Feb. 10, 1948. C. E. BURNS 2,435,574

PUNCHING MACHINE

Filed May 14, 1945 3 Sheets-Sheet 1

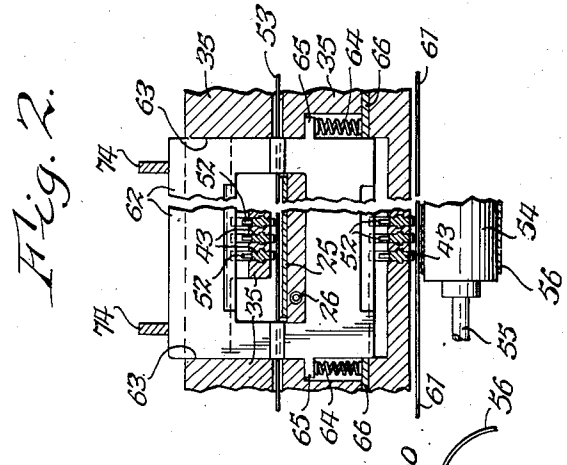


Fig. 2.

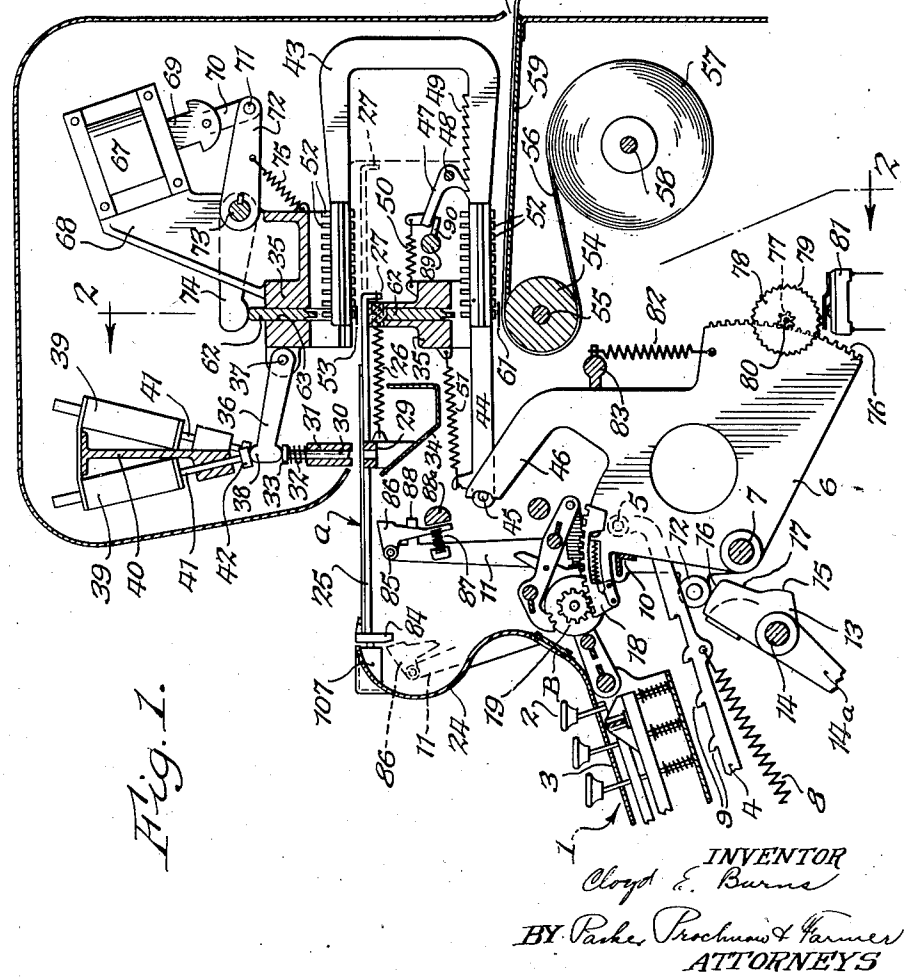


Fig. 1.

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Fig. 4.

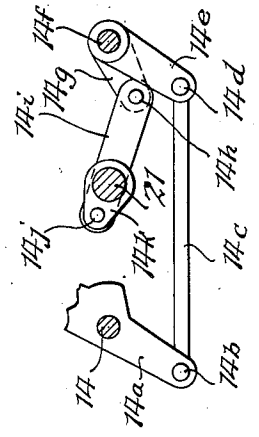
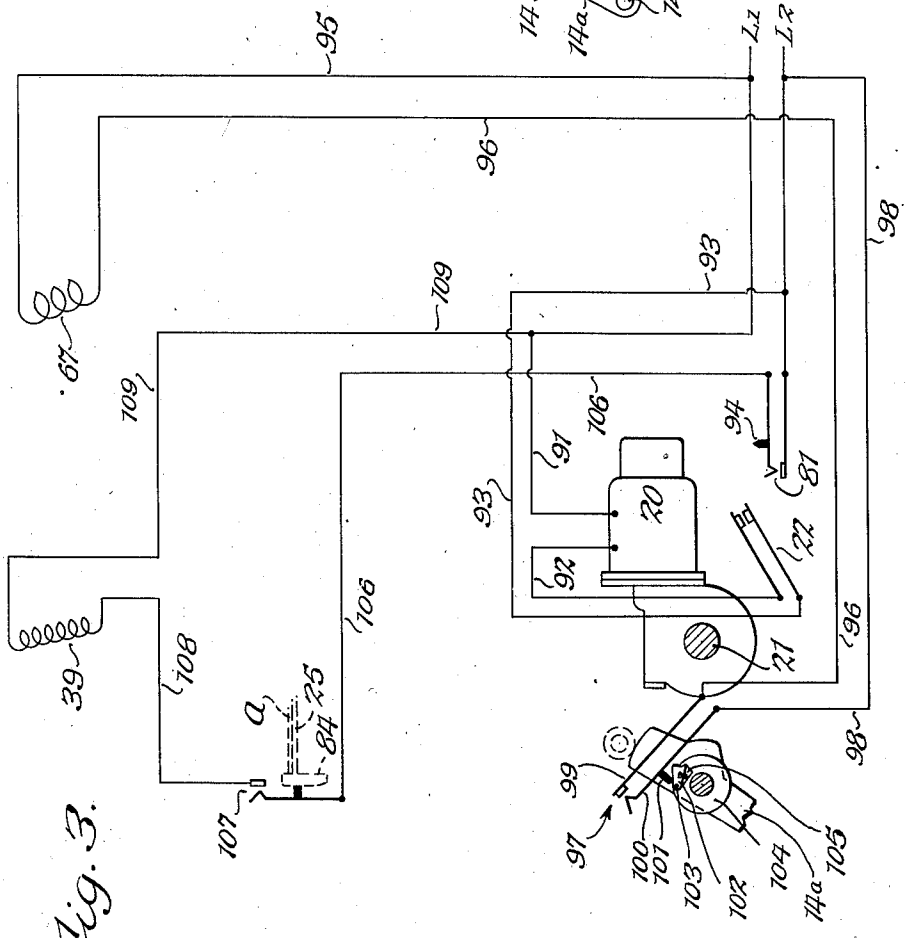


Fig. 3.



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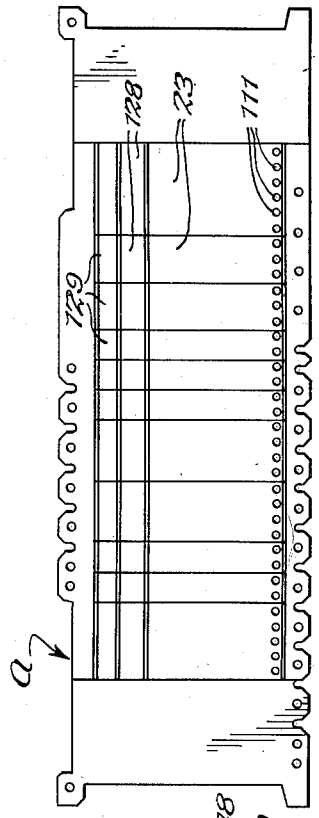


Fig. 6.

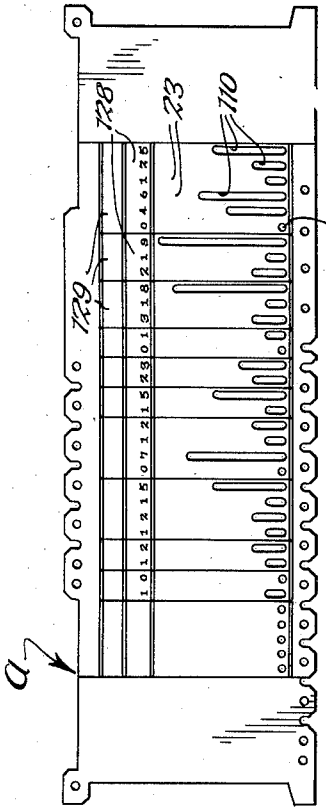


Fig. 7.

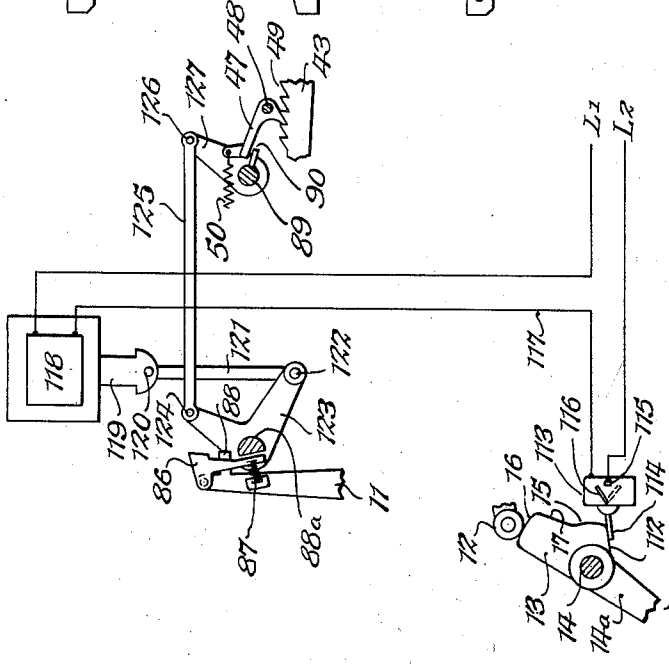


Fig. 5.

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UNITED STATES PATENT OFFICE

2,435,574

PUNCHING MACHINE

Cloyd E. Burns, Stamford, Conn.

Application May 14, 1945, Serial No. 593,744

25 Claims. (Cl. 164—113)

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This invention relates to the entry or recording of data on cards, by means of which the cards may be selectively sorted into any of many different groups according to the data entered thereon. In my copending application Ser. No. 567,477, filed December 9, 1944, the data as numbers is printed or written on the cards at the heads of columns and also recorded as slots of lengths varying proportionately to numbers printed on the card. The instant invention relates to apparatus for printing the data or information as numbers on the cards, and also in punching or cutting the slots in the cards of the proper lengths and in the proper zones or positions on the cards in accordance with the numbers printed thereon. It is desirable also to make a cumulative total of many of these entries, such as amounts of money, or quantities of items, and a permanent listing of the entries on a large number of cards.

An object of this invention is to provide an improved device for entering data on such cards in a simple and practical manner, so that the cards may subsequently be mechanically sorted and grouped according to the data entered thereon.

Another object of the invention is to provide an improved device for making a record on cards of suitable data, through which the cards may subsequently be grouped and sorted; with which the entry may be made by suitable manipulation of a keyboard; with which an item set up in the keyboard will be printed on the card, and slots cut in the card of lengths, and in positions, corresponding to the numbers set up in the keyboard; with which a record or list of all the items printed on the cards may be made in columns on a record tape; with which any of the numbers set up may be accumulated in a totalizer as part of the same operation; and which will be relatively simple, convenient, rapid, compact, practical and inexpensive.

Another object of the invention is to provide an improved device for punching slots in cards; with which the size of slot to be formed in a record card may be predetermined by suitable manipulation of a keyboard; with which correction in the operation of the keyboard may be made before the formation of the slots occurs; with which the slots will be cut automatically when an operation is initiated following the manipulation of the keyboard; which may utilize existing types of mechanism as much as possible; and which may be operated by relatively unskilled operators.

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Varous other objects and advantages will be apparent from the following description of one embodiment of the invention, and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawings:

Fig. 1 is a longitudinal, sectional elevation through a machine constructed in accordance with this invention;

Fig. 2 is a transverse, sectional elevation of a portion of the same, the section being taken approximately along the line 2—2 of Fig. 1;

Fig. 3 is a wiring diagram of some of the control circuits for the same;

Fig. 4 is a diagram of mechanism for converting rotary motion of the motor into rocking motion of a main shaft, and used in the machine illustrated in Figs. 1 to 3;

Fig. 5 is a wiring diagram of further control circuits of the same;

Fig. 6 is a face elevation of a standard card upon which entry of data is to be made; and

Fig. 7 is a similar view of the same card after data has been entered thereon by this apparatus.

Referring first to Figs. 1 and 2, the invention may utilize much of the mechanism of an adding machine sold in the open market by the Allen-Wales Adding Machine Corporation, and which is disclosed, for example, in U. S. Patents Nos. 1,386,021 of August 2, 1921, 1,386,022 of August 2, 1921, and 1,646,105 of October 18, 1927. The device includes a suitable keyboard 1 illustrated in said patents and having a plurality of rows of keys 2, the rows being arranged side by side and the keys in each row being selectively operable. These keys are all mounted in a keyboard unit 3 which may be detached from, or applied to the remainder of the machine as a unit, as fully disclosed in said Peters Patents Nos. 1,386,021 and 1,386,022 to which referrence may be had for more detailed information.

When any key in a row is depressed, it releases all of the other keys in the row so that they may rise, and the depressed key acts as a stop for a related stop bar 4 which is slidably mounted at one end, and at its other end pivotally connected by a pin 5 to a rack element 6 which is individually rockable on a shaft 7. An individual spring 8 is connected to each stop bar 4 so as to urge it yieldingly and forwardly until stopped by a depressed key 2 in the related rows of keys. Each stop bar has lugs 9 arranged in spaced relation along its upper edge, so that the stop bar will not have to move the full length of the related

row of keys before being stopped by a depressed key.

There is a stop bar 4 and a rack element 6 for each row of keys, all individually free to move forwardly under the action of the related, individual spring 8. The rack elements 6 are arranged side by side in spaced relation to each other along the shaft 7, and extending crosswise in front of all of these rack elements is a cross bar 10 which is carried at its ends by two arms 11, one at each side of the machine, and also rockable on the shaft 7. Each arm 11 has a roller 12 which rides upon the surface of a cam 13 which is fixed on the main operating shaft 14, there being a cam 13 adjacent each side of the machine. The shaft 14 is rockably mounted in the frame of the machine and extends from side to side. Each cam 13 has a portion 15 which is concentric to the axis of the shaft 14, and another arcuate portion 16 also concentric to the shaft 14, but spaced angularly about said axis from the concentric portion 16.

The arcuate portion 16 is further from the shaft 14 than the arcuate portion 15, and adjacent ends of these portions are connected by an active cam surface 17. The arcuate portions 15 and 16 may be called dwell portions or zones, because when the roller 14 is riding on either of them, there will be no movement of the arms 11. When the connecting portion 17 is engaged by the roller 12 while the shaft 14 is rocking, the arms 11 will be given a rapid rocking movement between two definite limits of movement, determined by the positions of the dwells 15 and 16. The cross bar 10, extending across the row of rack elements 6 holds them all in retracted or normal positions, such as shown in Fig. 1.

When the shaft 14 is first rocked counter-clockwise in Fig. 1, the roller 12 will first roll along the concentric dwell 16 for a given angular movement of the shaft 14, and then down the inclined connecting cam surface 17 during which the arms 11 move forwardly, until the roller 12 engages the arcuate zone 15, whereupon the roller 12 will move further along the concentric zone 15 while the shaft 14 rocks further in the same direction. This prevents further forward movement of the arms 11.

When the arms 11 move forwardly, the bar 10 will move forwardly to release all of the rack elements 6, and each rack element will then move forwardly until stopped by the zero stop if no key has been operated, or by engagement of a lug 9 of the connected stop bar 4 with a depressed key 2 in the related row of keys.

It will be understood, of course, that as in the keyboard as disclosed in said patent, there is a zero stop which is always effective to prevent substantial movement of the related stop bar unless one of the other keys in that row is operated, in which event the zero stop is released. The rack elements 6 will thus be stopped in different angular positions on the shaft 7. After a given angular movement of the shaft 14 in the counter-clockwise direction, it has an angular movement of the same amount in the opposite or clockwise direction, during which the roller 12 rides in the opposite direction along the concentric zone 15 for a given angular distance, then up the cam surface 17 until the roller engages the concentric zone 16, and then along that zone for the remainder of the movement. This moves arms 11 rearwardly and thereby returns cross bar 10 to its initial position. As the cross bar 10 returns to its normal position shown in Fig. 1, while rollers 12 are running on cam zones 17, it will pick up the rack elements 6 in succession where they have been stopped and carry them all back to the initial or normal position of Fig. 1.

Each rack element 6 has a rack member 18 which operates a totalizer digest wheel 19 during movement of the rack element in one direction, and there is a carryover between a group of adjacent digit wheels of the totalizer as disclosed in said prior patents to total the items set up in any group of columns forming an entry space. During movement of the rack members in one direction, the totalizer having wheels 19 will be shifted out of engagement with the rack members, but will be in mesh with the rack members during movement in the opposite direction, all as disclosed in said patents.

In said prior Patent No. 1,336,021, the shaft 200 corresponds to the shaft 14 of this application, and in that patent it is operated by a handle 5. However, many adding machines of this type now on the market are operated by an electric motor, and when started, will operate for a given cycle, and then stop automatically, which replaces the manual operation disclosed in said prior patent. One example of such mechanism for operating a shaft through a given cycle and then stopping it automatically, with opening of the circuit of the electric motor, is disclosed in U. S. Patent to Fried, No. 2,099,560 of November 16, 1937, to which reference may be had for a more complete disclosure. In that Fried patent the shaft 11 corresponds to the main shaft 14 of this application.

In the present invention the main shaft 14 carries an arm 14*a* which is pivotally connected by pin 14*b* (Fig. 4) to one end of a link 14*c*, the other end of link 14*c* being pivotally connected by a pin 14*d* to an arm 14*e* which is fixed on a shaft 14*f*. Another arm 14*g* which is fixed on the shaft 14*f* is pivotally connected by a pin 14*h* to one end of a connecting rod 14*i*, and rod 14*i* is pivotally connected at its other end to a crank pin 14*j* on a crank arm 14*k*, which is fixed on the shaft 21. The one revolution clutch mechanism is provided on the shaft 21, and it controls the switch 22 shown in Fig. 3, in the manner shown in said Fried patent (see particularly Fig. 10 of that patent). A governor, not shown, may, and preferably will be provided in series in the motor circuit to control the speed of the motor, and consequently the rate of operation of the machine, but inasmuch as any suitable governor may be employed and adds only its expected function, no illustration and description of any particular governor is given herein. The switch 22 is closed to start an operation in the manner shown in said Fried patent.

The mechanism so far disclosed is commonly employed in adding machines now on the market, except that with this invention a separate totalizer is provided for each group of rows of keys corresponding to the number of columns in each entry space 23, Figs. 5 and 6, of a card *a* on which entries are to be made, so that there will be no carryover between items in any entry space into those of another entry space. For example, in Figs. 6 and 7 there will be six columns in the right-hand entry space 23, three in the entry space next to the left, and so on, and a carryover between the digit wheels for each entry space 23 to an adjacent entry space will be avoided. For entry spaces 23 where the items entered are not amounts, but merely route numbers of some similar information, the totalizer for that entry space

can be omitted, because there would be no advantage in totalizing numbers which merely identify territory or salesmen's numbers. Totalizers are used, however, for entry spaces such as amounts of money, or kilowatt hours consumed, or numbers of items purchased, etc., where a total of the numbers entered might be useful.

Inasmuch as, with this exception just explained, the keyboard, stop bars, rack elements and related parts employ mechanisms similar to those disclosed in said patents, they have been shown only schematically for a single row of keys, and reference may be had to said prior patents for further information as to the mechanisms by which the different functions are accomplished and certain parts duplicated for a plurality of columns and entry spaces. To this mechanism which has just been explained, has been added additional mechanism for printing on the card the items set up in the keyboard, the punching of the slots in the entry spaces **23**, and the entry on a tape of all of the items printed on the cards. The digit wheels of the totalizers **19** may be viewed through a window B, Fig. 1, in the housing **24**.

At the top of the housing (Fig. 1) is a carriage or support **25** having a flat supporting surface on which the cards *a* (Fig. 5) are supported in succession for the entry thereon of the desired data. This support **25** is mounted for movement back and forth in a direction parallel to said surface in any suitable manner, but is initially or normally in the position shown by full lines in Fig. 1, into which it is urged by two springs **26** (Figs. 1 and 2) which engage with lugs **27** on the carriage. This support or carriage **25** (Fig. 1) has spaced ribs, so that the portion of the carriage beneath each column space **23** is exposed at both upper and lower faces. Below each column in each column space **23** is a female die **29** in close proximity to the lower face of card *a*. A punch element **30** is mounted for reciprocation in a guide **31** disposed above and aligned with each die **29** and above any card *a* then on the support. There is a punch element and an aligned die for each column in each entry space **23** of the card. Each punch element **30** is retracted or elevated by a helical spring **32** which acts between the upper end face of the guide **31** and a head **33** on the upper end of the element **30**.

A receptacle **34** is supported beneath the row of dies **29** so as to receive the punchings from the dies, and the frame connecting the dies **29** across the machine serves as convenient anchorage for one end of each of the springs **26**, there being one spring **26** adjacent each side of the carriage. A head **35** extends across the frame of the machine at the rear of the punch guide **31**, and springs **26** pass through passages in this head. A plurality of links **36** are arranged side by side, but spaced apart, in a row extending in a direction crosswise of the machine, and pivoted at **37** to the head **35**. The free ends of links **36** extend over the heads **33** of the punch elements **30**, are vertically elongated as at **38**, and have arcuate lower edges which engage and rock upon the upper faces of the heads **33** of the punch elements, there being an individual link **36** engaging with each head **33**.

A plurality of electromagnets **39** are supported in a suitable frame **40** above the punch guides **31**. Each electromagnet **39** has a reciprocating armature or core **41**, and each core **41**, at its lower end, has a head **42** which bears upon the convex upper end of the head **38** of an individual, related link **36**, so that when any solenoid **39** is energized, it will operate its core **41** downwardly, rock its related lever **36** which acts as an interponent, and in turn, push downwardly the related punch element **30** sufficiently to pierce the card *a* and enter the aperture in the die **29**. When a solenoid is deenergized, spring **32** on the related element **30** returns the operated punch element **30** to its elevated position, which rocks the related lever **36** upwardly and returns the operated core or armature **41** to its elevated position.

Inasmuch as it may be desirable to arrange the adjacent columns rather closely side by side, the electromagnets **39** may be tilted alternately forwardly and rearwardly to opposite sides of a vertical plane through the guide **31**, as shown in Fig. 1. The circuits of the solenoids **31** will be individually controlled in a manner which will be explained later herein.

A plurality of individual printing elements **43** are arranged side by side, and slidingly mounted in the head **35**, as shown in Figs. 1 and 2. These printing elements **43** are somewhat U-shaped in form, with the lower arm of each provided with a forward extension **44** which carries at its forward end, a laterally extending pin **45**. There is one printing element **43** for each rack element **6**, and each rack element **6** has an upstanding arm **46** which engages against the rear of the pin **45** of the related printing element **43**, so that when any rack element is rocked forwardly, or to the left in Fig. 1, it will, through the pin **45** which it engages, shift a related printing element **43** forwardly, to an extent corresponding to a particular key, in a related row of keys which has been depressed.

This will selectively position the printing elements **43** forwardly, and each printing element is held temporarily in whatever advanced position it is moved into, by an individual pawl or ratchet **47** pivoted at **48** which engages with ratchet teeth **49** on that printing element. An individual spring **50**, connected between each pawl **47** and the head **35**, yieldingly urges the nose of the pawl into engagement with the related ratchet teeth **49**. The ratchet teeth **49** are so inclined that when that element **43** is moved forwardly (left in Fig. 1), the ratchet teeth will cam aside the pawl **47**, but the engagement of the pawl with the teeth will prevent return movement of that printing element **43**. A spring **51** connected between the head **35** and the extension **44** of each printing element yieldingly urges each printing element rearwardly into its normal or idle position.

Each arm of each printing element **43** carries a row of type elements **52** which are normally spring retracted, individually, but which may be individually moved vertically for printing purposes. These type bars have a construction and mounting similar to those of the type bars or type elements disclosed in said prior patents for printing on a record tape the items set up on the keyboard of the machine of those prior patents. The corresponding type elements **52** in both upper and lower arms of each printing elements **43** are preferably aligned with each other. When the printing elements **43** are retracted, the zero type elements **52** may be in printing positions as shown, or they may be just beyond printing positions as in the adding machines of said patents. For the purpose of simplifying the description, the printing elements **43** are shown in positions to print the zeros when in retracted positions. The upper arm of each element **43** is above the path of travel of the carriage **25**, so that when the carriage **25** moves rearwardly into

the dash line position shown in Fig. 1, the record card thereon will be moved into a position beneath the type elements 52 in the upper arms of the printing elements 43, so that numbers may be printed directly upon the card *a*.

A ribbon 53, similar to a typewriter ribbon, extends in a direction from side to side of the machine beneath the type elements 52 in the upper arms of the printing elements 43, and just above the card *a* when the card is moved rearwardly, so that the type elements 52 of the upper arms of elements 43, when depressed, will print through the ribbon upon the card in the same manner that the type of a typewriter prints through a ribbon upon a paper held against the platen. The ribbon will be wound alternately upon spools at opposite sides of the machine and fed along in small increments by mechanism similar to that employed in typewriters for feeding the typewriter ribbon selectively in either direction.

A cylindrical platen 54 is disposed below the type elements 52 of the lower arms of the printing elements. This platen 54 is a cylinder extending from side to side of the machine and mounted on a rod or shaft 55 that is rotatably supported in the frame of the machine. A paper tape 56, wound on a spool 57 that is rotatably mounted on a shaft 58, is conducted around the platen 54, and then carried rearwardly over a plate 59 and discharged through an aperture or slot 60 in the rear of the housing 24. The tape 56 is fed past printing position by increments at each printing operation by the usual means employed in adding machines to move the tape ahead after each printing operation, and since the details of the tape feeding means are not a part of this invention they have not been illustrated.

Another inked typewriter ribbon 61 is disposed above the platen 54 and tape 56, below the type elements 52 in the lower arm which are in printing position, so that when the type elements 52 in the lower arms that happen to be in printing position, are depressed, they will print through the ribbon 61 upon the tape 56. A striker or hammer 62, Figs. 1 and 2, which is of closed loop form, is mounted in a vertically extending slot 63 in both the upper and lower arms of the head 35. The upper arm of the striker 62 extends across the type elements in the upper arms of all of the printing elements 43 in printing position at any time, and the lower arm of the striker 62 similarly extends across all of the type elements 52 in the lower arms of the printing elements 43, which are at any time in printing position. The striker 62 is normally held elevated by springs 64, Fig. 2, which engage between lugs 65 in the striker 62, and suitable abutments 66 on the head 35. When the striker is depressed, it compresses spring 64, so that as soon as the striker is released, the springs 64 will elevate it so as to clear the type keys 52 and enable the printing elements 43 to move forwardly or rearwardly.

An electromagnet or solenoid 67 is mounted in a frame 68 extending upwardly from the head 35, and its core or armature 69 is articulately connected through a link 70 to a pin 71 on a lever 72, and lever 72 is fixed on a shaft 73, also rockably mounted in the frame 68. The shaft 73 extends in a direction from side to side of the machine, and fixed thereon adjacent each side of the machine is an arm 74 which bears at its free end on the striker 62. Thus when the electromagnet 67 is energized, it will cause rocking

of the two arms 74, and the application of a depressing force to the end portions of the striker 62. When the striker moves downwardly, it will operate the type elements 52 of both upper and lower arms so as to print upon the card *a* and the tape 56 simultaneously.

Since the corresponding type elements 52 in the upper arm are aligned with or bear a definite relationship to those in the lower arm of the same element, the same numbers will always be printed upon the tape 56 as those that are printed upon the card *a*. A spring 75 acts between the head 35 and the arm 72 to retract the armature 69 and rock arms 64 in a direction to release the striker 62 when the electromagnet 67 is de-energized. The circuit for the electromagnet 67 will be discussed later herein.

Each rack element 6 is also provided with rack teeth 76, Fig. 1, arranged in a row concentric with the shaft 7. A pinion 77 meshes with the teeth 76 so as to be driven thereby. The pinion 77, in turn, is fixed upon a wheel 78 having peripheral teeth 79. Wheel 78 and pinion 77 form a unit, and the units for all of the elements 6 are individually mounted for rotation on a common shaft 80. An electric switch 81 is disposed for operation by the teeth 79 of each wheel 78, there being one switch 81 for each rack element 6. When a rack element rocks in either direction, it will rotate its related wheel 78 at a much faster rate, which will cause repeated rapid operations of the switch 81 for a purpose which will be explained later herein.

A spring 82 is connected between each rack element 6, and a cross stop bar 83, so as to urge each rack element forwardly to supplement the action of the spring 8 acting on the related stopping bar 4. Springs 8 and 82 together are substantially more powerful than the spring 51, so that when the cross bar 10 moves forwardly to release the rack element 6, the latter will be moved by springs 8 and 82 forwardly, and will move the connected printing elements 43 forwardly against the action of springs 51 that tend to retract the printing elements. Each spring 51 is powerful enough to retract its printing element 43 after that printing element has been released by the rack element 6, and has also been released from its pawl 47. The cross bar 83 serves to limit excessive rearward movement of all of the rack elements, although the movable cross bar 10 holds them in the retracted positions.

The card carriage 25 is provided along its forward edge with a depending flange 84, and each of the arms 11 has pivoted thereto at 85, a latch or pawl 86. A spring 87 acts between each arm 11 and an arm of the attached pawl 86 for urging that pawl in a counter-clockwise direction in Fig. 1 to an extent permitted by the limit stop 88. When the arms 11 move forwardly (left in Fig. 1), the pawls 86 will be moved into the positions shown in dash lines in Fig. 1, where they will be in front of the flange 84, and during this movement these pawls will be cammed aside or clockwise by the flange 84, after which the pawls or latches 86 will be shifted by their springs 87 back into the positions shown. Then when the arms 11 move rearwardly, the latches 86 will engage with the flange 84 of the card carriage, and will move the card carriage rearwardly into the dash line position shown in Fig. 1, and will hold it in that rearward position until the latches or pawls 86 are rocked clockwise to release the flange 84, in which event the springs 26 will re-

tract the card carriage 25 to the full line position shown in Fig. 1.

A rod 88a extends from side to side of the machine, and is rockably mounted. It has flat faces adjacent the latches 86 when the arms 11 are in their rearward positions shown by full lines in Fig. 1. The rod 88a is normally in the position shown in Fig. 1 where the flat face clears the latches 86. When this rod 88a is rocked, however, the circular portion of the periphery of the rod 88a will engage the latches 86 and rock the latter in directions to release the flange 84. The rocking of this rod 88a at the proper time will be discussed later herein.

Also extending from side to side of the machine and mounted for rotation about its longitudinal axis is another rod 89 having arms 90, one for each pawl 47. The rod 89 is normally held in an angular position in which the arms 90 will not interfere with the rocking movements of the pawls 47, but when rocked counter-clockwise in Fig. 1, the arms 90 will engage with the pawls 47 and rock them in directions to release all of the printing elements 43, so the printing elements may be, as a group, released for return to their rearward or retracted positions by the springs 51. The operation of this rod or shaft 89 at the proper time will also be explained later herein.

Referring next to Fig. 3, a part of the control mechanism is illustrated. Current for the operation of the controls is supplied through line wires L1 and L2 from any commercial source of current. One terminal conductor of the motor 20 is connected by wire 91 to the line wire L1, and the other side of the motor 20 is connected by wire 92 to one contact of control switch 22, the other contact of this switch being connected by wire 93 to the line wire L2.

The movable or spring contact of each switch 81 carries a pin 94 of insulating material which engages with the teeth 79 on the periphery of the wheel 78. The switch 81 is normally open, but it is cammed closed and released by the teeth 79 camming aside the pin 94. The line wire L1 is also connected by wire 95 to one side of the printing solenoid 67, the other side of that solenoid being connected by wire 96 to one contact of a switch 97.

The other contact of switch 97 is connected by wire 98 to line wire L2. The switch 97 includes a relatively stationary contact 99 and a leaf spring contact 100 which is normally out of contact with the member 99, but which may be cammed into engagement with it through a camming action on a pin 101 of insulating material which is carried by the spring contact 100. A cam pawl 102 is pivoted at 103 to a member or element 104 which is fixed on the main shaft 14 and normally urged outwardly to a limited extent by a spring 105. When the shaft 14 rocks counter-clockwise in Fig. 3, which would be during the first half of an operation of the machine, the pawl 102 will be cammed aside or inwardly by the pin 101, because the spring 105, which urges the pawl 102 outwardly, is not strong enough to overcome the leaf spring 100. Therefore the pawl 102 will snap idly past the pin 101 when the shaft 14 moves counter-clockwise in Fig. 3, or during the first half of the operation of the machine.

When the shaft 14 returns, (moving clockwise in Fig. 3) and after the roller 12 had ridden upon and a sufficient distance along the concentric zone surface 16, the end of the pawl 102 will engage against the pin 101. This end of the pawl is inclined so that it will cam the pin 101 aside, and in doing so will close the switch 97 by moving contact 100 into engagement with contact 99. The pawl, however, fully passes the pin 101 and releases it sufficiently to allow the switch 97 to open, before the movement of the shaft 14 ceases, this having happened in the position of the parts shown in Fig. 3. This momentary closing of the switch 97 causes a momentary closing of the circuit through the printing solenoid 67. The solenoid 67, when so energized, operates the printing mechanism to print simultaneously upon the card and tape as explained hereinbefore.

One contact of switch 81 is connected to line wire L2 and the other contact of that switch is connected by wire 106 to a normally closed type of switch 107 that is opened and held open by the carriage 25 when the latter is in its normal, forward position. Switch 107 is connected by wire 108 to solenoid 39 and the latter is also connected by wire 109 to line wire L1. When the rack elements 6 are released for forward movement to different extents, the switch 81 will be operated rapidly, but because the card carriage 25 is in its normal forward position, the switch 107 which is open will keep the circuit of solenoid 39 open, and there will be no actuation of any of the solenoids 39 while the rack elements 6 move forwardly. When the cross bar 10 returns, it picks up the rack elements 6 at different zones along its return, and when the rack elements 6 are picked up and moved back to the normal, rearward position, each switch 81, which is operated thereby, will now be effective to cause rapid energizations of the related punch solenoid 39.

It will be noted that immediately after the start of the return movement of the cross bar 10, the arms 11 which carry the cross bar 10 will engage with the flange 84 and start a movement of the card carriage 25 rearwardly, which releases switch 107 enabling it to close, and while the punch solenoids 39 are being operated, the card a on the carriage 25 will be moving rearwardly. Because the wheel 78 for each punch switch 81 moves faster than the rack element, and there are many teeth 79 on the wheel 78, the switch 81 will be closed a plurality of times while the card a is moving through a distance corresponding to one space in the column. The result is that with such rapid reciprocations of the punch element for each column, a slot 110 (Fig. 7) will be formed by such rapid punchings which overlap each other, and the distance moved by the card for each operation of the punch element 30 will be less than the distance across the punch element in a direction parallel to the direction of travel of the card.

Thus each slot will be formed by a series of rapid nibblings or punchings, so that they will not interfere with the progressive movement of the card with its carriage. In other words, the operation of the punches will be so rapid that they may punch the slot in the card while the card is moving without danger of damage to the card. There will be no operation of any punch element until the related rack element 6 is picked up during the return movement of the cross bar 10, and since the rack elements 6 have been selectively limited to different forward positions by the keys 2 which have been depressed, the slots 110 will be punched, in each column, beginning at zones determined by the operation of the keys, and the punching will be continued until the slots reach a common zero position

which is represented by the row of prepunched zero apertures 111 in the card, as shown in Fig. 6. These zero apertures 111 are uniform for all of the columns, and will be prepunched the same for all cards.

The slots 110, see Fig. 7, which are cut in the card, will all extend into the zero positions so that where a slot 110 beyond the zero position is formed, it will merge into the zero position as shown in Fig. 6. Thus by this arrangement the punches will only be operated during travel of the card in the one direction, and the punching of the slots will begin at different zones of such travel of the card, depending upon the different extents to which the rack element 66 have been moved forwardly when released, as determined by the particular related keys in the keyboard which were operated.

If no key in a row was operated, then the zero stop would be effective on the related stop bar for that row of keys, and there would be no forward movement of the related rack elements 6 when they are released by the cross bar 10. Consequently, there would be no operation of that rack element so held by the zero stop when the cross bar 10 was returned. This would mean that there would be no operation of the punch element for that column, and we would have only the prepunched zero aperture 111 for that column, which represents the zero position.

Referring now to Fig. 5, another part of the controls is illustrated, and current for such controls is supplied through the same line wires L1 and L2. The cam 13 on the main shaft 14 as used in adding machines of this type has a cam surface in the nature of an abutment 112, and a momentary contact switch 113 having an operating arm 114 is disposed for operation by this cam surface or abutment 112 just before the shaft 14 completes its return movement.

A contact 115 of the switch 113 is connected to line wire L2, and a movable contact arm 116 of the switch 113 is connected by wire 117 to one terminal of a release solenoid 118. The other terminal of solenoid 118 is connected to the line wire L1. When the shaft 14 starts its movement under the operation of the motor 20, as in adding machines utilizing such mechanism, the abutment surface 112 will release the arm 114 of switch 113, and a spring in that switch, which is not shown, will immediately shift the contact arm 116 from the full line position to the dash line position in Fig. 5, which causes a momentary engagement between the arm 116 and the contact 115, but the arm 116 moves beyond the contact 115. Whenever the switch 113 closes the circuit therethrough, it causes an energization of solenoid 118, and the latter operates its armature 119. This armature is connected by pin 120 to a link 121 which, in turn, is pivotally connected by pin 122 to one arm of a bell crank lever 123 which is fixed on the shaft 88a.

Thus when solenoid 118 is energized, it rocks shaft 88a counter-clockwise in Fig. 5 which tends to cause a rocking of the pawl 86 in a direction to release the flange 84 of the carriage, but since, at this time, the pawl 86 is not engaging the carriage flange, no harm is done, and nothing happens through this momentary energization of solenoid 126. The other arm of the lever 123 is pivotally connected by pin 124 to a link 125, which is also pivotally connected by pin 126 to an arm 127 which is fixed on the shaft 89. Whenever the solenoid 118 is energized, it not only rocks the shaft 88, but also the shaft 89 in the same direction, and rocking of the shaft 89 in this manner causes the arms 90 thereon to momentarily operate all of the pawls 47 to release the printing elements 43. This does no harm at this time, however, because the printing elements 43 are either fully retracted, or are moving forwardly, so that they are not held by the pawls 47.

In the operation of a machine of the type illustrated, the entries are to be made on a blank card *a* such as shown in Fig. 6, which has along its upper and lower margins, prepunched notches and apertures for use in sorting and classifying the cards according to the data recorded thereon, as explained in said copending application. Such cards have a plurality of entry spaces 23, each of any desired number of columns according to the entries to be made thereon, and the zero positions at the base of each column in each space 23 have a prepunched zero aperture 111. Above the entry spaces 23 are spaces 128, Fig. 6, in which numbers corresponding to the slots 110 for the entry space 23 immediately below it, will be printed, and immediately above each space 128 may be another space 129 in which may be permanently printed information identifying the character of the items entered in the columns of spaces 22.

For example, each space 129 may have printed therein words identifying the nature of the items to be entered such as "meter reading," the "route number," the "district" or the "rate," or any other data that is to be entered in the spaces 23 and 128. These preformed and prepunched cards as shown in Fig. 6, with the spaces 129 carrying the identification of the data to be entered in different columns, are then arranged in a position convenient to the operator. One of these cards is then placed on the carriage 25, face up, as shown in Fig. 1.

From information available, such as a meter reader's route book, the operator then proceeds to make an entry on the card of an account. For each entry space 23, in turn, the rows of keys in the keyboard are operated, one key for each row. That is, one key 2 of each row of keys will be depressed, except where the number to be set up in a row or column is zero in which case no key in that row will be operated. The keyboard will have as many rows of keys as there are columns in the different spaces 23, and the rows of keys may be grouped in the same manner that they are grouped in the columns of the spaces 23. If an error is made in the operation of any key before the entry is made on the card, the correct key in that column may be operated which will release the other keys of that row, but if one desired to release all of the operated keys in the case of an error, the usual key release key, such as found on the Allen-Wales type of adding machine and disclosed in said patents hereinabove mentioned may be operated, and then the numbers for different columns may all be set up in the keyboard in the same manner as before.

After the items have all been set up in the keyboard, the operator depresses the usual touch-bar found in such adding machines to initiate an electrical operation of the machine, which closes the switch 22 and starts an operation of the motor 20. The motor then operates to rotate the shaft 21 through one revolution, at the end of which revolution the motor is uncoupled or unclutched from shaft 21, and the switch 22 opened as disclosed in said Fried patent above identified. When shaft 21 makes one revolution

(see Fig. 4), it operates through the crank and linkage mechanism shown in Fig. 4 to rock the shaft 14 counter-clockwise in Figs. 1 and 3 through a given angular movement, and then back in the opposite direction to the normal, idle position shown in full lines in Fig. 1.

At the beginning of this movement of the shaft 14, the cam 13 on shaft 14 will move the abutment 112 to release the operating arm 114 of switch 113, which arm is then spring operated to move the contact 116 from the full line to the dotted line position in Fig. 5, during which the circuit of solenoid 118 is closed momentarily. This causes a rocking of shafts 88a and 89 without any harm or advantage resulting. During this initial movement roller 12 is riding on the concentric cam surface 16, and the arms 11 are held in their rearward positions shown in Fig. 1. As the roller 12 rides down the cam surface 17, the arms 11 will be released and be moved forwardly by the pressure on the cross bar 10 by the rack elements 6, or by special springs connected to the arms 11.

As the cross bar 10 moves forwardly, the rack elements 6 will all rotate counter-clockwise until the connected stop bars 4 are stopped by depressed keys, or by a zero stop if no key in a row is depressed. These rack elements 6 will be stopped in different positions of angular movement by the engagement by depressed keys with the related stop bars 4, and the cam 13 will continue its counter-clockwise movement. Just before the arms 11 reach their forward positions shown by dash lines in Fig. 1, the pawls or latches 86 will pass, and engage in front of the flange 84 of the carriage 25. When the shaft 14 begins its rearward movement, the cam surface 17 will force the arms 11 rearwardly and through the latches 86 will move the carriage 25 rearwardly from the position shown in full lines to that in dotted lines in Fig. 1.

During such movement the cross bar 10 will pick up the different rack elements 6 that had been stopped in the following movement at different positions determined by the depressed keys, and will return them all to the normal positions. During the forward or counter-clockwise movement of each rack element 6 which would be while the shaft 14 has its first half of movement, the switch 107 that was held open by the carriage, and which is in series with switch 81, prevents operation of the punching solenoids 39. The same effect could be obtained by using a one-way pawl and ratchet drive between each rack element 6 and the wheel 78 operated thereby so that the switch 81 would be operated only during the rearward or return movements of the rack elements 6. Such one-way drives are well known expedients in the art, and if used, the switch 107 is unnecessary. Switch 107 can be used, however, in all cases as a safety feature. While the switch 81 is operated repeatedly during the return movement of the rack element 6, after the carriage 25 has started its rearward movement, the related punching solenoids 39 will be actuated because the switch 107 is then closed.

The solenoids 39 will be energized repeatedly at a rapid rate which will cause very rapid operations of the punches 30, the operation of the punch element 30 for any column, being initiated when the rack element which controls it is picked up by the cross bar 10, and that will be determined by the particular key which was depressed. Thus the punching of the card during its travel will begin at different distances along the entry spaces 22 determined by the particular related keys that are depressed, and once this punching for any column is initiated, it will continue until the carriage 25 reaches its rearward limit of movement as caused by the arms 11, and at that time the punches 30 will be exactly aligned with the prepunched zero positions 111. The punching will be by rapid operations or nibblings which overlap while the card is moving, and because of the rapidity and frequency of the operations of the punch, compared to the relatively slow rate of movement of the card, the card may continue to move during the punching. This forms the slots 110 shown in Fig. 7 which begin at different distances and all continue to the zero position at the bottom of the card.

The manner in which a printed record is made on the card will next be described. As each rack element 6 moves forwardly or counter-clockwise in Fig. 1, its upstanding arms 46 acting through a pin 45 pulls forwardly a related, individual printing element 43 to an extent depending upon the extent of angular movement of the rack element, and positions beneath the striker 62, particular type elements 52 in both upper and lower arms of the printing element 43, that will, when the striker is operated, print on the card and on the tape, numbers corresponding to the depressed keys that limit the rocking movement of the related rack element 6. No printing occurs during a forward movement of the shaft 14, however, because the pawl 102 passes idly the pin 101 with no operation of the switch 97, and consequently there is no energization of the printing solenoid 67. The printing elements 43 are held in their different advanced positions, however, by their pawls 47 after the rack elements 6 have started or have returned to their normal positions.

After the arms 11 have completed their rearward movement and placed the card carrying carriage in its rearward position, and while the roller 12 is riding on the concentric portion 16 of the cam 13, the pawl 102 will cam aside the pin 101 and operate switch 97 to energize the printing solenoid 67. This causes an operation of the striker 62 with operation of the printing type elements immediately beneath the striker arms, which prints the same number upon the card a and upon the tape 56. The pawl 102 passes the pin 101 so as to allow the switch 97 to open just before the shaft 14 completes its cycle of movement, so that the operation of solenoid 67 will be only momentary and then will be deenergized.

After the switch 97 has been operated to cause the printing, a small further movement of the shaft 14 in the same return direction will cause the abutment 112 to engage arm 114 of switch 113 and move contact arm 116 to the full line position in Fig. 5, during which there is a momtary engagement with contact 115. This causes a momentary energization of release solenoid 118 with consequent rocking of shafts 88a and 89. The rocking of shaft 88a causes movement of the latches 86 to release the carriage 25 so that it can be returned to the normal forward positions by its spring 26. The rocking of shaft 89 rocks the pawls 47 to release all of the individual printing elements 43 to enable their return to their rearward or idle positions under the action of their springs 51. Thus the parts are all restored to their normal positions, automatically, at the end of a cycle of operation. When the carriage 25 returns to its forward position it opens

switch 107, and the parts are all ready for a new operation.

The card on which the record has been made is then removed and replaced by a new blank card, such as shown in Fig. 6, and additional items are set up and entered on the new card. The card, after the record has been made thereon, will have the appearance shown in Fig. 7, except that the slots 110 and printed items in the spaces 128 may vary with different cards, because the items set up and entered thereon may vary.

The totalizers for the different entry spaces 22 will be operated by the rack elements 6 during their return movements, to accumulate in each totalizer, the numbers corresponding to the depressed keys, and therefore after a desired number of cards have been run through the machine in this manner, the totalizer corresponding to each different entry space 22 of the cards will indicate directly a complete total or summation of all the entries made during that run for that entry space.

It will be observed that the operation of this device is as simple as the operation of an adding machine, and not only are the items totalized as they are entered on the cards, but they are also printed item by item in succession on the tape 56 so that, if desired, they can be checked back against the cards. The printed record on the card of the items in the spaces 128, gives an immediate visual record of the items, and the slots 110 in the card, immediately below the printed record of the item, enable the cards to be subsequently assorted and grouped, according to the items entered therein, as explained and claimed in my said copending application, Ser. No. 567,477.

The zero apertures 111 are preferably pre-punched and uniform for all cards, because in this example of the invention there is no substantial movement of the stop bars when the zero stops are effective. It will be understood however, that if the zero stops allow for a limited movement of the stop bars and rack elements without operation of the totalizer digit wheels, then this limited movement, when the rack elements 6 are returned to retract positions, can be used to operates switches 81 to punch the zero apertures 111 for all the columns, making pre-punching of zero apertures unnecessary.

It will be understood that various changes in the details and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention, as expressed in the appended claims.

I claim:

1. In a card punching device comprising a card-supporting carriage, means mounting said carriage for movement in a selected path parallel to the face of the card, a punch die beneath the card during said travel, a punch disposed above the die and operable into and out of the die to punch the card, means for moving said carriage through said path, selectively operable keys, and means controlled by the selective operation of said keys for causing operation of said punch during the movement of said carriage throughout a zone of such carriage movement, selectively determined by the particular key which is operated.

2. In a card punching device comprising a card-supporting carriage, means mounting said carriage for movement in a selected path parallel

to the face of the card, a punch die beneath the card during said travel, a punch disposed above the die and operable into and out of the die to punch the card, means for moving said carriage through said path, selectively operable keys, means controlled by the selective operation of said keys for causing operation of said punch during the movement of said carriage throughout a zone of such carriage movement, selectively determined by the particular key which is operated, printing mechanism, into printing relation with which a selected zone of said card moves at the end of its travel with said carriage, and means also controlled by said operated key for setting said printing mechanism to print on said card a number corresponding to that represented by said operated key at the end of said movement of said card.

3. In a card punching device, a keyboard having selectively operable keys arranged in a row, an element yieldingly urged in one direction from idle position until stopped by a key depressed in that row, means normally holding said element in said idle position but movable to first release said element for movement to the extent permitted by a depressed key of said keyboard, and then returning it to retracted position, a carriage formed to support a card to be punched and mounted for movement in a selected path, and means operable by said holding means during its motion in one direction of its movement to shift said carriage, means controlled by said element during its movement in one direction for punching said card during the movement of said card for a distance dependent upon the movement of the released element as determined by the depressed key, means for releasing said carriage from said holding means at the end of the carriage movement in which the punching occurs, and means for returning the released carriage to its former starting position.

4. In a card punching device, a keyboard having selectively operable keys arranged in a row, an element yieldingly urged in one direction from idle position until stopped by a key depressed in that row, means normally holding said element in said idle position but movable to first release said element for movement to the extent permitted by a depressed key of said keyboard, and then returning it to retracted position, a carriage formed to support a card to be punched and mounted for movement in a selected path, and means operable by said holding means during its motion in one direction of its movement to shift said carriage, means controlled by said element during its movement in one direction for punching said card for a distance dependent upon the movement of the released element as determined by the depressed key, means for releasing said carriage from said holding means at the end of the carriage movement in which the punching occurs, means for returning the released carriage to its former starting position, printing means adjustable by said element during movement in one direction into a position for printing on said card, at one zone of its movement, a number corresponding to the depressed key, and means set in operation by said carriage at the end of its punching movement for operating said printing mechanism to print upon said card.

5. A card punching device comprising selectively operable keys, a support mounting a card to be punched, punching mechanism having a punch element and a die, said mounting and

mechanism being relatively movable to cause punching of said card along a selected zone thereof, means for operating said punching mechanism to punch a slot in said card progressively by small successive increments during such relative movement, and means controlled by said keys for determining the zone of said card to be punched.

6. A device for recording data on cards which comprises selectively operable keys, a support for a card on which a record is to be made, mounted for movement in a selected path, means disposed to punch said card during movement of the card, means rendered effective by selective operation of said keys for causing repeated successive operations of said punching mechanism during movement of the card with said support to punch a slot in said card progressively by small increments, which increments are a fraction of the distance across the punch element in the direction of travel of the card, and means also controlled by the same selective operation of said keys for printing, on said card, a symbol corresponding to the length and position of said slot.

7. A device for entering records on cards which comprises a support for said card mounted for movement in a selected path, a keyboard having a plurality of selectively operable keys, means controlled by said keys for punching a slot in said card by rapid successive punches during the travel of the card for a zone having a length determined by the selective operation of said keys, and manually controlled means for causing a movement of said card and an operation of said punching mechanism after said selective operation of said keyboard has been performed.

8. A device for entering records on a card which comprises a support mounted for movement in a selected path and fully mounting a card for movement therewith, a punching mechanism disposed along said path to punch a slot in said card of selectively determinable length always ending in the same relative positions on different cards, by a series of repeated punchings intersecting each other while the card moves past the punching mechanism, a keyboard having a plurality of selectively operable keys which may be selectively operated to set up a given number determining the length of the slot, means operative for moving said card and support together along said path, and causing operation of said punching mechanism in a zone thereof determined by the selective operation of said keys, and means by which said prior means may be initiated.

9. A device for entering records on a card which comprises a support for said card mounted for movement in a selected path, a punching mechanism disposed to punch a slot in said card of selectively determinable length, but always ending in the same position on the card, by a series of repeated punchings intersecting each other while the card moves past the punching mechanism, a keyboard having a plurality of selectively operable keys which may be selectively operated to set up a given number, means operative for moving said card along said path, and causing operation of said punching mechanism in a zone thereof determined by the selective operations of said keys, and means by which said prior means may be initiated.

10. A device for entering records in a card which comprises a support for said card mounted for movement in a selected path, a punching mechanism disposed to punch a slot in said card of selectively determinable length by a series of repeated punchings intersecting each other while the card moves past the punching mechanism, a keyboard having a plurality of selectively operable keys which may be selectively operated to set up a given number, means operative for moving said card along said path, and causing operation of said punching mechanism in a zone thereof determined by the selective operation of said keys, means by which said prior means may be initiated, and printing mechanism disposed to print on said card, at a desired position of the card in said path, a number corresponding to the operated key, and made effective by said operative means at a predetermined period in its cycle of operation.

11. A device for entering records on a card which comprises a support for said card mounted for movement in a selected path, a punching mechanism disposed to punch a slot in said card of selectively determinable length by a series of repeated punchings intersecting each other while the card moves past the punching mechanism, a keyboard having a plurality of selectively operable keys which may be selectively operated to set up a given number, means for moving said card along said path, and for simultaneously causing operation of said punching mechanism in a zone thereof determined by the selective operation of said keys, printing mechanism disposed to print on said card, at a desired position on the card, a number corresponding to the operated key, and controlled by said moving means to be effective at a predetermined period in the cycle of operation of said moving means.

12. A device for entering records on cards which comprises a support for said card, a keyboard having selectively operative keys, a tape on which records may be entered in succession, printing mechanism disposed to print the same number on said card and said tape, and means controlled by the selective operation of said keyboard for punching a slot in said card of a length determined by the selective operation of said keys and for printing a number corresponding to the operated key on both card and tape.

13. A device for entering records on cards which comprises a support for said cards movable back and forth in a selected path, a keyboard having selectively operable keys, any key of which when operated, will serve as a stop, a stop bar mounted for movement in one direction to an extent determined by engagement with an operated key, means yieldingly urging said stop bar in said one direction until stopped by an operated key, an element operated with said stop bar, punching mechanism disposed to punch a slot in said card during its travel in said path, means controlled by said element for causing repeated operations of said punching mechanism during the travel of said card, and for a zone determined by the position of said element when stopped by said operated key, and means for holding said element and stop bar in normal retracted position, operable to first release them, then to return them to normal positions, and to move said support in said path.

14. A device for recording data on a card which comprises selectively operable keys, means movable from a predetermined position to any of different positions and controlled by selective operation of said keys, a support for said card, means connected to said key controlled means for punching a slot in said card with a length and a starting position representing a number set up by

selective operation of said keys and ending always in the same relative position on the card, a tape, and printing mechanism also connected to and controlled by said key controlled means for printing on said tape and said card, a symbol represented by the selective operation of said keys.

15. A device for recording data on a card which comprises selectively operable keys, a main shaft having a selected cycle of operation, a member operable when released into a position determined by selective operation of said keys, means controlled by said shaft for releasing said member for movement into said position and then returning said member to initial position, and means controlled by said member in its movement in one direction for punching in said card a slot of a length and in a position thereon, which represents and varies with the selective operation of said keys.

16. A device for recording data on a card which comprises selectively operable keys, a main shaft having a selected cycle of operation, a member operable when released into a position determined by selective operation of said keys, means controlled by said shaft for releasing said member for movement into said position and then returning said member to initial position, means controlled by said member in its movement in one direction for punching in said card a slot of a length and in a position thereon, which represents and varies with the selective operation of said keys, and printing mechanism controlled by said member in its movement in one direction for printing on said card a symbol representing the selective operation of said keys.

17. A device for recording data on a card which comprises selectively operable keys, a main shaft having a selected cycle of operation, a member operable when released into a position determined by selective operation of said keys, means controlled by said shaft for releasing said member for movement into said position and then returning said member to initial position, means controlled by said member in its movement in one direction for punching in said card a slot of a length and in a position thereon, which represents and varies with the selective operation of said keys, printing mechanism controlled by said member in its movement in one direction for printing on said card a symbol representing the selective operation of said keys, and totalizer mechanism operated by said member in its movement in one direction for totaling the numbers represented by the slots punched in successive cards as determined by successive selective operation of said keys.

18. A device for recording data on a card which comprises selectively operable keys, a main shaft having a selected cycle of operation, a member operable when released into a position determined by selective operation of said keys, means controlled by said shaft for releasing said member for movement into said position and then returning said member to initial position, means controlled by said member in its movement in one direction for punchng in said card a slot of a length and in a position thereon, which represents and varies with the selective operation of said keys, a tape, and printing mechanism positioned by said member in its movement in one direction for printing on said card and on said tape, a symbol representing the selective operation of said keys that positioned said member.

19. A device for recording data on a card which comprises selectively operable keys, a main shaft having a selected cycle of operation, a member operable when released into a position determined by selective operation of said keys, means controlled by said shaft for releasing said member for movement into said position and then returning said member to initial position, means controlled by said member in its movement in one direction for punching in said card a slot of a length and in a position thereon, which represents and varies with the selective operation of said keys, printing mechanism positioned by said member in its movement in one direction for printing on said card a symbol representing the selective operation of said keys, and means rendered effective by said shaft at the end of a cycle of operation for returning said printing mechanism to initial position.

20. A device for recording data on a card which comprises selectively operable keys, a main shaft having a selected cycle of operation, a member operable when released into a position determined by selective operation of said keys, means controlled by said shaft for releasing said member for movement into said position, and then returning said member to initial position, a carriage for mounting said card and movable back and forth in a selected path, means yieldingly urging said carriage into one position, means operated with said shaft, controlled means for moving said carriage against its urging means, means controlled by said member in its movement in one direction for punching in said moving card a slot of a length and in a position thereon which represents the selective operation of said keys, and means rendered effective by said shaft at about the end of a cycle of operation for releasing said carriage for return to its initial position.

21. A device for recording data on a card which comprises selectively operable keys, a main shaft having a selected cycle of operation, a member operable when released into a position determined by selective operation of said keys, means controlled by said shaft for releasing said member for movement into said position and then returning said member to initial position, a carriage for mounting said card and movable back and forth in a selected path, means yieldingly urging said carriage into one position, means operated with said shaft, controlled means for moving said carriage against its urging means, means controlled by said member in its movement in one direction for punching in said moving card a slot of a length and in a position thereon which represents the selective operation of said keys, means positioned by said member in its movement in one direction for printing on said card a symbol representing the selective operation of said keys that positioned said member, and means rendered effective by said shaft at about the end of a cycle of operation, and after a printing operation, for releasing said carriage for return to its initial position.

22. A device for recording data on a card which comprises selectively operable keys, a main shaft having a selected cycle of operation, a member operable when released into a position determined by selective operation of said keys, means controlled by said shaft for releasing said member for movement into said position and then returning said member to initial position, a carriage for mounting said card and movable back and forth in a selected path, means yieldingly urging said carriage into one position, means operated with said shaft, controlled means for moving said carriage against its urging means, means controlled by said member in its movement in one direction

for punching in said moving card a slot of a length and in a position thereon which represents the selective operation of said keys, means positioned by said member in its movement in one direction for printing on said card a symbol representing the selective operation of said keys that positioned said member, means controlled by said shaft and effective to cause an operation of said printing mechanism after the card has completed its movement against its urging means, and means also controlled by said shaft and effective after operation of said printing mechanism for releasing said carriage for its return to initial position by its urging means.

23. A device for recording data on a card which comprises selectively operable keys, a main shaft having a selected cycle of operation, a member operable when released into a position determined by selective operation of said keys, means controlled by said shaft for releasing said member for movement into said position and then returning said member to initial position, a carriage for mounting said card and movable back and forth in a selected path, means yieldingly urging said carriage into one position, means operated with said shaft, controlled means for moving said carriage against its urging means, means controlled by said member in its movement in one direction for punching in said moving card a slot of a length and in a position thereon which represents the selective operation of said keys, means positioned by said member in its movement in one direction for printing on said card a symbol representing the selective operation of said keys that positioned said member, means controlled by said shaft and effective to cause an operation of said printing mechanism after the card has completed its movement against its urging means, means also controlled by said shaft and effective after operation of said printing mechanism for releasing said carriage for its return to initial position by its urging means, and means controlled by said carriage for rendering said punching means ineffective while said carriage remains in its initial position.

24. A device for recording data on a card which comprises selectively operable keys, a support for said card movable in a selected path, a member shiftable back and forth, an element for moving said member in one direction and holding it releasably in an initial position, means yieldingly urging said member in the opposite direction when released, and controlled in the extent of its movement in said opposite direction by the selective operation of said keys, printing mechanism set by said member, during its movement in said opposite direction, in a position to print on said card a symbol related to the extent of movement controlled by a particular operated key, means for operating said element to return said member to its initial position and also moving said card and its support in said path into printing position relatively to said printing mechanism, and means rendered effective substantially at the completion of the movement of said card for causing an operation of said printing means to print on said card.

25. A device for recording data on a card which comprises selectively operable keys, a support for said card movable in a selected path, a member shiftable back and forth, an element for moving said member in one direction and holding it releasably in an initial position, means yieldingly urging said member in the opposite direction when released, and controlled in the extent of its movement in said opposite direction by the selective operation of said keys, means for returning said member to its initial position and also moving said card and support along said path, punching means operated automatically during the return of said member to its starting position for punching a slot in said card by intersecting increments, during the travel of said card, beginning in a relative position depending upon the particular position of said member as determined by selective operation of said keys and always continuing to a predetermined position on the card.

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