digit requiring the slotting out of more than one perforation will be known as a compound digit in order to distinguish it from a single digit which requires the slotting of one perforation only within each field.

It will be understood that in the case of a stack of cards with only single digits and a corresponding opened out perforation the cards bearing one digit will be left behind when a rod is passed through the stack and lifted to raise all the other cards which are not opened out at that digit. In one typical condensed code there are four perforations numbered 7, 4, 2, 1 and located in that order. The single digit cards for 7, 4, 2 or 1 are notched or opened out only at the respective numbered perforation. The compound digit cards are opened out at two of the single digits. For instance a 9 card is opened out at 7 and 2, an 8 at 7 and 1, a 6 at 4 and 2, a 5 at 4 and 1, and 3 at 2 and 1. It will thus be evident that one perforation of a single rod cannot segregate any particular cards because there will be left behind not only the single digit cards but also the compound digit cards in which the said single digit is compounded with another.

One aim of this invention is to provide a means capable of completely segregating, at one operation, any compound digit in any field.

An object of the invention is to provide instrument means which comprises a plurality of

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rods, needles or wires or the like of such number and spacing, or capable of being so spaced, that there is a group of needles of number and spacing corresponding to the number and spacing of the opened out apertures for each compound digit.

In order that the invention may be clearly understood the following more specific embodiments will now be described with reference to the accompanying drawings in which:

Fig. 1 shows a well known type of card with condensed coding.

Figs. 2 and 3 are respectively front and side elevations of a rack for the cards.

Figs. 4 and 5 are front and side elevations of a sorting mechanism.

Fig. 6 shows a pneumatic power arrangement for actuating the sorting mechanism of Figs. 4 and 5.

Fig. 7 is sectional view to a larger scale of the piston and cylinder of said pneumatic arrangement.

Fig. 8 is a modified form of the arrangement in Fig. 4.

As shown in Fig. 1 the card may have the perforations divided into "fields" of four A, B, C and so on representing units, tens, hundreds and so on and each four holes in any field singly represent the digits 7, 4, 2 and 1 and in the manner already described jointly give the compound digits 9, 8, 6, 5 and 3. The fields in the card shown are notched to give the numeral 631.

In Figs. 2 and 3 there is shown a suitable rack for the cards which consists of a base 14, a side 15 and a back 17. It may be of relatively heavy construction so that it will not move inadvertently under the needling action and/or it may be held in guides 51 as described later.

In Figs. 4 and 5 the apparatus comprises a holder which consists of a member 18 which has at least four elongated holes 19 corresponding to the hole spacing in the stack 6 of cards which are located in a rack as above described. The two outer holes have lateral slots 20 and the inner holes have vertical slots 21. These holes and slots slidably and frictionally accommodate the four needles 22 which have operating handles 23 which project out through the slots 20, 21. The lower part of the member 18 is of V-shape and rests in two V-shaped cradles 24 and it is provided with a central bridge or handle 25 which at its rear end has a V-shaped part 26 of similar cross shape to the part 18 and having four corresponding holes for the needles and which fits into a support cradle 27 similar to the cradles 24.

The member 18 and part 26 have guide pins 28 slidably engaging the cradles 24 and 27. Cross members 29 are provided on the member 18 and part 26 and are interconnected by lateral bridge members 30.

With this arrangement any one or more of the needles may be pushed inwards to engage the cards and the part 26, the other needles remaining inoperative but in correct alignment ready to be pushed into operative position if required. When the appropriate needles have been inserted the holder is raised, preferably by means of the bridge 25, the guide pins ensuring a parallel, vertical movement, and shaken or vibrated so that the appropriate cards will fall out. For instance if the appropriate needles are passed through perforations 4 and 2 all cards will fall out that are notched at these perforations to represent the compound digit 6. In similar manner a single needle may be used to separate out single digit cards after all the compound digit cards have been separated out. The lateral bridge members 30, which may be adjustable laterally or vertically, serve to prevent the cards tilting too much when being shaken and they also facilitiate separation if the tops of cards are slightly tapped against the members 30 during the shaking and vibration of the cards.

The card rack is adapted for relative lateral movement with reference to the holder so that the needles can be used in any desired "field" on the cards. To this end the rack may be slidable on the table 50 between guides 51.

This arrangement has the advantage that in segregating cards into numerical order, for example, there will always be one needle at least through the cards, holding them in position, so that the cards and the perforations therein will always be properly aligned for the next needling operation. For example, after sorting out the 9 digits cards which is done by using the needles 7 and 2 these needles will be left in position until needle 1 is inserted. Needle 2 can then be withdrawn and the cards are already properly needled and ready for sorting out digit 8. To sort out digit 7 needle 1 is withdrawn leaving needle 7 in position. In this way there will always be at least one needle in position in the cards until all digits have been completely sorted out from 9 to 1 so that the cards will always be found to be in alignment.

The last described arrangement may be adapted for power operation, as shown in Figs. 6 and 7. The bridge member 25 is attached to a piston rod 31 connected to a piston 32 in a cylinder 33 having air conduits 34 and 35 connected to a manually operable change over valve 36 which is connected by conduit 37 to a reducing and relief valve 38 in turn connected to a source of air under pressure. This valve need not be further described as it is of well known type and acts as a variable combined reducing and relief valve. The rod 31 has a flange 39 adapted to cooperate with a ball release valve 40 which is normally closed by the spring 41. At the top of the cylinder there is a compression spring 42.

The valve 36 which may simply be any suitable two-way valve enables air to be supplied to the bottom of the cylinder or cut off therefrom in which case it transfers from the bottom to the top of the piston and allows the latter to fall. If the air is supplied to the bottom the piston is raised until the flange 39 opens the valve 40 by the pin 40A and allows the air to escape whereupon the weight of the piston and associated parts and the spring 42 cause it to move down until the valve 40 again closes and the air pressure again raises the piston. Thus the piston is vibrated so long as pressure is supplied below the piston and the cards are shaken out. The valve 36 may also be moved to a neutral position so that the piston can be held in any desired position. The numeral 60 denotes an adjustable needle valve whereby the periodicity of vibration may be altered.

The arrangement in Fig. 8 is similar to that in Fig. 4 except that the pins 28 are replaced by three piston rods 52 adapted for pneumatic operation by the cylinders 33. The construction and operation of the cylinders and pistons is the same as in Figs. 6 and 7 except that the piston rods, in addition to extending out at the cylinder top, are extended out beyond the foot of the cylinders to carry the flanges 39 for operating the release valves 40A when the pistons are at the top of the stroke.

With the arrangements described all digits can be segregated in numerical order or all compound digits can be segregated in any desired order, after which all single digits can also be segregated in any order. Any compound digit can be segregated without disturbing or without any risk of upsetting the order of the cards remaining in the batch from which they are segregated.

In the following claims the term "card" or "cards" is intended also to include flat sheets, tallies, checks, documents or the like of any material which can be stacked.

What I claim is:

1. Means for separating cards from a stack of cards each card having a plurality of perforations along an edge and wherein single digits are presented by one perforation opened out to the edge of the card and compound digits are represented by a plurality of perforations opened out to the edge of the card, said means comprising a plurality of needles of which the spacing is such that a plurality of needles can be presented which correspond in spacing to the spacing of the opened perforations for any compound digit, holder means mounted for shaking movement in a plane parallel to the plane of the cards in the stack and provided with a plurality of elongated recesses for movably holding the needles for axial sliding movement of any one or more thereof and spaced to correspond with the perforations for a range of digits in the cards so that any one needle or any plurality of needles can be axially moved in the holder means and passed through the stack for the separation of any single digit cards or any compound digit cards and means for supporting the stack with the card perforations in horizontal alignment with the recesses so as to receive the needle or needles, the recesses being of sufficient length to support substantially the whole length of the needles when the latter are withdrawn from the stack.

2. Separating means as claimed in claim 1, having handle means whereby the holder means can be manually moved relative to the stack and shaken to separate the cards.

3. Separating means as claimed in claim 1, having power means whereby the holder means can be moved vertically relative to the stack and shaken and guide means whereby the holder means is guided for the vertical movement.

4. Separating means as claimed in claim 1, in which the needles are permanently but movably located in the recesses in the holder means and have handle parts projecting therefrom out of

the slots whereby the needles can be slid to an inoperative position in which they are free of the stack and an operative position in which they engage the stack and means for raising and vibrating the holder means and the needles.

5. Means for separating cards from a stack of cards each card having a plurality of perforations along an edge and wherein single digits are represented by one perforation opened out to the edge of the card and compound digits are represented by a plurality of perforations opened out to the edge of the card, said means comprising a plurality of needles of which the spacing is such that a plurality of needles can be presented which correspond in spacing to the spacing of the opened perforations for any compound digit and holder means provided with a plurality of elongated guide recesses for slidably holding the needles and spaced to correspond with the perforations for a range of digits in the cards so that any one needle or any plurality of needles can be inserted for the separation of any single digit cards or any compound digit cards, and power means for raising the holder means and needles to separate the appropriate cards, the said guide recesses being of sufficient length to hold and support the full length of the needles when withdrawn from the stack and so maintain them in alignment for reinsertion and firmly hold the needles during said raising movement.

6. Separating means as claimed in claim 5, in which the power means comprises a piston and cylinder device connected to the holder means, a source of air under pressure and manual valve means whereby the piston and cylinder device can be operated to raise or lower the holder means.

7. Separating means as claimed in claim 5, in which the power means comprises a piston and cylinder device connected to the holder means, a source of air under pressure and manual valve means whereby the piston and cylinder device can be operated to raise or lower the holder means and means for vibrating the piston when it reaches the top position, said vibrating means comprising a release valve normally spring-urged to closed position on the cylinder positioned to be opened automatically by the arrival of the piston at the top position and spring means for urging the piston away from said position.

8. Separating means as claimed in claim 5, in which the power means comprises a piston and cylinder device connected to the holder means, a source of air under pressure and manual valve means whereby the piston and cylinder device can be operated to raise or lower the holder means and means for vibrating the piston when it reaches the top position, said vibrating means comprising a release valve normally spring-urged to closed position on the cylinder located to be opened automatically by the arrival of the piston at the top position and spring means for urging the piston away from said position, and adjustable valve means for adjusting the rate of supply of air to the lower end of the piston to vary the periodicity of vibration.

9. Means for separating a card from a stack of cards each card having a plurality of perforations along an edge wherein single digits are represented by one perforation opened out to the edge of the card and compound digits are represented by a plurality of perforations opened out to the edge of the card, said means comprising a plurality of needles of which the spacing is such that a plurality of needles can be presented which correspond in spacing to the spacing of the opened perforations for any compound digit and holder means for the needles which is capable of movement relative to the stack to cause the needles when inserted through the stack to cause separation of the card, said holder means having elongated slots for slidably supporting the needles and of such length as to wholly support the needles when withdrawn from the stack.

10. Means for separating a card from a stack of cards each card having a plurality of perforations along an edge and wherein single digits are represented by one perforation opened out to the edge of the card and compound digits are represented by a plurality of perforations opened out to the edge of the card, said means comprising a plurality of needles of which the spacing is such that a plurality of needles can be presented which correspond in spacing to the spacing of the opened perforations for any compound digits and single digits and holder means provided with a plurality of recesses for movably holding the needles and spaced to correspond with the perforations for the range of digits in the cards so that any plurality of needles of desired spacing can be inserted for the separation of any card, said recesses being in the form of elongated slots enabling sliding movement of the needles to a position in which they project through the stack and a withdrawn position in which they are wholly supported in the slots ready for insertion into the stack.

11. Means for separating cards from a stack of cards each card having a plurality of perforations along an edge and wherein single digits are represented by one perforation opened out to the edge of the card and compound digits are represented by a plurality of perforations opened out to the edge of the card, said means comprising a plurality of needles of which the spacing is such that a plurality of needles can be presented which correspond in spacing to the spacing of the opened perforations for any single or compound digits and holder means provided with a plurality of recesses for movably holding the needles and spaced to correspond with the perforations for the range of digits in the cards so that any needle or combination of needles of any desired spacing can be inserted for the separation of any desired card and power means for raising the holder means and needles to separate the appropriate card, said recesses being in the form of elongated slots enabling sliding movement of the needles to a position in which they project through the stack and a withdrawn position in which they are supported in the slots ready for insertion into the stack.

12. Means for separating cards from a stack of cards each card having a plurality of perforations along an edge and wherein single digits are represented by one perforation opened out to the edge of the card and compound digits are represented by a plurality of perforations opened out to the edge of the card, said means comprising a plurality of needles of which the spacing is such that a plurality of needles can be presented which correspond in spacing to the spacing of the opened perforations for any compound digit and holder means provided with a plurality of elongated guide recesses for slidably holding the needles and spaced to correspond with a few of the perforations, guide means for allowing lateral movement of the holder relatively to the cards so that the needles can be brought into register with and inserted into any corresponding num-

ber of the perforations along the entire card, and power means for raising the holder means and needles to separate the appropriate cards, the said guide recesses being of sufficient length to hold and support the full length of the needles when withdrawn from the stack and so maintain them in alignment for re-insertion and firmly hold the needles during said raising movement.

13. Means for separating cards from a stack of cards each card having a plurality of perforations along an edge and wherein single digits are represented by one perforation opened out to the edge of the card and compound digits are represented by a plurality of perforations opened out to the edge of the card, said means comprising a plurality of needles of which the spacing is such that a plurality of needles can be presented which correspond in spacing to the spacing of the opened perforations for any compound digit and holder means provided with a plurality of elongated guide recesses for slidably holding the needles and spaced to correspond with the perforations for a range of digits in the cards so that any one needle or any plurality of needles can be inserted for the separation of any single digit cards or any compound digit cards, and power means for raising the holder means and needles to separate the appropriate cards, the said guide recesses being of sufficient length to hold and support the full length of the needles when withdrawn from the stack and so maintain them in alignment for re-insertion and firmly hold the needles during said raising movement, said power means comprising a piston and cylinder device connected to the holder means, a source of air under pressure and manual valve means whereby the piston and cylinder device can be operated to raise or lower the holder means and means for vibrating the piston when it reaches the top position, said vibrating means comprising a release valve normally spring-urged to closed position on the cylinder located so as to be contacted by and opened by a part moving with the piston when the latter arrives at its top position and spring means for urging the piston away from said position.

14. Means for separating cards from a stack of cards each card having a plurality of perforations along an edge and wherein single digits are represented by one perforation opened out to the edge of the card and compound digits are represented by a plurality of perforations opened out to the edge of the card, said means comprising a plurality of needles of which the spacing is such that a plurality of needles can be presented which correspond in spacing to the spacing of the opened perforations for any compound digit and holder means provided with a plurality of elongated guide recesses for slidably holding the needles and spaced to correspond with the perforations for a range of digits in the cards so that any one needle or any plurality of needles can be inserted for the separation of any single digit cards or any compound digit cards, and power means for raising the holder means and needles to separate the appropriate cards, the said guide recesses being of sufficient length to hold and support the full length of the needles when withdrawn from the stack and so maintain them in alignment for re-insertion and firmly hold the needles during said raising movement, said power means comprising a piston and cylinder device connected to the holder means, a source of air under pressure and manual valve means whereby the piston and cylinder device can be operated to raise or lower the holder means and means for vibrating the piston when it reaches the top position, said vibrating means comprising a release valve normally spring-urged to closed position on the cylinder and located to be engaged and opened by the arrival of the piston at the top position and spring means for urging the piston away from said position, and adjustable valve means for adjusting the rate of supply of air to the lower end of the piston to vary the periodicity of vibration.

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